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Subjective well-being in online and mixed educational settings

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Subjective well-being in online and mixed educational settings

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Editorial: Subjective well-being in online and mixed educational settings

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COVID-19, schools, wellbeing, online learning, peer interaction, teacher-student relationships

Editorial on the Research Topic
Subjective well-being in online and mixed educational settings

1. Introduction

This Research Topic aims to bring together a set of papers that will enable the scientific community to contribute to the understanding of the changes in these factors associated with subjective wellbeing in schools. Together with this, we have sought to show how the effects of the global pandemic may not only be temporary, but a permanent change in how we understand the role of school relationships and their effects on subjective wellbeing, now actively mediated by technology.

The 24 articles that comprise it represent a significant contribution to how these changes are implemented and sustained in education systems around the world. This editorial is organized into three sections, which seek to provide a common framework for understanding Subjective Well-being in Online and Mixed Educational Settings. To this purpose, the first part presents a referential and theoretical framework of Subjective wellbeing from the social sciences in which the 24 works are inscribed. The second part describes the two thematic axes that organize the monograph and briefly presents each of the 18 articles that comprise it. Finally, we point out some considerations that we have been able to extract from the reading of the theoretical and empirical material presented in the monograph, composed of relevant voices from different geographies and traditions.

2. Subjective wellbeing in education

Subjective wellbeing is now a key concept in the study of human development. Its determinants and effects across the lifespan have been the subject of much research.

Over the last 20 years, interest in measuring and incorporating the "subjective wellbeing" approach has grown significantly worldwide, both in academic activity and in public policy (Calvo and Beytía, 2011; Oyanedel et al., 2015). In this regard, interest has focused on studies on adult and child populations, with little research on formal educational contexts and their school communities. At the same time, evidence on subjective wellbeing and quality of life is particularly scarce in non-Anglo-Saxon countries (Oyanedel et al., 2015), where there are no regular and comparable measurements between populations from different socio-cultural contexts (Casas et al., 2013).

The concept of quality of life is defined with respect to both objective and subjective conditions that ensure social wellbeing, with emphasis on the different stages of life development (Urzúa and Caqueo-Urízar, 2012). From the social sciences, this last element is the one that has taken on greater relevance in recent years, being defined as "subjective wellbeing." This corresponds to the psychosocial component of quality of life, and refers to the perceptions that people have regarding their living conditions—economic, social, cultural, health, personal achievements, among others—(Seligson et al., 2003; Casas et al., 2013). Thus, it is a concept that refers to the evaluations -both positive and negative- that people have regarding their lives, from a multidimensional perspective (Lau and Bradshaw, 2010) where aspects of cognitive evaluation and emotional elaboration are integrated (Petito and Cummins, 2000) either in relation to life as a whole or to particular areas of it. Thus, with respect to quality of life, subjective wellbeing supplies the psychological devices that engage both physical and emotional stability in people's lives (Casas and Bello, 2012; Oyanedel et al., 2015), by virtue of its present but not momentary state (Veenhoven, 1994).

From the perspective of public policy, the effort to measure and monitor the subjective wellbeing of citizens has aroused greater interest because it is considered a useful tool for accessing the "fulfilled" life of a country (Ben-Arieh, 2008). This is because it complements the traditional definition of "subjective wellbeing"—measured mainly as the availability of income—, allowing development policies to be humanized by making them more inclusive (Oyanedel et al., 2015). This is precisely because "its objective is in the subjective": considering citizens' perceptions of their lives provides fundamental information on how to improve the quality of life of this social group as beneficiaries of public policies (Ben-Arieh, 2008).

A relevant aspect in the study of subjective wellbeing is its relationship with objective indicators of economic growth and wealth in different countries. At the general population level, differences have been found according to the income of individuals, with a strong relationship when comparing countries, but decreasing when observing within countries (Oyanedel et al., 2015). Antecedents such as the above highlight the relevance of socio-economic status in relation to the study of subjective wellbeing, an area insufficiently explored from the perspective of educational communities due to the scant empirical material that existed before the COVID-19 pandemic. But this undoubtedly changed with the massive global virtualisation of educational processes that began in March 2020 (and extended in some countries to as late as mid-2021).

Research on wellbeing in educational settings has allowed us to understand the role of teachers, peer relationships, school climate and school satisfaction in subjective wellbeing. It has also helped us to assess associations of subjective wellbeing with desirable outcomes, such as higher educational achievement, and traits such as resilience, courage and self-efficacy.

Changes in educational environments as a result of the global pandemic have meant a shift in the understanding of school from a face-to-face space to a partially or fully online experience (Rivera-Vargas et al., 2021a). These changes in educational environments go beyond the mere experience of teaching and learning, changing the social relationships that underpin it (Rivera-Vargas et al., 2021b).

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Schools are one of the key spaces of socialization in contemporary societies. There, children not only acquire learning and knowledge, but also social norms and develop their personalities through continuous interaction with teachers, school staff, peers and their families (Erstad et al., 2021). Most of our current knowledge about schools is based on pre-COVID-19 learning (Rivera-Vargas et al., 2021b).

The global pandemic has dramatically changed the functioning of schools from a safe space where parents could leave their children to learn to a space of potential contagion. These obvious changes are underpinned by alterations in foundational social relations, which give students a sense of purpose. These relationships are one of the key predictors of subjective wellbeing, and understanding them is key to understanding the new challenges that subjective wellbeing will now face as part of adapted educational environments.

3. Structure of the monograph

A total of 24 articles from the following 12 countries have been included in this monograph: Venezuela, Peru, Chile, Colombia, South Africa, China, UK, Belgium, Romania, Italy, Spain and Germany. Of these 24 articles analyzing subjective wellbeing in online and blended learning environments, 11 focused on higher education, and 13 on compulsory education (primary and

secondary). It is precisely on the basis of this distinction that for this editorial we have grouped the 24 contributions into these two main blocks.

3.1. Higher education

In the 11 papers on higher education included in this monograph, two distinct profiles can be discerned. First, those that present the results of empirical research on the field, and second, those that present the results of the implementation of teaching innovations mediated by digital technologies.

With regard to the empirical works, we can appreciate the following:

In the article "*Emotional Wellbeing: The Impact of the COVID-19 Pandemic on Women Academics in South Africa*" written by Ronnie et al. the specific stressors manifested in South African women academics during the lockdown and their effect on emotional wellbeing are discussed. The study concludes that the work-life balance that occurred during the lockdown appeared to have a concertina effect on emotional wellbeing, as participants were pressured to manage an inordinate number of responsibilities at once.

In the article "*The Effect of Fear of the COVID-19 on Depression Among Chinese Outbound Students Studying Online in China Amid the COVID-19 Pandemic Period: The Role of Resilience and Social Support*," authored by Chen et al. it was determined how fear of the COVID-19, correlates with depression. Along with this, the potential role of resilience and social support in the association between fear of COVID-19 and depression among Chinese students studying online in China in the midst of the COVID-19 pandemic period was explored. The results show that fear of COVID-19 was positively correlated with depression and negatively correlated with resilience and social support. Both resilience and social skills were negatively correlated with depression. Social support showed a resilience correlation.

In the article "*Emotional Intelligence and Academic Self-Efficacy in Relation to the Psychological Well-Being of University Students During COVID-19 in Venezuela*," written by García-Álvarez et al., the predictive capacity of academic self-efficacy and emotional intelligence skills on certain dimensions of psychological wellbeing in Venezuelan university students is analyzed. The results show that emotional intelligence and academic self-efficacy are protective psychological resources for the psychological wellbeing of young university students.

In the article "*Depression, COVID-19 anxiety, subjective well-being and academic performance in university students with COVID-19 infected relatives: A Network Analysis*," written by Ventura-León et al. examined the relationship between anxiety, depression, subjective wellbeing and academic performance in Peruvian health sciences university students with COVID-19 infected relatives. The results reveal that a depression and wellbeing node (PHQ1-SWB3) presents the highest relationship. The most central nodes belong to COVID-19 anxiety, and there are no global differences between the comparison networks; but at the local level, there are connections in the network of COVID-19 infected students that are not in the group that did not present this diagnosis.

The article "*Subjective Well-Being in Healthcare Professionals in Colombia: On the Constitution of Subjectivity and the Ethics of Care in Times of the COVID-19 Pandemic*" written by Barragán-Giraldo et al. reveal how subjective wellbeing has been generated in a group of professionals in the healthcare field in Colombia, who carried out postgraduate studies at the time of the pandemic caused by the novel SARS-CoV-2 coronavirus in a synchronous and remote learning course facilitated by employing digital technologies.

In the article "*What Matters in Online Education: Exploring the Impacts of Instructional Interactions on Learning Outcomes*" written by Li et al., the results of a research where the effects of instructional interactions on the learning outcomes of Chinese university students (i.e., academic performance and learning satisfaction) were analyzed based on the Interactive Equivalence Theory by conducting two empirical studies are presented. The results showed that task values mediated the relationship between student-content (SC) interaction and learning satisfaction. Moreover, SC may not only affect learning satisfaction directly, but also through task value and self-regulated learning respectively, or through chain mediations of both task value and self-regulated learning.

Regarding the papers on teaching innovation mediated by digital technologies, we can appreciate the following:

In the article "*Chilean University Students' Satisfaction With Online Learning During COVID-19 Pandemic: Demonstrating the Two-Layer Methodology*", written by Montero et al., the main determinants of university students' overall satisfaction with online classes and academic performance are identified and analyzed through the domain satisfaction approach. The results show manifest student satisfaction with the support provided by the university and with learning and satisfaction with the perceived quality of online classes.

In the article "*Serious Games as a Method for Enhancing Learning Engagement: Student Perception on Online Higher Education During COVID-19*", written by Arias-Calderón et al., the impact of the use of "serious games" as a complement to synchronous online classes to ensure the continuity of pedagogical activities in a Chilean university is analyzed. The results show that students positively valued the use of this proposed innovative pedagogical model in terms of motivation and engagement.

In the article "*Self-regulated learning and academic performance in Chilean university students in virtual modality during the pandemic: Effect of the 4Planning App*," written by Jaramillo et al., the effect of using the 4Planning app with intracurricular focus on SRL and on the academic performance of students at a Chilean university is analyzed. The results show that students who used the app express substantial satisfaction in different pedagogical dimensions.

In the article "*Teaching Presence vs. Student Perceived Preparedness for Testing in Higher Education Online English Courses During a Global Pandemic? Challenges, Tensions, and Opportunities*," written by Morales et al., the results of a study conducted in a Chilean university are presented in which the extent to which online teaching presence could be a mediating factor in the context of test preparation within a language course in aspects related to autonomous learning and perceived learning outcomes.

However, both student and teacher voices evidenced pervasive challenges and tensions that hinder the potentially transformative benefits that online learning is expected to bring.

In the article "*E-Portfolio as an Evaluative Tool for Emergency Virtual Education: Analysis of the Case of the Andrés Bello University (Chile) during the COVID-19 Pandemic*," written by Rodríguez et al., the results of an investigation are presented in which the perception of the students of the Phonoaudiology degree of a Chilean University on the incorporation of the E-portfolio as an evaluative tool during emergency virtual education due to the COVID-19 pandemic was analyzed. The results of the study show that there is an improvement in the methodology and teaching support, as well as in the creativity and professionalism of the students.

3.2. Compulsory education (primary and secondary)

In the 13 papers on compulsory education (primary and secondary) included in this monograph, two marked profiles can also be seen. Firstly, those which present a more global view of the problem, and secondly, those which present a more local view of the problem.

With regard to the works with a global view, we can appreciate the following:

In the article "*Distance Learning and School-Related Stress Among Belgians during the COVID-19 pandemic*" written by De Coninck et al., the main factors explaining increased school stress in Belgian adolescents were identified and analyzed. The results show that overcrowding, economic hardship and domestic violence are risk factors for increased stress, whereas social support and the absence of material deprivation are protective factors.

In the article "*Webcams and Social Interaction During Online Classes: Identity Work, Presentation of Self, and Well-Being*" written by Hosszu et al., a study is presented in which they analyzed how the wellbeing of teachers and students in Romania has been affected by online education through (1) the spillover effects of the sudden shift to online classes; (2) identity work at the individual and group levels; and (3) students' and teachers' presentations of self in the online environment. Results indicate that both students and teachers experienced ambivalence and various changes in wellbeing generated by the flexibility, burdens, and interruptions of homeschooling. Another aspect to note is that the identities associated with the roles of teacher and student were challenged and open to renegotiation.

The article "*Distance learning during the first confinement: impact on the family and its effect on students' engagement*" written by Chifari et al. presents research that analyzes how Distance Emergency Education (DE) impacted Italian families during the confinement caused by the COVID-19 pandemic and, in particular, to what extent the impact of DE on families, measured in terms of shared space and equipment, moderates the effect of student and family characteristics on student engagement. The main results reveal how the impact of EED on families played a significant role in predicting the level of student engagement observed by parents with respect to different predictor variables.

In the article "*Students' Experiences in Suddenly Transformed Living and Educational Environments by COVID-19*" written by Hernández-Hernández and Sancho-Gil an analysis is presented on how Spanish university students felt affected by the COVID-19 pandemic and, especially, by the irruption in this context of non-face-to-face classes and mixed teaching methods. The results show that the emotional effects have allowed them to generate positive strategies of readaptation and collaboration with other classmates.

In the article "*Well-being of School Communities in the Context of the COVID-19 Pandemic. A Qualitative Study in Chilean Schools of Low Economic Strata*", written by López et al., presents a study whose purpose was to describe and understand the construction of school wellbeing in Chile during the pandemic, based on the notion of collective and sustainable wellbeing. The results showed that, while facing the challenges of school closures, schools made efforts to protect the wellbeing of students and teachers.

In the article "*Impact of techno-creators and techno-inhibitors on manifestations of technostress in Chilean kindergarten directors in the context of the COVID-19 pandemic and telework*", written by Estrada-Muñoz et al., the impact of techno-creators and techno-inhibitors on the different manifestations of technostress in Chilean kindergarten directors in the context of the COVID-19 pandemic and telework is analyzed. The paper suggests that techno-creators provoke manifestations of technostress, however, techno-inhibitors did not show a significant effect in the reduction of these manifestations in the sample studied.

In the article "*Teachers' emotional exhaustion before and during the COVID-19 pandemic: Neither emotional strain nor holiday feeling*" by Bleck and Lipowsky, changes in the emotional exhaustion of active German teachers before and during the COVID-19 pandemic are analyzed. In this context, changes in the emotional exhaustion of a cohort of German professors were analyzed longitudinally, taking into account variables such as gender, age, the teaching degree studied or the amount of time devoted to distance teaching.

In the article "*Subjective Well-Being and Schools in South Africa: A Post-COVID-19 Analysis*" by Morales-Olivares et al., we present the results of a study conducted in South Africa, which analyzed subjective wellbeing in families with school-going children as a function of selected social variables such as gender and material living conditions.

In the article "*Online learning performance and engagement during the COVID-19 pandemic: Application of the dual-continua model of mental health*" by Kim et al., the results of a study in which the relationship between students' adaptation to online learning and their mental health was analyzed using the Dual-Continua Model are presented. The results revealed that two dimensions of mental health (i.e., mental wellbeing and mental disorder) were independently associated with all objective and subjective indicators of online learning.

In the article "*Psychometric properties of the Collective Efficacy Scale Short-Form in Chilean teachers*", written by Herrera et al., the results of a study that analyzed the dimension of personal wellbeing in Chilean school teachers are presented.

Regarding the works with a local view, we can appreciate the following:

In the article "*Parental Acceptance of Educational Technology: Lessons from Around the World*" written by Osorio-Sáez et al. based on a questionnaire applied to families in 19 countries, the main factors that contribute to parents' acceptance and use of technology to support their children's learning were identified and analyzed. The results show that parents are more involved in children's learning when schools provide or suggest well-structured technological tools, and when parents are socially influenced by the opinions of other parents, teachers, children, the general public, family members, etc.

In the article "*Socioeconomic Status, Parental Involvement and Implications for Subjective Well-Being During the Global Pandemic of Covid-19*" written by Treviño et al. formal and informal parental practices of home learning during the school closure period in 19 countries around the world are analyzed. The main findings show that parental socioeconomic status is a key predictor of both formal and informal parental practices.

The article "*Psychological Well-Being in Teachers During and Post-Covid-19: Positive Psychology Interventions*" written by García-Álvarez et al. presents a systematic literature review that compiles some of the research on teacher psychological wellbeing in the context of the COVID-19 pandemic.

4. Final considerations

In conclusion, we believe that the contributions that form part of this Research Topic focusing on subjective wellbeing in online and blended educational settings may allow us to increase our understanding of the role of teachers, peer relationships, school climate and school satisfaction on subjective wellbeing. It can also help us assess associations of subjective wellbeing with desirable outcomes in virtual contexts, such as higher educational achievement, and traits such as resilience, courage and self-efficacy. In any case, it will be up to the educational and scientific community to judge the impact of these contributions. We will be watching.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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ORIGINAL RESEARCH
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Parents' Acceptance of Educational Technology: Lessons From Around the World

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One of the long-term lessons from the school closures due to the global pandemic COVID 19, is that technology and parental engagement are the best levers to access education so as to bridge the achievement gap between socially disadvantaged children and their peers. However, using technology is not as simple as bringing equipment into the school and home and initiating its usage; these are just the first steps into a more complex and ambitious achievement of using technology as a catalyst for a shift toward new learning models in remote and hybrid settings. A theoretical framework based on the theory of acceptance and use of technology and social cognitive learning theory was used to analyse data from a survey completed by 4,600 parents from 19 countries during the national lockdowns in 2020. Regression models and thematic analysis of open-ended responses were employed to identify factors that contribute to parental acceptance and use of technology in support of their children's learning. Our results show that parents are more engaged in children's learning when well-structured technological tools are provided or suggested by schools, and when parents are socially influenced by the opinions of other parents, teachers, children, the general public, relatives, etc. Conversely, they are less engaged when they perceive the technological tools to be challenging and beyond their knowledge or skills. The study's findings have practical implications for governments and school leaders, who need to be aware of the factors likely to determine the use of technology at home and take action to meet parents' needs when using technology to support learning.

Keywords: parental engagement, use of technology, school closures, home learning environment, technology acceptance model

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INTRODUCTION

On average, almost half of 15-years-old across Organisation of Economic Cooperation and Development (OECD) countries are enrolled in schools where the headteacher reported that an effective online learning support platform was available (Ikeda, 2020). The picture is similar when it comes to the availability of adequate professional resources for teachers to learn how to use available digital devices, with 65% of them having access to this kind of resource across OECD countries (Ikeda, 2020). However, the support parents receive to help their children in using the same technologies to learn at home remains unexplored (Garbe et al., 2020; Müller and Goldenberg, 2021).

The UNESCO global monitoring system of school closures caused by COVID-19 showed that in April 2020, over 1.6 billion learners in 194 countries were affected. Four months later, schools

remain closed in 105 countries. This means that, during this period, approximately 12 million parents around the world faced the challenge of educating their children at home. School closures have increased the existing achievement gap. Evidence from different studies around the world suggests children have made less academic progress compared with previous year groups and that there is a large attainment gap for disadvantaged students, which seems to be getting wider (Maldonado and De Witte, 2020; Domingue et al., 2021; Engzell et al., 2021; Kogan et al., 2021; Pier et al., 2021). This represents a once in a lifetime opportunity to unpack the lessons that can be learnt from the impact of this global emergency. Provision of devices and access to the Internet are key steps, but not the only ones. Working closely with parents to help them to use technology to support their children's learning is critical as well. Combining parental engagement and use of technology is the best strategy in mitigating both the short and longer-term impacts of COVID-19, where years of progress made in education around the world are now under threat (Cruddas, 2020; Novianti and Garzia, 2020; OECD, 2020).

There is limited information on parents' ability to enhance their skills and the factors that facilitate their engagement with children's learning when utilising the existing online learning support platforms chosen by schools. Available data is limited and mainly describes the provision of devices, access to the internet (UNICEF, 2020) and concerns about parents' ability to keep their children safe online (OFCOM, 2020).

This study is aimed at identifying the factors associated with fostering parental acceptance and use of technology to support their children's learning in 19 countries. Social cognitive learning theory (SCLT) (Bandura, 1999) and the theory of acceptance and use of technology (TAMs) (Venkatesh and Davis, 2000; Venkatesh et al., 2003; Venkatesh and Bala, 2008; Abdullah and Ward, 2016) are used to explain how parents receive and use technology to support children's learning. Under SCLT, a socially appropriate outline for explaining how parents approach technology is proposed, while TAMs explain what factors influence parental acceptance and technology use.

This paper is organised as follows: section two provides a review of the literature relating to parental engagement, home learning environment, social-cognitive learning theory, and the theory of acceptance and use of technology. Section three presents the exploration of the current international data on parental engagement and acceptance and use of technology. Section four presents the research questions that guide the present study. In Section five, the method employed for gathering the data is explained, whilst Section six presents the results derived from this study. Section seven discusses the study's findings and the last section concludes with recommendations for policy and future research.

LITERATURE REVIEW

Parental Engagement With Children's Learning

Evidence from research has shown parental engagement in children's learning is critical to student success (Fan and Chen, 2001; Desforges and Abouchaar, 2003; Jeynes, 2005, 2007, 2012; O' Brien et al., 2014; Purcell-Gates et al., 2014). O' Brien et al. (2014) found that children whose parents participated in intervention programmes experienced substantial growth in language and literacy. These findings support the idea that parents are the best partners to close achievement gaps (Goodall, 2017). Hence, parents as equal partners, with a voice and an active presence, support learning and not only homework or the curriculum.

Yet, a consensus of what parental engagement means is still problematic as it has many definitions. According to Kim, parental engagement refers to parents' involvement in their children's lives in order to enhance their outcomes (2009, p. 89). As such, parental engagement is not just involvement in or support of the school, but also, helping with learning (Goodall and Montgomery, 2014). This perspective entirely changes the traditional role parents have played whereby they are part of a limited partnership that supports the schools' goals. In the present study, Goodall and Montgomery's (2014) continuum, which charts parental involvement to parental engagement, is used as a framework in measuring parental engagement with children's learning.

To better understand what parental engagement is and how it is operationalised, let us start by defining parental involvement. According to Latunde (2017), there are two types: traditional and non-traditional. Traditional forms of parental involvement include helping with school homework, attending parents' evening and social events (Goodall, 2013, 2018; Torre and Murphy, 2016; Watt, 2016) and volunteering in the classroom (Lewis et al., 2011). Under this perspective, parents are treated as peripheral to education (Pushor, 2007), which places the school in a privileged place of having expertise and power (Latunde, 2017, p. 10), and parents as having a minor impact on student educational outcomes (Jeynes, 2005).

Non-traditional definitions of parental involvement have emerged more recently and have broadened the spectrum of parental engagement. Parental engagement includes, among other activities, parents providing moral and emotional support, reading with their children, promoting and supplementing learning, following and supporting their children's learning interests, modelling learning, modelling resilience and creating learning environments (Latunde, 2017). The premise is that learning is a broad concept, one beyond the school curriculum and not limited by the school walls, with parents playing an active role in it.

Parental engagement shares a powerful connection with children learning at home and it is a strong predictor of children's achievement (Harris and Goodall, 2008; Harris et al., 2009). Parents not only support the school curriculum but learning in all its forms and feel empowered enough to work alongside the teaching staff, suggesting new ways to approach tasks and solving problems, as well as leading children's learning processes.

Studies have proven that parental behaviours and attitudes toward learning impact upon children's learning. That is, parental engagement is essential for improving educational outcomes (Melhuish et al., 2008; Jeynes, 2012, 2014a,b; Huat See and Gorard, 2015; Karemaker et al., 2017). Studies in the field have

been predominantly small scale. They have used inconsistent parental engagement definitions focused on participation in school-based activities, rather than engagement with children's learning. Consequently, the field has had to rely on a few large-scale research studies providing evidence of a relationship between specific parents' behaviours, strategies and factors that underpin their engagement.

Home Learning Environment

Parental engagement happens long before schooling, and it is one of the elements of the home learning environment. Homes are not only the place where parents cover basic needs, such as affection, safety and survival. They pass on knowledge and capital that children use on a daily basis to their benefit (Bjorklund et al., 2002; Bornstein, 2006). Homes become transformed into learning environments to educate young people for successful adjustment to cultural, physical, social and technological challenges.

Scholars have presented frameworks to determine the elements and relationships in the home learning environment. For instance, Bornstein (2006) and Bradley and Corwyn (2004) have presented frameworks that have focused on cognition, language, and socio-emotional skills, whilst others have centred their attention on the effect of the home learning environment on achievement (Hess and Holloway, 1984; Brooks-Gunn and Markman, 2005; Melhuish et al., 2008). Home learning environment frameworks are diverse, but they share many common factors that contribute to children's success. An alternative framework focusing on what happens at home and not at school has been proposed by Dearing and Tang (2010, p. 131). In the present study, we have employed and adapted three elements presented by Dearing and Tang (2010) to define home learning environments; (1) parental engagement with children's learning, (2) the parent-child relationship and emotional climate that favours learning, and (3) learning materials, with an emphasis on technology (see **Figure 1**).

The first characteristic of the home learning environment is parental engagement. It was explained in the previous section as referring to activities that parents and children share that stimulate learning. It also involves the actions that parents undertake to enhance their skills to support children's learning. The second characteristic is the parent-child relationship and emotional climate that favours learning. It refers to a positive home atmosphere that parent and child create together (Dearing and Tang, 2010). This is mediated by parenting style (Maccoby and Martin, 1983) and the store placed on education at home (Francis and Archer, 2005), which depends on parents' beliefs, expectations, and values.

The last characteristic is learning materials. Children learn through interaction with others and objects (Piaget, 1950, 1951, 1981). Research suggests that material resources are necessary for brain development, and the absence of objects limits neural growth (Blakemore and Frith, 2005). In a study with children raised as deprived orphans, Rutter et al. (2004) found that learning objects played a crucial role in recovery from cognitive deficits. Studies have evidenced children's access to books as a predictor of literacy achievement (Clark, 2011). To sum up, learning materials at home are effective; however, these materials have to match the developmental stage.

Technological devices and software are also critical learning materials in the home and parents play an active part in the development of a digital learning environment (Baruch and Erstad, 2018). Digital literacy concerns have been a key focus of national education policy agendas (Mossberger et al., 2007; Selwyn, 2016, 2017; Livingstone et al., 2018; Livingstone and Blum-Ross, 2019, 2020). Global initiatives from across both the private and public sectors have been implemented to provide access to up-to-date educational technology to narrow the digital divide (Bozkurt et al., 2020; Van Dijk, 2020; Pangrazio and Sefton-Green, 2021) and enable the development of the necessary skills for facing the challenges that technology brings to schools and workplaces. These initiatives have involved the provision of equipment and access to the internet. They have been reproduced in different countries with similar aims and target populations of school-age students. Countries and regions, including the United States, Australia, Panama, Uruguay, Costa Rica, Colombia, Europe, and the United Kingdom have launched a range of small- and large-scale projects providing technology in schools (Zheng et al., 2016). Their experiences vary, with there being mixed evidence on the impact of these projects due to infrastructure, investment, school leadership, teacher training and home involvement during the implementation.

1:1 Technology not only impacts on how children learn and interact in schools, but also transforms the dynamics at home and potentially determines whether learning is taking place (Lei et al., 2011). Devices in the home increase access to resources and information (Zucker and McGhee, 2005). That is having a personal device at home not only facilitates academic-related tasks, but also increases opportunities to engage with online/offline games, social media (Lei et al., 2011), family interactions and potentially develop skills in parents that enable them to better support their children. The provision of technological devices and access to the internet is the first step toward using technology to support learning at home. Before using technology as part of the learning routine at home, parental acceptance of it is crucial. Parents decide which devices to purchase, how many devices per child, how many hours to use them and the level of restrictions applied to their usage. These decisions are based on parents' attitudes toward the use of technology, which are based on their beliefs, expectations, values, parenting style, and the social influences they are subject to Venkatesh et al. (2003).

How parents accept and use technology is explained by two intertwined theories: Social cognitive learning theory (SCLT) (Bandura, 1977, 1986, 1997, 1999) and the theory of acceptance and use of technology (Davis, 1985; Venkatesh and Davis, 2000; Venkatesh et al., 2003; Venkatesh and Bala, 2008; Abdullah and Ward, 2016). SCLT postulates a socially fitting framework for explaining how parents approach technology through observations, interactions and discussions with their children, relatives, other parents, and teachers (Livingstone and Blum-Ross, 2020). While the theory of acceptance and use of technology explains what influences parental acceptance and use.

Social cognitive learning theory suggests that human beings learn both behaviours and cognitive strategies from observing

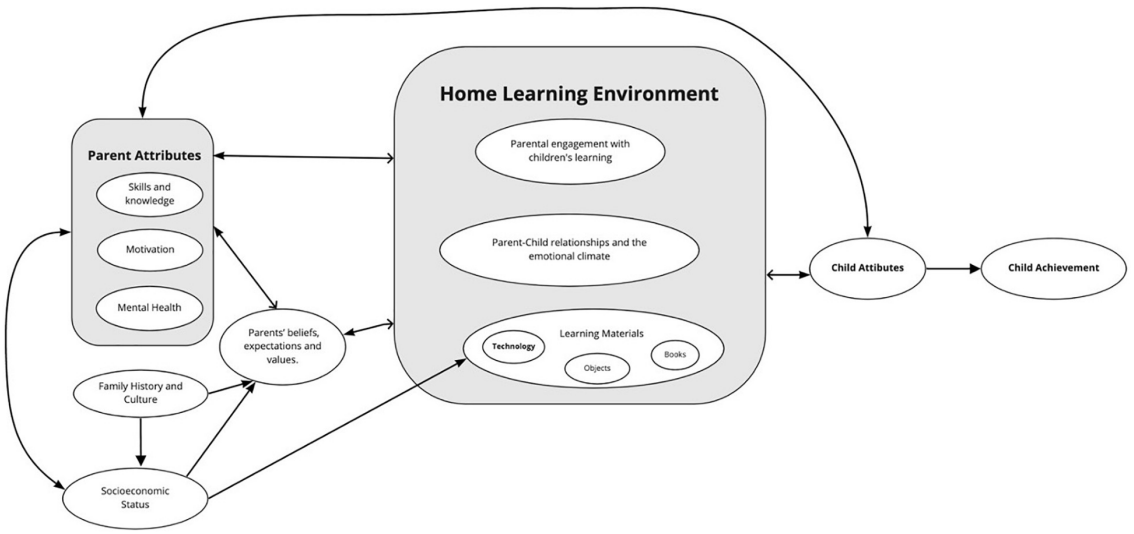

FIGURE 1 | Conceptual model of home learning environment adapted from Dearing and Tang (2010, p. 131).

how others behave and that these assets can be acquired without being directly reinforced (Green and Piel, 2009). Observing becomes a powerful tool for learning new information and ideas that lead to the development of behaviours (Bandura, 1999) and attitudes toward the acceptance and use of technology. For instance, (a) parents observing other parents using certain applications for supporting learning at home; (b) parents following a teacher's recommendation on a specific website that can boost students' performance in maths or (c) parents observing their children troubleshooting a device at home. A positive outcome in this observation process might lead to a change of behaviour in the parents and how they relate to technology.

The self, environment and behaviour are the domains of SCLT. These are represented in external and internal social reinforcement, social influence (Venkatesh et al., 2003), past experiences and self-efficacy (Bandura, 1978, 1997), all of them playing a vital role in a reciprocal interaction. The first element, external and internal social reinforcement, influences the way parents acquire and maintain behaviour. For instance, parents use emails as the primary way to communicate with teachers because the school has suggested it, whilst also receiving information from other parents on alternative forms of approaching teaching staff, such as phone calls, text, and WhatsApp messages.

The second element, social influence (Venkatesh et al., 2003), pertains to the degree to which a subject perceives it essential to others that they perform an action or undertake a change in behaviour. It refers to what is accepted as the group norm or group "subjective culture that the individual has made with others, in specific social situations" (Triandis, 1979, p. 210). In this regard, accessing different perceptions and opinions might be a powerful source of inspiration for how parents welcome and use technology at home to support children's learning. The third element is the parent's past experiences. That is, parents' past experiences influence whether the action will occur or not; they shape whether a parent will join in specific behaviour as well as explaining the reasons and expectations that reinforced that decision. These will be heavily influenced by their own experience in schooling, previous experiences dealing with technology at the workplace and/or daily life.

The last element is self-efficacy (Bandura, 1977, 1978), which refers to a parent's beliefs in her/his ability to influence her/his child and the environment in ways that will foster the child's development and success (Ardelt and Eccles, 2001). Parental self-efficacy is influenced by parents' specific capabilities, confidence as well as other individual factors and environmental factors that may act as barriers or facilitators. Self-efficacy involves parents' conviction that technology can be used as a tool to enhance learning; however, to reach that conviction, they need to welcome or accept technology as that powerful tool.

The process of technology acceptance has been explained by several theories: diffusion and resource dependence theory (Pfeffer, 1982), innovation adoption theory (Rogers, 1983, 2003); technology and social inclusion (Warschauer, 2004; Alonso Cano et al., 2010; Ceretta and Canzani, 2016; Cobo and Rivera-Vargas, 2018); and the technology acceptance model (TAM) (Davis, 1985; Venkatesh and Davis, 2000; Venkatesh et al., 2003; Venkatesh and Bala, 2008; Abdullah and Ward, 2016). In this paper, we use the TAM to measure parental acceptance and technology use. A key selection criterion was how TAM provides insight on what factors influence parental acceptance and technology use.

Technology acceptance models models have been widely used in previous studies looking at how technology is accepted and used by students, educators, and employees. Previous studies, such as those of King and He (2006); Šumak et al. (2011), and Abdullah and Ward (2016), have shown that TAM is the most commonly applied and robust theory in existing research for understanding users' acceptance of technology in a variety of contexts. Since its appearance in 1985, the original TAM has been

adapted and complemented with different factors or variables. In Davis's (1985) original model, three factors were introduced, all of them in order to reflect the context of the application. Four main factors determine an individual's acceptance and use of technology: perceived usefulness, ease of use (capability and effort), social influence (Venkatesh et al., 2003), and facilitating conditions (Triandis, 1977). We investigated the last three factors to explore parental acceptance and use of technology as a preliminary step to enhance their skills, build competencies and facilitate their children's learning (see **Figure 2**).

Perception of usefulness (Venkatesh and Davis, 2000) is an essential factor, for it determines whether the technology is useful for supporting learning. During the national lockdowns, the only way to access education was via different forms of technology: online platforms, apps, informative emails, WhatsApp messages and calls, phone calls, videoconferencing, printed materials, etc. So, technology was already perceived as useful and essential for accessing education. Additionally, the selection of learning management systems lies with the schools, governments, or local education authorities. That is, these organisations are those who decide which educational technology should be acquired, purchased and given to families. There are even some cases where schools not only select the educational technology to use in terms of the software, but also which device is allocated to students. For instance, in the Learning Foundation 1:1 programme in the United Kingdom, schools are tasked with choosing which technological devices parents should purchase (Learning Foundation, 2021). Consequently, the perception of usefulness is outside of parents' control in the decision-making process, and for that reason was not explored in this study.

Ease of use (capability and effort) is explained as parents' perception of how easy or difficult it is to use educational technology given their abilities (Davis, 1989). It includes positive and negative factors, such as complexity [negative] (Rogers, 1983, 2003; Prensky, 2005; Goodyear and Carvalho, 2019; Haaranen et al., 2020), perceived ease of use, effort expectancy, and past experiences and self-efficacy (Bandura, 1978, 1997). Social influence includes parent's exposure to, exchanges with, and access to the perceptions of others (parents, teachers, children, the general public, and relatives, etc.) in the use of the educational technology, including how one is perceived by others (Venkatesh et al., 2003). Social influence also refers to the use of educational technology, regarding whether it is indispensable for the completion of tasks via online platforms, apps, and networks, etc. Facilitating conditions pertain to the systemic or situational factors that affect the access and ability to use the educational technology (Triandis, 1977; Venkatesh and Bala, 2008). In the present study, facilitating conditions specifically refer to the acquisition and access granted to children and parents to well-structured learning management systems or apps selected by the school. Investigating the three above factors can provide understanding of parents' attitudes toward the acceptance and use of technology to support their children's learning.

INTERNATIONAL DATA ON PARENTAL ENGAGEMENT AND ACCEPTANCE/USE OF TECHNOLOGY

International Large-Scale Assessments

Internationally comparable data on parental engagement and parental acceptance and use of technology in education is extremely limited. Data from the OECD and the United Nations Children's Emergency Fund – UNICEF data present a limited approach to parents' participation in their children's education. The Programme for International Student Assessment PISA, for example, only presented findings from their parental involvement questionnaire distributed in 15 countries during 2009, 2012, 2015, and 2018. Moreover, in the PISA questionnaire parental engagement was relegated to some retrospective questions, and only captured attitudes toward reading, self-reading time, parents' texts preferences and, in 2018 only, parents' involvement in online extended reading activities.

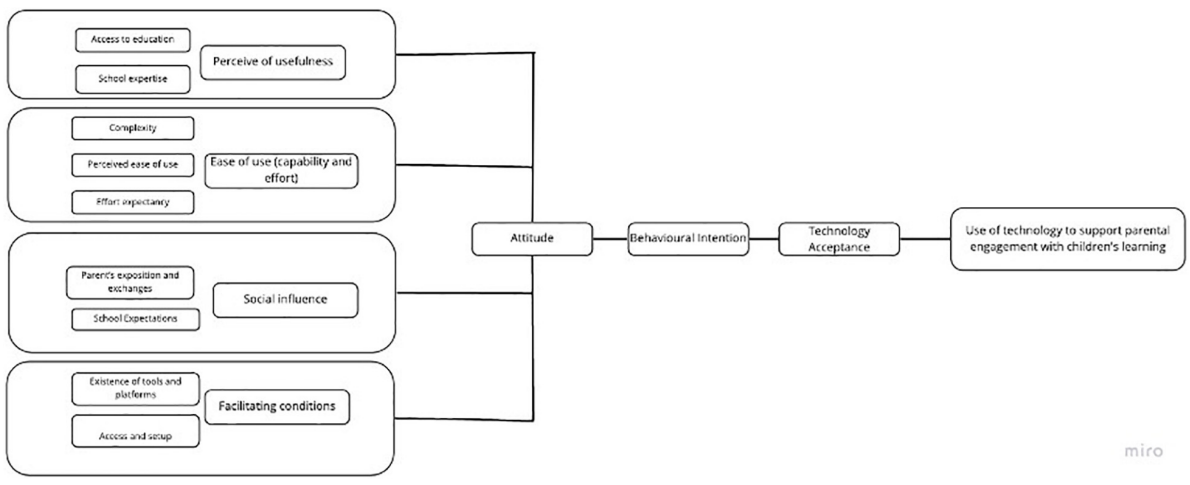

FIGURE 2 | Hypothesised model for the acceptance and use of technology to support parental engagement with children's learning.

Furthermore, when exploring parents' attitudes toward using technology to support children's learning, international studies like PISA and the Trends in International Mathematics and Science Study – TIMSS did not establish a clear theoretical background. Whilst a review of the PISA Assessment Framework (OECD, 2019) shows that some references were made to theories developed by authors, such as Bryk (2010); Chapman et al. (2012), and Klauda (2009), no explicit reference was made to indicate what concepts from which theories were underlying the items used to create the corresponding items and scales.

A similar approach is taken in the design and analysis of the Multiple Indicator Cluster Survey (MICS) carried out by UNICEF (UNICEF, 2020). It is designed on the basis of the identified needs for the national and subnational monitoring priorities. Currently, the sixth and largest round of surveys (MICS6) is being undertaken, with the largest numbers being in Europe and Central Asia (17 surveys in total) and West and Central Africa (12 surveys). More details are provided in **Table 1**.

This extensive survey has involved seven progressively updated versions or rounds. MICS collects data to identify key indicators used to assess children and women's situations across the world. It presents disparities in the home learning environment across and within countries. The inequalities are represented in terms of access to learning materials, such as books and technological devices. The findings of MICS6 provide only a limited measurement of parental engagement with children's learning, considering only two factors: parents supporting homework and the number of reading books at home. The surveys have also explored parents' IT skills outside of the educational context (UNICEF, 2020); however, this information is not linked to children's learning.

Recent Empirical International Studies

Between 2018 and 2019 a series of reports were published as part of the UNESCO-Fazheng project. The reports described fourteen case studies from twelve countries. These case studies were governments, ministries of education and school-led initiatives on best practices in mobile learning. The findings from the initiatives led by governments and ministries of education in Uruguay (Cobo and Rivera-Vargas, 2018); Croatia (Smoljo and Korda, 2019); the republic of Korea (Lim and Kye, 2019) and Rwanda (Wallet and Kimenyi, 2019) presented few or no impactful activities regarding parental engagement with children's learning. In these initiatives, parents seemed to perform a secondary role in the implementation of mobile learning. On the other hand, initiatives led by individual schools or groups of schools in China, Brazil, the United Kingdom, Russia, and Portugal showed that parents played an active role while dealing with technology to support learning. These countries presented evidence of the impact of shared visions, partnerships between home and school, and having a training programme to make parents part of the initiative.

In the same studies, China reported findings where a school assessed parents' digital skills according to their job or occupation and presented opportunities within the school for parents to develop digital skills and create online resources for school platforms (Su and Li, 2019). Parents were also frequently invited to participate in events, meetings, and activities with their children (Yu et al., 2019). Related results were found in Portuguese and Spanish schools, where researchers observed increasing interest amongst parents in the school's activities and pupils' motivation to attend both extracurricular activities and regular lessons as well as a lowering dropout rate (Hinostroza et al., 2019; Lima and Tulivuori, 2019). According to these reports, school-led initiatives seem to be more successful in engaging parents in the use of technology to support learning. Some studies imply this is due to a shared vision regarding the use of technology (Uvarov et al., 2019; Yu et al., 2019) and constant school-home communications (Barbosa et al., 2019). No schools in any of the two models of implementation reported factors associated with how parents accept or use technology to support children's learning.

RESEARCH QUESTIONS

Many studies have explored the impact of COVID-19 on employment, management of the pandemic, the economy, mental health and student achievement and teaching. However, very few have focused on how parents are coping with home-schooling; the strategies they are using, the synergies they are developing, the partnerships they are establishing and the challenges and opportunities educational technology has opened to them under the current circumstances. Studies focusing on parents' perspectives possess a narrow theoretical basis and their scope is limited to how parents are supporting the school agenda. This empirical study was designed to extend the existing body of knowledge to explore the factors likely to shape parents' acceptance and use of technology to support their engagement with their children's learning.

The following questions were proposed to address the above-identified research gaps.

- To what extent does parents' acceptance/use of technology influence their engagement with children's learning?

Three specific sub-questions guide this study:

- To what extent do others' opinions influence the use of technology in supporting parental engagement with children's learning?
- To what extent does the use of existing school technology impact upon parental engagement with children's learning?
- To what extent does the effort needed to use online tools impact upon parental engagement with children's learning?

MATERIALS AND METHODS

Data

The data from this study stems from the International COVID-19 Impact on Parental Engagement Study (ICIPES) (Osorio-Saez et al., 2020). ICIPES was a joint effort in 23 countries to investigate the ways in which parents and caregivers engaged with their children's learning during the period of social distancing arising from the global COVID-19 pandemic.

TABLE 1 | MICS surveys by phase and territory.

Phase	South Asia	East Asia/the Pacific	Europe/Central Asia	Eastern/Southern Africa	Middle East/North Africa	West/Central Africa	Latin America/the Caribbean	Total per region
1	7	8	5	13	10	18	2	63
2	4	7	10	11	13	14	7	66
3	1	6	13	6	8	13	6	53
4	5	9	10	7	7	12	10	60
5	6	7	9	6	4	11	9	52
6	7	10	17	5	6	12	10	67
Sum total	30	47	64	48	48	80	44	**361**

TABLE 2 | Themes included in the questionnaire.

Domains in ICIPES, 2020	Subdomains	Items	
		Likert scale questions	Open-ended questions
Parental engagement with children's learning (Kim, 2009; Goodall and Montgomery, 2014)	Parental engagement	5	6
Parental acceptance in the use of technology	Facilitating conditions (Triandis, 1977)	3	
	Social influence (Venkatesh et al., 2003, p. 451)	4	
	Ease of use (Capability and effort); Complexity (Rogers, 1983, 2003; Prensky, 2005; Goodyear and Carvalho, 2019; Haaranen et al., 2020)	10	

Data was collected using an online survey with a total sample of 4,658 parents/caregivers of children between 6 and 16 years old, living with their child. Children were between grade 1 and 13, which represents between 1 and 13 years of schooling, counting from the beginning of Level 1 of the International Standard Classification of Education-ISCED (UNESCO, 2011). The survey was administered by the University of Bath team using the JISC Online Survey Tool (Osorio-Saez et al., 2020). All respondents gave their informed consent and the research collaborators only had access to the data after it had been fully anonymised.

The four main domains explored in the questionnaire were: Parental engagement with children's learning, School support for parents and children, Home-schooling and family life balance and Parental acceptance in the use of technology. The full version of the Osorio-Saez et al.'s (2020, 2021) background questionnaire can be found in the ICIPES User Guide. In this paper, data from two domains were used: Parental engagement and Parental acceptance in the use of technology, as shown in **Table 2**. In addition to the data collected from the Likert scale responses, the research design also included the following six open-ended questions:

(1) Tell us more about the school's support during home-schooling throughout the COVID-19 lockdown period.
(2) Are you teaching your child at home? (Taking the time for sitting and explaining the topics and activities to them) Why not?
(3) Tell us more about how you get prepared yourself to support your children's learning.
(4) Tell us more about how you teach your children at home.
(5) Tell us more about the activities you and your children do together during the lockdown period.
(6) Tell us more about how confident you feel dealing with technology to support your children's learning.

The descriptive and augmented texts from the answers to the above questions were used to explain the quantitative findings in this study.

Even though we received responses from 23 countries, the information of four was omitted due to a low response rate. So, we used a final sample of 4,600 parents residing in 19 countries. More detailed information about each country's respondents can be seen in **Table 3**.

Variables

The main dependent variable was parental engagement with children's learning (ENG_Scale). This scale was constructed by the Osorio-Saez et al.'s (2020, 2021) research team using five items and is included in the international dataset. Parents were asked to what extent they agreed with the following statements: Q21_2 *I follow my ideas about what my children need to learn,* Q21_3 *I mix my own ideas with the school's plan on what my children need to learn,* Q22_2 *I list and prepare the activities myself before developing them with my child(ren),* Q22_3 *My children and I have a set home-schooling timetable*, Q22_6 *I develop with my children spontaneous learning activities not necessarily school-related such as cooking, woodwork, online games, physical activities, etc*. The response options were organised on a five-point Likert scale, with the categories "Always," "Often," "Occasionally," "Rarely," and "Never."

TABLE 3 | Participant demographics.

Countries	Number of Participants
Ethiopia	171
Ghana	142
Tanzania	58
China	217
Japan	159
Italy	517
Turkey	78
United Kingdom	191
India	54
Pakistan	45
Sri Lanka	199
Chile	1,597
Colombia	94
Costa Rica	155
El Salvador	83
Honduras	246
Mexico	244
Uruguay	61
United States	289
N =	4,600
Area	
Urban	3,725
Rural	747
Other	128
Family composition	
Living with the father/mother of the child	3,626
Living with a partner who is not the father/mother of the child	275
Raising a child without a partner	591
Other	108
Parent age	
Under 18 years old	32
18–24	47
25–34	740
35–44	2,232
45–54	1,329
55–64	188
65–74	30
75 or older	2
Gender	
Female	3,529
Male	1,071

The leading independent variables were social influence (four items), facilitating conditions (three items) and ease of use (capability and effort /complexity) (10 items). Parents were asked about the frequency with which they carried out different activities using technology (response options: Always, Often, Occasionally, Rarely, and Never), and how confident they felt doing so (response options: not at all confident, slightly confident, moderately confident, quite confident, and extremely confident). More information about the variables can be found in the ICIPES Technical documentation (Osorio-Saez et al., 2021).

The other independent variables included in the analysis can be organised into two groups, namely characteristics of the family and characteristics of the students. The following variables are part of the first group: location (urban/rural), parental gender (male/female), parent years of schooling, parent age (in years), the number of children in the household and family socioeconomic status. In the second group, we have the following variables: child's gender (male/female), and child's years of schooling. The purpose of including these variables is that they are theoretically associated with the outcome of interest (parental engagement), so we use them here as control variables. **Table 4** provides detailed descriptive statistics for the variables used in this study.

Socioeconomic status (SES) was constructed using the following questions. Q5: What do you do in your main job? (e.g., teach high school students, help the cook prepare meals in a restaurant, manage a sales team). This was an open question that was recoded into an ordinal variable following the list of occupations described in the one-digit International Standard Classification of Occupations (ISCO). Q7: In a normal month, what is your total household income? This variable was recorded by grouping the income level reported in deciles of income within each country. Q13N asked: How many usable devices are there in the house? (Smartphones, tablets or iPads, laptops, and desktops). Q14: How many computers per child have you got at home?

Analytical Strategy

The main data analysis method used was Ordinary Least Square (OLS) regression – a technique used to define the line of best fit for a set of data – with country fixed effects (for the 19 countries). We fitted three regression models to examine whether and to what extent the three factors included in the TAM [facilitating conditions, social influence, and ease of use (capability and effort/complexity)] predict parental engagement with children's learning. As aforementioned, the dataset used in our analyses included data from 19 different countries. To account for the cluster (country) dependency, and following previous international comparative studies in educational research, a dummy variable was included for each country (Chudgar et al., 2013; Zhou, 2014; Gumus and Bellibas, 2016). The goal of using a country dummy variable was to control for variations in parental engagement that took place due to the differences among countries that are not included in our set of independent variables. In other words, the use of a country dummy variable can account for variations in parental engagement due to the factors specific to each country. Each regression model was fitted with this country effect, except for the first one, which was the base model.

The analysis began by fitting a model that included only the country variables for a country. This model was used to estimate the percentage of the total variation in parental engagement that was accounted for just by country effect. The following is the equation for Model 1.

$$\text{Parental Engagement}_{ij} = \beta_{ij} + e_{ij} \quad (1)$$

The second model (2) investigated the relationship between the parental technology acceptance variables [facilitating conditions, social influence, and ease of use (capability and effort/complexity)], with the country effect controlled for. When compared with the first model, this second model provided us with an estimation of how much variation was accounted for by our variables of interest [facilitating conditions, social influence, ease of use (capability and effort/complexity)] beyond the country effect.

Lastly, in addition to our interest variables, the third model (3) examined this relationship controlling for family and children's characteristics, as well as for the country effect. When this model was compared with the second one (2), it enabled the estimation of how much variation was accounted for by the control variables beyond our variables of interest and the country effect. The following are the equations for Models 2 and 3, respectively:

$$\begin{aligned}\text{Parental Engagement}_{ij} = {} & \beta_{1j} + \beta_1 \text{ Facilitating conditions}_{ij} \\ & + \beta_2 \text{ Social influence}_{ij} + \beta_3 \text{ Effort}_{ij} \\ & + \beta_4 \text{ SES}_{ij} + C_j + e_{ij} \qquad (2)\end{aligned}$$

$$\begin{aligned}\text{Parental Engagement}_{ij} = {} & \beta_{1j} + \beta_1 \text{ Facilitating conditions}_{ij} \\ & + \beta_2 \text{ Social influence}_{ij} + \beta_3 \text{ Effort}_{ij} \\ & + \beta_4 \text{ SES}_{ij} + \gamma \text{ (Parental)}_{ij} \\ & + C_j + e_{ij} \qquad (3)\end{aligned}$$

For the quantitative and qualitative analysis, the lead researcher created an analysis codebook, which was informed by the study's conceptual framework (Plano Clark, 2010; Stentz et al., 2012). Four categories were used to classify and summarise the qualitative data reflecting the original three inquiry topics [facilitating conditions, social influence, and ease of use (capability and effort /complexity)] and any new themes arising after reading the survey responses. Data were extracted manually from survey responses and summarised into four charts, three named after the variables of interest in this study and the fourth one named "other findings." Using this data reduction and display strategy, the researchers examined the accounts of all respondents within the common thematic framework (Braun and Clarke, 2012).

Then, the results of the quantitative and qualitative analyses were compared, with the emergent themes being matched with the regression models' results and named after the dependent and independent variables. This data added depth to the analyses, and it was used to suggest possible underlying mechanisms to explain the quantitative patterns.

The use of research collaborators during the qualitative analysis led to confirmability and consolidation of the resulting themes. Any discrepancies were discussed until an agreement was reached.

RESULTS

In this section, the inferential results from the regression models are discussed in tandem with the qualitative data to provide a fuller understanding. Three multiple regression models with country fixed effects were employed to examine to what extent parents' acceptance and use of technology impact parental engagement with children's learning. The results of each model are detailed below.

In the first instance, an unconditional model with the country fixed effect being controlled for was estimated. The results indicate that the differences among countries only accounted for about 8% of the total variation in parental engagement (see **Table 5**). In addition to the country fixed effects, the second model was established to investigate to what extent parents' acceptance and use of technology and SES can predict parental engagement with children's learning. The results show that the facilitating conditions, social influence, and ease of use (capability and effort/complexity) are all significant predictors of parental engagement with children's learning (see **Table 5**). This model accounts for an additional 18% of the total variation in parental engagement. The third model investigated the extent to which the parents' acceptance and use of technology, predicts parental engagement with children's learning, whilst controlling for several family and children characteristics as well as the country fixed effect. In other words, it allowed us to estimate the net relationship between our variables of interest and parental engagement. This model explains just an additional 2% of the variation in parental engagement (see **Table 5**). The results for each of the variables of interest are provided in the next section.

The Association Between Parental Engagement With Children's Learning and Parental Acceptance of the Use of Technology: Facilitating Conditions

A positive and statistically significant relationship between parental engagement and the facilitating conditions was revealed from the application of the regression model. Hence, the latter is a significant predictor of the former ($\beta = 0.121$, $p < 0.001$). This means that where more participating parents have been granted access to educational technology, such as Learning Management Systems, e.g., school platforms and apps, the average parents reported being more likely to engage with their children's learning.

Parents' strengthened desire to contribute to their children's learning involved not only using technological devices but also the educational technology provide by the school, governments, or other non-profit organisations, as evident from parents' responses:

> *"Having an online platform helps me to organise our routine; everything is on one site, I know where the activities are, and I just need to follow the sequence. I also can check how my children are progressing on the curriculum."*
>
> *Parent from the United States*

> *"Having an online platform is an advantage. Parents can download plenty of learning materials from there. There is also a Facebook group where teachers share videos and lessons. Each homeroom*

TABLE 4 | Descriptive statistics for the variables used in this study for all countries.

	Minimum (min)	Maximum (max)	Mean	Standard deviation (SD)
Dependent variable				
Parental engagement	−1.958	2.729	0	1
Independent variables				
Facilitating conditions	−2.778	1.757	0	1
Social influence	−2.936	1.408	0	1
Effort/complexity	−2.751	1.803	0	1
Socioeconomic status	−2.356	4.003	0	1
Location (0 = Urban, 1 = Rural)*	0	1	0.186	0.392
Parent gender (0 = Female, 1 = Male)*	0	1	0.232	0.422
Parent schooling	0	25	15.43	3.754
Parent age	0	7	3.19	0.864
Child's gender (0 = Female, 1 = Male)*	0	1	0.504	0.500
Child's years of schooling	0	14	5.043	3.221
Children in the household	0	10	1.309	1.449

**The column titled Mean represents the proportion of the cases in the category 1.*

teacher has a WhatsApp group where relevant information is shared and also, she follows some important actions from parents."

Parent from Colombia

"Thanks to the online platform and video lessons, I am on top of my children's learning."

Parent from Italy

"I was not familiar with the online platforms, except for Google. I, too, had to learn the programs, set up parent access, manage all of her sign-ins and passwords. I experienced glitches and issues and had to figure it out. I had never done Zoom or Google meet and had to learn them both personally. We had to learn a lot about technology to support my children quickly and the best part of it all is that there are so many great things that we can all continue to use whether we are face to face, hybrid, or remote."

Parent from Chile

"My daughter's school suggested using the platform and other apps and websites I find quite useful. I often visit the recommended websites."

Parent from the United Kingdom

In some contexts, facilitating conditions are absent due to factors such as inadequate equipment or infrastructure, high Internet costs, or the absence of an online platform for the school.

These contexts still require schools to provide education. School materials are sent home using low-tech and non-tech methods, such as photos sent through WhatsApp parent groups or printed materials collected from school.

This study asked some parents to describe their experiences with low tech or non-tech solutions:

"My children's school does not use an online platform; parents collect some printed materials and children complete schoolwork on paper or via WhatsApp. When completed, schoolwork is sent to the school; no specific feedback is provided after that."

Parent from Ghana

"My child's teacher sends a weekly message via WhatsApp; there are so many messages on that group that I get lost. Sometimes I miss important information; then I realise my child is behind on schoolwork, because I receive a phone call from his teacher."

Parent from Colombia

"In Ethiopia, the Internet is expensive, and schools don't have a website or platforms. Schools and we, parents, do what we can with the resources we have."

Parent from Ethiopia

"Technology is not used much in our society, because of the lack of knowledge and infrastructure. The problem is resources. Schools know most households only have a phone and poor network, so they avoid sending online work."

Parent from Tanzania

The Association Between Parental Engagement With Their Children's Learning and Parental Acceptance of the Use of Technology: Social Influence

According to the results, social influence is a significant predictor of parental engagement ($\beta = 0.452$, $p < 0.001$), i.e., the direction of the relationship is positive. In other words, the more participating parents adopt and take part in at least one social network, the more the average parents reported being engaged with children's learning.

Parents are influenced by the degree to which an individual perceives what others (parents, teachers, and the general public) believe they should use in terms of technologies to support children's learning. The more parents are influenced in this way, the more they are engaged with their children's learning.

Parents' comments helped us to understand the relationship between these two analysed variables:

TABLE 5 | Parents' acceptance and use of technology predicting parental engagement with children's learning.

	Model 1	Model 2	Model 3
	Parental engagement (With dummy)	**Parental engagement (With dummy)**	**Parental engagement (With dummy)**
Facilitating conditions		0.135***(6.569)	0.121***(5.513)
Social influence		0.465***(29.516)	0.452***(26.936)
Effort		−0.311***(−16.026)	−0.300***(−14.380)
Socioeconomic status			0.010(0.559)
Location			−0.028(−0.842)
Parent gender			0.159***(4.497)
Parent schooling			−0.001(−0.346)
Parent age			0.060**(3.210)
Childs' gender			−0.003(−0.136)
Child's years of schooling			0.040***(8.512)
Children in the household			−0.006(−0.635)
Intercept	0.054(0.838)	−0.045(−0.802)	−0.431***(−3.884)
R-square	0.075	0.250	0.273
N	4599	4555	3931

$^{**}p < 0.01$; $^{***}p < 0.001$.
Notes: Sample weight is SENWT, t statistics in parentheses.

"I make sense of homework after reading other parents and teachers' comments on the Facebook group."

Parent from Honduras

"I've taken inspiration from friends on social media, and I've used and followed YouTube videos too."

Parent from Spain

"I ask friends and relatives for advice via social media. I sign up to Facebook groups, where I find great advice about schoolwork and fun activities with the children."

Parent from Uruguay

"I follow the school daily plan, but children finish these activities in two hours. Hence, I must look for fun activities on Facebook. Family Lockdown is the best for finding inspiration of we what to do with school-age children."

Parent in the United Kingdom

"Read before to ensure I can help/explain. Message teacher or friends if I need help!."

Parent in Mexico

"I often check parents' comments on social media."

Parent in China

"I have started a WhatsApp group to talk to relatives in other countries to share the experience."

Parent in Sri Lanka

The Association Between Parental Engagement With Children's Learning and Parental Acceptance of the Use of Technology: Ease of Use (Capability and Effort/Complexity)

The results, in this case, indicate that when school technology is perceived as being complex to use, parents are less likely to engage with their children's learning ($\beta = -0.300$, $p < 0.001$). In other words, the more parents have to make an effort to understand how to work with a particular piece of technology, the less they are engaged with their children's learning.

The difficulties when using educational technology include complexity, perceived ease of use, effort expectancy, and self-efficacy, all of which prevent parents from engaging with children's learning. Additionally, parents expressed concerns regarding their role, due to the lack of direction or guidelines in relation to what was expected from them, when their children were working with the school's educational technology.

Parents' concerns about how difficult it is to use certain pieces of educational technology are also evident from respondents' comments:

"I think the school platform is not that user friendly. When we try to circle or drag and drop, it's really quite difficult to be precise. When completing cloze questions, answers are always wrong after typing all the possible answers."

Parent from the United Kingdom

"They use Moodle in my [children's] school, where there are some activities to complete online and others to print or watch videos. I get lost some time, for example, with the videos, after watching, I not sure what we should do: discuss about them? Write a summary?"

Parent in Mexico

"I struggle using the school platform. It is not user friendly. I don't understand how it works."

Parent in El Salvador

"I still don't understand how to upload homework. We send them attached in emails to the teachers or school."

Parent in Colombia

"I feel exhausted dealing with too many platforms. Zoom is the easiest one to use, but the one used for science and math classes, we don't know how to use it."

Parent in the United Kingdom

"We often send wrong answers in the maths homework, which is because we don't know how to add some signs to the equations. It would be better if we could just work on a piece of paper and send a picture."

Parent in Italy

"The app that we are using with the school is unfriendly and difficult to use. The school says we can print; but it not easy printing worksheets from the app."

Parent from India

The Association Between Parental Engagement With Their Children's Learning and the Family and Children's Characteristics

Regarding the other control variables included in the model: parent gender, parent age and child's years of schooling were significant in predicting parental engagement. On the other hand, SES, location, parent schooling, child's gender, and the number of children in the household were not significant. These are interesting results, but space constraints prevent us from discussing them in detail.

Whilst SES is not a significant variable for predicting parental engagement (see **Table 5**), qualitative data reveals that parents in some countries expressed their concerns about not having resources or the most suitable devices for children to access education:

"My children (4 in total) use one computer or my smartphone, taking turns This slows their learning at home and for me it is impossible to help them to complete the activities in one day."

Parent in Tanzania

"In Ghana, Internet is expensive, so we cannot top-up the phone to share the internet every day. Therefore, no homework can be finished."

Parent in Ghana

"Ideally, he should be working in a tablet or iPad, but we don't have the money now. The mouse is too big for his little hands."

Parent in the United Kingdom

"She works on an old computer that was borrowed from the school, not the best or fastest, but the only way to access school lessons."

Parent in the United States

Regarding parent gender ($\beta = 0.159$, $p < 0.001$), the results suggest that male parents are more likely to engage than female ones. Fathers commented on their engagement with learning:

"Balancing home and work commitments has been tough... I have become my daughter's maths teacher."

Father from Chile

"I particularly enjoy when teachers call to find out how they are doing. Speak to the children, visited them at home and also send them work to do. I have become a fully involved father."

Father from Ghana

Parents' age showed a weak but statistically significant association with engagement ($\beta = 0.060$, $p < 0.01$), That is, the older the parents reported as being, the more likely they were to engage with children's learning. Whilst open-ended responses from parents describe some concerns about the relationship of their age and IT skills to support learning effectively, they also commented on what action they take to become informed:

"I watch videos on YouTube to understand before sitting with my children to do the activities. When I was at school there were no computers, so there is a lot I need to learn."

Parent from Costa Rica

"I call my youngest sister to troubleshoot the computer."

Parent from Mexico

"At my age, technology is challenging, that's why I try hard to keep up."

Parent from Pakistan

Children's years of schooling are also positively associated with engagement ($\beta = 0.040$, $p < 0.001$). In other words, the more the years of formal schooling of the children, the more their parents tend to be engaged with their learning. Whilst the vast majority of parents, indeed, want to take part in their children learning activities, the way in which those with secondary-school aged children engage varies. In general, the qualitative data suggests that for this group of children, the engagement becomes more supportive than guiding or teaching:

"They are old enough to tackle homework and complete their activities, but we always keep an eye on ESafety."

Parent from the United States

"My son is 17 years old. He does not come often to me to discuss homework, but he comes to me when he wants to be sure the information online is accurate and not fake."

Parent from Colombia

DISCUSSION

This study was aimed at providing empirical evidence for the factors that influence parents in accepting and using technology to support their engagement. For the research, data from a survey of 4,600 parents from 19 countries collected in 2020 during the national lockdowns due to the global pandemic of Covid-19 were analysed. Three regression models were employed to identify factors that contribute to parents' acceptance and use of technology to support their engagement with children's learning.

Concerning parental acceptance and use of technology, our findings indicate that social influence (Venkatesh et al., 2003), facilitating conditions (Triandis, 1977), and ease of use (capability and effort) (Davis, 1985; Venkatesh and Davis, 2000) are significant determinants of such engagement. Parents perceive that the school has facilitated access to educational technology, such as learning management systems and apps; however, ease of use (capability and effort) often prevents them from engaging with technology to support learning. They report how some of the school educational technology is complex (Rogers, 1983, 2003; Prensky, 2005; Goodyear and Carvalho, 2019; Haaranen et al., 2020). This idea of complexity is explained by lack of experience in dealing with technology, the intricate look and feel of the platforms and apps as well as bugs and errors in some low-tech educational tools.

Complexity as a Barrier

This idea of complexity as a barrier is in line with the findings of previous studies (Rogers, 1983, 2003; Prensky, 2005; Goodyear and Carvalho, 2019; Haaranen et al., 2020) that have provided evidence of a strong link between acceptance/use of technology and parental engagement. The fundamental factor in making educational technology-EdTech amiable is the design of the interface. Hence, an educational platform app and/or school website should be well structured, user-friendly, and easy to navigate.

The selection of EdTech should follow six basic steps; Review of scientific research into how people learn and the best ways to integrate technology with singular learning approaches (Bower, 2019). Assessment of the external (previous and current) users of the system (Connaway et al., 2011). Assessment of the potential institutional users, which might offer the most suitable starting point and possibilities for training and support, which is applicable to the learner, the teacher and the parent that support learning (Hinostroza et al., 2019; Lim and Kye, 2019). Pre-tests or pilots of the new system (Bossavit and Parsons, 2018; Tsivitanidou and Ioannou, 2021) to test functionalities and ensuring absence of error, crashes and reliance on other devices/elements. Revision of the quality in the embedded content. Finally, assessment of the educational compatibility (Rogers, 1983, 2003; Chen, 2011; Kemp et al., 2019) of the technology applied at all levels to achieve the expected learning outcomes.

Social and Family Influence

From the results, it also emerged that social influence, some in the form of virtual communities (Rivera-Vargas et al., 2017) plays a role in helping parents to engage with the use of technology to support children's learning. Social Learning Theory supports this finding. Parents value having access to other's perceptions and opinions in scheduled and spontaneous exchanges with other parents, teachers, children, the general public, and relatives. These exchanges allow for them to self-assess their performance and role in home-schooling, voice their struggles, and help them to find answers as well as alternative ways to deal with the challenges that home-schooling imposes. In this regard, "others" support parents navigating not only in the challenges that educational technology presents, but also, as a networking mechanism so to be up to date in traditional parental involvement activities with schooling and parental engagement activities that allow their children to reach their potential. Similar findings have emerged from a recent empirical study in Australia (Ewing and Vu, 2021) and Livingstone and Blum-Ross (2020) who found that as part of their digital engagement, parents valued collaborative learning.

Other difficulties reported when dealing with technology at home are associated with the number and type of activities that are sent on a daily basis, as well as parents' perception that some activities will work better on paper than on a screen, such as writing and spelling. Many also mentioned the lack of resources to do some of the homework such as not having a printer, a digital pen, trackpad, and an ergonomic mouse, etc.

Some clarity on parents' role in educational technology is also imperative, moving away from the expected role of policing screen time (Livingstone and Blum-Ross, 2020) and homework. Many expressed how they make sure activities are undertaken and completed; however, when there are online resources that contextualise or extended learning, they struggle to find out what is expected from them. A framework or checklist to be distributed among schools, where they can set and self-assess their institutional strategies to help parents in dealing with technology, would be of value. This material should include the channels for advice on regulations (security and safety), channels for training (workshops, video tutorials, spaces for parental discussions, and guidelines for promoting child/parent conversations) and clear definition of the parents' role in supporting learning. This framework might respond to the need to make educational technology more user friendly to parents, as well as facilitate open spaces for partnerships and discussions with families in relation to the selection of the most suitable educational technology according to collective experience.

Other Findings

Other findings from this study have shown that male parents are more likely to engage with their children's learning than female ones. This finding is consistent with previous research suggesting that even when fathers have had limited schooling, their involvement in their children's schools and school life is a powerful factor underpinning their academic achievement (Grolnick and Slowiaczek, 1994; Nord, 1997; Gadsden and Ray, 2003; McBride et al., 2005). However, more research needs to be carried out to investigate fathers' and mothers' roles in dealing with educational technology. It was also found that older parents are more engaged with children's learning. Research on

how parents get engaged according to their age regarding the acceptance and use of educational technology is required.

One last finding emerged from the present research. The greater the number of years of formal schooling of the children, the more their parents tend to be engaged with their learning. Previous studies, however, have highlighted that some forms of parental involvement can be beneficial in the early years of schooling but less so in later years (Jeynes, 2007; McNeal, 2012; Patall et al., 2008). One possible explanation for this finding could lie in the parents' concerns about screen time, online safety, and the evolution of the parents' role in secondary school.

Study Implications

This study's findings constitute a valuable novel contribution to knowledge, because they reflect internationally comparable data on parental engagement and parental acceptance /use of technology education, which has previously received limited attention. The pandemic has revealed countless obstacles that parents have been facing daily when seeking to educate their children at home. Regardless of their preparation and skills to support learning, the primary responsibility for enforcing and maintaining young people's educational engagement lies on the parents.

In sum, this study has provided valuable information regarding the factors that influence how parents accept and use technology: how they are building their IT capacity to support their children at home, their parenting practices assisted by technology, their new partnerships to respond to their new role and challenges, the opportunities as well as the barriers to engaging when deploying educational technology to support children's learning. The above findings can inform researchers, practitioners, and policymakers in identifying ways to support parental engagement with children's learning beyond the provision of devices and access.

Study Limitations

Whilst this study's results provide valuable insights into how to enhance parental engagement in children's learning, some limitations should be noted. The analysis in this paper is an all-countries one, where some variables differ from country to country, thus limiting the generalisability of the results. Moreover, data collection was done via an online survey and social networks, thus only parents with access to the internet could provide answers. Finally, the qualitative data were gathered via open-ended questions within the survey, which meant that follow up questioning was not possible.

CONCLUSION

This is the first study to report the relationship between technology acceptance and use and parental engagement with children's learning, by incorporating objective measurement among 4,600 parents from 19 countries during the national lockdowns due to the COVID-19 pandemic. The results have shown that parents are generally struggling with complex educational technology, which (Rogers, 1983, 2003) can act as an obstacle to their engagement with their children's learning effectively. However, regardless of the difficulties they might encounter while dealing with technology, many manage to engage in the use of technology to support such learning. Further empirical research is needed to examine parental engagement and the educational technology landscape at the country level, including in-depth qualitative research that looks at both schools' and parents' perspectives.

Beyond providing devices and access, it is necessary to support families in dealing with educational technology. As this research has shown, perceived complexity in educational technology stops many parents from accepting it, but when they do so, they are able to contribute to their children's learning. In sum, it is essential that opportunities are provided to parents that help them overcome technological barriers to their engagement in their children's learning, thereby lessening the achievement gap that has been widening for many during the current pandemic.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: Journal data in Brief https://doi.org/10.1016/j.dib.2021.106813; Mendeley: https://data.mendeley.com/datasets/kvvdgvs8zs/2.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The University of Bath provided ethical approval EIRA1–5408. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

EMO-S contributed to the conception and design of the study, and wrote the different versions of the manuscript. NE performed the statistical analysis and wrote the quantitative portion of the methods section of the manuscript. AS-H contributed as a supervisor of the study, also revised, read, and approved the draft and the submitted version of the manuscript. All authors contributed to the article and approved the submitted version.

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The Effect of Fear of the COVID-19 on Depression Among Chinese Outbound Students Studying Online in China Amid the COVID-19 Pandemic Period: The Role of Resilience and Social Support

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Objective: The present study focused on examining fear of the coronavirus disease 2019 (COVID-19) is correlated with depression and explored the potential role of resilience and social support on the association between fear of the COVID-19 (FoC) and depression among Chinese outbound students studying online in China amid the COVID-19 pandemic period.

Methods: A total of 476 Chinese outbound students from different universities worldwide, currently studying *via* online mode in China, completed an online survey including measures on FoC, resilience, social support, and depression.

Results: (1) Fear of the COVID-19 was positively correlated with depression and negatively correlated with resilience and social support. Both resilience and social support were negatively correlated with depression. Social support showed a positive correlation with resilience. (2) The effect of FoC on depression mainly occurred through two paths: the mediating effect of resilience and the moderating effect of resilience. However, the moderating effect of social support on the association between FoC and depression was not sustained in this study.

Conclusion: This study indicated the mediating and moderating effects of resilience on the association between FoC and depression among Chinese outbound students studying online in China during the COVID-19 pandemic period. The current findings confirmed that resilience has significant implications in preventing negative mental states under the COVID-19 context among this particular group.

Keywords: fear of COVID-19, depression, resilience, social support, Chinese outbound students, COVID-19 pandemic

INTRODUCTION

Due to the rapid spread of the coronavirus disease 2019 (COVID-19) pandemic, governments worldwide have imposed travel restrictions and most higher education institutions have switched to online learning (Sahu, 2020; Walke et al., 2020). However, these rapid changes have caused a drastic increase in psychological problems for college students worldwide and put international students into a problematic situation (Al-Maroof et al., 2020; Pierce et al., 2020; Wang et al., 2020).

Moreover, the stressful situation under the COVID-19 pandemic period has severely harmed the mental health of the Chinese students studying outbound (Ma and Miller, 2020). In addition to the COVID-19 pandemic-related concerns, the Chinese outbound students (COSs) also confront isolation and discrimination as a result of China being the first country to experience the COVID-19 pandemic period (Zhai and Du, 2020), which has disrupted their studies and prompted a slew of psychological disorders such as fear and depression. Due to the unpredictability of the COVID-19 pandemic, many COSs have returned to mainland China to learn *via* online mode (Mok et al., 2021). Therefore, those COSs studying online in China have been a brand new and unique group and the study on their psychological status influenced by the COVID-19 pandemic is urgently important.

Fear of the COVID-19 (FoC) is a negative emotion or a negative response toward any danger or health threats such as harm to oneself physically, any discrimination, or isolation related to the COVID-19 (Witte and Allen, 2000; Zhang et al., 2020). Depression is a clinical mental illness comprised of a negative emotional state and is the most mainstream consequence of the COVID-19 pandemic (Kendall et al., 1987; Rajkumar, 2020). Many individuals are susceptible to depression as a result of the COVID-19 pandemic and subsequent events (Tang et al., 2020). Therefore, we speculated that FoC may be associated with depression. The present study focused on examining whether FoC is correlated with depression among COSs studying online amid the COVID-19 pandemic period. Moreover, previous FoC-related research has found that FoC may indirectly affect mental health issues *via* other resources (Rodríguez-Hidalgo et al., 2020; Belen, 2021). However, few studies extended to the effects of the resilience and social support of an individual on depression during the COVID-19 pandemic period. Aneshensel and Stone (1982) point out that social support has a practical buffering effect in preventing depressive symptoms. Meanwhile, resilience can also operate as an inner resource against negative psychological symptoms when an individual is faced with adversity. Thus, based on the buffering model of social support (Aneshensel and Stone, 1982) and resilience theory (Van Breda, 2001), this study also explored the potential role of resilience and social support on the association between FoC and depression among the COSs studying online amid the COVID-19 pandemic period.

Fear of the COVID-19 and Depression

Previous research has shown that there is a significant positive correlation between fear of FoC and depression (Bendau et al., 2021; Sakib et al., 2021). Kaparounaki et al. (2020) found a high increase in overall depression score with increased suicidal thoughts and other anxiety symptoms throughout the first period of nationwide lockdown in Greece. Increasing FoC in the COSs caused by the quarantine and lockdown restrictions has resulted in rising uncertainties among students with regard to their academic and career efforts (Feng et al., 2021; Yang et al., 2021), and misinformation during the COVID-19 pandemic was also found to be related to FoC (Gabarron et al., 2021). Previous research has shown that FoC triggers depression (Egunjobi, 2020; Al Majali and Alghazo, 2021; Pak et al., 2021). A growing body of research provides evidence that the COVID-19-related fear is a threat to mental health and higher FoC is linked with an increased depression (Ahorsu et al., 2020; Bakioğlu et al., 2020; Yıldırım et al., 2021). Saricali et al. (2020) point out that FoC puts individuals in a high-tension state and makes them feel helpless leading to depression. Therefore, this study hypothesized that:

> Hypothesis 1 (H1): FoC will be positively correlated with depression.

The Role of Resilience

The ability of a person to recover from the traumatic events is referred to as resilience, also called the capacity to learn to live in times of fear and uncertainty and the ability to adjust to the difficult and problematic experiences in life (Meichenbaum, 2005; Herrman et al., 2011). Past studies have shown that resilience has the ability to reduce negative emotions such as depression (Songprakun and McCann, 2015; Anyan and Hjemdal, 2016). While psychological consequences still differ among people, resilience plays a crucial role in describing such individual differences. It can be termed either as an attribute, a result, or a process (Fletcher and Sarkar, 2013). Luthar et al. (2000) describe resilience as a changing approach that encompasses adjustment in times of adverse circumstances. Individuals with higher resilience can better recover from the trauma experiences (Schaubroeck et al., 2011).

However, the role of resilience in the association between FoC and depression is not clear. Previous research has shown that resilience plays a mediating role in the relationship between FoC and negative mental states such as stress (Peker and Cengiz, 2021), anxiety (Seçer et al., 2020), and distress (Lorente et al., 2021). Resilience represents the certain traits that allow a person to adjust to the events that they experience (Connor and Davidson, 2003), and it has a mediating effect between fear and depression (Seçer et al., 2020), especially during the COVID-19 pandemic period (Yıldırım et al., 2020). Therefore, the present study proposed that those COSs with lower levels of resilience would have higher levels of depression. Thus, this study aimed to explore that:

> Hypothesis 2 (H2): Whether low levels of resilience will mediate the association between FoC and depression [as shown in the conceptual framework in **Figure 1A**].

On the other hand, the existing studies have also revealed the moderating effect of resilience on depression (Wingo et al., 2010; Catalano et al., 2011). Havnen et al. (2020)

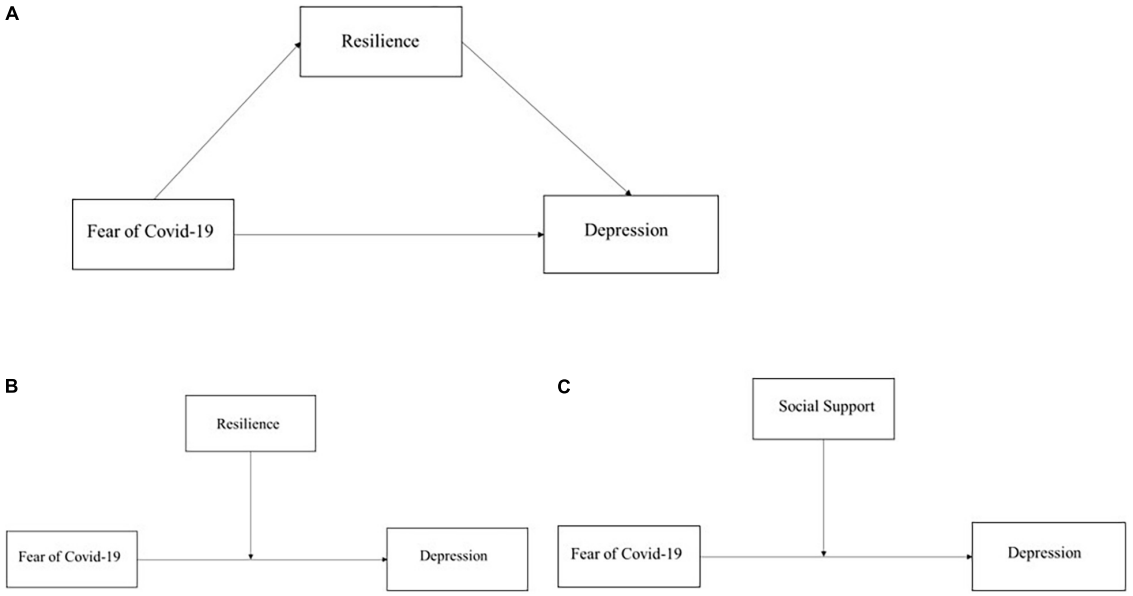

FIGURE 1 | Conceptual models. **(A)** Conceptual model for testing whether resilience will mediate the association between FoC and depression. **(B)** Conceptual model for testing whether resilience will moderate the association between FoC and depression. **(C)** Conceptual model for testing whether social support will moderate the association between FoC and depression.

demonstrated that resilience worked as a moderator in relieving depressive symptoms throughout the COVID-19 pandemic period. Meanwhile, recent empirical studies indicated that when resilience works as a moderator, it has a buffering effect on depression caused by the negative consequences associated with the COVID-19 pandemic (Aguiar-Quintana et al., 2021; Schierberl Scherr et al., 2021). Considering the buffering effect of resilience on depression, the present research also proposed to explore the potential buffering effects of resilience on the relationship between the FoC and depression of the COSs studying online in China. Thus, this study aimed to explore that:

Hypothesis 3 (H3): Whether the low levels of resilience will moderate the association between FoC and depression (as shown in the conceptual framework in **Figure 1B**).

The Moderating Role of Social Support

Social support has been shown to function as a buffering variable in reducing the negative consequences of mental illness (Cohen and Wills, 1985; Trepte et al., 2015). Hornstein and Eisenberger's (2017) research (2017) illustrates that social support has a preventative effect on the fear-related adverse effects; within this context, social support is essential to help aid the psychological problems (Li et al., 2021). College students with lower levels of social support are more likely to suffer from mental illnesses (Hefner and Eisenberg, 2009). Previous research has shown that social support is negatively correlated with depression (McDougall et al., 2016).

Besser and Priel (2008) found that social support affects depression by acting as a moderator of death-related fears, but not the COVID-19-related fears. However, a previous study revealed that social support is an influencing moderator of depression in the Chinese student groups (Zhou et al., 2013; Hou et al., 2020). Therefore, the present study argues that for the COSs with less social support, their depression levels are higher than those the COSs with lower FoC. Although previous research has shown that social support has a buffering effect on depression (Rueger et al., 2016), less support is extended to the influence of FoC. Thus, based on the previous evidence, this study hypothesized that:

Hypothesis 4 (H4): Low levels of social support will moderate the association between FoC and depression (as shown in the conceptual framework in **Figure 1C**).

MATERIALS AND METHODS

Participants and Procedure

Considering the social-distancing requirement during the COVID-19 pandemic period, all the data were collected through an online self-administered survey questionnaire. This study involved 476 COSs, including 164 males (34.5%) and 312 females (65.5%), currently studying *via* online mode in China from the different universities worldwide. The survey was conducted from March 2021 to May 2021 and all the participants had returned to China before January 2021. For the age range, 243 participants ranged from 18 to 22 years (51.1%), 206 participants ranged from 23 to 27 years (43.3%), and 27 participants were older than 27 years (5.7%). Meanwhile, 238 participants were undergraduate students (50.0%) and 238 participants were graduate students, which including 213 participants at the master level (44.7%) and 25 participants at the doctoral level (5.3%). The reporting

studying area indicates that 31.1% (n = 148) of participants were studying in Hong Kong special administrative region (SAR)/Macau SAR/Taiwan of China, 27.7% (n = 132) of participants were studying in North America (including the United States and Canada), 19.1% (n = 91) of participants were studying in the United Kingdom or European Union countries, 16.6% (n = 79) of participants were studying in the Asian countries (e.g., Japan, South Korea), 5.3% (n = 25) of participants were studying in Australia or New Zealand, and 0.2% (n = 1) of participants were studying in the other regions. The demographic information is shown in **Table 1**.

MEASURES

Demographic Information

Participants provided age (1 = ranged from 18 to 22 years; 2 = ranged from 23 to 27 years; 3 = older than 27 years), sex (0 = male; 1 = female), education level (1 = undergraduate students; 2 = master-level students; 3 = doctoral-level students), and outbound studying region.

Fear of the COVID-19

Fear of the COVID-19 was measured by using the Fear of the COVID-19 Scale (FCV-19S) (Ahorsu et al., 2020). The FCV-19S contains seven items that measured FoC content with two domains: physical response of fear (four items) and fear thinking (three items). Items are measured on a 5-point Likert scale (from 1 = disagree to 5 = completely agree) where a higher mean score indicates higher FoC (Ahorsu et al., 2020). The previous study has validated the FCV-19S in different contents including Chinese content (Chi et al., 2021). The Cronbach's alpha of the FCV-19S was 0.83.

TABLE 1 | Demographic information of the participants (N = 476).

Variable	*N*	Percent
Sex		
Males	164	34.5%
Females	312	65.5%
Age Range		
18 to 22 years	243	51.1%
23 to 27 years	206	43.3%
above 27 years	27	5.7%
Education Level		
Undergraduate	238	50.0%
Master Level	213	44.7%
Doctoral Level	25	5.3%
Studying Region		
HK/MO/TW	148	27.7%
North America	132	27.7%
UK/EU	91	19.1%
Asia	79	16.6%
Australia/New Zealand	25	5.3%
Others	1	0.2%

North America including The United States of America and Canada; HK, Hong Kong SAR, China; MO, Macao SAR, China; TW, Taiwan, China; UK, The United Kingdom of Great Britain and Northern Ireland; EU, Countries in the European Union; Asia, Asian countries (excluding China).

Depression

Depression was measured by using the Beck Depression Inventory-II (BDI-II) scale (Beck et al., 1996). The BDI-II contains 21 items that measured the level of depression in the recent 2 weeks; each item was rated on a 4-point scale (from 0 = symptom not present to 3 = symptom strongly present) with a higher mean score indicating a higher degree of depression (Beck et al., 1996). Wang et al. (2011) validated the BDI-II in Chinese content and the Cronbach's alpha of the BDI-II scale was 0.80.

Resilience

Resilience was assessed by using the Connor–Davidson Resilience Scale (CD-RISC) developed by Connor and Davidson (2003). The CD-RISC consists of 25 items rated on a 5-point Likert scale (from 0 = *not true at all* to 4 = *true nearly all the time*) with a higher mean score reflecting higher resilience (Connor and Davidson, 2003). The CD-RISC was validated in a well-used Chinese content by Yu and Zhang (2007) and the Cronbach's alpha of the CD-RISC was 0.91.

Social Support

Social support was measured by using the 6-item COVID-19 Version Perceived Social Support Questionnaire (F-SozU) developed by Sommerlad et al. (2020). This questionnaire is an adapted version of the F-SozU (Kliem et al., 2015) to measure perceived social support during the COVID-19 pandemic period. Each item was rated on a 5-point scale (from 1 = *not at all true* to 5 = *very true*) with a higher mean score reflecting the higher level of perceived social support. The Cronbach's alpha of the F-SozU was 0.83.

Statistical Analysis

The SPSS software version 26.0 was used for the data analysis. The demographic characteristics were analyzed by descriptive analyses. The Pearson correlation was calculated to test the bivariate correlations among FoC, resilience, social support, and depression. According to Hayes (2013), Model 4 and Model 1 in the PROCESS macro for SPSS (version 3.5.3) were used to test the mediating role of resilience as well as the moderating roles of resilience and social support. About 95% CIs of the indirect effects were calculated from 5,000 bootstrap resamples estimates in which mediating and moderating effects are significant at $p < 0.05$ when the CI does not include zero.

RESULTS

Bivariate Correlations Among Study Variables

Descriptive statistics and correlations for all the variables are shown in **Table 2**. FoC was positively correlated with depression (r = 0.59, $p < 0.001$) and H1 was supported. Besides, FoC was negatively correlated with resilience (r = 0.37, $p < 0.001$) and social support (r = 0.24, $p < 0.001$). Both resilience (r = 0.52,

$p < 0.001$) and social support ($r = 0.42$, $p < 0.001$) were negatively correlated with depression. Moreover, social support showed a significant positive correlation with resilience ($r = 0.63$, $p < 0.001$).

Role of Resilience

After controlling for sex, age, and education level, the mediating effect of resilience on the association between FoC and depression was analyzed. The results of the regression analysis are shown in **Table 3**.

When sex, age, and education level were included in the regression model as three control variables, the results showed that FoC has a significant positive association with depression (β = 0.583, $p < 0.001$). Meanwhile, the negative association between FoC and resilience (β = 0.359, $p < 0.001$) as well as the negative association between resilience and depression (β = 0.357, $p < 0.001$) was also significant. Moreover, when resilience was used as a mediator, the positive association between FoC and depression (β = 0.455, $p < 0.001$) was also significant. The bootstrap results of the mediating effect indicated that the indirect effect of FoC on depression was significant (β = 0.113, $SE = 0.017$, 95% CI = 0.082, 0.148) and the mediating effect caused a variance of 21.89% of the total impact of the models (**Table 4**). As 95% CI in the path did not contain zero value, the results confirmed that H2 was supported.

To investigate the moderating effect of resilience and social support on the association between FoC and depression, the aforementioned covariates were controlled. **Table 5** shows the interaction between FoC and depression from resilience emerged as a significant predictor [β = 0.006, $p < 0.05$, 95% CI 0.012; 0.001, $R^2 = 0.459$, $F(6,469) = 66.482$, $p < 0.001$]. Additionally, changing $R^2 = 0.007$ statistically due to interactions, $F(1,469) = 5.885$, $p < 0.05$, which means that the moderation explained the 45.96% of the variance in the resilience of the model. Therefore, resilience has a positive significance on the relationship between FoC and depression. The results illustrated the interaction by depicting the regression line of the relationship between FoC and depression at high, medium, and low (+1 SD, mean, –1 SD) resilience scale scores. The graph showed that resilience played a role in narrowing the positive correlation between FoC and depression mentioned in the research literature. The highest levels of depression were found in the individuals who reported low levels of FoC and low resilience (**Figure 2**). Overall, the results of the moderation analysis indicated that the resilience of the individuals attenuated the association between FoC and depression in the COSs. Thus, H3 was supported.

TABLE 2 | Descriptive statistics and correlations between variables ($N = 476$).

	M	SD	1	2	3	4
1. Fear of COVID-19	15.94	5.99	1			
2. Resilience	62.97	11.77	−0.37***	1		
3. Social Support	3.51	0.61	−0.24***	0.63***	1	
4. Depression	10.11	5.30	0.59***	−0.52***	−0.42***	1

***$p < 0.001$.

The Moderating Role of Social Support

After controlling for sex, age, and education level, the moderating effect of social support on the association between FoC and depression was analyzed. Contradictory to H4, the result showed that the moderating role of social support is insignificant. Being a predictor of FoC on depression, social support does not act as a moderator for the relationship [β = 0.002, $F(6,469) = 58.8261$, $p = 0.956$] (**Table 6**.). Thus, H4 was rejected.

DISCUSSION AND CONCLUSION

Discussion

This study examined the mediating effect of resilience as well as the moderating effects of resilience and social support on the relationship between FoC and depression among the COSs studying online amid the COVID-19 pandemic period. The correlational analyses revealed that FoC had a positive relationship with depression, which was consistent with the previous studies that higher FoC is positively correlated with increased depression (Bakioğlu et al., 2020; Al Majali and Alghazo, 2021). The results indicated that FoC is an important trigger for depression among the COSs studying online amid the COVID-19 pandemic period. Marcus et al. (2014) argued that depression is a serious affliction that has a negative impact on the mental health of an individual. Thus, those COVID-19-related fears may increase the likelihood of depressive symptoms, which negatively influence the mental health of the COS.

This study also contributes to the theory by revealing the mechanism through which FoC influences the depression of the COSs studying online in China. Although previous research revealed that FoC is associated with depression, the underlying mechanism was not enough clear. Previous research indicated that mindfulness could help to counter the negative effects of FoC on depression, thus reducing depression (Belen, 2021). This study demonstrated the mediating role of resilience between FoC and depression. Previous research has shown that a higher level of FoC can restrain resilience, thus bombing the depression (Yıldırım et al., 2020), this study further examined that resilience is an effective mediator in the linkage between FoC and depression among the Chinese group. Resilience is mediated by assessing the path from FoC to depression. Weaker resilience is equipped when the individual experiences a higher-level fear mood. The situation of the COSs is different from those of Chinese students studying in the domestic universities in mainland China. They face the cultural differences and changing international circumstances after the COVID-19 outbreak that are complicated. At the same time, the institution of non-native languages and diverse curricula of outbound universities are stressful (Ching et al., 2017). Therefore, the COSs need the strong capability to adjust themselves to deal with fear, difficulty, and uncertainty. Resilience can meet all those requirements of the COSs ensuring that the COSs counter negative situations and enhance their mental health.

The findings of this study also showed that resilience moderated the relationship between FoC and depression, which is consistent with prior research showing that resilience has a

negative and substantial impact on depression (Hjemdal et al., 2011). Individuals with weaker resilience are more likely to experience depressive symptoms. This finding further explains the resilience theory (Van Breda, 2001). Furthermore, those COSs studying online in China also need to endure time differences, network latency, and various emergencies while conducting their online learning. Under the special circumstances of the COVID-19 pandemic period, the COSs with higher resilience are more capable of dealing with social isolation, life stress (Cacioppo et al., 2011), and the threats of various crises (Kimhi et al., 2020). Thus, the COSs with stronger resilience may be better able to withstand the FoC and recover from its negative effects.

The present finding also contributes to the buffering effect in the buffering model of social support (Aneshensel and Stone, 1982). The moderating effect of social support on the association between FoC and depression was not sustained in this study. It was found that social support can be a preventive factor against negative psychological and emotional effects among Chinese students (Cheng, 1997; Chen, 2018). Previous studies also indicated that social support can be a preventive factor against negative psychological emotions among Chinese students (Cheng, 1997; Chen, 2018). The COSs are generally faced with high financial costs, high expectations from their families, heavy academic tasks, and not assimilated stereotypes of the Chinese group (Ruble and Zhang, 2013; Fang et al., 2020; Xi et al., 2020). In particular, the widespread prejudice against the China and Chinese citizens after the COVID-19 outbreak has put the COSs in a more complicated and hostile environment (Mittelmeier and Cockayne, 2020); thereby, social support is particularly imperative for them in this challenging situation. The reason why only a weak moderating effect was found could be that mere provision from the interpersonal resources is not sufficient to prevent the negative mental consequences under the predicament. Social support could only be beneficial if it is tailored to the most appropriate coping methods for the stressful circumstances (Sarason et al., 1990; Schreurs and de Ridder, 1997; André-Petersson et al., 2006). Therefore, future studies should focus more on the application environment of social support to provide the students with valuable helping in threatening those difficulties.

Fear of the COVID-19 has a tremendous mental health impact all over the world; therefore, related mental illness prevention is critical during this difficult time (Pakpour and Griffiths, 2020). While e-learning mode is employed worldwide during the COVID-19 pandemic period, this finding can provide empirical evidence in implementing psychological interventions to prevent depression among international students. As a result of their minority status, the mental health of the international students is often neglected by both their homeland and their studying region and they are more prone to depressive disorders (Chen et al., 2020). To help the international students to minimize their depression, FoC should be avoided that can be utilized as a preventive therapy. They could also be incorporated into the mental health training program of the college to assist the international students in building psychological resilience (Saltzman et al., 2020), hence minimizing depression.

Since FoC is a reaction to the worldwide spread of the COVID-19 (Daniel, 2020), this study can provide empirical data to verify the detrimental mental impact on the FOC as well as suggest novel models involving resilience, social

TABLE 3 | Regression analysis of relationship between fear of COVID-19 and depression with mediation analyses (N = 476).

		Coeff.	Standardized Coeff.	Boot Se	p	Bootstrap 95%CI		R^2	F
						Lower	Upper		
Resilience (Model I)								0.153	21.215***
	Constant	1.567		1.639	0.339	−1.655	4.788		
	Gender	−3.189	−0.129	1.053	0.003**	−5.257	−1.121		
	Age	1.171	0.059	1.178	0.321	−1.143	3.485		
	Education Level	−0.829	−0.042	1.191	0.486	−3.169	1.510		
	FoC	−0.705	−0.359	0.084	< 0.001***	−0.869	−0.540		
Depression (Model 2)								0.345	61.972***
	Constant	−0.664		0.649	0.307	−1.941	0.612		
	Gender	0.148	0.013	0.417	0.723	−0.672	0.967		
	Age	0.140	0.016	0.467	0.764	−0.777	1.057		
	Education Level	0.226	0.025	0.472	0.633	−0.701	1.153		
	FoC	0.516	0.583	0.033	< 0.001***	0.451	0.582		
Depression (Model 3)								0.453	77.792***
	Constant	−0.412		0.595	0.489	−1.581	0.757		
	Gender	−0.365	−0.033	0.385	0.344	−1.123	0.392		
	Age	0.328	0.037	0.427	0.443	−0.511	1.168		
	Education Level	0.092	0.010	0.432	0.831	−0.756	0.941		
	FoC	0.403	0.455	0.033	< 0.001***	0.339	0.467		
	Resilience	−0.161	−0.357	0.017	< 0.001***	−0.194	−0.128		

*$p < 0.01$, ***$p < 0.001$.

support, and depression with FoC as a predictor. The findings of this study could contribute to understanding the buffering variables and the mental resources that are important to mitigate unfavorable consequences of mental health during the COVID-19 pandemic period. By suggesting that resilience may assist in minimizing depression, this study provided a novel research path for preventing mental health problems. Promoting internal resilience would be an effective strategy for reducing depression when faced with hardship (Brewin et al., 1989; Malhi et al., 2019).

TABLE 4 | Resilience in the mediation effect analysis (*N* = 476).

	Effect	Boot SE	Bootstrap 95%CI		Effect%
			Lower	Upper	
Total effect	0.516	0.033	0.451	0.582	
Direct effect	0.403	0.033	0.339	0.467	78.10%
Indirect effect	0.113	0.017	0.082	0.148	21.89%

TABLE 5 | Results from a regression analysis examining the moderation of the effect of FoC on depression by resilience (*N* = 476).

Variables	Outcome: Depression				
	Coeff.	*SE*	*p*	LLCI	ULCI
Constant	−0.579	0.596	0.332	−1.750	0.592
FoC	0.394	0.033	< 0.001***	0.329	0.458
Resilience	−0.158	0.017	< 0.001***	−0.191	−0.126
FoC × Resilience	−0.006	0.003	0.016*	−0.012	−0.001
Gender	−0.391	0.383	0.308	−1.145	0.362
Age	0.329	0.425	0.439	−0.506	1.165
Education Level	0.104	0.429	0.809	−0.740	0.949
	R^2 = 0.4596				
	$F(6, 469) = 66.482$, $P < 0.001$				

*$p < 0.05$ and ***$p < 0.001$.

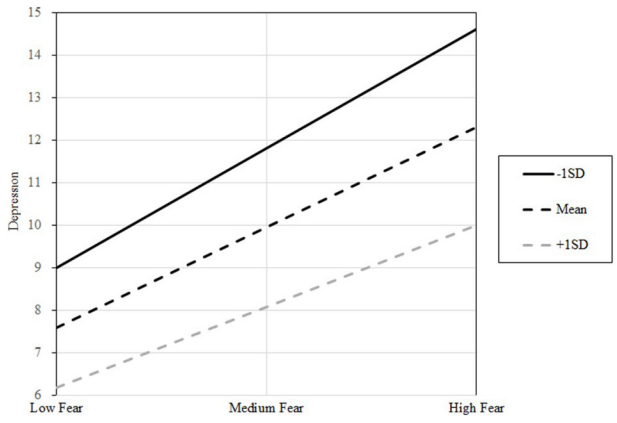

FIGURE 2 | Results of the moderation model. Three lines are the visual representation of different moderation effects of FoC on depression when resilience scores were at its +1 SD, mean, and –1 SD. Fear refers to fear of COVID-19 (FoC).

Implications

First, this study extends existing FoC and depression literature among the international student group by showing that FoC has a significant positive effect on the depression of the COS. A positive association between FoC and depression was found, which is consistent with previous studies showing that FoC can be a trigger to depression in the domestic contexts (Bakioğlu et al., 2020; Al Majali and Alghazo, 2021). Second, the findings indicated that FoC is associated with depression through both the mediation and moderation models with resilience. The current findings confirmed that resilience has significant implications in preventing the negative mental states under the COVID-19 context. The underlying mechanism of association between FoC and depression was explored. These findings also provided a more comprehensive grasp of mental health services and higher education institutions working with the international students to help determine the protocols and interventions to prevent mental illness in the students.

Limitations and Future Directions

Some limitations that exist in this study need to be acknowledged. First, a previous study revealed that there are regional differences in FoC (Lo Coco et al., 2021). However, the different influences from the studying region of the COS were not applicable in this study. Second, the present sample of the COSs was predominantly composed of those studying in North America, the United Kingdom/European Union, or Hong Kong/Macau/Taiwan of China because of the commonly known study region preference of the COSs. Therefore, future studies should focus on the COSs from a specific region or obtain a more region-balanced sample to indicate the influence of FoC among the COSs studying in the different regions. Furthermore, this study did not collect the information on the current resident region in China of those COSs. Previous research has found that regional differences in various areas of China (e.g., comparing Wuhan with other cities in the low-risk infection areas) on the impact of the COVID-19 on mental health due to the epidemic history and risk of infection in these areas (Wen et al., 2020; Ge et al., 2021). Thus, a future study involving

TABLE 6 | Results from a regression analysis examining the moderation of the effect of FoC on depression by social support (*N* = 476).

Variables	Outcome: Depression				
	Coeff.	*SE*	*p*	LLCI	ULCI
Constant	−0.132	0.115	0.249	−0.358	0.093
FoC	0.511	0.036	< 0.001***	0.440	0.582
Social Support	−0.301	0.036	< 0.001***	−0.372	−0.229
FoC × Social Support	−0.002	0.035	0.956	−0.069	0.066
Gender	−0.014	0.074	0.854	−0.159	0.131
Age	0.069	0.083	0.407	−0.094	0.231
Education Level	0.023	0.083	0.787	−0.141	0.186
	R^2 = 0.4294				
	$F(6,469) = 58.8261$, $P < 0.001$				

***$p < 0.001$.

a regional difference in China could be conducted. Moreover, the study cannot directly emphasize the mechanisms of social support in preventing depression. Previous studies measured social support from different perspectives (Eagle et al., 2019; Ye et al., 2019) and perceived social support from different sources (Procidano and Heller, 1983). This study only measured the perceived social support during the COVID-19 pandemic period without detailed information on the support resources. Therefore, an additional measurement of social support that would be applied in the current results is not confirmed. On the other hand, the current study is only a cross-sectional design, which makes our findings that are not deep-going and comprehensive enough. Therefore, a longitudinal design that addresses the temporal association among those variables or an experimental design to control more confounding variables could be adopted in future studies. Fourth, due to the social distancing considering during the COVID-19 pandemic period, this study utilized an online self-reporting questionnaire; thus, interference from the external environment and potential response bias to the items were unavoidable. Therefore, multiple rating sources or measurements should be utilized to minimize the presence of bias during the data collection. Fifth, we use the Hayes approach (2013) to test the mediating and moderating roles of resilience and social support, which contains some potential limitations. Although this approach exhibits considerable statistical power, it is also more likely to make the error of type I than the other mediating and moderating methods (Preacher et al., 2011; Fang and Wen, 2018). Therefore, future research needs to take into account the errors caused by the statistical methods.

Conclusion

This study demonstrated the mediating effect and the moderating effect of resilience on the relationship between FoC and depression among the COSs studying online in China during the COVID-19 pandemic period. However, the moderating effect of social support on the association between FoC and depression was not sustained in this study. The findings provided empirical evidence to confirm not only a positive relationship between FoC and depression but also suggest that it is mediated as well as moderated by resilience. Thus, providing more research evidence to attention in resilience training from institutions in higher education because of their significant role in the mental health of the international students.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Research Ethics Sub-Committee of the College of Liberal Arts and Social Sciences in the City University of Hong Kong. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

YC designed the research and completed the manuscript writing. YC, YL, and ZL collected and analyzed the data. YZ and TZ reviewed and edited the manuscript. All authors contributed to the article and approved the submitted version.

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Socioeconomic Status, Parental Involvement and Implications for Subjective Well-Being During the Global Pandemic of Covid-19

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School closures prompted by the global outbreak of COVID-19 have impacted children's subjective well-being. In this context, a growing number of studies has pointed out that the experience of learning at home is an essential factor influencing their subjective well-being, raising the importance of parental involvement in the educational process of their children. This article explores the formal and informal parental practices of home learning during school closures period in 19 countries and their explanatory factors, with the further aim of discussing their implications for children's subjective well-being. The study uses the International COVID-19 Impact on Parental Engagement Study (ICIPES) database and develops a regression analysis of family, child, and school factors predicting parental involvement in homeschooling. The main findings show that parents' socioeconomic status is a critical predictor of both formal and informal parental practices. In addition, the results denote the impact of other factors, such as the level of parental confidence with the use of technology and children's age and gender (in the case of informal activities). Based on these findings, the article discusses policy implications to promote parental involvement and children's subjective well-being.

Keywords: socioeconomic status, parental involvement, school closure, COVID-19, subjective well-being

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1 INTRODUCTION

School closures during the expansion of the COVID-19 pandemic on education have impacted 94% of the world's student population (United Nations, 2020a). As a response to this scenario, 90% of the ministries of education have implemented some form of remote learning approaches, including radio, television, or the internet (UNICEF, 2021).

Research about the pandemic effects on children and adolescents is still emergent. Recent literature reviews have alerted about the impact of lockdown measures -and notably schools' closures-on children's well-being. Indeed, consistent evidence has shown not negligible effects on a range of emotional, behavioral, and restlessness/inattention problems, as well as a decrease in life satisfaction, which are expected to disproportionally affect disadvantaged students (Bathia, 2020; Rajmil et al., 2021; Viner et al., 2021). For example, evidence for children and adolescents aged 3–18 years in Italy and Spain states that 85,7% of parents perceived changes in their children's emotional status and behavior, including symptoms such as difficulty concentrating, boredom, irritability, feelings of loneliness, uneasiness, and worries (Bathia, 2020). Moreover, data from Oslo (Norway) has identified a significant decline in life satisfaction among boys and girls during the

restriction period (Bathia, 2020), and in Canada more than half of the children 9–15 years surveyed presented changes that contribute to a lower level of subjective well-being (Mitra et al., 2021).

Several studies have pointed out that the experience of home learning is an essential factor influencing their subjective well-being. In this area, research has posited that the quantity and difficulty of school homework is a predictor of well-being, i.e., when the school work load is high and/or difficult it has been related with a decrease in subjective well-being during the pandemic (Engel de abreu et al., 2021). Moreover, research has highlighted the association between academic activities and socioemotional problems, showing that learning activities are negatively associated with behavioral problems (e.g., emotional symptoms, hyperactivity/inattention, and peer relationship problems) (Tso et al., 2020). In addition, a recent study shows that students with better learning experiences at home report lower emotional reactions (e.g., "felt sad," "felt angry," "felt lonely") and low somatic/cognitive responses (e.g., "had trouble concentrating," "had headaches") (Larsen et al., 2021). Considering these findings, international reports have called to enhance parental support of children's homeschool experiences to protect their subjective well-being, while advancing on research about families' involvement in learning at home (e.g., Engel de Abreu et al., 2021; O'Connor et al., 2020; OECD, 2020).

Different national studies developed in the context of the global pandemic have provided evidence about parents' responses to school closures (Zancajo, 2020). In general, the results show the critical role of parents' SES in supporting their children learning at home. In this sense, all the papers have shown how socioeconomic differences—measured as occupational status, educational level, or family income—are relevant factor predicting the quality of home support for schooling to face the COVID-19 pandemic in countries as diverse as Spain (Bonal and González, 2020), Chile (Treviño et al., 2021), England (Andrew et al., 2020; Bayrakdar and Guveli, 2020) and Netherlands (Bol, 2020). Most of these studies have been developed in middle and/or high-income countries through online surveys. In this way, while previous literature has provided initial evidence on the relationship between COVID-19, parental support, and subjective well-being, studies have not yet examined global patterns in a wider range of countries, including OECD and non-OECD members. Therefore, expanding research to a cross-national sample of countries opens the opportunity to study global trends in this area in diverse geographical, socioeconomic and cultural settings.

Based on these emergent results and adopting a supranational perspective, this article explores the parental practices of home-learning during school closures period in 19 countries and its explanatory factors through regression models, with the aim of discussing its implications for the subjective well-being of children and adolescents. The study uses the International COVID-19 Impact on Parental Engagement Study (ICIPES) database (Osorio-Saez EM. et al., 2021), which includes data from countries as diverse as Chile, United States, Ghana, China, Japan or Pakistan.

The article is divided into four sections. The first part presents the research framework of the study, in which we delve into the concept of parental involvement and its explanatory factors, as well as its relationship with children's well-being. The second section describes the research method, including the data, variables and analytical strategy used. The third part presents the main findings. The paper ends with the core conclusions and a set of policy and research implications.

2 RESEARCH FRAMEWORK

The expansion of the covid-19 pandemic can be defined as a global socio-natural disaster. It is socio-natural because, in contrast to the epidemiological views of the pandemic, COVID-19 can be understood as a both natural and social phenomenon, dissolving the modernist dichotomy that divided humans from nature (Rogers et al., 2013). It is a disaster, since it has interrupted routines and has caused the collapse and/or stress of several social organizations and institutions (Lavell et al., 2020). Finally, it is global, not only because of the scale of the problem, but also because of the transnational and relational nature of its consequences (Castells, 2006).

This conceptualization of COVID-19 as a global socio-natural disaster reinforces the idea that all systems and organizations in the world have been challenged by the pandemic. In education, the outbreak of the COVID-19 pandemic has generated a global transformation rarely seen since the World War II. COVID-19 has forced schools to transform the learning process and to promote distance or online teaching. Additionally, students' daily interactions with their peers have been interrupted, generating a decrease in the opportunities of peer-to-peer socialization of children and adolescents. Finally, homes adapted to the new education dynamics, with parents assuming a more active role in the school teaching process while, in many cases, working from home. In this context, parental involvement in the educational process has emerged as one of the central topics of research due to school closures during the pandemic (Bonal and González, 2020).

Parental involvement is as the participation of parents in the educational process and experience of their children (Wilder, 2013). More precisely, parental involvement refers to the "proactive engagement of parents in various activities and behaviors that aim to promote learning and development of their children" (Ma et al., 2016: 773). Different studies have demonstrated the benefit of parental involvement on student achievement (e.g., Ma et al., 2016), social-emotional skills (Van Voorhis et al., 2013), well-being, and mental health (Hornby and Blackwell, 2018). Considering the vastness of the concept (Goodall, 2013), researchers have operationalized the term as a continuum between involvement in/with school, involvement in schooling, and involvement with learning of children and adolescents (Goodall and Montgomery, 2014). There are also diverse types of involvement such as parenting, communicating, volunteering, learning at home, decision making and collaborating with the community (Epstein, 2011), which can be either overt or implicit practices (Tan et al., 2020). Parental

involvement can be analyzed according to spheres of involvement in which a difference has been introduced between practices at school and at home (Hornby and Blackwell, 2018). Focusing on the home sphere, the literature distinguishes formal and informal educational practices. Formal educational practices directly aim at supporting schooling—such as teaching or practicing their numeracy or literacy skills—while informal educational practices, indirectly or spontaneously, expose students to opportunities to learn, for example through cooking or playing games (Skwarchuk et al., 2014).

Research has positioned parental involvement as a critical condition to support student learning and well-being. Simultaneously, the evidence shows the weight of the SES in the capacity of parents to provide support for schooling, due to inequalities in the distribution of economic, social and cultural capitals among families (Harris and Goodall, 2008; Lareau, 2000, 2011; Tan et al., 2020). For example, a recent metanalysis found that parental education is related to the capacity to provide support, showing that parents with higher education can offer more home support to their children (Tan et al., 2020). Adopting a broader perspective, Horbny and Lafaele (2011) have raised attention to four types of factors of parental involvement for all SES groups: a) *individual parent and family factors* (e.g., parental beliefs and perceptions on involvement, current life contexts, class, ethnicity, and gender); b) *child factors* (e.g., age, learning difficulties, disabilities or talents, and behavioral problems); c) *school factors* (e.g., differing goals and agendas, attitudes, language used); and, d) *societal factors* (e.g., historical and demographic, political, economic) (Horbny and Lafaele, 2011). Consequently, parental involvement seems to be the product of particular social, economic, and cultural conditions, in which the SES is a relevant factor, but not the only explanatory variable. In terms of the specific role of SES on parental involvement, research has outlined that low-SES families face barriers in terms of economic hardships, time-consuming work, lower pedagogical competencies, and scarce interactions with schools and teachers (e.g., Lareau, 2000; Horby and Lafaele, 2011; Wang et al., 2016).

Different national studies have investigated families' responses to school closures, highlighting the critical role of parental SES on homeschooling practices (Zancajo, 2020). In this line, available evidence, proceeding primarily from OECD's countries -such as England, Spain, or the Netherlands-has shown inequalities in the number of hours dedicated to learning at home and the type of activities in relation to family income (Andrew et al., 2020). The literature has also found variations on involvement with more educated families providing both higher quality and more intense support (Bol, 2020; Bayrakdar and Guveli, 2020). Also, higher SES parents are more confident on their abilities to satisfy their children's learning needs (Bonal and Gonzalez, 2020; Bol, 2021). Finally, higher SES families tend to engage to a greater extent in informal homeschooling practices aligned to school logic as well as in extra-curricular activities (Bonal and Gonzalez 2020; Treviño et al., 2021).

Other family factors, along with SES, are also related to parental involvement. One study points out that single parents tend to spend significantly less time on schoolwork at home in comparison to bi-parental households during COVID-19 school closures (Bayrakdar and Guveli, 2020). This suggests that household composition (Myers and Myers, 2015) may be related to the burden that single parents may have faced during this period (Bayrakdar and Guveli, 2020). Complementarily, recent studies have discussed the trend of more significant support in primary school for boys and more intensive support for girls in secondary education (Bol, 2020). Finally, initial evidence shows that online learning is a factor that moderates the role of parents' SES in homeschooling (Bayrakdar et al., 2020).

The intensity of school activities during the pandemic also may affect well-being in the households. As the teaching processes moved from classrooms to the households, parents or adults in charge do not necessarily have the skills or time to support intense school activities and homework (Ponce et al., 2021). Therefore, during the pandemic, the level of pressure on parents to teach their children at home (Fontenelle-Tereshchuk,2021; Parczewska, 2020) may create tension in the relationship and negatively affect subjective well-being of children and adolescents.

Recent evidence shows a positive association of parental engagement with facilitating conditions (e.g., the existence of tools and technological platforms provided or suggested by schools), as well as social influence (e.g., parents exposition and exchanges with other parents, teachers, children, etc). Finally, there is a negative relationship of parental engagement with the knowledge or performance when using technological devices (Osorio-Saez E. et al., 2021).

Summarizing, the literature shows that formal and informal parental involvement practices in home-learning are linked to children's subjective well-being. This study explores home-learning parental practices during school closures due to COVID-19 in 19 countries and the factors that explain such practices. Consistently with available research, the study examines how formal and informal educational practices at home are related to family factors (e.g., SES, confidence using technology), children's factors (e.g., age, gender), and school requirements for families when supporting home-learning.

3 DATA AND METHODS

3.1 Data

The data for this study comes from the International COVID-19 Impact on Parental Engagement Study (ICIPES) (Osorio-Saez EM. et al., 2021). This study "investigated the ways in which parents and caregivers are building capacity to engage with children's learning during the period of social distancing arising from the global Covid-19 pandemic" (Osorio-Saez et al., 2020:3). The survey was conducted online in 23 countries (Belgium, Cameroon, Chile, China-Mainland-HongKong-Macao, Colombia, Costa Rica, El Salvador, Ethiopia, Ghana, Honduras, India, Italy, Japan, Mexico, Pakistan, Peru, Spain, Sri Lanka, Tanzania and Zanzibar, Turkey, United Kingdom, Uruguay, and United States), achieving a total sample of 4.658 parents/caregivers with children between 6 and 16 years old (mean = 4.36).

TABLE 1 | Number of observations and days the school was fully closed per country.

Countries	N	Days: Fully closed
Chile	1.597	67
China	217	33
Colombia	94	115
Costa Rica	155	189
El Salvador	83	205
Ethiopia	171	151
Ghana	142	50
Honduras	246	147
India	54	146
Italy	517	66
Japan	159	11
Mexico	244	180
Pakistan	45	112
Sri Lanka	199	141
Tanzania	58	52
Turkey	78	129
United Kingdom	191	62
United States	289	0
Uruguay	61	20

Source: ICIPES, 2020 (Osorio-Saez EM. et al., 2021) and UNICEF, 2021. Note: The number of observations refers to the number of parents that completed the survey.

Despite having information for 23 countries, four were omitted from this study due to a low response rate. Therefore, the final sample is composed of 4.600 parents/caregivers belonging to 19 countries. As each country experienced school closures due to the COVID-19 pandemic at different periods, **Table 1** presents the number of observations per country and the number of days schools were fully closed (between March 11, 2020–February 2, 2021), according to UNICEF (2021) data.

3.2 Procedures

Data collection took place from May 2020 to August 2020. The survey was distributed through the social networks of the participating academic institutions in each country (Osorio-Saez, et al., 2021a). The survey was translated into seven languages (Japanese, Turkish, Spanish, Urdu, Traditional Chinese, French and Italian). In addition, a minimum threshold of 200 parents with complete surveys was established to ensure data quality[1] (Osorio-Saez, et al., 2020). However, it is important to note that the sample is non-probabilistic and not representative at the country level. In fact, most of the parents that answered the survey have a higher education degree, a figure that suggests that the sample may be biased towards higher SES households.

3.3 Variables

For the analysis, we constructed two parental involvement variables: formal educational practices and informal educational practices. Additionally, and considering our research framework, we use as predictors family SES, confidence using technology and family structure; as well as child age, gender, and rurality; and intensity of school activities and homework. **Table 2** shows the descriptive statistics of the variables used in the analysis.

3.3.1 Dependent Variable

Based on a Confirmatory Factor Analysis (CFA), we measure parental involvement in two dimensions: formal educational practices and informal educational practices. On the one hand, the formal educational practices dimension was created using three items: i) Are you teaching your child at home? (Taking the time for sitting and explaining the topics and activities to them) (PEHS); ii) My children and I have a set homeschooling timetable (PE_4); and iii) Check the school's emails, blog, and website to follow the activities they suggest for the children (PUTR_1). The items involving formal educational practices have answer options in a form of Likert scale (Always, Often, Occasionally, Rarely, and Never). However, due to the upward bias of parental responses we dichotomized these variables assigning Yes = 1 for the options Always, Often, and Occasionally, and recoding Rarely and Never as No = 1. On other hand, the informal educational practices dimension was constructed through eight items: i) Eating meals together (PENTMA_1); ii) Shopping online (PETMA_3); iii) Learned about something on the internet (PETMA_4); iv) Reading an electronic book or article together (PETMA_5); v) Watching a film and discussing it together (PETMA_6); vi) Created a piece of art on paper or using any other physical material together (PENTMA_7); vii) Used technology to create or edit videos, photos or music or other content (PETMA_7); and, 8viii) Played computer/video games (PETMA_9). It is important to note that the items of informal educational practices are dichotomous, and they were collected as 1 = Yes, and 0 = No. In both scales, we constructed an index, with mean = 0 and standard deviation = 1.

The CFA is conducted using a theorical model on parental involvement following the research framework. In the formal educational practices dimension, three items available in the database related to learning support are selected. Meanwhile, in the informal educational practices, 17 actions performed at home that indirectly expose students to the acquisition of learning are identified. In this second dimension, an Exploratory Factor Analysis (EFA) was previously applied to determine the number of factors related to spontaneous activities in the home, the objective of this analysis was to establish the variables to be introduced in the CFA model. As a result of the EFA, we decided to include eight items that establish the unidimensional presence of the construct to measure. Finally, the CFA model has an acceptable statistical fit, according to Brown (2006) = χ^2 (43) = 167.230, p = 0.00, CFI = 0.943, TLI = 0.927, RMSEA = 0.022, SRMR = 0.031 and a moderate correlation between the dimensions (0, 31).

The Kuder-Richardson Formula 20 (KR-20) is used to measure the reliability of each dimension, since the data set consist of dichotomous variable. **Equation 1** shows the formula of the KR-20, where k is the number of items, pj is

[1]All the data are free and its available at doi: 10.1016/j.dib.2021.106813.

TABLE 2 | Descriptive statistics for all countries.

Variable	Mean	Standard deviation	Minimum	Maximum
Formal educational practices	0	1	−0.2005	0.0759
Informal educational practices	0	1	−1.0052	0.7776
Socioeconomic Status	0	1	−2.3512	4.0029
Technology at home	0.9096	0.2868	0	1
Receives the learning plan	0.8411	0.3656	0	1
Female	0.4974	0.5000	0	1
Family structure: Raising a child without a partner	0.1329	0.3394	0	1
Parental confident	0.8424	0.3644	0	1
Children in the household	1.3087	1.4491	0	10
Rural	0.1670	0.3731	0	1
Child age	4.3597	3.2573	0	11

Source: ICIPES, 2020 (Osorio-Saez EM. et al., 2021). Note: For dummy variables the column mean *represents the proportion of the cases in the category 1.*

the proportion of correct responses to item j and σ_x^2 is the variance of sum test scores (Foster, 2021)

$$\frac{k}{k-1}\left(1-\frac{\sum_{j=1}^{k} p_j\left(1-p_j\right)}{\sigma_x^2}\right) \quad (1)$$

The KR-20 score for the formal educational practices dimension is 0.28 and 0.63 for informal educational practices. The second dimension presents a value close to 0.7 (an acceptable consistency). While the first dimension presents low reliability, this is because more than half of the participants (N = 2,797) answered that they carried out the three formal educational practices, a situation that restricts the variance and has consequence in the low reliability. However, as both dimensions are theoretically relevant and the correlation between them indicates a difference between the practices performed by parents, we decided to interpret this result with caution and include this dimension (formal educational practices) in the analysis. Finally, it is worth mentioning that for the CFA model and the reliability estimation, the total sample (N = 4,600) is used.

3.3.2 Independent Variable

3.3.2.1 Family Factors

To measure SES, we used the scale constructed by Osorio-Saez and colleagues (2021b, 2020), which shows robust fit and reliability indicators. The authors created this scale through CFA using four questions: Q5: What do you do in your main job? (e.g., teach high school students, help the cook prepare meals in a restaurant, manage a sales team), which was an open question that was recoded into an ordinal variable following the list of occupations described in the one-digit ISCO (International Standard Classification of Occupations); Q7: In a normal month, what is your total household income? which was recorded by grouping the income level reported in deciles of income within each country; Q13N: How many usable devices are there in the house? (smartphones, tablets or iPads, laptops, desktops), and Q14: How many computers per child have you got at home?

To measure the effect of families' digital access on parental involvement we include the predictor of technology at home, which corresponds to the following question, Q14: How many computers per child have you got at home?[2] This variable is added as a dummy variable in the model, where 0 means no computers all at home, and 1 represents either one per child or computer shared between parents and children at home.

On the other hand, we included a family structure variable, which was recorded as 0 for bi-parental households, and as 1 for single headed households. Additionally, include the variable of number of siblings in the household, which ranges from 0 to 10. Finally, we consider the variable parental confidence using technology coded as 0 if parents are not confident and 1 if parents are confident in using technology.

3.3.2.2 School Factors

We incorporated a predictor of planned school activities and homework coded as 0 if the family does not receive a learning plan and 1 if the family receive a learning plan from the school. According to our research framework, this variable may be related to parental engagement.

3.3.2.3 Child Factors

For the analysis we use three variables related with child, i) child's gender (0 = Male or 1 = Female), ii) child's age (6–16 years old) and location (0 = Urban or 1 = Rural).

3.4 Analytic Strategy

We used analysis method Ordinary Least Square (OLS) regression with country (19 countries) fixed effects. OLS regression is a technique that uses a line to define the fit to the entire data set (Montgomery, et al., 2012). While the fixed effects regression model is represented in **Eq. 1**, the α_i are entity-specific intercepts that capture heterogeneity across entities (Hank et al., 2020). In this case, parental educational practices (dependent variable) vary by country. Therefore, to control for this variation, we incorporated a

[2]Since the variable Q14 regarding technology at home is included in the socioeconomic status scale (SES), we estimate different models for technology at home and SES.

TABLE 3 | Descriptive statistics on parental involvement by country.

Countries	Formal educational practices		Informal educational practices	
	Mean	Standard deviation	Mean	Standard deviation
Chile	–0.0239	0.0715	–0.0936	0.408
China	–0.0143	0.0615	–0.1010	0.361
Colombia	–0.0145	0.0668	–0.0909	0.427
Costa Rica	–0.0091	0.0590	–0.0548	0.364
El Salvador	0.0010	0.0497	0.0129	0.345
Ethiopia	0.0163	0.0425	0.1280	0.352
Ghana	0.0264	0.0395	0.2030	0.372
Honduras	–0.0054	0.0597	–0.0126	0.392
India	0.0184	0.0442	0.0496	0.353
Italy	–0.0107	0.0601	–0.0535	0.366
Japan	–0.0018	0.0579	0.0570	0.355
Mexico	0.0225	0.0473	0.2100	0.349
Pakistan	0.0397	0.0244	0.2990	0.339
Sri Lanka	0.0124	0.0521	0.1190	0.380
Tanzania	–0.0297	0.0767	–0.0914	0.406
Turkey	0.00580	0.0551	0.0567	0.336
United Kingdom	–0.0125	0.0630	–0.0512	0.359
Uruguay	–0.0213	0.0712	–0.0520	0.534
United States	–0.0053	0.0662	0.1080	0.369

Source: ICIPES, 2020 (Osorio-Saez EM. et al., 2021).

dummy variable for each country, in line to other studies (Zhou, 2014; Gumus and Bellibas, 2016; Osorio-Saez E. et al., 2021)[3]. This strategy of adding fixed-effects by country allows for controlling variation due to differences across countries that may be due to unobserved variables. In addition, the SENWGT variable is included in the analysis, this factor "is a normalized (senate) weight variable that was created for analyses across a group of countries where contributions from each of the countries in the analysis was desired to be equal regardless of their population size" (Osorio-Saez et al., 2020: 20). This means that all countries contribute similarly to the coefficient, avoiding biases due to differences in sample size among countries.

$$Y_{ic} = \beta_0 + \beta_1 X_{1,ic} + \ldots + \beta_k X_{k,ic} + \alpha_c + \varepsilon_{ic} \quad (2)$$

Five models are fitted for each of the dependent variables. The first model includes only the fixed-effects by country. The second and third models estimate the relationship between formal educational practices or informal educational practices (dependent variable) and socioeconomic level (Model 2) or technology at home (Model 3) and school activities and homework, controlling for the effect of countries. Finally, the fourth and fifth model nests the previous two (second and third) but adds the characteristics of the child and the family, controlling for the country effect.

[3]Due to data limitations (sample size or not nested), low sample variability with respect to years of schooling per country, and the fact that we seek to control for cross-country variation in the independent variables, we use this technique (OLS regression with country fixed effect) instead of other analyses (e.g., multilevel models).

4 FINDINGS

The dimensions of parental involvement (formal and informal educational practices) by country show similar variations (**Table 3**). For such a reason, we decided to perform the analysis in 19 out of the 24 countries included in the ICIPES survey (Osorio-Saez EM. et al., 2021).

4.1 Formal Educational Practices

In relation to formal educational practices, socioeconomic level is a significant predictor (B = 0.009, $p < 0.001$), showing that families with a higher socioeconomic status provide more educational support to their children (**Table 4**). Although the coefficient is small this result is consistent with findings on the impact of the covid-19 pandemic on student learning due to socioeconomic status, for example. lower income students have fewer hours spent learning at home (Zancajo, 2020). In addition, parents who receive a learning plan or activities from the school tend to implement less formal educational practices (B = −0.004, $p = 0.05$) than those who do not receive such material from the school. On the contrary, the availability of a computer at home for the child has a negative association with the implementation of formal educational practices.

Age, number of siblings, family structure and parents' confidence using technology are relevant predictors of formal educational practices. As the age of the child increases, parents provide less educational support (B = −0.001, $p < 0.001$). Conversely, the more siblings in the household, the more formal educational practices parents engage in (B = 0.004, $p < 0.001$). This seems to be similar to teaching practices, which adapt to the age of the student recognizing evolving levels of autonomy from preschool to high school (Treviño, et al., 2019). On the other hand, parents who are confident in their capacity for the use of technology tend to provide more support to their children

TABLE 4 | Regression model for formal educational practices.

	Model 1	Model 2	Model 3	Model 4	Model 5
	Formal educational practices (with dummy)	Formal educational practices (with dummy)	Formal educational practices (with dummy)	Formal educational practices (with dummy)	Formal educational practices (with dummy)
Socioeconomic Status	—	0.011 (0.001)***	—	0.009 (0.001)***	—
Technology at home	—	—	−0.013 (0.002)***	—	−0.011 (0.002)***
Receives the learning plan	—	−0.005 (0.002)*	−0.000 (0.002)	−0.004^{+} (0.002)	−0.002 (0.002)
Female	—	—	—	−0.003 (0.002)	−0.002 (0.002)
Rural	—	—	—	−0.003 (0.003)	−0.001 (0.003)
Child age	—	—	—	−0.001 (0.000)***	−0.001 (0.000)***
Children in the household	—	—	—	0.004 (0.001)***	0.003 (0.000)***
Raising without a partner	—	—	—	−0.005 (0.003)	−0.007 (0.003)*
Parental confidence	—	—	—	0.018 (0.003)***	0.027 (0.003)***
Intercept	0.001 (0.001)	0.004(0.002)*	0.012 (0.002)***	−0.011 (0.004)**	−0.013 (0.004)***
R-squared	0.00	0.04	0.01	0.06	0.04
N	4,599	4.130	4,597	3.770	4.183

*Source: ICIPES, 2020. + = 0.05. *p < 0.05. **p < 0.01. ***p < 0.001.*

The analyses use Senate Weights (SENWT), in which the data for each country is expanded to the same population number nationally, ensuring that each country contributes equally to the estimation in this analysis that includes all the countries. Models include country fixed effects to control for differences across countries. Data on the table represents regression coefficients, and standard errors in parentheses, except for the last two lines which include the percentage of variance explained by the model and the total sample used for the estimations.

TABLE 5 | Regression model for informal educational practices.

	Model 1	Model 2	Model 3	Model 4	Model 5
	Informal educational practices (with dummy)	Informal educational practices (with dummy)	Informal educational practices (with dummy)	Informal educational practices (with dummy)	Informal educational practices (with dummy)
Socioeconomic Status	—	0.092 (0.006)***	—	0.086 (0.006)***	—
Technology at home	—	—	−0.064 (0.014)***	—	−0.051 (0.016)***
Receives the learning plan	—	−0.017 (0.013)	0.003 (0.014)	−0.016 (0.015)	−0.005 (0.015)
Female	—	—	—	−0.024 (0.012)*	−0.022 (0.012)
Rural	—	—	—	−0.020 (0.017)	−0.000 (0.016)
Child age	—	—	—	−0.002 (0.002)	−0.003 (0.002)
Children in the household	—	—	—	0.024 (0.002)***	0.024 (0.003)***
Raising without a partner	—	—	—	−0.016 (0.021)	−0.028 (0.020)
Parental confidence	—	—	—	0.078 (0.022)***	0.13 (0.022)***
Intercept	0.040 (0.006)***	0.053 (0.012)***	0.091 (0.015)***	−0.042 (0.023)	−0.053 (0.023)*
R-squared	0.01	0.07	0.01	0.08	0.04
N	4.599	4.130	4.597	3.770	4.183

*Source: ICIPES, 2020. *p < 0.05. **p < 0.01. ***p < 0.001.*

The analyses use Senate Weights (SENWT), in which the data for each country is expanded to the same population number nationally, ensuring that each country contributes equally to the estimation in this analysis that includes all the countries. Models include country fixed effects to control for differences across countries. Data on the table represents regression coefficients, and standard errors in parentheses, except for the last two lines which include the percentage of variance explained by the model and the total sample used for the estimations.

through formal educational practices (B = 0.018, $p < 0.001$), a finding consistent with the literature which suggests that availability of technology must be accompanied of knowledge on how to use the technology to support learning (Bol, 2020; 2021; Bayrakdar and Guveli, 2020; Bonal and Gonzalez, 2020). Finally, when considering the family structure (Model 5), it is found that parents who live alone with their children would have fewer formal educational practices (B = −0.007, $p < 0.05$). The routine and division of labor in families changed during the COVID-19 lockdown (Larsen, et al., 2021), affecting the time spent on home schooling. This finding implies that single parents may resort to technological devices in the homeschooling process rather than formal educational practices due to lack of time. That is, factors at the individual and family level (besides SES) also affected parental involvement in home education (Horbny and Lafaele, 2011) during the school closures period.

4.2 Informal Educational Practices

Parental SES (B = 0.086, $p < 0.001$) and technology at home (B = −0.051, $p < 0.001$) are significant predictors of informal educational practices (**Table 5**). When controlling by SES the gender of the child becomes a significant predictor of informal practices (B = −0.024, $p < 0.05$). That means that parents engage in informal practices with girls less frequently than they do with boys. This could be due to the fact that women and girls do most of the housework (IIEP-UNESCO, 2020). For example, girls aged 5–14 years already spend 40% more time doing household work than boys do, and girls between 5–9 years old spend 30% more

time on household chores than boys their age (UNICEF, 2016). This situation has increased (especially in less developed countries) in the COVID-19 pandemic and with the closure of schools (United Nations, 2020b). Therefore, this type of informal educational practices could be more common and independent (without parental support) for girls than for boys. On the other hand, the result on parents' confidence in their technological capabilities is maintained (Model 4: B = 0.078, $p < 0.001$ and Model 5: B = 0.13, $p < 0.001$). In other words, the greater parental confidence the more informal educational activities they carry out with their children. This finding suggests that parental technological capabilities reinforce parental involvement in children's learning at home (Osorio-Saez E. et al., 2021).

5 CONCLUSION

This paper explores the main predictors of formal and informal parental practices at home in the context of the evidence showing a relationship between such practices and children's academic subjective well-being during the COVID-19 outbreak (e.g., Teso et al., 2020; Engel de Abreu et al., 2021; Larsen et al., 2021). Using an international database of 19 countries we analyzed the relationship between household SES and the type of parental practices. This section discusses our findings in light of previous literature and highlights our results' potentialities, limitations, and implications.

The main result of the article shows—without ignoring the limitations specified below—that SES is a significant predictor of parental involvement in formal and informal activities during the pandemic expansion. Although research has extensively discussed SES association with parental educational practices (e.g., Harris and Goodall, 2008; Lareau, 2000), the Covid outbreak and school closures introduce a new scenario in which inequalities in this respect are reproduced. While national studies in some middle and high-income countries have provided evidence of the critical role of family SES in the pandemic (Bonal and Gonzlez, 2020; Andrew et al., 2020; Bol, 2020), our findings shed light on common global patterns of parental involvement gaps by SES by using a large data of different 19 nations and controlling by country effects. The consistent and statistically significant gaps identified in formal and informal practices indicate a worldwide trend, which negatively affects disadvantaged children cross-nationally and may have a considerable impact on their academic achievement and subjective well-being. The socioeconomic inequalities in parental involvement uncovered might be rooted in the unique difficulties faced by low-SES parents due to the barriers they face in their material resources, economic hardships, and the time and energy constraints of their workload, as well as their relative lack of educational/pedagogical competencies and self-efficacy for helping their children in transferring learning activities from schools to their homes (e.g., Lareau, 2000; Horby and Lafaele, 2011; Wang et al., 2016).

Our results indicate that other factors, different from SES, are related to parental involvement. On the one hand, regarding family factors, our findings highlight the role of the household composition in parental engagement in home learning during the COVID-19 crisis. This finding is aligned with studies underlining the role of family structure in involvement both before the pandemic (Myers and Myers, 2015) and during its period (Bayrakdar and Guveli, 2020). In addition, parental confidence in technology is identified as a significant predictor of involvement in education, suggesting the crucial relationship of the ICT competencies of families in their participation in the schooling processes of their children in the period. This result is consistent with former evidence that has shown in some countries differences between parents already familiar vs unfamiliar with technology in learning at home (Bhamani et al., 2020) and the struggles faced by low-SES parents due to the lack of digital tools to support their children (Pozas et al., 2021). On the other hand, the age and gender of students (in the case of informal activities) are variables associated with families' engagement in home learning during the COVID-19 crisis, with involvement in formal activities decreasing as child age increases, and involvement being higher for boys in informal practices. The finding in terms of child age is consistent with former literature that has shown a decline in support and changes in parental strategies between elementary and middle/high school as students become more autonomous (Bhargava and Witherspoon, 2015; Wang and Sheikh-Khalil, 2014).

This paper has several limitations due to the fact that the study prioritized collecting data during school closures. First, similarly to other studies that took place during the COVID-19 outbreak (e.g., Engel de Abreu et al., 2021), the use of a non-probabilistic sample limits the generalizations of the findings, despite their consistency with previous studies. Second, the use of internet and institutional social media may have caused a bias towards higher SES families having access to internet, underrepresenting families without this service (e.g., Engel de Abreu et al., 2021). Third, sample data shows that more than half of the sample of parents hold a higher education degree, a situation that suggests an upward bias in terms of SES. Fourth, this upward SES bias led us to recode formal parental practices to create dichotomous variables, instead of creating the index with all the Likert scale. This may reduce the true variance of practices and, also, reduces the variability of the practices' indexes. Fifth, although our models explain a limited proportion of the variance in formal and informal practices, the findings are consistent with previous studies. Sixth, parental involvement in formal educational practices presents low internal consistency, a result explained by upward bias of responses of families in the three practices that compose this indicator. This is also related to the bias towards higher SES families in the sample. Finally, the analysis for all countries (e.g., the sample size per country makes a comparative study difficult) limits the generalizability of the results, as the variables differ from country to country. The study results should be interpreted with these caveats in mind.

Without disregarding these limitations, our results introduce diverse policy implications aimed at supporting

parents (especially those of lower SES) on their involvement in home learning in order to contribute to their children's academic achievement and subjective well-being. On the one hand, echoing international policy reports, our findings posit the urgency of generating strategies that assist parents in contributing to their children's educational experiences (e.g., OECD, 2020). Multiple alternatives have been proposed in this area, such as quality tutorials, teaching sessions, pedagogical material, child-oriented books, and enhancing school-family communication. On the other hand, our results point out the priority of investing in reversing the technological inequalities at home and improving families' digital competencies to promote their confidence using ICT. Finally, the role of child age and gender on parental involvement claims for tailored strategies that support parents through the children's different stages of development and combat the incipient gender gaps visualized.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Students' Experiences in Suddenly Transformed Living and Educational Environments by COVID-19

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This manuscript builds on research about how university students felt affected by the Covid19 pandemic and, especially, by the irruption of non-face-to-face classes and mixed teaching methods in this context. How have young people experienced this situation? How has it affected their wellbeing and the learning strategies should develop have had to incorporate into their virtual relationships? their virtual relationships? How have they related and relate to virtual tools for a task that they have always experienced face-to-face? To answer these questions, the TRAY-AP project that investigates how university students learn collected 89 scenes that show the effects of the Covid 19 on their lives and the university. We grouped these scenes into seven key concepts to detect how students were emotionally affected, especially by moving from face-to-face to virtual learning. From this analysis, although primarily negative, the emotional effects have also allowed them to generate positive strategies for readaptation and collaboration with other colleagues. All of which opens the way to rethink the predominant pedagogical and knowledge relations in the university.

Keywords: learning lives, online learning, emotions, adaptation, agency, COVID 19

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INTRODUCTION

The abrupt and profound changes brought about by the Covid 19 pandemic have profoundly transformed people, families, institutions, and societies' ways of life worldwide. Situations provoked by this context are having considerable consequences and effects on people mental health (Giuntella et al., 2021), especially in the emotional and affective dimensions due to the imposed "social distance" (Sikali, 2020) and the need to reshape personal and professional settings (Strom and Gumbel, 2021). In this situation, higher education students attending face to face institutions had to unexpectedly adapt to new learning environments in which knowledge, affects, contact, bodies, and complicities were placed in an unknown dimension (Farnell et al., 2021; Pokhrel and Chhetri, 2021). Both for them, teachers and administrators.

This manuscript gives an account of research about how higher education students are experiencing the changes in their lives caused by the pandemic and, especially, by the irruption of online teaching and the use of mixed teaching methods in the context of Covid19. The University of Barcelona, like many others, made a quick adaptation to the new situation. Each teacher used the resources at hand to ensure that no student was left unattended. However, how have young people

experienced this situation? Has this new scenario affected their wellbeing and the learning strategies they have had to incorporate into the relationships situated in the virtual terrain? How, in short, have they related and related to virtual tools to carry out tasks they have always experienced in a face-to-face setting. These and other issues have risen to the top of the agendas of many researchers in different countries. Understanding how students shape their experiences in this ambiance is relevant for assessing the situation we find ourselves in and making decisions that bring these exceptional circumstances closer to students' needs.

State of the Art

In April 2020, we received an invitation from the Universidad Autónoma de Chile to participate in/advise a research project entitled "Didactic-organizational, bodily and emotional factors that, in a non-classroom context and in times of pandemic, contribute to meaningful learning of university students". Collaboration with the preparation of this project made us realize that studies were underway – early in the pandemic – showing that students worldwide have been affected by the spread of Covid-19. The main reasons were travel restrictions, the physical distancing, the isolation in their residences and the closing of borders. These new circumstances affected their life plans and priorities and their interest in online classes (Quacquarelli Symonds, 2020a,b).

Since the pandemic's beginning, there have been many publications in different countries (Crawford et al., 2020). Among them, we find those analyzing the problems and challenges of this new situation (Quintana, 2020; Tejedor et al., 2020; Tesar, 2020; Toquero, 2020) such a sensitive issue as student assessment (García-Peñalvo et al., 2020); showing the emerging vulnerabilities in education systems (Ali, 2020); analyzing the opportunities and threats stemming from remote learning (Ślaski et al., 2020); offering world's perspective on the impact of COVID 19 in higher education (Aristovnik et al., 2020; Bairagi, 2020; Marinoni et al., 2020).

Studies about the impact on students' lives focused on their experience in the distance learning model (Adnan and Anwar, 2020; Baladrón Pazos et al., 2020; Pérez-López et al., 2021); on various aspects of their lives on a global level (Aristovnik et al., 2020); or different aspects of their emotional health, stress and wellbeing (Apaza et al., 2020; Bono et al., 2020; Nurunnabi et al., 2020; Garvey et al., 2021; Holzer et al., 2021; Rodríguez-Larrad et al., 2021; Van de Velde et al., 2021).

These early studies and those carried out the following year (Farnell et al., 2021; Pokhrel and Chhetri, 2021) showed that quarantining at home and the closure of university facilities were the main reasons why students felt disconnected from society and their social circles (Killian, 2020). In some cases, students reported negative experiences of having to return to the family home during the pandemic due to family environments that were not conducive to online learning (Killian, 2020). The detection of these initial reactions opened several studies on students' psychological stress and distress. One example was the study by Arënliu and Bërxulli (2020), who measured the psychological pain of students at the University of Pristina in the early days of the Covidien-19 pandemic in Kosovo. These authors found significant differences among students in their motivation to attend online lessons and their levels of psychological distress. Students reported that they were not motivated to participate in online teaching and showed high (moderate to severe) levels of psychological distress, in contrast to students who reported being highly motivated to attend online lessons. It should be kept in mind that these results may have changed in later stages of physical distancing (Arënliu and Bërxulli, 2020) and that there may be an increase in stress levels with prolonged social isolation or quarantine (Brooks et al., 2020 to Arënliu and Bërxulli, 2020). Within this line of studies on students' experiences, one of the most relevant to the breadth of the sample is the one that has focused on how the pandemic has affected students' wellbeing and lives (Van de Velde et al., 2020). This study involved students from 27 European countries, those from North America and South Africa.

Following these studies, the results of the UNESCO (2020) report suggest that, globally, the main concerns of university students are social isolation, financial problems, internet connectivity and, in general terms, pandemic-related anxiety. In Latin America, however, the hierarchy of concerns is different. UNESCO's Chairs have prioritized three areas: Internet connectivity, financial issues, and difficulties in maintaining a regular timetable associated with forms of teaching and learning in schools that do not encourage self-regulated learning.

In summary, studies on how pandemic-generated situations in the lives of university students have shown that institutions that respond to both emotional and academic aspects favor better academic performance and learning engagement. In this sense, universities that support students' wellbeing also increase students' feelings of belonging within the education system. With this dual support, students feel safer and more satisfied with each other and acquire more appropriate coping and stress management skills (Sadock et al., 2009; Kieling et al., 2011; Hyseni Duraku and Hoxha, 2018, 2020). These authors' contributions indicate that further emotional support for students has become apparent during this exceptional university period. In this regard, students have stated that universities can play an essential role in social isolation by communicating with them and providing emotional support during these difficult times (Quacquarelli Symonds, 2020b).

Concerning another issue we address in our research: how online learning has affected students' wellbeing, different studies (Cidral et al., 2018; Selvaraj, 2019) have evidenced that user satisfaction and e-learning systems significantly impact students' success. Against this backdrop, in the context of Covid, the study by Quacquarelli Symonds (2020b) indicates that while some students reported that they were enjoying online teaching, others, due to university closures, expressed a lack of motivation and negative attitudes toward online learning. However, as we intend to do in our study, it is necessary to see whether this dissatisfaction occurs if it is a modality imposed by exceptional circumstances and not a learner's choice. Within this theme, the research by Shahzad et al. (2021) carried out to analyze the impact of e-learning on the learning of women and men at university shows that women make more use of the applications and possibilities related to e-learning platforms.

Regarding e-learning, UNESCO (2020) shows that the abrupt entry into a complex teaching modality, with multiple technological and pedagogical options, and a steep learning curve, can generate less optimal results, frustration, and anxiety. The main challenge being the adaptation to an educational modality never experienced before without the corresponding training. Coronateaching refers to an emerging phenomenon with psycho-affective implications for both teachers and students to describe this teaching modality. These implications would be like a syndrome experienced by the teacher or student when feeling overwhelmed by receiving excessive information through educational platforms, mobile applications, and email. To this can be added frustration and helplessness stemming from limitations in connectivity or lack of technical knowledge for the operation of digital platforms and resources (UNESCO, 2020, p. 25).

Almost all studies consisted of an online survey (Khan, 2021), hence the need to look at more embodied experiences. Research in which students can openly explore their feelings, moments, anxieties, discoveries, and hopes, all of whom report on their subjective wellbeing.

Situating TRAY-AP Research Project

Building from the TRAY-AP[1] project, this paper explores students' experiences from a more personalized and closer perspective. The TRAY-AP project aims to reveal the learning trajectories of university students, considering their conceptions, strategies, technologies, and learning contexts. To inquire about students' learning lives, we adopt two notions as conceptual guides. The first one is "a person-in-context perspective" (Turner and Patrick, 2004, p. 1764) linked to the referent "persons-acting-in-setting" as the unit of analysis (Lave, 1988, p. 189). The second follows the differentiation that Biesta (2013) makes between "socialization," which concerns how, through education, individuals become part of existing orders and traditions, and "subjectification" that has to do with ways of being not determined by those orders and traditions.

The TRAY-AP research project departs from an onto-epistemological and methodological position based on a relational and performative ethic (Geerts and Carstens, 2019). This position implies considering the "Other" as a "being in becoming" who is a bearer of knowledge and experiences. In the research, participants can show themselves as becoming subjects in their relationships with learning and knowledge.

In this article, the guiding question is: how do students participating in research -taking place during the COVID pandemic- live, dialogue, and incorporate into their learning lives an experience that disrupts their lives and the "contextures" that shape their learning in college and beyond?

We have proposed a research project within this conceptual and methodological framework in which young people make their "learning lives" visible.

Fifty participants from Catalonia (28) and the Basque Country (22) are taking part. Of these, 30 are women, and 20 are men, a proportion close to the distribution observed in Spanish universities in the 2019–2020 academic year (55.6 and 44.4). By branches, we selected them following the distribution that appears in Catalonia and the Basque Country in the report of the Ministry of Universities (Ministerio de Universidades, 2021): Social and Legal Sciences 18, Arts and Humanities 12, Engineering and Architecture 5, Experimental Sciences 6, Health Sciences 6, and double degrees 3 (**Table 1**). This sample responds to the "qualitative" nature of the research and the demanding intensity of monitoring and analyzing each learning life. It is also like that found in other research with a similar focus. For example, 48 students participated in Jornet and Erstad's (2018) study and 44 in the study by Biasin and Evans (2019).

Considering this research's contextual and corporeal nature, invited participants should have a high predisposition to collaborate. They should agree to spend several hours with researchers and prepare documents to share. Researchers, on their side, should be able to contact personally participants on at least four occasions. These kinds of processes are only possible within a certain proximity. This was the reason for working with students from the two Autonous Comminities (Catalonia and the Basque Country) to which the research teams belong. That does not question, however, the research rigorousness and validity. From an onto-epistemological position, which does not aim to make statistical generalizations and test hypotheses based on logical positivism, but to explore a complex, multi-layered phenomenon in which all actors and actants – human, non-human and matter – have a role to play (Latour, 2008; Tuin and Dolphijn, 2012).

The choice of university degrees and the distribution of participant students aim to provide as diversified a sample as possible. The purposive selection of young people follows the chain referral method (Penrod et al., 2003), often used when there are difficulties finding participants due to the sensitive nature of the "object" of study.

MATERIALS AND METHODS

We conducted four conversations with each student to meet the project's objectives and ensure participants' engagement and interest.

- The first is to explore how different studies portrait contemporary young university students and address questions related to their relationships with learning (Veen and Vrakking, 2006; Seemiller and Grace, 2016;

TABLE 1 | TRAY-AP research sample.

Universities	Number of students	Knowledge areas
Barcelona, Girona, Catalan Polytechnical University, Autonomous University of Barcelona, Pompeu Fabra (28) Basque Country (22)	30 women 20 men	Social and legal sciences (18), arts and humanities (12), engineering and architecture (5), experimental sciences (6), health sciences (6), double degrees (3)

[1]Learning trajectories of young university students: conceptions, strategies, technologies, and contexts (https://cutt.ly/NRAFGZH).

Twenge, 2017; Haidt and Lukianoff, 2018; Carr, 2020; Desmurget, 2020). In this meeting, we asked two main questions, which are the trigger for this article: How are their learning experiences during the pandemic? What are the possibilities and limitations of e-learning?

- In the second meeting, students reconstruct their learning lives based on a biogram (Abel, 1947; Domingo et al., 2017).
- Students share a field diary of learning 'scenes' in the third session (Denzin, 1997).
- In the fourth, students comment on questions posed by the researchers in dialogue with the transcripts of previous encounters and on the script of each learning life story.
- A final meeting revolves around the validation of this learning life story. In all encounters, comments and feelings on their experiences during the pandemic also appear.

We transcribed all the conversations and fragmented them into "significant scenes" that made it possible to identify and establish if standard chains of thought, concepts, paths, threads, and conjunctions exist and whether these can suggest an explicit logic of association or a common argument (Beach et al., 2014, paraphrased). We used significant scenes (Denzin, 1997) as an analysis strategy because they allow us to configure the research evidence. The scenes show those singular experiences in that they represent a marking moment that we explored to promote critical reflection (Ornelas, 2016). The notion of scene originates from Denzin (1997), who considers it a fragment of a narrative text that goes beyond the traditional boundaries of the ethnographic text. The basic unit of analysis is not the fact but the scene, the situation in which an event occurs. Stories and poems are written in the facts, not about the facts. [. . .] Personal narrative can also be ethnography. [. . .] These materials (self-dialogue, scenario, and conversation) evidence that the described events are authentic and not fragments of their imagination (Denzin, 1997, 208, paraphrased).

According to Bowie et al. (2003), the adjective "significant" is a general term commonly applied to events or incidents described as critical, adverse, near misses, or errors. As Charmaz (2006) points out, meaningful scenes allow the freezing and lengthening of time so that it is possible to dialogue with them. They "confront us with new situations or show us other ways of doing and other types of relationships" (Hernández-Hernández, 2007, p. 182). They allow us to embody the localization and partiality from which this text emerges.

We located the scenes in conversations with 14 collaborators (10 women and four men) who made comments related to (a) their emotional and wellbeing/discomfort during the pandemic; and (b) the relationship with e-learning and the perceived emotional effects on the quality of their learning.

Analysis and Definition of Key Concepts

Taking as a reference a previous study (Hernández-Hernández and Sancho-Gil, 2017) on the learning experiences of young people in secondary education, we organized the dialogue with the scenes in the following steps: (1) Reading carefully and collaboratively in pairs the 14 collaborators' transcriptions. (2) Selecting all the fragments of each report related to scenes referred to their emotional experiences in life and virtual learning. In this process, we located 89 scenes. (3) Analyzing each scene by pairs to check key emotional concepts and validate their relevance as a foundation for making general claims and qualitative similarities and differences. (4) Challenging and supporting the relevance of the attribution of the seven key concepts identified in the scenes, assuming the liminality of some attributions. (5) Dialogue with the scenes, grouped into crucial concepts and relate them to bibliographic references.

As shown in **Table 2**, we named seven key concepts after carefully and rigorously analyzing each scene and discussing their most significant features. The identified key concepts are:

Wellbeing versus discomfort (23[2])

It refers to scenes in which they point out in a general way how the pandemic generated situations of wellbeing or discomfort in life in general, as well as in the university.

> I think I'm living it pretty badly, and now I'm not tragic, but the first lockdown was indeed much worse (Marc, student of Physics).

Interactions with other people (10, 1 mix)

They refer to interactions and exchanges with teachers, students, and family members and how they were affected by the pandemic situation.

> It reduces the interaction between the one who explains or teaches and the one who receives the knowledge so much that it is practically impossible. I won't say it's unfeasible, but it becomes very complicated (Marc, student of Physics)

The role of corporeality (7, 1 mix)

Grosz (1994, 2004) called corporeality the notion that displaces the body toward the non-human, more-than-human, beyond-human and concentrates on the zones of proximity between the body and the world.

> It's true that at least one thing that many professors tell us, and I understand it perfectly, is that I don't see your face and I don't see if you don't understand anything if you understand everything and I have to go faster (Marc, student of Physics).

The emotional effect of virtual teaching and learning (35)

The pandemic changed the terrain of the face-to-face and virtual pedagogical relationship. This alteration entailed a reconfiguration of the presence of bodies and led to configure the computer screen as a "place" of learning, presences and absences. This unexpected change affected students and teachers. This concept refers to the ways of feeling affected and was reflected in the most significant number in the students' scenes. That is why we pay special attention to it in the following section.

> What annoyed me the most was having to break the link suddenly (at her internship). It is true that later, with the virtual networks and so on, we tried to keep in touch again, with the mothers, the educators and so on, and it was a way of learning virtually (Nerea, student of Social Education).

Yes, it has made me lose the desire to learn or to do something I like, and I have simply been a bit of a robot. They told me

[2]Number of times participants refer to a given key concept.

something, they explained something to me, and I was doing it step by step (Lisa, student of Architecture).

Emotional Learning time (6)

The pandemic changed the terrain of the face-to-face and virtual pedagogical relationship. This alteration entailed a reconfiguration of the presence of bodies and led to configure the computer screen as a "place" of learning, presences and absences. This unexpected change affected students and teachers. This concept refers to the ways of feeling affected and was the one Confinement and virtual lessons altered time management and the relationship with time. This concept relates to how the effects of time change in the emotional life of students.

> The timetable says that from 8 to 10 am I have to do 2 h of dermatology; from 10–12 infectious diseases. and then you organize yourself as you can or want to. For example, I used to have lessons from 2 to 7 pm, and in the morning you could do whatever you wanted. Now we do all the theory classes in 1 month, in February. And then they cram in 8 h of classes a day so that you can do practical work (Anna, students of Medicine).

Personal living strategies (4)

Lockdown meant a disruption in outdoor life, something fundamental in Mediterranean countries. Students had to develop strategies in everyday life to adapt to this new situation. This concept refers to strategies aimed, in most cases, at achieving better emotional accommodation.

> So, I don't know. I learned many strategies. I've been going to a psychologist for a long time, and it's helped me understand that a space doesn't determine how I am and how I am. I also adopted a dog, and that does a lot. Right now, if I found myself in confinement like the other one, I think I would be pretty calm, and I would have resources, and I would go on with my normal, quiet life. Before, I was caught off guard amidst construction work. It was "madness" (Maria, Fine Arts, student).

Emotional space (5)

Because of the disruption of life outside, household spaces had to be reorganized. Houses were not designed for many household members to live and work in, and the adaptation had emotional effects.

> On top of that, many things came together. We had half-finished work in the kitchen, and we had to [prepare] food with a microwave oven. I didn't imagine that this would "crush" me so much mentally. My mother, a shop cashier, came home every day "pulling her hair out" without a kitchen (Maria, Fine Arts, student).

The Emotional Effects of Virtual Teaching and Learning in Pandemic Times

Participants in our study highlighted the "emotional effect of virtual teaching and learning" as the most salient in their learning lives during the period they suffered from movement restrictions and university closure. We, therefore, focus the second level of analysis and results on this key concept.

Khan (2021, p. 8) argues, based on his review of 39 studies that focused on the impact of the COVID-19 pandemic, that the abrupt closure of higher educational institutions, followed by a lockout, has left individuals bewildered and dealing with a variety of difficulties. This situation can contribute to increased anxiety and stress, such as job instability, financial worries, homeschooling, despair, loneliness, loss, trauma, and illness. Khan, to confirm this statement, refers to a study by Watermeyer et al. (2021) focused on the online migration that followed COVID-19, the severe damage caused to pedagogical roles in higher education, in terms of dysfunction and disturbance,

TABLE 2 | Extract of learning scenes organization.

Student name and affiliation	Scene	Focus	Emotional affect
Anna (Medicine, UB)	28. The second semester of 2020–2021 is beginning, and we are about to close the first anniversary of the Covid pandemic. Most of the classes are still distance learning. This situation leads to intensive use of the digital resources available, including the drive organized by themselves and the UB's Virtual Campus.	In the second academic year of COVID, students have learned to organize learning collectively and on their initiative, in parallel to the teachers' proposals.	Positive effects: (3[1]) Facilitate students' self-organization
Mikel (Computer engineering, UPV)	34. The virtual teaching they have been giving us during the confinement and Covid are negatively allied. With lockdown, virtual teaching was a very limiting factor. Face-to-face classes are not the same as having a PowerPoint and talking without asking questions until the end. There is a lack of contact, the learning situation changes. It is not the same to be in a classroom in a work environment, in a study environment, as it is at home where you have I don't know how many distractions.	The virtuality of the classes generates isolation and reduces the interaction with the group and the teachers, "and they are negatively allied".	Virtual classes generate adverse effects (4) and are a limiting factor in students' lives.
Anastasia (UPV, Philosophy)	64. Well, we have had many classes and so on, but. on the one hand, is your ability to concentrate, if you care, you go to the class and listen to it. You learn the same as if you were here because, in the end, they are explaining it to you anyway, what you learn more or less, in the end, depends on your ability to concentrate and how much you want to put in on your part.	If you care, you go to the virtual class, listen to it, and learn the same.	Ambivalent effects: (3) The concentration depends if the student cares, not about virtual conditions.

[1] *It indicates the number of times it is pointed out.*

TABLE 3 | Students' emotional effects on learning during the COVID-19.

Emotional effect	Characterization	Relevance
Negative emotional effect	The time limitation when performing online activities' make you very nervous'.	Feel nervous
	Replacing teacher interaction with video generates 'overload on oneself'.	Feel overload
	The substitution of presence for virtuality in parallel groups leads students who are not in front of the teacher to leave the classroom.	Dropout for lack of attention
	The virtuality of the classes generates isolation and reduces the interaction with the group and the teachers, "and they are negatively allied."	Generates isolation and reduces the interaction with others
	My performance dropped a lot because I was at home, and there were more distractions.	Distraction, drop in performance.
	The personal distance from teachers and classmates, imposed by virtuality, affects the quality of pedagogical relationships.	Affects the quality of relational experiences (3).
	I have made a very strong disconnection from the university, and really in this last year, the fact of being in from the screen, my ability to concentrate has decreased a lot.	Disconnection, lack of concentration, and dispersion.
	I made a change and relaxed and stopped trying so hard to learn. -I've learned some things – but it's been a year of "well: I pass."	Lack of effort to learn, lack of retention when preparing for an exam.
	I have lost this ability to. well, I don't think I have lost it, but the fact of being alone, isolated, working from home makes it difficult getting together with my friends to work on a topic.	Loss of ability to learn with others due to isolation.
	It has made me lose the desire to learn or to do something I like, and I have simply been a bit of a robot.	Being "a bit robotic" reduces the intensity of learning and results in loss of agency.
	It is much more violent because of the virtual campus.	Virtuality generates symbolic violence personally and in the group.
	There are people, for example, a classmate, that the pandemic affects her a lot. She is very embarrassed to put the camera on or talk in class; she is very anxious, so we talked more about this topic.	Shame and anxiety in people who are emotionally affected by the pandemic situation.
	Because there are no presential classes, some teachers don't let me do the projects I want to do as performances or projects with a robust feminist component.	Affects students' agency and autonomy.
	If everything has to be online, the student has to put in a lot of effort, and it is much easier to get out of the computer.	Online classes demand extra effort for learning and facilitate dropout.
.	The fact that you can comment with someone without having to send a WhatsApp or put in the microphone relaxes you a lot, so the fact of being. isn't it?	Virtuality goes in a different direction of face-to-face proximity that generates a climate of relaxed proximity.
Positive emotional effects	Recording lectures, as a flipped classroom strategy, build student confidence.	Feel confident.
	The use of the flipped classroom generates the perception of teacher's satisfaction by the student.	Feel empathy with the teacher.
	Entering the 2nd year of COVID, students have learned to organize learning collectively and on their initiative, in parallel to the teachers' proposals.	Facilitate student's self-organization
	I am trying to delve a little deeper into what exactly is going on with the teachers. I conceive it as several lines of action that can complement each other a little bit. everything has to do, doesn't it?	Promoting alternatives to the limitations generated by teachers in the face of virtuality.
	I have used that video of al-Sa'dawi, and I have used other things, and there began a little bit like the line of work of the university, pandemic and mental health.	Recovering the initiative, establishing relationships, and confronting mental health.
	I was frustrated with the sculpture class. Well, it occurred to me, I started to do this (specific action), the schedule (activities) came to me there. And the schedule, well, I showed it to I don't know who, who liked it.	Generate alternatives and answers in collaboration with other students in the face of limitations on virtual classes.
	And so, it has been good for me to get to know myself in that situation, set patterns, organize myself, and set routines.	Contribute to self-knowledge
	I pass the memes to my classmates, and they like them, and I don't know like there is a line of.; we want to continue talking about this topic, which seems positive to me because it is like a more profound thing.	Socialize the concerns and limitations and generate collective alternatives (2).
Ambivalent emotional effects	The non-presence in the classes and the access to other ways of teaching and learning, such as the inverted classroom, puts students in contradictory situations	Feel on contradiction
	If you care, you go to the class and listen to it, and you learn the same	The concentration depends if the student care not only of virtual conditions (2)
	The most positive aspects: "tutorials" and lectures who uploaded some videos and. that's also a great thing because you can watch them whenever you want. There is less contact, the contact is worse, expressing yourself is scary.	Virtual resources facilitate learning autonomy and affect self-expression
	Not being able to live the academic experience in a university in Latin America was a bummer, but at the same time, I lived some things that I don't think I will ever live again in my life.	The pandemic generates limitations on the inside and the outside, but new experiences beyond the university open new, unexpected possibilities (3).

not only from an educational perspective but also in terms of academics' personal lives. We want to put this idea of "dysfunction and disruption" in dialogue with the 34 scenes collected in the TRAY-AP study, which in some respects confirms this assumption. However, it also shows how students generate individual and collective responses to develop their agency and resilience. That is to say, their capacity of acting and recovering from difficulties. For Prout and James (1997) (in Rose, 2011, p. 66) "agency is the ability to initiate an action of choice, reflected as creative production where people's activity can be a source of change."

To carry out this dialogue, we created a table with four columns. In the first one, we placed the student's name, the studies s/he is doing, and the university s/he belongs to. We placed the 34 scenes linked to the key concept "emotional effects of teaching and virtual learning" in the second. In the third column, we highlighted the effects that stood out in the scenes. In the fourth, we indicated the positive, negative or ambivalent character, in emotional terms, of those effects. **Table 2** shows an example of the organization of the scenes.

A negative emotional effect slows down the student's agency, leaves them in suspense, prevents them from acting, and produces inhibition, discomfort, and decisiveness. A positive emotional effect leads students to take on challenges, propose collaborative initiatives, and generate strategies that activate their capacity for agency. An ambivalent emotional effect that includes characteristics of the two previous ones moves them in several directions. All this means that the capacity for agency can be slowed down but also activated. To appreciate in detail the characteristics of these effects, we have organized them, inspired by Huguley et al. (2021), in **Table 3**, which shows each of the effects reported by the students.

Table 3 shows the emotional effects that the situation of confinement and isolation has generated in the students. In general, the adverse effects stand out, which are evident and have been named by the research: feeling nervous and overloaded, abandoning learning situations due to lack of attention, decreasing performance, feeling that isolation reduces interaction with others and affects relational experiences, feeling distracted, disconnected, and lacking concentration; seeing how it affects effort and retention to learn; feeling dispersion, virtual symbolic violence, embarrassment and anxiety. However, the decrease in relationships with others and the loss of agency stand out the most, producing, as Lisa points out, that one ends up being "a bit robotic".

Nevertheless, if these are the predominant dimensions that require intense psychological support and pedagogies of care (Goralnik et al., 2012; Desierto and De Maio, 2020; Burke and Larmar, 2021; Mehrotra, 2021), the students have also been resilient and have generated alternatives to the situations they have had to live.

Some students feel more self-confident. It has opened their empathy with the teachers. They have learned to organize themselves, to generate alternatives to the limitations of the virtual classroom. They have generated actions of collaboration and care with their colleagues, and it has made self-knowledge possible.

However, the effects do not only move in a duality. Students have also experienced ambivalent situations associated with the contradictions in which they live, experiences of maladjustment to which they have had to adapt. They stated that the lack of concentration is not a determinant of the pandemic but a person's decision. Most participants were aware of phenomena studied by different authors (Alter, 2017; Carr, 2020; Desmurget, 2020; among others) related to how digital devices capture and dispersing their attention and make it difficult to concentrate. Although virtuality also provides resources that facilitate learning and promote autonomy, above all, the pandemic generates limitations. However, they also point to new experiences beyond the university that unexpectedly open possibilities. Pau, an architecture student who spent part of the pandemic in Chile, synthesized this last consideration in the experience lived in the period when the democratic constituent process was opening, pointing out what may be a summary of students' assessments of the emotional effects generated in their lives and the university:

> Pandemic sucks; obviously, it always will. Online classes suck. Just like missing classes sucks, not being able to go to university sucks. Not living the academic experience at a university in Latin America was a bummer. Still, at the same time, I experienced some things that I don't think I will ever experience again in my life (Pau).

The analysis on how the situation has affected students relationships with themselves, with others and with the world allows us to notice that after an initial moment in which virtual encounters seemed to be a continuation of their experiences before the pandemic, three responses emerged: blocking, adaptation, and reinvention. Researching the experiences of young university students during the pandemic time, based on in-depth interviews, makes it possible to encounter the unknown and feel challenged on how to make sense of it from the adopted onto-epistemic-methodological and ethical framework.

CONCLUSION AND PERSPECTIVES

When the COVID19 pandemic was confirmed and the lockdown occurred, different authors and organizations undertook urgent research to understand how the new situation affected university students' lives. As reported in Khan's (2021) meta-analysis, most of this research used questionnaires. In this same period, we initiated the TRAY-AP research project on trajectories and learning ecosystems of young university students. The meetings, despite the difficulties, were face-to-face. From the beginning, we introduced how they were dealing with the pandemic context and how the changes were affecting them in their daily lives and their relationship with the non-presential modes that university education offered them. Here, we started to see layers of young people's experiences not considered in research based on questionnaires and the richness involved in implemented contextual and in-depth explorations. Learning is a deep contextual and process (Phillips, 2014) that occurs throughout, in the length, breadth and depth of life (Banks et al., 2007). The contextual and ongoing nature of learning reinforces

the need to study educational phenomena in-depth and breadth, taking into account the experiences of those involved. Our initial challenge was to open a dialogue with the transcripts of the four conversations we have had with each student to appreciate how the inability to attend classes physically affected them emotionally in their relationship with their ways of learning at the university. The process we followed is explained in detail in the article and led us to identify seven key concepts around which the students' accounts of their experiences converged. With one of these concepts, the one that had elicited the most significant number of scenes (# The emotional effect of virtual teaching and learning -35), we carried out a second-level analysis that allowed us to name the emotional effects the students had indicated. This new analysis allowed us to point out the most relevant contributions of the study.

The first consideration is the importance of carrying out research that followed the students in their movements and did not lead them to a previously defined goal by the researchers and only to answer given questions. The meetings held were for the students a place of calm, welcome and care. An opportunity to think about a subject (how and where with who and what they learn). Something "that is always there, but that I have not stopped to reflect on" (as Marc said). In this framework of relationships, the experiences around the lockdown opened up as an opportunity for listening (Les Back, 2007) and exploring different ways of narrating their experiences and allowing us to avoid getting involved in "extractive" research (Wilmsen, 2008) and engaging in an educational, inclusive and participatory (Elliott, 1988; Nind, 2014; Abma et al., 2019) process with participants. This scenario calls for educational research more embedded in people's "real" lives and circumstances, considering their voices and their effects. The emerging knowledge might help teachers see students in a more complex and stuational way to improve their educational relationships and student learning.

As underlined in different reports and research on state of the art, the second consideration is that the university and the faculty, in general, were not prepared for such an abrupt change. Most of them emphasized the continuity of classes in virtual and distance format and not on the accompaniment and care of students in this transition. When students point out the emotional effects highlighted in the article, they point out how they had to face loneliness and caring relationships with other colleagues. The virtual has acted in urgency, but learning, as the students point out, is also an emotional experience and as Maria pointed out, "to learn the first thing I have to do is to take care of myself." What raises this reflection is that universities should further consider how they can be institutions that take care of their members. We need more research based on the educational context and oriented toward improvement and change.

The third shows the difficulties highlighted by many participants to organize themselves and develop independent and self-regulated learning strategies. Students contributions reveal that higher education is mainly teacher-centered. Many universities still believe that "teaching is telling, learning is listening, and knowledge is what is in books" (Cuban, 1986, p. 27). In this way, moving face-to-face to virtual teaching usually becomes a set of lectures (sometimes broadcasted) followed, sometimes, by a set of questions. Most students lack skills and intellectual autonomy when other teaching methods (as flipped classroom or collaborative tasks). Contemporary higher education institutions operate in a highly complex and multifaceted world, where "data is cheap, but making sense of it is not" (Boyd, 2014). The great challenge in this context is how to provide young people with educational experiences that help them develop their full capacities to become responsible citizens of a better world. An ideal that is unattainable without the full participation and engagement of institutions, teaching staff and students.

The fourth consideration, as suggested above, relates to the need to pay attention to learners' social and personal circumstances. Learning is a highly contextual process (Phillips, 2014), not just a cognitive process, but a fully embodied and experiential journey, in which affect, what affects us, plays a crucial role. The participants in our study with better living conditions and higher social and cultural capital found much fewer difficulties during the pandemic. They showed much more open perspectives and resources than others with different circumstances, as in the case of Blai, an Economics student, passionate reader, and highly engaged in cultural, social and political issues that remember the confinement time as very positive. "It was like a time of downtime that I could dedicate myself to reading, watching movies, and dedicating myself to what I liked without having any worries." In this regard, the university cannot go on thinking of them as an equalizer. Not recognizing students' diversity and not paying attention to their needs by treating all the "in an equal manner" can perpetuate the academic, social and cultural divide. This insight is of paramount importance in research about educational "excellence" and competitive rankings facing universities.

In conclusion, after the abrupt shock of the first confinement and the need to adapt without preparation or resources to a new university, work and social situation, students have, in general, developed emotional strategies and tactics of adaptation to this unexpected life condition. The consequences and lessons learned could better prepare them to better understand and cope with their present and future life in an ever-changing world. One of the remaining questions, which calls for further research, is if universities have learnt from this situation. Whether they are coming out of this crisis wiser and ready to make a difference, or whether they will be back to the "same" starting point.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation, provided that they do not violate the ethical commitment.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Comissió de Bioética, University of Barcelona. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

Both authors contributed to the article and approved the submitted version.

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Distance Learning During the First Lockdown: Impact on the Family and Its Effect on Students' Engagement

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This contribute investigates how Emergency Remote Education (ERE) impacted families during the spring 2020 Covid-19 lockdown, and in particular, the extent to which the impact of ERE on families, measured in terms of space and equipment sharing, moderates the effect of student and family characteristics on students' engagement. The study derived from the administration of an online survey to 19,527 families with children attending schools, from nursery to upper secondary grade. The total number of student records collected amounted to 31,805, since parents had to provide data for each school-age child in the family. The survey contains 58 questions, divided into three sections, with the first two sections designed to get a reading at family level and the third section to gather data for each school-age child in the family. After verifying the validity of the engagement construct through confirmatory factor analysis, two structural equation models were used to analyze the students' engagement. The main findings reveal how the impact of the ERE on the families has had a significant role in predicting students' level of engagement observed by parents with respect to different predictor variables. Finally, we argue that it is necessary to follow a holistic approach to observe the challenges imposed by the switch of the process of deferring teaching from presence to distance, imposed by the pandemic emergency on families. In fact, a holistic approach can promote student engagement and prevent the onset of cognitive-behavioral and affective problems linked to disengagement in ERE.

Keywords: emergency remote education (ERE), students' engagement, COVID-19, family involvement in education, home learning environment (HLE)

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1. INTRODUCTION

The onset of the Covid-19 pandemic in the early 2020s forced most educational institutions to suspend face-to-face teaching activities and move toward distance learning to contain the spread of the epidemic. Not all European countries have adopted the same measures, some have progressively readmitted students to school after the most critical period, others, like Italy, implemented nationwide school closures as of 9 March 2020 until the end of the school year (United Nations Educational, 2021). The closure of school in presence on our national territory was firstly established with a Decree by the Prime Minister (DPCM 4 March 2020), and confirmed with subsequent similar decrees (DPCM of 26 April 2020; D.L. 16 May 2020, n. 33; DPCM 17 May 2020); teaching was provided online until the end of the school year. Therefore, Emergency Remote Education (ERE) represented a temporary solution, the only way "to survive in a time of

crisis with all resources available, including offline and/or online" (Bozkurt and Sharma, 2020, p.2), realistically a branch of online learning and homeschooling.

It is interesting to note that during the period of school closures caused by the pandemic, the focus of many studies has been on what happens when the classroom space-time setting moves into the home environment, introducing the multi-faceted world of learning in the digital age into the rhythms of family life (Benigno et al., 2021; Gentile et al., 2021). Scholars and academics worldwide have searched answers to the many research questions raised by the ERE, mainly from the schools' and teachers' perspective: how schools and teachers managed the emergency.

However, the number of scientific papers on how students reacted, in terms of student engagement, to ERE is still very deficient. In particular, there is a gap in the literature concerning the study of engagement in relation to its impact on the cognitive-behavioral and affective attitudes toward the new online learning experiences during the pandemic crisis. Starting from this, the motivation for the study presented in this paper is to analyze the impact of ERE on students' engagement — defined in terms of cognitive-behavioral and affective attitudes toward ERE — considering at the same time both the support provided by the Italian families during the homeschooling period and the educational approach followed by teachers.

The importance of considering the complexity and diversity of families' settings to cope with ERE from home has been highlighted by several studies (Brom et al., 2020; Di Pietro et al., 2020; Hapsari et al., 2020; Pellegrini and Maltinti, 2020), which have investigated specific variables influencing ERE activities (e.g., the number of children engaged in ERE at the same time; the number of parents working from home, at full or part time; availability of separate space for studying or the necessity to share house spaces; availability of technology equipment in the household). It is reasonable to assume that comfortable and arranged family conditions, with the necessary space to work and technological equipment, foster a more positive and productive engagement for studying and, more in detail, to complete the assigned learning tasks. Unfortunately, this might not be the case for many students who live in a disadvantaged condition, in which they carry out their work in a small space shared with other family members. Several studies reveal considerable differences in housing quality across European countries, and capture important disparities that affect children's engagement and goals achievement (Di Pietro et al., 2020; Gigli, 2020; Ndhine, 2020).

Besides, it is important to reflect non only on the different families' conditions, but also on the educational challenges raised by the ERE context. According to Affouneh et al. (2020), the course design, assessment, and teaching strategies originally planned for face-to-face teaching have changed. Teachers, students, and parents have had to adapt very quickly to new educational scenarios where the use of technology plays a very strong and important role. The massive and not always prepared use of emerging technologies, during the crisis, has reshaped different learning aspects, influencing the student's engagement (Bergdahl et al., 2020; Khlaif et al., 2021), and impacting on their affective, cognitive and behavioral attitudes toward the educational experiences. Theoretically, student engagement is defined as "the student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" (Newmann et al., 1992, p.12).

It plays a crucial role in students' learning and satisfaction in distance education because online learners seem to have fewer opportunities to be engaged with positive learner experiences and interactions with content, peers, and instructors (Bolliger and Martin, 2018; Martin and Bolliger, 2018).

However, if before COVID-19 several studies have focused on online learning trying to identify the factors influencing student's engagement in normal situations (Fugate et al., 2018; Wong and Chong, 2018), there is a lack of research about the distinct components influencing student's engagement in online learning during the COVID-19 pandemic emergency. So, in accordance with Bond's definition of engagement, that is rooted in the communities of learning paradigm, engagement represents "the energy and effort that students employ within their learning community, observable via any number of behavioral, cognitive or affective indicators across a continuum" (Bond and Bedenlier, 2019, p.3). Following this definition, the present study explores the construct of engagement taking into consideration both the cognitive-behavioral and emotive-affective factors which influence student engagement in the Italian families, during the ERE in the period of COVID-19 crisis.

Consequently, through the administration of an online survey to a representative sample of 19,527 Italian families, the current study tries to answer the following research questions:

- Q1 How do specific ERE strategies adopted by teachers directly impact on students' engagement?
- Q2 How do specific students characteristics directly impact on students' engagement?
- Q3 How do specific family characteristics directly impact on students' engagement?
- Q4 How does the impact of ERE on the family moderates the influence of students and family characteristics on students' engagement?

The choice of the variables to be investigated, both those related to the student characteristics and those related to the family characteristics and the educational context, has guided the entire research process. A process based on a systemic approach according to which studying the construct of engagement could not be separated from the analysis of what could influence it, directly or indirectly. Thus, it became very important to understand how, during the pandemic period, variables related to the family or the instructional contexts could provide sensible and practical answers to why student engagement was not always constant, but often depending on the situational antecedents that trigger it and the consequences that maintained it.

Studying the strength of this impact, in such a large sample, will add an important piece of knowledge to the current literature on engagement by relating it not only to the quality of the learning provided, but also to the quality of the family support

given to the students who had to face the challenge of emergency remote education.

2. METHOD

2.1. Participants

The survey participants were 19,527 families, and the total number of child records collected amounted to 31,805. This difference is due to the design choice of allowing parents to provide data for each of the school-age children in the family, thus obtaining a more detailed picture of the impact of distance learning. The responding parent was generally the mother(86,7%). Considering data from all parents (both respondent and other parents), 30.8% of them are between 45 and 49 years old; 94.4% of them are Italian citizens. About the level of education, 36.5% of parents have a university degree, and 46.2% have a secondary school diploma. In terms of employment status, 77.2% of parents were employed, and 10.6% were unemployed. Data reveals that 55.3% of the parents interviewed worked from home during the lockdown period. The sampled families live prevalently in the regions of Central Italy (68.9%). The sample of children includes kids in nursery school (10.2%), and pupils at first cycle primary schools (16.6%), second cycle primary schools (23.3%), first cycle secondary schools (25.5%) and second cycle secondary schools (24.5%). The presence of a disability was reported for 905 children out of 31805. These students are distributed among the following school levels: 11.2% preschool, 21.7% first-cycle elementary, 20.3% second-cycle elementary, 26.3% first-cycle secondary, and 20.6% second-cycle secondary.

2.2. Design

The objective of the survey was to obtain a comprehensive picture of the impact of distance learning on the families during the Covid-19 emergency. To this aim, during the first phase of the COVID-19 pandemic (March-May 2020), we structured the questionnaire in such a way to allow parents to report data for each of the school-age children in the household. It contains 58 questions, divided into three main sections, with the first two sections designed to gather information regarding the family as a whole, and the third section to collect data for each child in the family. Considering the use of the survey as a tool to investigate the impact of ERE on families, the present study complies with the approach provided by selective studies (Kish, 1987; Ato et al., 2013).

2.3. Procedure

The questionnaire was administered online through the open-source software LimeSurvey, and spread through the snowball sampling technique between May 12 and June 22, 2020. The data collection has been conducted according to the regulation established by the General Data Protection Regulation (GDPR, 2016). In particular, the questionnaire has been designed according to the privacy by default principles, as specified in the article 25 of the Regulation, so as to reduce the personal and special data to be collected, and minimize the ethical impact as indicated by Hoerger and Currell (2012). Specifically, all the collected data are anonymous, thus minimizing the risk that this information could lead back to the identity of the participants. Furthermore, the LimeSurvey software used to administrate the questionnaire has been installed on the Institute's management server in order to maintain total control over the life cycle of the data and the technical information collected by the servers themselves and necessary for the use of the questionnaire (e.g., IP address, type of browser, etc.). Finally, along with the questionnaire we provided an informative letter containing details on the purpose of the research, the authors, and any other information useful for understanding the scientific context in which the survey has been conducted.

2.4. Instrument

The first set of questions concerns the socio-demographic profile of the family. In particular, parents' personal data (gender, age, nationality, citizenship, school level, employment status), and general data on the composition of the household (i.e., the number of adults and number of children of school age) have been collected. In this first section, we investigated whether one or both parents worked from home (WFH) during the pandemic and if they needed support to manage their child(ren) (whether they worked from home or not). The second section provides a picture of families' technological endowment and their initial capacity to respond to distance learning and parents' WFH requirements. In particular, whether or not they had immediate availability of the equipment necessary to attend remotely, and whether they were in some way "forced" to equip themselves independently or with the support of the school. Resources availability and parental confidence in information technology constitute an essential part of the questionnaire useful in corroborating the studies on socio-cultural and instrumental inequalities highlighted by many of the previously mentioned studies. The third section of the questionnaire collects information about the family's distance learning experience concerning the individual child. Therefore, parents fill out a form for each school-age child, specifying the school leveland the presence of any disabilities or special educational needs. This section investigates the impact that distance learning has had on family management, whether it has had repercussions on daily life and shared spaces organization. An additional set of questions was proposed to detect families' perceptions related to the educational effectiveness of distance learning and school organization, both in terms of support and communication with the families. Specific questions were also formulated to understand whether their children's psycho-physical well-being was affected during the lockdown period and whether noteworthy changes were observed in the socio-affective and behavioral domains. Finally, in the case of a child with disabilities parents were asked to report how distance learning had ensured inclusion even in the virtual context.

2.5. Statistical Analysis

To analyze students' engagements during ERE, we focused on the responses provided by parents to the question "What attitude do you notice in your son/daughter toward distance education?". In particular, through this question, we asked parents to what extent (in a scale from 0 to 10) they had noticed the following

attitudes: cooperation, curiosity, interest, concern, restlessness, and emotional volatility.

First, we conducted a qualitative investigation calculating the descriptive statistics on the scores for these items. Then we analyzed these attitudes observed by the parents according to the engagement model reported by Bond and Bedenlier (2019) and Bond (2020a,b), where the construct of engagement is defined as a second-order latent variable built on the first-level latent variables (affective and cognitive-behavioral). Specifically to the *Affective* component, a less restless, worried and volatile behavior observed in the student corresponds to greater involvement in distance learning activities. Similarly, concerning the *Cognitive-behavioral* component, the level of engagement increases when their family members perceive students as very interested, collaborative and curious about learning. We verified the factorial structure of the engagement model through a Confirmatory factor analysis (CFA).

Next, we studied student engagement as certain conditions varied. In particular, we considered the following variables grouped in three areas:

- the family context
  - age of the parents, calculated as the maximum age of the two parents
  - school level of the parents, calculated as the maximum school level of the two parents
  - residence, considered ad the macro-area of Italy (North, Center and South Italy)
  - citizenship
  - presence of at least one parent in remote working
- the characteristics of the student
  - gender
  - school level
  - presence of disabilities
- the teaching approach used during the ERE
  - technology tools used during ERE
  - implementation of collaborative activities during ERE.

We verified the effects of these variables on the students' engagement by means of a structural equation model (Model A) (Q1,Q2,Q3).

Finally, we fitted a second structural equation model (Model B) to check if and how the impact of ERE on the family moderates the effect of the variables related to family background and student characteristics over the students' engagement (Q4). The impact of ERE on the family was defined as a latent variable observed by the responses of two items through which we asked parents about the impact of distance education on space sharing and instrumentation sharing.

Both the models was defined as multilevel structural equation model to cope with the hierarchical structure of the collected data. In fact, allowing the parents to provide data for each school-age child we obtained a sample of 19,527 families and 31,805 students; indicatively, an average of 1,63 student records was reported for each family. Data about students represent the first-level units, while the second-level units are the family.

For the purposes of this article of the 31,805 student records collected, the 25,563 student records for which distance education was enabled were analyzed. Structural models were estimated on the 20,586 student records for which the variables investigated were found to have no null values.

Multiple fit indices were considered to check the models : the root mean square error of approximation (RMSEA), the standardized root mean squared residual (SRMR), and the comparative fit index (CFI). RMSEA levels of < 0.05 indicate a good fit while values < 0.08 indicate an acceptable fit (Kline, 2015). SRMR < 0.05 represents a good fit and < 0.10 is acceptable (Schermelleh-Engel et al., 2003). Finally, CFI values of > 0.97 can be considered a good fit (Schermelleh-Engel et al., 2003), and > 0.95 can be considered an acceptable fit (Schermelleh-Engel et al., 2003).

All the analyses on student-level variables were carried out using the Lavaan package (Rosseel, 2012) of the open-source software R (R Core Team, 2018).

3. RESULTS

The 20,586 student records used to estimate the structural model are divided into 10,497 records referring to male students and 10,089 to female students. In 570 cases, parents reported the presence of disabilities. The 20,586 cards are composed by 3,476 cases relating to the first cycle of the primary school, 5,050 to the second cycle of the primary school, 5,985 to students of the first degree secondary school and 6,075 to students of the second degree secondary school. In the structural models, a variable representing the linear component of a polynomial contrast matrix was used to assess the effects on engagement as the school level increases. In 8,831 out of 20,586 cases, at least one parent in remote working was present in the household. Concerning citizenship, only in 364 cases did the respondent household declare itself a first or second-generation immigrant. The vast majority of the responding households were residents in central Italy (14,020), while 5,027 and 1,539 households were residents in northern and southern Italy. The parents' educational level shows a prevalence of families with a university degree (10,598) or a high school diploma (10,479). In 3,233 cases, parents declare a Bachelor degree, while there are residual cases of parents with a secondary school license (1,232), an elementary school license (11) or no qualification at all (10). As in the case of students' school level, it was chosen to use a variable capable of representing the linear component of this ordinal variable. **Table 1** shows the distribution of the age of the parents.

Table 2 shows the frequencies of technologies adoption during ERE.

Mean scores, standard deviations, together with skewness and kurtosis for the investigated observed students' behaviors are shown in **Table 3**.

According to the Kolmogorov-Smirnov test, all items show significantly non-normal distributions ($p < 0.0001$ for all the items).

TABLE 1 | Distribution of parents' age.

Age	*n*
<20	8
20–24	3
25–29	21
30–34	192
35–39	1,017
40–44	3,890
45–49	6,965
50–54	5,886
>54	2,604

TABLE 2 | Frequencies of technologies adoption during ERE.

Variable	*n*	Freq
Collaborative activities	8,073	0.39
Video conference systems	16,925	0.82
Online learning platform	10,887	0.53
Shared folders	3,012	0.15
Publisher learning resources	1,119	0.05
Electronic registry	15,737	0.76
Messaging	8,502	0.41

TABLE 3 | Descriptive statistics of observed students' behaviors.

	Variable	Mean	SD	Skewness	Kurtosis	% Missing
1	Collaborative	6.89	2.55	−0.95	0.41	0
2	Curious	6.47	2.56	−0.79	0.13	0
3	Emotionally volatile	3.75	3.45	0.35	−1.28	0
4	Interested	5.46	2.75	−0.42	−0.55	0
5	Restless	3.81	3.36	0.33	−1.21	0
6	Worried	4.03	3.53	0.23	−1.36	0

Table 4 shows the correlations between individual attitudes highlighting the significant correlations, with an absolute value ranging between 0.14 and 0.86. Particularly strong are the correlations between the collaborative, curious, and interested items and between the restless, emotionally volatile, and worried items.

The CFA of the engagement construct built on observed behaviors in accordance with Bond and Bedenlier (2019) and Bond (2020a,b) shows a good fit according to all the fit indices ($SRMR = 0.03$, $CFI = 0.99$) except for RMSEA ($RMSEA = 0.08$). **Figure 1** shows the factor loadings of the engagement model.

The model A shows a good fit according all the fit indices ($RMSEA = 0.04$, $SRMR = 0.02$, $CFI = 0.96$). Also, model B shows a good fit according all the fit indices ($RMSEA = 0.04$, $SRMR = 0.02$, $CFI = 0.96$).

Figures 2, **3** report the factor loadings and the regression coefficients of the two structural models.

TABLE 4 | Correlations of observed students' behaviors.

	Collaborative	Curious	Interested	Restless	Emotionally volatile
Collaborative					
curious	0.86****				
Interested	0.62****	0.73****			
Restless	–0.14****	–0.16****	–0.12****		
Emotionally volatile	–0.41****	–0.42****	–0.33****	0.54****	
Worried	–0.36****	–0.38****	–0.29****	0.52****	0.76****

****$p < 0.0001$.

Table 5 shows the estimates of indirects effects, respectively on the engagement latent variable, mentre la **Table 6** shows the estimates of total effects of the variable on the engagement latent variable.

4. DISCUSSION

The results analyzed according to the two structural models described above and obtained through the wide survey carried out on Italian families during the period of the first lockdown (March-June 2020), explain how some variables related to the family context, to the student's characteristics and to the didactic approach influenced the families' perception of their children's emotional-affective and cognitive-behavioral involvement during the remote education activities.

The first of the two models used (**Figure 2**) highlights the effect of some descriptive variables on students' engagement. In particular, the model analyzes how some characteristics of the family (parents working from home, migrant family, area of residence, parents' age and school level), of the student (gender, disability and school level) and of the remoteness education approach adopted during the pandemic emergency influenced students' engagement.

Specifically to the educational approach, the model shows that parent's perception of children's engagement is higher especially where collaborative activities were proposed, thus confirming the findings by Bolliger and Martin (2018). The use of videoconferencing systems, online platforms and shared folders have played a key role in keeping interest and motivation high. The effect of using these tools have resulted in more effective motivation than using other online tools. Therefore, we can deduce that the education approach used during the remote activities has had a strong impact on the children's engagement, especially when it has adopted teaching strategies and support tools which are contextually appropriate and motivationally salient.

These findings support the idea that, in order to be effective in engaging the student's interest, ERE must have characteristics that make it not a mere transposition of face-to-face teaching, but rather a corpus of activities properly designed for the distance setting (Zhu et al., 2016). Furthermore, ERE should provide students with rich, holistic learning opportunities

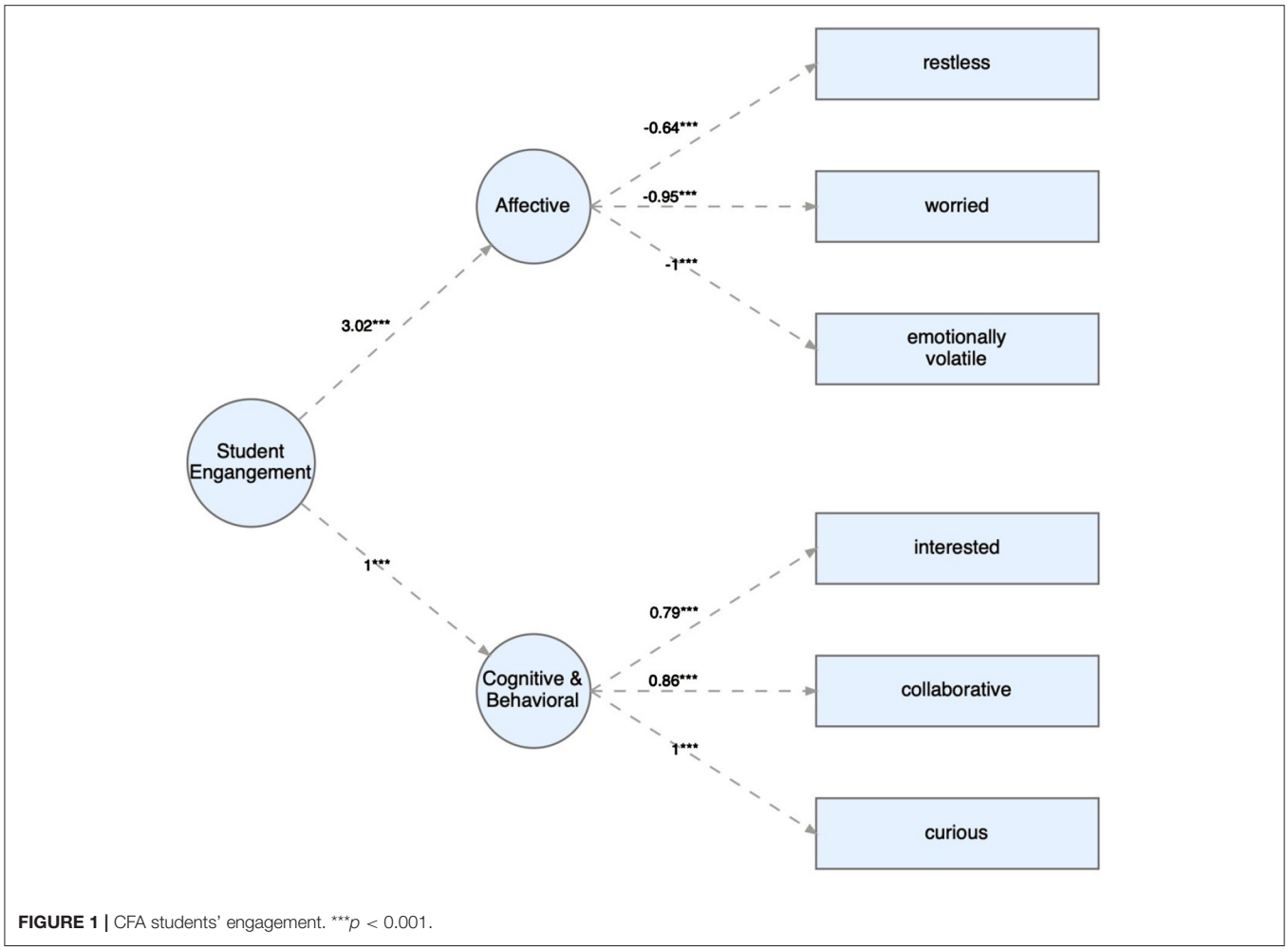

FIGURE 1 | CFA students' engagement. ***$p < 0.001$.

during the pandemic lockdown engaged relatively frequently and successfully with online learning (Domina et al., 2021).

Specifically to the students' characteristics that influenced her/his engagement model A has highlighted that the gender of the students had a significant impact on engagement; in particular, female students were more involved than their male peers. This result is confirmed by a number of studies showing that female adolescent students can achieve significantly more positive online learning outcomes than males because they are more persistent, motivated, and more self-regulated than their male peers (Yu, 2021). In particular, Korlat et al. (2021) in their study examining the relationship between gender and level of engagement, state that if boys are perceived as more able than girls in online activities, girls are more engaged in learning activities and more study oriented. Thus, it could be that girls are more likely to have transferred their previously established learning practices to the new online learning context. Similarly, in Hsiao (2021) study, the male gender tends to be more passive in learning and consequently boys' independent learning ability may require further improvement.

Individuals with disabilities are perceived by their parents to be less involved ($\beta = -1.12^{**}$), in addition, the analysis reported in Model B confirms both a direct effect on engagement ($\beta = -0.88^{***}$) and an indirect effect through an increased impact on families ($\beta = 0.31^{*}$). We hypothesized that children with disabilities, during the period of the pandemic emergency, as Parmigiani et al. (2020) suggests, suffered more from the loss of contact with their peers and teachers, thus making the family feel less involved in their studies and more socially isolated. In addition, their presence at home, being less autonomous and deprived of the support they usually enjoy in class, had a greater impact on the family who had to, often without external help and very quickly, provide their own care and share both physical and temporal spaces.

Besides, we note that there is a small difference between central and northern Italy and that, in particular, students from northern Italy seem to have been less involved than those from central Italy, while there are no significant differences between the south and the center. It is remarkable to point out that when the school level of the students grows, engagement increases, and that parents' age and working from home do not impact on the perception of parents' level of engagement. Similarly, no significant differences have emerged between families with migrant backgrounds and native families.

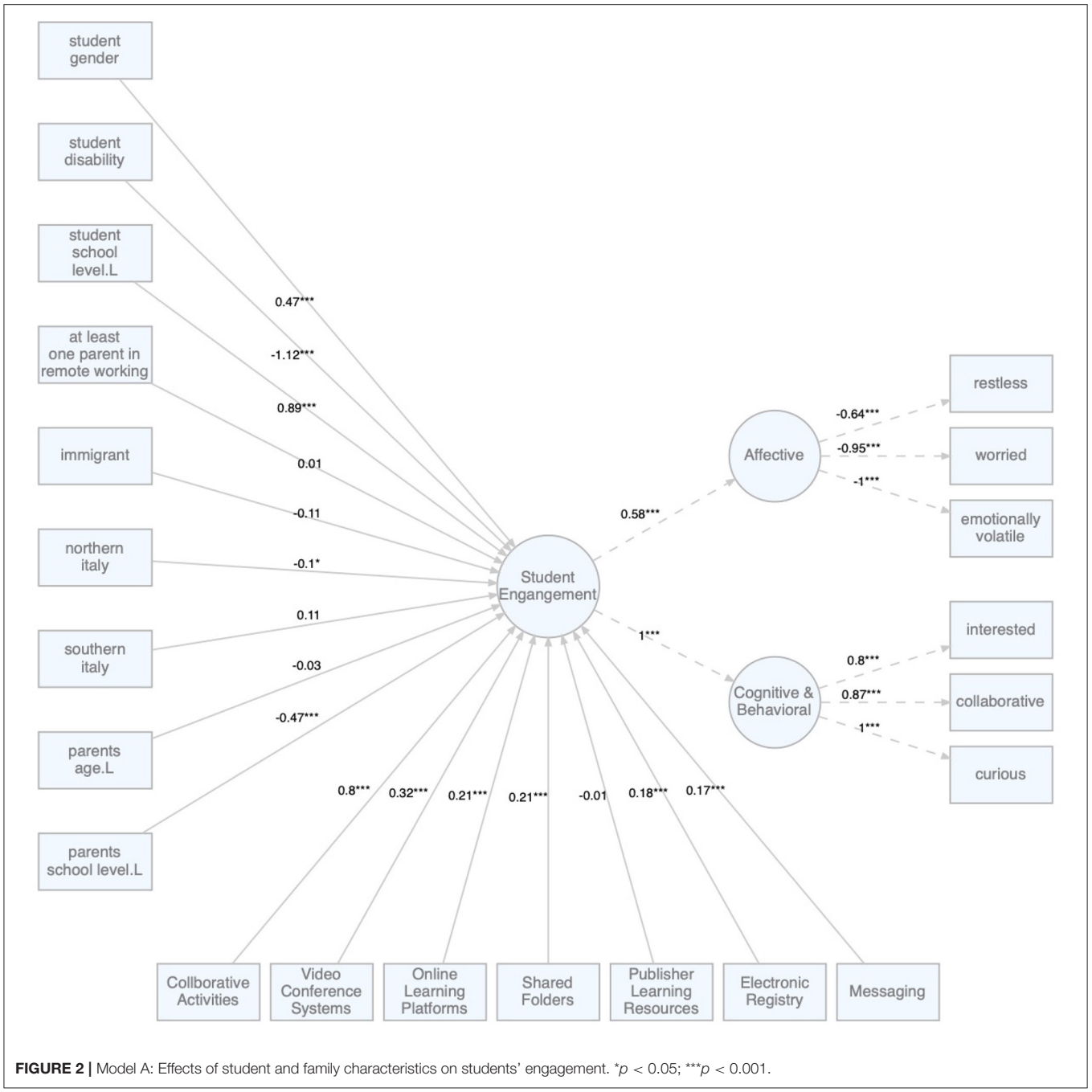

FIGURE 2 | Model A: Effects of student and family characteristics on students' engagement. *$p < 0.05$; ***$p < 0.001$.

The parent's school level, on the other hand, has a significant impact in the sense that parents with high schooling seem to perceive lower engagement of their children. This is probably due to the fact that parents with a higher level of education and greater knowledge of how the ERE could be carried out, having higher expectations, found greater deficiencies and critical issues in the design of the educational activities. The results indicate, on the other hand, according with other studies (Domina et al., 2021) that parents with a higher school level can support their children more readily both in the technical management of suitable tools, and in the supervision of the contents proposed through the ERE.

These considerations can be further explored by discussing some effects that emerge from the analysis of Model B (**Figure 3**) in which the effect of context variables at the level of engagement is mediated by the latent variable "impact on the family" declined in two dimensions: sharing of spaces and sharing technological tools. In general, Model B highlights that the greater the need of the family members to share spaces and tools, the less is the perceived involvement of children ($\beta = -0.19^{***}$) in distance

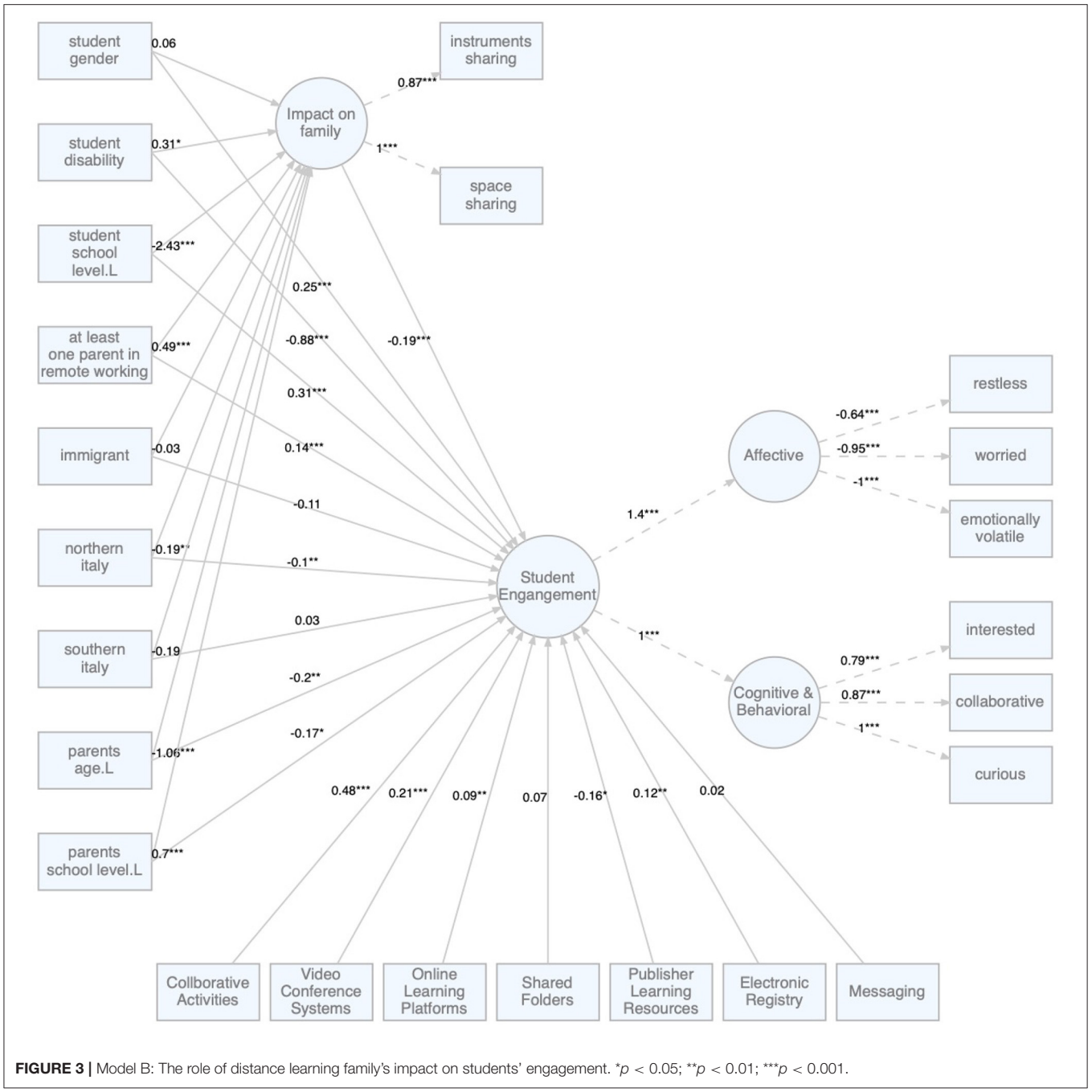

FIGURE 3 | Model B: The role of distance learning family's impact on students' engagement. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

learning activities. In particular, where in the first model (Model A) some of the identified effects did not seem to be completely intuitive, in the second model they can be explained in greater detail. Two aspects are particularly contrived: the fact that in model A the presence of the parent working from home has no impact on engagement ($\beta = 0.01$) and also the non-impact of immigrant families ($\beta = -0.11$).

In fact, if in the model A the presence of a parent working from home has no impact on engagement, in the light of a more in-depth analysis that also includes and considers the study of the impact on the family, we note that when there is a parent working from home, the impact on the family increases in terms of sharing spaces and technological equipment ($\beta = 0.49$***), probably because family members are "forced" for reasons of work and/or support for children's learning to physically share the same spaces and tools. In the study of Di Pietro et al. (2020), for example, it has debated the role that a more well-equipped home environment, in terms of greater autonomy of spaces, has in facilitating learning of children in ERE. If the parent working from home can facilitate the support of children in ERE

TABLE 5 | Estimates of indirect effects on engagement.

Label	EST	SE	*z*	*p*-value	CI.lower	CI.upper
ab_s_gender_impact	−0.01	0.01	−1.23	0.218	−0.03	0.01
ab_s_disability_impact	−0.06	0.03	−2.19	0.029	−0.11	−0.01
ab_s_school_level_L_impact	0.46	0.02	22.69	0.000	0.42	0.50
ab_p_SW_impact	−0.09	0.01	−7.84	0.000	−0.11	−0.07
ab_p_immigrant_impact	0.01	0.04	0.14	0.891	−0.07	0.08
ab_p_northern_italy_impact	0.04	0.01	2.92	0.003	0.01	0.06
ab_p_southern_italy_impact	0.04	0.02	1.71	0.088	−0.01	0.08
ab_p_age_L_impact	0.20	0.02	9.73	0.000	0.16	0.24
ab_p_school_level_L_impact	−0.13	0.02	−5.37	0.000	−0.18	−0.08

TABLE 6 | Estimates of total effects on engagement.

Label	EST	SE	*z*	*p*-value	CI.lower	CI.upper
total_s_gender	0.24	0.04	6.19	0.000	0.16	0.31
total_s_disability	−0.94	0.11	−8.37	0.000	−1.16	−0.72
total_s_school_level_L	0.76	0.06	12.42	0.000	0.64	0.89
total_p_SW_impact	0.05	0.04	1.35	0.177	−0.02	0.12
total_p_immigrant_impact	−0.10	0.13	−0.81	0.417	−0.36	0.15
total_p_northern_italy_impact	−0.06	0.04	−1.66	0.097	−0.14	0.01
total_p_southern_italy_impact	0.06	0.06	1.02	0.310	−0.06	0.19
total_p_age_L_impact	0.00	0.06	−0.01	0.989	−0.12	0.12
total_p_school_level_L_impact	−0.30	0.08	−3.83	0.000	−0.45	−0.15

more closely, understanding in real time the needs that arise and proposing timely solutions (Lagomarsino et al., 2020), it is also true that the emergency situation significantly increased the risk of psycho-physical stress of parents with a potential negative effect on the well-being of children in ERE (Spinelli et al., 2020). Therefore, if the presence of the parent impacts "negatively" on the family for the reasons described, on the contrary, it positively impacts on the engagement, removing the initial effect that apparently could seem insignificant.

The non-impact of immigrant families appears at odds with the literature regarding the impact of Covid-19 on migrant families. Darmody et al. (2021), after pointing out the limited empirical evidence available on the impact of the COVID-19 pandemic on migrant/refugee/asylum-seeking children, highlight how the pandemic has widened pre-existing socio-economic inequalities (Dustmann et al., 2012; Entorf, 2015) and, in particular, educational inequalities, with dramatic consequences on vulnerable groups, such as children with special educational needs and migrant children. Similar conclusions are achieved by Bond (2020b), in her systematic review on K-12 research on teaching and learning during the COVID-19 pandemic, who points out that, even though little research has focused on migrant students, support for migrants and refugees is one of the priority topics highlighted in literature. Amongst the reasons that led to this worsening of the situation of student migrants forced to home-schooling during the pandemic, the literature highlights several factors, including the educational attainment of their parents, who are less familiar with the curriculum and with the host country language (Smyth et al., 2009; Lehmann et al., 2021); the lack of educational technology and, accordingly, reduced opportunities to engage in online education (Bayrakdar and Guveli, 2020; Popyk, 2020; Primdahl et al., 2020; Save The Children, 2020); the scarce availability of a quiet place to study (Kluge et al., 2020; Darmody et al., 2021; Lehmann et al., 2021); the socioeconomic factors that generally penalize migrants (Dustmann et al., 2012), which were found to be dramatic during the pandemic and lockdown periods (Kluge et al., 2020); the negative impact on learning engagement and academic progress of students (Mohan et al., 2020; Darmody et al., 2021; Lehmann et al., 2021).

All these studies have widely demonstrated the impact of COVID-19 pandemic on families with migrant backgrounds and, specifically to our analysis, the negative impact on students' engagement. By taking into account the number of surveys received by families with migrant backgrounds, it emerges that it is unrepresentative of the actual situation in the Italian schools. In fact, comparing data on the presence of pupils of foreign origin in Italian schools (data updated to 31/08/2019; source: Italian Ministry for Education), it emerges how the sample of respondents is extremely small: preschools: 11.4% (compared to a percentage of respondents equal to: 1.61%) primary schools: 11.5% (compared to a percentage of respondents equal to: 1.44%) lower secondary schools: 10.5% (against a response rate of: 1.07%) secondary schools: 7.4% (against a percentage of respondents equal to: 1.12%) It is therefore highly likely that the data for migrant families are in fact not statistically significant, and for this reason the models presented in this paper do not provide statistically appreciable indications of the impact that the pandemic had on these families. Although not explicitly investigated in our research, the low number of responses would seem to be a consequence of what was said earlier about the socio-economic and cultural gap between families with a migrant background and native families. Specifically, migrant families may have met problems in responding to the questionnaire due to their difficulties in accessing information technology, their educational attainment, and their difficulties with the Italian language.

Furthermore, if we look at the school level of students, we notice that as the school level increases, engagement increases ($\beta = 0.31^{***}$) and the impact on the family decreases ($\beta = -2.43^{***}$). Intuitively, we could hypothesize that older children impact less on the sharing of spaces and tools, as they are less dependent in terms of educational support from parents and more autonomous in the use of technology.

The data also reveal a lower suffering of families in Northern Italy respect to the impact on the family ($\beta = -0.19^{**}$), compared to those in the Center, probably due to a better socio-cultural condition and a greater propensity to consider distance learning as a valid alternative during the

lockdown period. Otherwise, for families in south Italy, no significant data emerges in comparison with the center of the Italian territory.

As for the explanatory variable "age of parents," the model A shows a non-significant effect on perceived engagement ($\beta = -0.03$). In fact, model B highlights how the direct negative effect as the age of the parents increases ($\beta = -0.2^{**}$) is balanced by a positive indirect effect ($ab\_p\_age\_L\_impact = 0.2^{**}$) given by the decrease in the impact on the family ($\beta = -1.06^{**}$).

Compared to the level of education of the parents, in the model A we observed that as the parents 'school level increases, engagement decreases ($\beta = -0.47^{***}$). The second model, shows that the total negative effect of parents' school level on engagement is the sum of a direct effect ($\beta = -0.17^{*}$) and of an indirect effect ($ab\_p\_school\_level\_L\_impact = -0.13^{*}$) on the engagement. Specifically, the indirect effect highlights the more the parents' school level increases and the more they increase the requests in terms of sharing tools and space ($\beta = 0.7^{***}$). It is plausible that parents with a higher level of schooling, as well as professionals, have done more working from home than parents who are self-employed or have a lower level of schooling. Consequently, parents who have been working remotely from home for a long time have had the opportunity to observe their children more closely during activities in ERE, with a twofold consequence. On the one hand, being more competent due to their level of schooling, they were more sensitive in understanding the advantages and disadvantages of the didactic approach used remotely, on the other hand, remaining in the household they had more difficulties in sharing both the technological equipment and the physical spaces.

If previously the reading of this data without the impact could lead us to an interpretation that parents with a higher school level have a more negative perception of ERE, in reality, this value of the negative impact on engagement is not only due to a direct effect but it is also due to the indirect effect, that is to say the increase in the impact on the family that the parent with the highest level of education has.

5. CONCLUSION

In this paper we have examined how the student engagement construct, too often misused, poorly understood, and overgeneralized, during the period of the pandemic emergency is influenced by a variety of factors such as the family environment, the didactic approach and the student attitudes toward the remote learning activities. This with the intention of emphasizing how the construct of engagement, defined as a learner's interest and participation in an educational initiative, is directly related to favorable instructional strategies, supportive family characteristics and positive affective, cognitive-behavioral attitudes. Working collaboratively using online communication tools and building effective cooperative activities, in the specific context of the forced distance, has been found to be extremely important for student engagement. Besides, we found that the perception of interviewed parents about the student engagement depends on their effective presence and support at home, according to working from home practices, or to their school level. Moreover, the level of student's engagement reflects the parents' perception of their affective and cognitive-behavioral attitudes. So it is notable that students' engagement is related to their approach to learning processes: curiosity, interest and collaboration are important antecedents of a more involvement, such as to be restless, worried or emotionally volatile could impact differently on the level of engagement. These results suggest many interesting implications that should be addressed in the present and in the future in Italy, and in all countries involved in the pandemic, if we want to promote student engagement also during the remote learning and prevent the onset of cognitive-behavioral and affective problems linked to disengagement. Families and schools need to have correct information and guidelines about the best way to establish positive behavior support and a conducive environment that positively affects their personal and student's well being. A limitation of this study can be given by the fact that there are certain factors that have to be dealt with more in depth, with particular regard to alternative and appropriate educational suggestions to make students more engaged. At the same time, starting from the theoretical framework of Zhu et al. (2016), it could be interesting in a future study to reflect on the engagement as one of the main key factors to be improved to make ERE a multidirectional interactive learning experience based on a technology-enriched environment. Furthermore, in depth investigation of the family impact is necessary, in order to better understand the relationships between specific variables and students' engagement. Among the others, our analysis of data regarding families with migrant background has produced findings which do not fit with evidence from the several empirical studies on the subject. We argue that this is due to the limited number of questionnaires filled by migrant families, thus making data not statistically significant. Nevertheless, this reveals a dramatic fact: not only children from migrant families have been penalized by ERE more than native children, but these families have been widely excluded from surveys of the impact that ERE had on them, constituting a serious additional element of social exclusion for these families.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Commission for Ethics and Integrity in Research of the National Research Council on Italy. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AC: conceptualization, investigation, methodology, supervision, and writing—original draft. MA: conceptualization,

investigation, project administration, and supervision. VB: conceptualization, investigation, project administration, supervision, writing—review, and editing. GC: conceptualization, investigation, and supervision. GF: conceptualization, investigation, supervision, writing—review, and editing. MG: conceptualization, data curation, formal analysis, investigation, methodology, supervision, visualization, and writing—original draft. LF: conceptualization, investigation, supervision, and writing—original draft [according to the CRediT–Contributor Roles Taxonomy (https://casrai.org/credit/)]. All authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.762213/full#supplementary-material

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Subjective Well-Being in Healthcare Professionals in Colombia: On the Constitution of Subjectivity and the Ethics of Care in Times of the COVID-19 Pandemic

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The purpose of this work is to reveal how subjective well-being has been generated in a group of professionals in the healthcare field in Colombia, who carried out postgraduate studies at the time of the pandemic caused by the novel SARS-CoV-2 coronavirus in a synchronous and remote learning course facilitated by employing digital technologies. Two methods were assumed, one was qualitative, taking into account some elements of narrative research and discourse analysis, and the other was quantitative, through a rapid reconnaissance survey. The research assumes the constitution of subjectivity from memory and everyday life, as well as the ethics of care concerning caring for oneself and others, as categories that were (re)signified with the narratives—and as notions that make up a theoretical corpus—to understand subjective well-being.

Keywords: subjective well-being, healthcare professionals (HCPs), subjectivity (European Education Thesaurus), ethics of care of the self, COVID-19, higher education, remote education of emergency

INTRODUCTION

The COVID-19 outbreak disrupted traditional practices in higher education, pedagogy, and interpersonal relationships in the classroom, to the point of (re)configuring ways of managing education. From this perspective, various practical initiatives have sought to address this situation, seeking to generate, through micro-curricular adjustments, didactics, evaluative processes, and situations that allow better learning to establish subjective well-being in students. This has led to a rethinking of how the practices of different educational actors are associated, creating other pathways of social interaction in which digital technologies are put into play and, especially, the possibilities of remote education assisted from various technological developments.

Educational experiences that were previously developed in person had to be modified during the COVID-19 pandemic. Learning settings had to be adjusted to the needs of the pandemic situation to include other ways of accessing training processes. Therefore, faculty's practices were affected, as well as the didactic and pedagogical relationships that hitherto made possible the student well-being. Given that such adjustments implied assimilating digital skills

to manage school relationships and making changes in practices that constitute subjective well-being, school inequalities related to access and the connectivity of individuals and communities inevitably emerged.

It is estimated that the pandemic caused by the novel SARS-CoV-2 coronavirus has had catastrophic effects, not only in terms of physical health and mortality but also in areas of mental health and the world economy, with social, political, and cultural consequences that are difficult to calculate (Levy, 2020). It is difficult to examine or compare how the new social and educational configurations are generated—or will be generated—and to foresee, from an almost antagonistic perspective, the generation of new knowledge from "new interactions" (Anzola-Pardo, 2019), especially in classrooms.

Higher education institutions (HEIs) face dualities with the progressive return to normality (gradual, permanent, or without people on campuses). According to UNESCO-IESALC (2020) as of May 2020, university closures had already affected approximately 23.4 million students in the world. To tackle this issue, the same organization launched the COVID-19 plan toward the reopening of higher education in Latin America and the Caribbean. The initiative indicates how the situation of HEIs affects students, identifying different States, where the majority of institutions are still on hold regarding openings. In the report, Nicaragua is noted as the only nation in the region with a policy of total opening. Taking a different approach, Colombia—with a fully vaccinated population of 28.45% as of August 2021—has opted for a partial (hybrid) opening.

The postponement of face-to-face activities and uncertainty limit a concrete resolution in the face of training processes since in most cases flexibility has become an essential aspect of continuity; however, spontaneity by adaptation prevails. Thus, faculty members were forced to transform face-to-face to virtual teaching—facing these situations without being fully prepared in the use of digital platforms, teaching, learning, and evaluation while maintaining, in some way, curricular proposals and their teaching techniques. Nevertheless, these new academic interactions make up educational modalities that, although rarely experienced in the past, generate positive pedagogical disruptions and different perspectives of mediation from frustration and being overwhelmed by adaptation through and to digital technologies.

Pedagogical settings should also be considered as a place of care in which actions of recognition of otherness are promoted. In educational and pedagogical practices, this takes place when the difficult becomes easy and learning experiences are stimulated. The relationship between faculty and the student becomes the site of human interactions to generate links and, therefore, learning propitiation. In this sense, subjective well-being is not something added but is rather a constitutive part of educational activity.

In the present study, subjective well-being was promoted in postgraduate students within the framework of the emergency remote education practices caused by the COVID-19 pandemic. The promotion of subjective well-being in higher education involves concrete actions on pedagogy in practice. The pedagogical actions are of a practical order; for this reason, they go beyond theory and are inscribed in the transformation that can be generated by those who participate. With the pandemic, the place of the experience has changed, leading faculty members to reconfigure ways of conceiving their educational relationships; thus, institutions and people have had to reinvent themselves.

The centrality of the pedagogical action used in this study is framed by the conception that practical knowledge (Phronesis) has to address a reflective notion before, during, and after action (Kemmis, 1986, 2009; Carr, 1995, 2004, 2005; Flyvbjerg, 2001; Kemmis et al., 2014; Barragán, 2015); in this case, in postgraduate training settings.

THEORETICAL-CATEGORICAL HORIZON

When speaking of the configuration of the mental well-being of human beings, the psychological is an important dimension in terms of the acceptance of personal development. This brings together the subjective, which recognizes the elements of satisfaction of one's configuration, and the social, in which configurations are sought in relationships with others (Joshanloo et al., 2018; Chung and Hahn, 2020). This research focuses on the subjective dimension from the perspective of well-being exclusively.

We assume subjective well-being as those practices that allow people to acquire a state of well-being with themselves and with others, in such a way that the configuration with the psychic and social being occurs. There are different traditions regarding this notion; however, it is relevant to understand that multiple inquiries about subjective well-being have incorporated affective indicators of happiness (Hedonic well-being), as well as cognitive evaluations of satisfaction before life. Similarly, elements related to personal growth, human development, and levels of self-acceptance have been considered, as well as the meaning of well-being, with the search for happiness and its relationship with the fulfillment of human beings (Keyes et al., 2002).

In general, two traditions have been established for the study of subjective well-being: one that emphasizes happiness (hedonic well-being) and one that deals with human potential (eudaimonic well-being) (Waterman, 1993; Ryan and Deci, 2001). In this framework of reference, various investigations explore subjective well-being in a less instrumental key, to the point that the Aristotelian tradition of understanding ethics is retaken (Deci and Ryan, 2008), especially in the search for eudaimonia, in its philosophical dimension, a fundamental issue in ethics (Waterman, 1990; Díaz et al., 2015). The search for eudaimonia in others generates well-being, beyond a hedonic satisfaction of individual needs (Huta et al., 2012). Joshanloo et al. (2018) insist on the need to explore eudaimonic well-being, which seeks to improve positive mental health through a rich understanding of psychological and social well-being, in a complementary relationship. It is about understanding that eudaimonic activities are foundational elements of subjective well-being (Martela and Sheldon, 2019). Hence, this type of well-being is sought in labor relations or other spheres of human relations (Russell, 2008; Chung and Hahn, 2020).

This inquiry makes an approximation of subjective well-being by exploring some dimensions from ethics. Thus, the categorical horizon of work encompasses the constitution of subjectivity and ethics of care, categories that operate as elements of methodological articulation, and the theoretical resignification of subjective well-being.

Constitution of Subjectivity

The configuration of the notion of the subject has had a long journey. In Europe, Plato, Aristotle, and Seneca, and in China, Confucius—to name just a few thinkers—have addressed the question of the good life or the conditions that allow states of well-being. Descartes' concept of cogito discusses representation and places the subject as an instrumental archetype of understanding the human, emphasizing rationality as an all-encompassing notion of all spheres of understanding about the human and especially well-being. Known as "modern rationality" this condition has become an established hegemony in the interpretation of the human. This hegemonic approach has been widely criticized, as it constrains other approaches to the human (Gadamer, 1975; Frank, 1995; ŽiŽek, 1999; Santos, 2010; Barragán, 2012). Criticism of and resistance to this totalitarian approach to the notion of the subject frame the human as a network of interactions that are configured and, consequently, surpass the epistemological scientism that usually rules in different disciplines. In this context, the notion of the constitution of subjectivity appears as a construct that allows us to move beyond the restricted perspective of modern rationality. Constituting subjectivity means, in short, understanding that human beings have a system of relationships, which goes beyond the objectification of human activity. This theoretical construct emerges as opposed to the modern understanding of the subject concerning human action.

Two categories are relevant for understanding the constitution of subjectivity. The first is "memory," which does not refer exclusively to the memories that can be brought to the present. Memory, as a possibility of establishing historicity, leads the human being to recognize themself. It is someone who recognizes the self in their context. It is about the Heideggerian Dasein which is, ultimately, the human being who is assumed to be situated in a "concrete there" (Heidegger, 2003). Memory—as a present loaded with the past and with the tension of the future—allows the individual to situate the self in their biography and is assumed to be situated in historical consciousness (Gadamer, 1975, 1986, 2002).

The second category for constituting subjectivity is "the everyday." The human being, when moving in routine life, runs the risk of falling into the dark heaviness of everyday life (Heidegger, 2003). Everyday things and experiences can become irrelevant as they can become an unreflective routine that loses its value. When viewed with new eyes, the everyday is, par excellence, important to generate belonging in one's historicity (Gadamer, 1986; Ricoeur, 1990, 2010; Heidegger, 2003). The everyday speaks of the world: the one to which we have access daily and which is a motive for reflection.

Ethics of Care

Caring for oneself and others, in terms of the pursuit of good and happiness, is the center of ethics. Aristóteles (1985, 2004) emphasizes the relationship between good (Agathon) and happiness (the Eudaimonic), as a possibility of ontological ethics. This approach to ethics goes beyond the deontological instrumentalization of moral action and values to focus on practices. Caring enables a human being to cope with existence; that is to say, with oneself. In this sense, the existential, particularity that which characterizes human actions—is always about the world and the experiences that derive from it.

Care also invites us to browse the world (Heidegger, 2003) and perceive existence from other perspectives and thus, explore other possibilities for configuring subjectivity. It implies, at the same time, questioning the surrounding world and one's existence. To exist is to take care of oneself (Gadamer, 1986; Ricoeur, 1990; Barragán, 2015).

It is in this questioning of existence and the world, that human beings take care of themselves and by extension others, as well as the material world: this always concerns the everyday. An ethics of care will have, as its axis and center, the search for good from the perspective of happiness and consequently, it implies assuming a caring attitude toward oneself and others. In this way, caring for oneself and caring for others are fundamental dimensions in the generation of subjective well-being.

MATERIALS AND METHODS

Two approaches were used in this work. The first was quantitative, using a rapid reconnaissance survey (Butler, 1995). The other was qualitative, as part of which experience was central to the methodological approach (Creswell, 1997; Creswell and Miller, 2000; Flyvbjerg, 2001). Experience is understood as a set of actions that refer to the meanings of life that individuals seek in specific situations concerning their practical knowledge, which are configured by entering into relationships with others (Barberousse, 1999; Flyvbjerg, 2001; Eikeland, 2008; Jay, 2009; Perreau, 2010; Grondin, 2014, 2018). For the methodological design, the main aspects of narrative research were taken into account, in which the experience gains value, insofar as it is related, to raise awareness about what happened and address future action patterns in the face of phenomena with equivalent characteristics (Delgado and Gutiérrez, 1999; Bolívar et al., 2001).

Within this framework, and considering that it is necessary to generate subjective well-being in higher education (Botha et al., 2019), the current work examines how subjective well-being has been generated in a group of professionals who work in the field of healthcare in Colombia. The group was carrying out postgraduate studies during the new SARS-CoV-2 coronavirus pandemic, in a synchronous remote learning course via digital technologies during the years 2020 and 2021.

The experience of professionals working in healthcare in seven Colombian capital cities (Bogotá, Neiva, Cúcuta,

Armenia, Cartagena, Barranquilla, and Pasto) was documented. Participants carried out didactics to promote subjective well-being. For the present work, the following actions were taken into account: an activity called work with valuable objects; the production of testimonial narratives (TN), and, finally, a rapid reconnaissance survey (Butler, 1995), as seen in **Table 1**.

The first didactic activity served as a narrative trigger. It consisted of a work called "discussions around valuable objects," where each participant put in an online application, a photograph of an object that was important to them, to promote moral practices and the moral culture of the group (Puig-Rovira, 2003; Puig-Rovira et al., 2012). Subsequently, each participant commented on the objects in writing and then, voluntarily, each one spoke about their images or asked classmates. The purpose of this activity was to generate the interaction of the group and that which they can recognize in others, through objects, human beings with similar feelings and characteristics.

The second activity was the preparation, by each participant, of a testimonial story in which they narrated situations that triggered some tension from ethics or morals in their professional practice in the field of healthcare during the COVID-19 pandemic. These narratives operated as an environment for narrative empowerment for the production of subjective well-being and, at the same time, as an information-gathering strategy.

TABLE 1 | Rapid reconnaissance survey—recurrence of words during courses.

Considered questions	Yes	No	Categories	Word recurrence	Count
Valuable objects as generators of well-being	98.78%	1.22%	Constitution of subjectivity	Life	32
				Meet	23
				Person	26
				Being	26
				Things	23
				Professional	22
				Object	17
Knowing classmates better generating well-being in the relationships	98.17%	1.83%	Ethics of care	Valuable	25
				Values	22
				Knowledge	21
				Ethics	18
				Wellness	13
				Life	12
				Colleagues	18
				Ours	17
				Other	14
Relevance of valuable objects in pedagogical terms	98.78%	1.22%	Pedagogical aspects	Class	54
				Allowed	32
				Appreciation	37
				Excellent	21
				Teacher	21
				Dynamic	17
				Knowledge	17
				Learning	10
				Tools	10

Testimonial narratives, in their epistemology, are related to stories and life narratives. In both approaches "Life story" and "Life narrative," a storytelling experience is presented that is open to interpretation that, by anchoring itself to the biography of the narrator, makes it possible to address the lived experience (Chanfrault-Duchet, 1987; Pujadas, 1992; Santamarina and Marinas, 1993; De Miguel, 1996; Atkinson, 1998; Bertaux and Kohli, 2003). However, TN are a type of abbreviated narrative that marks a person's biography and that, due to their relevance, become a reason for reflection for themselves and others. Relating generates the possibility of looking again at relevant events in people's lives, to open up the possibilities of exploring new pathways that allow us to face similar events.

A rapid reconnaissance survey was sent to the people who made the TN. It used yes/no questions and open responses, examining the experience of the participants in the two activities previously mentioned, and concerning the promotion of subjective well-being. It was also investigated relevant aspects of the academic space of remote learning mediated by digital technologies. The purpose of this strategy is to quickly approach a phenomenon and look for relevant aspects that can give general clues about the situation under investigation (Butler, 1995).

A questionnaire was (Goetz and LeCompte, 1988) sent to 179 students from two specializations, and who took the course in healthcare ethics during the years 2020 and 2021. The questionnaire was completed by 164 participants (91.62%), which corresponds to a 99% confidence level and a 3% margin of error.

Concurrent Triangulation (CT) was then applied to the themes derived from the qualitative and quantitative data gathered. The collection and analysis of data were conducted separately yet concurrently. The findings were integrated during the interpretation stage of the study, where equal priority was given to both types of data (Terrel, 2012). Onwuegbuzie and Leech (2006) explain that research design will be concurrent if the quantitative phase of the study does not inform or drive the qualitative phase, and vice versa. In this sense, the triangulation of information collected is based on what appeared in the evaluative discussions at work with valuable objects, the TN, and the reconnaissance survey (S).

A simple emergent coding was carried out, which was analyzed following the guidelines of content analysis (Krippendorf, 1990; Navarro and Díaz, 1999; Monge-Acuña, 2015) and the discursive emergence of narrative research that allows us to reflect upon life and also find the meta-discursive regularities regarding the categorical horizon established as an interpretive basis (Orofiamma, 2002; De Ryckel and Delvigne, 2010).

The population included 164 healthcare professionals in the fields of: Nursing, 63; medicine, 31; dentistry, 22; bacteriology, 9; physiotherapy, 7; psychology, 5; administration, 7; optometry, 5; epidemiology, 2; surgical instrumentation, 6; law, 4; economy, 3. Of these, 142 declared themselves to be female, 22 male, and 1

person preferred not to mention gender. Informed consent was requested from all participants and the data was guaranteed to be processed anonymously.

DISCUSSION

As mentioned in the materials and methods section, a rapid reconnaissance survey (Butler, 1995) allowed us to measure the perception of the activities carried out at the time of the research process. An analysis of the frequency of words led to our focus on the narratives based on the categories of the constitution of subjectivity and ethics of care. It should be mentioned that the group of healthcare professionals recognized the relevance of the pedagogical action in promoting subjective well-being, and 98.78% considered that the activity carried out during a class in the ethics and values of healthcare, with valuable objects, led them to greater knowledge as human beings, generating some sort of well-being. Only 1.22% did not perceive it that way.

In total, 98.17% considered that the activity on valuable objects led them to get to know their colleagues better, generating well-being in relationships, but 1.83% did not consider it this way. It is noteworthy that 99.39% of those who participated in the course recognized that these activities presented an opportunity to generate personal well-being and self-care during class, helping them to cope with remote learning mediated by virtual platforms in times of the COVID-19 pandemic; 0.61% did not consider it that way. These quantitative results made it possible to ratify the importance of generating subjective well-being from a pedagogical perspective in higher education and created the possibility of reviewing the phenomenon using the narratives that appear in the testimonies.

In the qualitative phase, examination of the narratives allowed us to capture different ways of understanding subjective well-being. It also enabled us to consider the constitution of participants' subjectivity and the ethics of care. In connection with the objective of the work, some reports are presented to allow us to further examine how subjective well-being was perceived by the professionals who participated in the research. This allows us to trace future pathways so as not to repeat past mistakes; and thus, narrating becomes an opportunity to recognize historicity (Gadamer, 1975) in a discursive key: "This experience taught us that the word has power when used assertively" (Physician 22, TN). Thus, memory, as an ethical trigger, promotes historical awareness training guidelines for healthcare professionals, as discussed in some reports:

> "The principles and values instilled in our training make us look, from the perspective of ethics and morals, between what should be done and what it is done; each human being makes a decision, depending on his/her culture, values, and even convenience" (Nurse 13, TN).

> "It reminded me of people and the value that each one has; in addition to the most important places in my life" (Nurse 21, S).

> "It was a different activity, which kept us focused, and made us reflect on many areas of our lives, and made us remember the value of many things that surround us" (Odontologist 9, S).

> "Our values and principles are not negotiable, although sometimes, without agreeing, we must respect the position and the way of thinking of people, avoiding judgments" (Odontologist 18, TN).

The narrative represents a situated knowledge that permeates the experience itself in terms of ways of subjecting themselves to this group of people, based on the decisions they have made, as outlined in this testimony: "I will remind myself regarding how important the decisions I have made are" (Nurse 42, S). Another participant observed that "There remains a great experience, which is prudence, as an act of knowing how to decide" (Doctor 18, TN).

Narrating what happened leads to the recognition that "remembering the values and different paradigms of society make us think about what it is good and acting well always brings us benefits and inner peace" (Doctor 17, S). The teleological sense of acting assumes dimensions of intrapersonal recognition: "we can become aware of the importance of being better human beings. Day after day, without having to trample anyone, and with the joy of knowing that what is done correctly is based on our principles" (Doctor 32, TN).

These narratives allow us to glimpse the ethical possibilities of acting, as practical knowledge (Aristóteles, 1985; Ricoeur, 1990; Gadamer, 2002), to build possible worlds from memory and the ethical question about what happened and what should be:

> "A deathly silence, in a few seconds that became eternal; that moment so short and with a fine line that limits life and death, when you sedate the patient, pass the orotracheal tube, and see the patient's clinical response, it becomes a daily routine; many patients with happy satisfaction respond to the proposed therapy; many others do not, and only in sedation, their lack of oxygen leads them to respiratory failure and, unintentionally, that crucial moment arrives in which they decide to resuscitate a patient, having full knowledge that if you do so, the risk of infecting the whole team and yourself is everything! [. . .]. In any society that aspires to humanistic healthcare practice, the work of a doctor, in particular, is related to preparation and motivation to offer help, without considering the difficulties that may arise, the obstacles that may have to be overcome, even going so far as to put one's life at risk, for the sake of saving the patient's life; however, how ethical is it to go?" (Doctor 2, TN).

Another relevant aspect is that narrating allowed participants to approach the everyday, as a reflective opportunity concerning what is valued by people. As one participant observed, "knowing what is valuable to someone, undoubtedly offers a lot of information, not only about the object itself, but that tells a story that allows us to intuit other things about people" (Bacteriologist 6, S). In this way, the experiences of others are valued, acting as a way to deepen views on oneself and the profession:

> "It has helped me to put myself in other people's shoes; how they have lost their beloved ones, because of a virus and the big

suffering when you are not able to say the last goodbye. As a nurse, I have set myself a new challenge in which I am willing to fight and support others who are in the fight against diseases that may not have a possible cure, treatment, or perhaps COVID-19—that we still do not know treatment to eliminate or cure. Seeing people die every day is very shocking to me. I think that the experience can help healthcare professionals, who at this moment feel demotivated by the pandemic situation, to be more human and to live a new story every day; to no longer want to see patients die from the virus; they [healthcare professionals] must go ahead, and contribute with their knowledge in the fight against this virus; in every fight, there is a new story to learn" (Nurse 4, TN).

"[Relating] helped me to make an approximation of the day-to-day work; understand that, like patients, we suffer when things do not go as expected. That we are not half-gods, that every day we give all our effort to help the sick ones, to alleviate their suffering" (Doctor 11, TN).

"Healthcare professionals also have needs and feelings. However, being in the field and although it is not visible after the mask, we wear a big smile to be able to face a new day. Every day we convince ourselves that everything will work out and that we are going to overcome it, as we have done on other occasions. Throughout the day, bad news arrives from patients or colleagues and, gradually, you lose energy. A feeling of anger takes hold of you when you try to make it disappear as soon as possible, so as not to get home emotionally upset. This experience helps me to continue fighting to put ethical and moral principles before particular benefits. Furthermore, in times of the pandemic, where healthcare costs were magnified. Being better is of great hope when we shall defeat COVID-19" (Nurse 53, TN).

By reviewing the daily practices in the field of healthcare, the study participants were able to take stock of those situations that generated tension and that became an opportunity to think about subjectivity, as mentioned in these testimonies: "He taught me that you have to give value to all things and that you have to value the things of the others; It should also be in my professional practice: all people have value and contribute something good" (Nurse 44, S).

"Understand that a human being's life is very important; we learn daily to tackle our fears and to overcome them. This experience has been a stage of risks; we have learned to accept the SARS-COV2 virus as something normal in our daily lives" (Nurse 49, TN).

"It touches the depths of being, being able to know facts that have marked other people's lives; being able to have the opportunity to listen, learn, and handle different situations. This is what daily living is about and knowing how to cope with every opportunity" (Dentist 22, S).

"Every day we learn something different for our professional growth and as human beings" (Physiotherapist 3, S).

The ethics of care (Ricoeur, 1995, 2001) emphasizes the possibility of examining one's actions, for individual and collective growth, regarding moral and deontological tensions. These moral issues were relevant to this group of professionals: "sometimes we lose sight of our priorities because we are in charge of solving what it is urgent in labor matters; this activity helps to establish priorities and remember what is valuable" (Odontologist 3, S). Taking care of oneself involves valuing people and looking for pathways to configure one's subjectivity: "the importance of this story is the ability to establish or preserve moral integrity and to recover from distressing situations for ethical reasons" (Psychologist 1, TN). The ethical issue is present in many testimonies: "it invites us to reflect and become aware of that, if I do things well, without harming the other, I build family, business and society" (Nurse 43, S). Other participants mention similar issues:

"Knowing and exploring more as a person, avoiding limiting ourselves, to become mechanical. We play a professional role and the important thing is to contribute to societal growth; the important thing is to reflect before giving a preliminary judgment. Ethics and morals allow us to make decisions by reality, without resulting in a conflict, [how] we can be fair and good, based on the values and principles that we have." (Nurse 45, S).

"It showed me the personal sensitivity that I can have and that it is important to put others first, ensure their well-being and, in the event of having staff under my responsibility in the future, I will know how to act" (Surgical Instrumentalist 1, S).

As already mentioned, the ethics of care also implies taking care of others to create a common shared concept of the "we" (Ricoeur, 1990; Gadamer, 2002). The different activities carried out in academic settings enable this: "It helped me understand the perspective of the lives of others" (Odontologist 6, S). There is the recognition of the other as a co-worker and professional in the field of healthcare, as it emerges in this testimony. The exercise makes it possible to "recognize the importance of others, their experiences and their knowledge [. . .]. it helps me better understand the environment and look for tools to more effectively develop communication and work with others" (Doctor 27, S). It also enabled participants to accept "the value of the other; that has allowed me to assess the dimensions that the human being possesses. This activity can be extrapolated to the professional part, where we must interact with many people who are very valuable for themselves" (Medic 16, S).

The recognition of the patient, as the one who questions the exercise of other healthcare professionals and reflects upon the work that is carried out, was discussed in the following testimonials:

"It is difficult to see how the same teamwork stigmatizes patients, without addressing the reality of each person in depth; perhaps it is difficult to understand a situation until you are literally in the shoes of those people. As professionals, we have to provide holistic care to people, a space to vent and express all their feelings, providing them with security" (Nurse 12, TN).

One response outlined how "We learn that the care of our patients is done in a humanized way, with medical honesty, responsibility, and patient's freedom" (Nurse 37, RTN). As another participant outlined, "all human beings are susceptible

to something and caretaking depends on us. It is also important to highlight those services; both administrative and healthcare ones must be streamlined and improved for better-humanized healthcare" (Physician 31, TN). This was reiterated by another response, outlining that "standing up for the rights of each patient so that they are not violated; the exercise of our profession honestly and transparently. Not to forget that healthcare careers are at the service of the community and are not only for profit" (Odontologist 3, TN).

These previous testimonies show the importance of the constitution of their subjectivity in intersubjective tension (Gadamer, 1975; Frank, 1995; ŽiŽek, 1999; Santos, 2010). The constitution of subjectivity, consequently, is embodied, insofar as the gaze is focused on memory and everyday life. On the other hand, the care of oneself and others are aspects that generate subjective well-being:

> "It is liberating to relate the experience. It can be part of the process of healing emotions that is experienced with these types of moments where the fact of being a healthcare professional is so involved and, at the same time, being a relative of the one who lives the difficult situation" (Nurse 1, TN).

The participants recognized that these pedagogical settings made possible the conditions to constitute subjective well-being in the framework of the COVID-19 pandemic. They stated that elaborating narrative testimonies and working on valuable objects made it possible to reflect on themselves and meet others (Gadamer, 1986; Ricoeur, 1990). Thus, they positively valued the generation of the subjective well-being that the pedagogical actions developed:

> "It was a wonderful interaction where relevant aspects were shared about the role we play in society, as individuals and as healthcare professionals" (Doctor 10, S). "It generated interaction with my colleagues, appreciating the positive things that other people have, highlighting their value and recognizing the positive in others" (Nurse 40, S). "We were able to express ourselves with affection and respect to each one; this makes us more aware of the situations of others" (Odontologist 13, S).

Within this framework, the pedagogical spaces that were promoted, offer opportunities for subjective well-being in postgraduate students in the framework of remote emergency education caused by the COVID-19 pandemic. This forum led this group of professionals to realize and reflect on ethics, and the situations that arise in day-to-day work, seek solutions, develop creativity, and provide a quality service.

The constitution of subjectivity and the ethics of care can also be understood as the space of interaction with the other, the place of the deployment of all potentialities, job satisfaction, appreciation, recognition, and closeness to the reality of others. Thus, subjective well-being was generated, as recognized by all participants.

RESULTS

Based on the discussions in the previous sections of this study, and taking into account narratives on the subjective well-being of this healthcare professional group in Colombia, this study contributes to understanding of subjective well-being.

As outlined in **Table 1**, a set of quantitative results shows the levels of acceptance of the activities carried out in the promotion of subjective well-being and the relevance of the actions carried out. When carrying out an analysis of the most frequently used words in the survey, certain concepts were raised, which allow us to compare the narrative findings with the results indicated in **Table 1**.

Displaying the triangulation with qualitative data, the participants' commitment to understanding subjective well-being in the eudaimonic horizon led to the establishment of the categories "Constitution of subjectivity" and "Ethics of care." In the first category, memory and the everyday must be considered axial notions. In the second category, it is vital to consider caring for oneself and caring for others.

Such categories emerged from the narrative analysis and were also evident in the results of the reconnaissance survey. These findings showed that 98.78% of the participants recognized the importance of the activities carried out as a factor that generates subjective well-being, enabling them to recognize themselves as human beings and professionals. It is noteworthy that 99.39% of the participants considered the actions to be relevant, especially in the context of the COVID-19 pandemic.

The understanding of subjective wellbeing in the eudemonic horizon supports the categories "Constitution of subjectivity" and "Ethics of care." In the first category, memory and the everyday must be considered as axial notions. In the second category, it is vital to consider caring for oneself and caring for others.

This study used memory, as a generator of subjective well-being, to frame situations, feelings, and significant events, generate approaches to affective situations, and cognitive approaches. First, it enabled participants to refer to emotions, frustrations, helplessness, and satisfaction with good work. Second, it facilitated reflections on acquired knowledge and practice in daily life, ethics, and morals in professional performance. An interesting indicator from the survey is the frequency of words such as *life (32), knowing (23) person (26),* and *being (2*6), which refer to a recognition of the biographical trajectories of the participants, as outlined in **Table 1**.

Memory contributes to the expectations of the present and the future, based on lived experiences. All events have internal implications in people, as they imply a change in attitudes, appreciation of family, and the profession itself. Remembering enables a person to make decisions and value the others. Looking at the everyday enables people to review what frames subjective well-being, and in this case, professionals who work in healthcare. This was evidenced in the narratives of participants, 98.78% of whom considered that activities with valuable objects (photographs) generated self-knowledge. This was also seen in the frequency of words that appeared in the survey, for example *things (23), professional (22)*, and *objects (17*), which refer to the

perception of the everyday as a primary category (see **Table 1**). Thus, the everyday becomes an opportunity to interact with others and satisfy the need to belong and relate socially.

The present study has shown that promoting memory activities in everyday life as categories of the constitution of subjectivity, provides the opportunity to reflect on the decision-making connected with ethical experience as part of the wider search for good and happiness. Such a situation becomes a challenge for education, from the perspective of subjective well-being.

Taking care of oneself and the promotion of subjective well-being in the academic space should be a constant practice, as it implies recognition and appreciation of oneself. Different words that appeared in the analysis of the rapid reconnaissance survey allowed participants to look at self-care. As outlined in **Table 1**, these words included *valuable (25), values, (22) knowledge, (21) ethics, (18) well-being (13)*, and *life (12)*. These words indicate that that self-care involves knowing oneself as an axiom. It involves reflecting on oneself, with an attitude of humility and truth, to realize what is happening inside ourselves and requires respect and consideration; forgiveness and acceptance of fears and failures, and, the "healing" of mistakes.

These aspects, which appeared emphatically in the narrative testimonies, were also evidenced in the reconnaissance survey when 98.78% of participants stated that the activities generated some type of well-being, as they had emerged in the narrative discourses on self-care and caring for the others compared to a 1.22%, who did not consider it this way. From this perspective, care also appears when 98.17% of students considered that the activities allowed them to meet their classmates.

Promoting self-care invites one to preserve one's health and seek a better quality of life, which provides a sense of well-being and personal satisfaction. Thus, subjective well-being is produced through self-care that guarantees physical and psychological well-being. In addition, reviewing how one acts or reacts facilitates self-evaluation and decision-making regarding behaviors and procedures.

Caring for others appears because caring for oneself is made explicit by action, through attitudes and behaviors that involve attention, knowledge, and techniques, to meet the needs of others. As shown in the narratives, as well in most used words in the rapid reconnaissance survey, the word *colleagues (18)* reflects the self-awareness about the others. This also happens for the word *ours (17)*, which allows thinking about common feelings and sensations (see **Table 1**).

For 99.39% of the participants, academic spaces acted as places of pedagogical experience that contributed to the training. In this perspective, and as it emerged in the narratives, the didactic interactions that were put into play derived in concrete moments of recognition of others, through the activities launched in this remote learning course mediated by technologies. In this respect, it is important to mention the frequency of the words *class (54), dynamics (17), knowledge (17) learning (10),* and *tools (10), which* allowed us to recognize the didactic strength of the academic year. In the same way, the words: *thank you (37), excellent (21*), and *teacher (21),* when contrasted with the narratives, made it possible to recognize the didactic dimensions in the promotion of subjective well-being. Therefore, it is feasible to promote subjective well-being actions in remote learning courses, emphasizing the constitution of subjectivity and self-care, as educational training opportunities.

In the academic spaces where these subjective well-being actions were carried out, contextualized learning was promoted from the perspective of practical knowledge, especially because the activities made ethical actions possible at an experiential narrative level, which facilitated the constitution of the subjectivity of the participants. These methods thus helped participants to recognize the importance of others, their experiences and knowledge, put themselves in the place of the other, and learn from the experiences of others. Participants placed themselves in different circumstances and learned from each one of them.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: https://unisalleedu-my.sharepoint.com/:f:/g/personal/dibarragan_unisalle_edu_co/ErtJZ1kMKtJFg0uf3Xn9y48ByueSRGaoQNiX_7m-BeY0tA?e=94k3Bb.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Emotional Intelligence and Academic Self-Efficacy in Relation to the Psychological Well-Being of University Students During COVID-19 in Venezuela

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Due to the COVID-19 pandemic, educational centers and universities in Venezuela have closed their physical plants and are migrating to emergency remote education to continue with academic programs. This empirical study aimed to analyze the predictive capacity of academic self-efficacy and emotional intelligence skills on each of the dimensions of psychological well-being. We employed a cross-sectional predictive design. The sample comprised 277 university students, of which 252 were female (91.00%). Their ages ranged from 18 to 45 years, with a mean of 20.35 (SD = 2.29). Non-probabilistic chance sampling was used. For data collection, we used an anonymous online form, contacted students by mail, and invited them to participate in the study. Questionnaires were available between 217 and 227 days of decreed quarantine in Venezuela. The results indicated average levels of academic self-efficacy (Me = 4; IQR = 2), emotional intelligence: clarity (Me = 27; IQR = 10), attention (Me = 25; IQR = 10) y repair (Me = 25; IQR = 12), and psychological well-being (Me = 35; IQR = 5). We found differences according to sex and age, specifically in emotional regulation (z = 3.73, $p < 0.001$, d = 0.438) and in bonds of psychological well-being (z = 2.51, p = 0.012, d = 0.276) favoring men (Me = 33, IQR = 9; Me = 8, IQR = 1), respectively. Regarding age, statistically significant differences were found in the group of students older than 21 years with higher perception of psychological well-being (z = 3.69, $p < 0.001$, d = 0.43) and in each of its dimensions. Emotional intelligence and academic self-efficacy were found to be significant predictors of psychological well-being and its dimensions, specifically on control (R^2-Cox = 0.25, R^2-Nagelkerke = 0.34, 69.90% of total correct classification), links (R^2-Cox = 0.09, R^2-Nagelkerke = 0.12, 65.07% of total correct classification), projects (R^2-Cox = 0.32, R^2-Nagelkerke = 0.46, 78.40% of total correct classification), acceptance (R^2-Cox = 0.17, R^2-Nagelkerke = 0.23, 68.28% of

total correct classification), and total well-being (R^2-Cox = 0.52, R^2-Nagelkerke = 0.71, 87.16% of total correct classification). It was concluded that emotional intelligence and academic self-efficacy are protective psychological resources of psychological well-being that should be promoted at university to mitigate the negative effects of the pandemic on the mental health of young people.

Keywords: COVID-19, higher education, emotional intelligence, academic self-efficacy, psychological well-being

INTRODUCTION

In Venezuela, since March 2020, the authorities have taken preventive measures to counteract the spread of the new coronavirus (SARS-Cov-2); these have included quarantine, social distancing, isolation, and even confinement (García-Álvarez and Cobo-Rendón, 2020). One of the consequences of these measures was the drastic shift from face-to-face university education to a model of university education called university at home. In short, it was a transition from dynamic face-to-face classes to distance learning, in a social fabric of uncertainty and high expectations. This required a constant reconstruction of the formal educational training processes in a country where there are already so many technological obstacles. Studies have reported student desertion, discouragement, and lack of support regarding motivating to participate, as a possible consequence of this implementation of emergency remote education in Latin America (García-Aretio, 2021).

Recent emerging scientific literature on student psychological well-being during COVID-19 has shown, *via* empirical studies, that students' psychological well-being is low (Dodd et al., 2021) with impairments in mental and physical health (Son et al., 2020). Other longitudinal studies have also shown that students' psychological well-being and mental health have decreased (Savage et al., 2020). In Saudi Arabia, university students reported a high prevalence of anxiety, insomnia, and depression during confinement in 2020, and family support was found to be a protective factor of well-being, especially in women (Alfawaz et al., 2021). In the United Kingdom, it was found that more than half of the student population had mental health difficulties, such as stress, anxiety, depression, and even symptoms of psychological trauma. At the same time, it was found that self-efficacy and physical exercise appeared to be coping mechanisms during confinement (Ihm et al., 2021).

Similarly, in Sweden, university students reported negative mental health experiences, such as loneliness, boredom, anxiety, stress, depressive symptoms, and concerns regarding their studies, finances, and possible contagion. In addition, they reported high-stress negative affects such as interruption of studies, confinement, and uncertainty due to the pandemic, which impacted academic self-efficacy (Berman et al., 2021). In Spain too, students reported increased anxiety during their 2020 confinement. It was also found that students with higher levels of anxiety had lower levels of academic self-efficacy, specifically male students reported higher levels of self-efficacy that the women (Alemany-Arrebola et al., 2020).

Studies have focused on personal resources as well as those related to academic contexts. University students have other outlets that bring them gratification, showing that despite adversities and difficulties, university students have found spaces of gratification in the university context, even suggesting that self-efficacy, academic satisfaction, and sense of belonging are configured as protective factors (Capone et al., 2020). Self-efficacy can be a protective factor against student insecurity and stress during this period (Gulley et al., 2021; Wen et al., 2021). It has been identified as a predictor of academic performance during COVID-19 pandemic (Talsma et al., 2021). A study in China found a positive relationship between academic self-efficacy and student well-being (Yang et al., 2021). In addition, in September 2020, another study found that university students reported good psychological well-being when some of the preventive measures were lifted by April 2020, such as the return to classes at some universities (Tan et al., 2021). Emotional self-efficacy has also been found to be negatively associated with fear of contagion in Italian university students. Low levels of emotional and academic self-efficacy have been associated with depressive symptoms and learning skill deficits during confinement (Calandri et al., 2021).

Another personal resource that has been studied during the pandemic is emotional intelligence. Emotional intelligence is a protective factor of well-being (Hussien et al., 2020; Bermejo-Martins et al., 2021; Moroń and Biolik-Moroń, 2021), and directly and indirectly contributes to improving psychoeducational variables in university students (Iqbal et al., 2021). It has aided in the development of resilience, well-being, and mental health in Spanish students during the COVID-19 pandemic (Bartos et al., 2021). Specifically, emotional intelligence is a predictor of psychological well-being, enabling healthier coping strategies during COVID-19 pandemic by avoiding emotional distress (Sánchez-Ruiz et al., 2021). Some experimental studies based on emotional intelligence and mindfulness in university students report a decrease in anxiety and depression symptoms during the confinement period (Sturgill et al., 2021). Another intervention based on the improvement of emotional intelligence through workshops and seminars for university students improved the levels of academic performance, academic engagement, and self-efficacy during confinement. The authors of this intervention suggest the importance of including training in socioemotional education in the university curriculum (Moreno-Fernández et al., 2020); other studies have confirmed that emotional intelligence has an impact on burnout, stress, and academic performance in the development of e-learning confined (Alam et al., 2021). It is relevant to consider emotional skills and academic self-efficacy as psychoeducational variables that may impact the

adequate psychosocial functioning of students, that is, with self-perceived psychological well-being as an indicator of mental health (Ryff et al., 2021).

We would like to point out some important concepts of the variables that underpin the research we are presenting here:

a) The emotional intelligence construct formulated by Salovey and Mayer (1990) refers to a cognitive capacity for attention, understanding, and regulation of emotions—all skills that allow for the development of a healthier life (Salovey et al., 1995).
b) Academic self-efficacy, a construct of Bandura's (1982) social cognitive theory, is defined as the beliefs and expectations that people have regarding their ability to plan, organize, and execute specific activities of academic performance (Palenzuela, 1983; Domínguez-Lara and Merino-Soto, 2017).
c) Multidimensional psychological well-being (Ryff, 1989), a concept that was further developed in South America by Casullo (2002) is understood as a broad construct that includes social, subjective, and psychological dimensions that lead people to function well. It is composed of six dimensions: (c1) Self-acceptance, which is also a main characteristic of positive functioning. People with high self-acceptance have a positive attitude toward themselves, feel good about their past, and accept the different aspects of their personality, both positive and negative; (c2) Positive relationships with other people. This refers to the capacity to experience love, empathy, and intimacy with others and to have quality relationships with others; (c3) Autonomy, which implies the capacity to maintain one's individuality in various social contexts, such as resisting social pressure and self-regulation of behavior, enjoying self-determination, and maintaining independence and personal authority; (c4) Mastery of the environment, which refers to managing the demands and opportunities of the environment to satisfy one's own needs and abilities, as well as the capacity to influence the context to which one belongs; (c5) Purpose in life, that is, the capacity to set goals and define a series of objectives that allow one's life to have meaning and purpose; and (c6) Personal growth, which encompasses the interest in developing potential, growing as a person, and maximizing one's own potential.

In Latin America, we found some antecedents focused on psychological well-being in university students during the COVID-19 pandemic. In Peru, researchers found a deterioration of psychological well-being relating to low psychological coping strategies (Campos et al., 2020). In another study in Guatemala, with a higher percentage of female participation (66.7%), the authors also found average levels of multidimensional psychological well-being during COVID-19 confinement. Possibly explained by resilient factors and low anxiety (González-Aguilar, 2021).

In Colombia, with a sample of Psychology students that included a greater number of female participants (80.4%), they found average levels of multidimensional psychological well-being, although with low dimensions of social relationships or bonds, as well as in the dimension of autonomy, measured during weeks six and nine of declared preventive social isolation in the country (Araque-Castellanos et al., 2020). In the same context, another study was developed on psychological well-being in Psychology students. A greater female participation was identified (78.85%). The authors found high levels of multidimensional psychological well-being, suggesting that there were possibly socio-cultural or psychological factors that could protect the mental health of students (Ruiz-Domínguez et al., 2020). It is interesting to note that, in several studies on the effects of the pandemic on student well-being, women presented greater participation in these investigations.

The COVID-19 pandemic is considered a healthcare crisis. In Venezuela, this is combined with political, social, and economic crises. Against this background, this study seeks to generate paths of action educational and intervention to prevent psychosocial risks and promote mental health of undergraduates. Some studies conducted in 2020 have shown high levels of anxiety, emotional intelligence (Giménez and Medici, 2021), increased stress, and depression without risk of psychosis in the Venezuelan general population (Raggio et al., 2021). A study with university students in Maracaibo, Venezuela reported that students maintained an adequate level of self-efficacy that allowed them to manage their academic load, despite difficulties in planning and completion of tasks in a timely manner (Romero et al., 2021). The antecedents at the global, Latin American, and national levels suggest the relevance of studying psychological well-being as a relational variable in the educational context during the pandemic.

This study is part of the research trends referred to in the "university student" person. This research seeks to understand psycho-social factors that influence mental health and university experience in a period of life considered highly stressful due to the different demands and conditions of adaptation, permanence, and progress in university studies. In the same way, there is a growing interest in psychological and educational science in studying personal and social resources that can be considered as protective or resilient factors in times of pandemic, an event that can be considered psychosocial trauma. We are interested in studying the personal and social resources that can be considered as protective and that can mitigate the negative effects of the pandemic on students at the university level (UNESCO, 2020; Parra-Sandoval, 2021).

Therefore, this research is justified in contributing to the study of university students in a person-oriented approach, emphasizing psychological well-being in relation to emotional intelligence skills, including a psychoeducational variable such as academic self-efficacy in the research design. Study carried out during a COVID-19 pandemic in a country with a generalized social, economic, and political crisis. The contributions of this study are: (a) approach to the object of well-being from a salutogenic approach, and not from an approach based on the detection or screen of symptoms; (b) corroborate that personal factors such as emotional intelligence and academic self-efficacy can be protective factors of student psychological well-being in crisis situations such as the pandemic; (c) the results

can contribute to the design of psychosocial interventions for students that can enhance personal resources as resilient factors, it is also important to take into account the gender approach for the construction of well-being; and (d) In a Latin American context, the manuscript stands out as an important background in studying the variables mentioned in a pandemic context that gives a cross-sectional impression of how students have maintained their well-being. Studies are needed to explore mental health, the impact of educational changes on psychological well-being, as well as health promotion in the development of the pandemic, but also in the post-pandemic return to school (Wang et al., 2021).

The objectives of the research were: (a) to describe emotional intelligence skills, academic self-efficacy and multidimensional psychological well-being in university students in Venezuela during the COVID-19 pandemic; (b) to determine whether there are statistically significant differences according to gender and age of the students; and (c) to analyze the predictive capacity of academic self-efficacy and each of the emotional intelligence skills on each of the dimensions of psychological well-being.

MATERIALS AND METHODS

This is a cross-sectional and empirical-predictive study, with non experimental research design. It is a cross-sectional study, since only one measurement of the variables of interest we are made. It is of an empirical-predictive type, since the analysis of the variables we are carried out employing quantitative methods (Ato et al., 2013).

Participants

The sample consisted of 277 students from a Venezuelan university, of which 252 were female (91.00%). Their ages ranged from 18 to 45 years, with a mean of 20.35 (SD = 2.29). When grouped by age, a percentage of 58.80% (n = 163) was recorded for those under 20 years of age, and 41.2% (n = 114) for those aged 21 years and older. The difference in sex can be explained by the fact that the Psychology program has more female enrollment. The sample was obtained employing a non-probabilistic sampling of casual or accidental type according to Kerlinger and Lee (2002) in this research it was specifically casual by volunteers who decided to participate in the call for the study.

Instruments

A questionnaire was made available online between 217 and 227 days of the decreed quarantine in Venezuela (October 20 to 30, 2020). The form contained informed consent, the objective of the study, and the following psychometric scales:

a) Multidimensional Psychological Well-being Scale: its objective is to measure psychological well-being from the eudemonic perspective. It is a 13-item scale with three response options: disagree (1), neither agree nor disagree (2), and agree (3). The confirmatory factor analyses in the original study yielded four dimensions of psychological well-being. The dimensions are Control/Acceptance (e.g., "If something goes wrong I can accept it, admit it"), Autonomy (e.g., "I can say what I think without major problems"), bonds (e.g., "I have people to help me if I need it"), and Projects (e.g., "I think I know what I want to do with my life") in addition to adequate reliability (Casullo, 2002). For the Venezuelan context, it presents adequate psychometric indices (García-Álvarez and Hernández-Lalinde, 2020).
b) Trait Meta-Mood Scale (TMMS) with the aim of measuring emotional intelligence from the model of Salovey and Mayer (1990), is a scale designed in Spanish with 24 items that has five response options: do not agree at all (1), somewhat agree (2), quite agree (3), strongly agree (4), and strongly agree (5), for its correction the scores in each of the three dimensions are added directly. The dimensions are perception (e.g., "I think it is worth paying attention to my emotions and mood"), understanding (e.g., "I often notice my feelings in different situations"), and emotional regulation (e.g., "even if I feel bad, I try to think about pleasant things"). This questionnaire has adequate psychometric indices (Fernández-Berrocal et al., 2004).
c) A single item measuring academic self-efficacy- "How confident are you that you will be able to effectively perform the tasks (papers, exhibits, exams, etc.) that your academic life demands of you?" (Domínguez-Lara and Merino-Soto, 2017). It is answered with a five-point scale ranging from "not at all confident" (1) to "very confident" (5). Previous studies in South America have shown that this unique item of academic self-efficacy that has adequate validity evidence with other personality constructs and other self-efficacy measures (Domínguez-Lara et al., 2019).

Table 1 lists the reliability coefficients of the questionnaires used. The selected questionnaires presented adequate validity and reliability indices for their use among university students.

Procedure

Data collection was performed using an online form. The form also mentioned the objective of the study and emphasized anonymity, confidentiality, and the scientific nature of the results,

TABLE 1 | Participants' level of academic self-efficacy, emotional intelligence, and psychological well-being.

Variable	Me (IQR)	Cronbach's alpha	McDonald's omega
Academic self-efficacy	4 (2)	–	–
EI–Attention	27 (10)	0.90	0.90
EI–Clarity	25 (10)	0.89	0.89
EI–Repair	25 (12)	0.89	0.89
PB–Control	11 (2)	0.61	0.62
PB–Links	9 (1)	0.62	0.63
PB–Projects	8 (1)	0.45	0.46
PB–Acceptance	8 (2)	0.48	0.48
PB–Total	35 (5)	0.82	0.82

EI, emotional intelligence; PB, psychological well-being; Me, median; IQR, interquartile range.

before requesting for consent to participate in the study. This study was conducted in accordance with the ethical guidelines of the American Psychological Association, Declaration of Helsinki, and the Federation of Psychologists of Venezuela.

Analysis Plan

The normal distribution of scores was verified using the Shapiro-Wilk test, box plots, and Q-Q plots. We did not find normal distribution of scores, the Mann-Whitney *U* test was used to compare the constructs analyzed according to sex and grouped age. To express the results, the median (Me) and the interquartile range (IQR) were used, and the mean rank (MR) was adopted as a measure of centralization in cases in which the distribution of scores exhibited a different shape between groups. The predictive role of emotional intelligence and academic self-efficacy was established through logistic regression, in which the dependent variables were each of the dimensions of psychological well-being. These were categorized using the 25th and 75th percentiles, thus creating two groups identified as "low" and "high" levels of psychological well-being. In addition, age and sex were included as covariates, and adjusted odds ratios were obtained. The assumptions of the logistic regression were verified without finding inconsistencies, while the predictive capacity and model fit were established using the classification table and the Cox and Nagelkerke pseudo coefficients of determination. The data were processed and statistically analyzed in IBM SPSS Statistics 25 and R version 4.0.5.

RESULTS

The results showed low average levels of emotional intelligence skills in the following order: comprehension (Me = 27; IQR = 10), attention (Me = 25; IQR = 10), and regulation (Me = 25; IQR = 12). Regarding self-perceived academic self-efficacy, students reflected an adequate level of confidence in their competence to efficiently fulfill their academic duties during the pandemic (Me = 4; IQR = 2). Results showed average levels of psychological well-being (Me = 35; IQR = 5), suggesting the need for psychological intervention to promote adequate psychosocial functioning in the dimensions of control, self-acceptance, autonomy, bonds, and Project or purpose in life. See **Table 1** for descriptive analyses of variables and reliability indicators.

Differentiation According to Sociodemographic Characteristics

Gender had an effect only on emotional regulation, a dimension corresponding to emotional intelligence, and on bonding, a construct pertaining to psychological well-being. Specifically, male students (Me = 33, IQR = 9) exhibited higher scores than female students (Me = 25, IQR = 12.75) in emotional regulation or repair, we detected a significant difference of small magnitude ($z = 3.73$, $p < 0.001$, $d = 0.44$). Likewise, the bonds reported by male students (MR = 190.31, IQR = 1) were greater than those found in female students (MR = 148.25, IQR = 1), again showing a small effect size ($z = 2.51$, $p = 0.012$, $d = 0.28$). In contrast, age influenced all dimensions of psychological well-being, including the total construct; participants aged 21 years or older had higher levels of psychological well-being (see **Table 2**).

Predicting Psychological Well-Being Based on Emotional Intelligence and Academic Self-Efficacy

Our findings regarding the predictive role of emotional intelligence and academic self-efficacy on psychological well-being are shown in **Table 3**. The results showed that emotional attention decreases high scores in psychological well-being and its dimensions: acceptance, bonds, and projects; emotional understanding increases scores in psychological well-being and its dimensions of acceptance, autonomy, and projects; and emotional regulation increases scores in the dimension of bonds. In turn, academic self-efficacy predicts higher scores in psychological well-being, acceptance, and bonding dimensions. Taking the acceptance/control dimension as an example, we observed that a one-point increase in emotional attention decreases the probability of obtaining a high level in this construct by 6.20% (OR = 0.94, 95% CI: 0.89–0.99), while unit increases in the emotional clarity dimension raise the probability of achieving high scores on the dimension by 7.45% (OR = 1.07, 95% CI: 1.01–1.15). In contrast, a one-point increase in academic self-efficacy raises the probability of exhibiting a high level in this dimension by 163.39% (OR = 2.63, 95% CI: 1.78–3.90). It should be clarified that the factors not described in these results were assumed to have remained constant during the study period. In addition, both age and sex were included as covariates in the regression models.

DISCUSSION

Our central objective was to determine the predictive role of academic self-efficacy and emotional intelligence skills on the psychological well-being of university students during a period of confinement due to the COVID-19 pandemic. Despite the difficulties related to the pandemic, university students show an average level of psychological well-being, possibly promoted by their personal resources of emotional understanding and regulation. We also found an adequate level of academic self-efficacy, possibly allowing them to organize motivational and behavioral efforts to perform tasks, reports, exams, and other activities demanded by university academic life.

Regarding emotional intelligence skills (Fernández-Berrocal et al., 2004), the participating students showed adequate attention. Students report the ability to read their emotions and feelings by being able to experience them. They can consciously recognize their emotions and identify what they feel by giving it a verbal label. At the level of emotional understanding, the participating students can understand themselves, identifying their needs and desires, being able to integrate what they feel within their complex thinking considering the changes according to the context marked by adversity.

The university students presented adequate emotional regulation. Emotional regulation is a skill that would help them to control their own emotional response to intense situations.

TABLE 2 | Psychological well-being according to age groups.

Variable	Up to 20 years: MR (IQR)	From 21 years: MR (IQR)	*Z* (p)	Cohen's d
Control	143.70 (2)	165.77 (2)	2.20 (0.028)	0.25
Links	143.82 (2)	165.56 (1)	2.31 (0.021)	0.24
Projects	143.61 (1)	165.90 (1)	2.26 (0.024)	0.25
Acceptance	141.15 (1)	169.98 (2)	2.89 (0.004)	0.32
Psychological well-being	137.67 (5)	175.76 (3.25)	3.69 (<0.001)	0.43

MR, mean rank; IQR, interquartile range. Mean rank are reported instead of median because the shape of the distributions differs according to age group.

TABLE 3 | Emotional intelligence and academic self-efficacy as predictors of psychological well-being.

Dependent variable (DV)	Independent variables (IV)	OR (p)	CI 95%	R^2	Sens (%)	Spec (%)	T (%)
Control	Emotional attention	0.94 (0.022)	0.89–0.99	0.25, 0.34	71.17	68.42	69.90
	Emotional clarity	1.07 (0.040)	1.00–1.15				
	Emotional repair	1.02 (0.474)	0.97–1.08				
	Academic self-efficacy	2.63 (<0.001)	1.78–3.90				
	Age	1.17 (0.065)	0.99–1.38				
	Gender	0.47 (0.246)	0.13–1.68				
Links	Emotional attention	0.97 (0.183)	0.93–1.01	0.09, 0.12	53.23	75.00	65.07
	Emotional clarity	1.09 (0.002)	1.03–1.15				
	Emotional repair	0.99 (0.636)	0.95–1.03				
	Academic self-efficacy	1.29 (0.070)	0.98–1.69				
	Age	1.12 (0.086)	0.98–1.27				
	Gender	0.83 (0.699)	0.33–2.10				
Projects	Emotional attention	0.85 (<0.001)	0.79–0.91	0.32, 0.46	50.70	89.39	78.40
	Emotional clarity	1.04 (0.256)	0.97–1.12				
	Emotional repair	1.08 (0.012)	1.02–1.15				
	Academic self-efficacy	3.35 (<0.001)	2.17–5.19				
	Age	1.54 (<0.001)	1.22–1.95				
	Gender	1.16 (0.831)	0.31–4.35				
Acceptance	Emotional attention	0.90 (<0.001)	0.85–0.95	0.17, 0.23	73.53	61.90	68.28
	Emotional clarity	1.13 (0.001)	1.05–1.21				
	Emotional repair	1.01 (0.750)	0.95–1.07				
	Academic self-efficacy	1.18 (0.362)	0.83–1.68				
	Age	1.15 (0.061)	0.99–1.33				
	Gender	0.41 (0.189)	0.11–1.55				
Total	Emotional attention	0.68 (<0.001)	0.58–0.80	0.52, 0.71	83.61	89.66	87.16
	Emotional clarity	1.46 (<0.001)	1.23–1.74				
	Emotional repair	1.10 (0.078)	0.99–1.22				
	Academic self-efficacy	2.81 (0.001)	1.56–5.04				
	Age	0.96 (0.964)	0.17–5.43				
	Gender	1.36 (0.081)	0.96–1.92				

OR, odds ratio; CI, bilateral confidence interval; R^2, Cox and Nagelkerke pseudo R^2; Sens, sensitivity; Spec, specificity; T, total.

It is suggested that students can generate alternative adaptive thoughts to control/regulate the different variations that may occur during the day. Can tolerate frustration and feel confident in the face of goals they set in the midst of a pandemic. This finding is congruent with their level of academic self-efficacy, which was adequate. Possibly helping them to continue in their training process despite difficulties, suggesting that they perceive themselves capable of achieving their goals, evaluating priorities and successfully facing the obstacles encountered on their way through a state of pursuit toward their academic goals during the confinement.

The psychological well-being of the students was found at a medium level, with low tendencies. This result points to opportunities for intervention to improve the experience of university students in the development of academic and professional life projects, strengthening self-acceptance and control over what happens in their lives in a context marked by adversity.

The results indicate that bonds should be strengthened in quality and quantity; we believe that bonds were one of the dimensions most affected by the pandemic together with the perceived autonomy to make decisions (Ryff, 1989;

Casullo, 2002). In addition to this pandemic situation, other factors related to the critical situation of the country with which students must deal with daily can be incorporated. However, it is at a medium level despite the adversities, which is congruent with the Latin American background described above.

The background described above has emphasized exploring learning in remote emergency education, as well as approaches to mental health as an absence of psychopathology. In this study, we considered psychological well-being as an indicator of mental health related to emotional intelligence (psychic resources) and academic self-efficacy (psychoeducational). It can be stated that the results are congruent with other studies conducted in Venezuela during the COVID-19 pandemic, specifically regarding adequate levels of academic self-efficacy (Romero et al., 2021); however, our results differ from that of the study conducted by Giménez and Medici (2021) regarding emotional intelligence skills. Our results are also congruent with international evidence suggesting that self-efficacy, emotional understanding, and regulation skills may be protective factors for mental health and well-being during a pandemic (Persich et al., 2021; Sabouripour et al., 2021; Sánchez-Ruiz et al., 2021); additionally, in this study, emotional perception established a proportional inverse relationship with psychological well-being, which is congruent with other studies before the pandemic (Extremera and Fernández-Berrocal, 2006; Extremera et al., 2009).

The results confirm that self-efficacy and socioemotional aspects are important for the construction of psychological well-being in university students both pre-pandemic and during it, as they enable the need for competence, autonomy, and relationships according to the self-determination theory (Kohls et al., 2021; Matos Fialho et al., 2021). Similarly, the results are interpreted from Hobfoll's (1989) conservation of resources theory, which emphasizes that internal resources (such as self-efficacy) at the personal level would allow people to adapt to new, changing, and unfamiliar needs. Before online emergency remote education, the university as an institution could generate external support through either programs or support tutorials that maximized or compensated students' personal and internal resources that helped to build students' resilience (Plakhotnik et al., 2021).

The results of this study are congruent with those of an Iranian study, which postulates that self-efficacy is closely linked to optimism, resilience, and the construct of multidimensional psychological well-being of university students during the COVID-19 pandemic. In effect, self-efficacy is a mediator of resilience to each element of well-being: environmental mastery, autonomy, self-acceptance, positive relationships with others, personal growth, and purpose in life. It is suggested that self-efficacy is linked to optimism in the sense of motivating present future-oriented behaviors (Sabouripour et al., 2021). Similarly, emotional stability and self-efficacy were significant predictors of multidimensional psychological well-being in emerging young adults in Nigeria (Bada et al., 2020).

Pre-pandemic scientific literature has also highlighted that emotional intelligence is a personal resource that can be a promoter of both hedonic and eudemonic mental health and psychological well-being (Di Fabio and Kenny, 2016; Sánchez-Álvarez et al., 2020). Similarly, one of the premises put forward by Bandura is that self-efficacy is an active element in the construction and subjectivization of psychological well-being, which can be considered a source of well-being (Sansinenea et al., 2008; Cabanach et al., 2012) even in clinical populations (Suriá and Ortigosa, 2018).

These findings highlight the university educational experience as a space for universal psychoeducational interventions aimed at the promotion of personal resources for both prevention and health promotion, and even from a gender perspective that responds to the diversity of trajectories in the construction of these psychosocial resources (Sawyer et al., 2021). In this study, differences were found only in emotional regulation and the bond dimension of well-being, and mostly among men, evidence suggesting different trajectories according to sex or gender in the experience of the same (Gartzia et al., 2012; García-Álvarez et al., 2020; López et al., 2021). There were significant differences according to age for only psychological well-being in those older than 21 years, which can be explained by the fact that those younger than 21 are in a greater situation of dependence and little autonomy. In addition, age increases the possibility of constructing the elements of multidimensional well-being (Ryff, 2014; Ryff et al., 2021).

We recommend that universities implement social-emotional education strategies that emphasize the development of emotional understanding and regulation, when it comes to factors involved in self-regulated learning and consider academic self-efficacy and its sources of promotion: direct experiences of mastery, vicarious experiences, verbal persuasion, and physiological or emotional activation (Hernández, 2018; Alarcón, 2020) either online or in hybrid face-to-face and online modalities. Although, at the time of writing this article (August 2021), the vaccination process is still ongoing and there are no concrete back-to-school announcements in the country. The objective of these interventions should be to promote health and prevent psychopathology that may jeopardize university permanence of university students, where techniques are provided to develop adequate emotional management and coping strategies to face the different challenges of a university, as well as other complex events (Arias and Giuliani, 2014). We also recommend designing and implementing interventions aimed at promoting agency, a construct formed by self-efficacy, optimism, future orientation, and imagination as a psychological state that allows us to build our well-being and our future (Seligman, 2021). It would be interesting to consider the model healthy university as a management model (Burns et al., 2020).

A limitation of the present study is that the data were collected online due to the current pandemic using non-probability sampling. This represents a bias, given that responses were only obtained from students with Internet access, leaving out those without Internet access. This may have impacted the measurement of the total perception of psychological well-being across all students in a country with marked inequalities. It is also important to note that the participants were limited to Psychology students, the vast majority of whom were female, making a more equitable sample difficult. In this sense, we are

recommended that future researchers replicate this study post-pandemic, to compare the results, as well as work with equal groups of men and women to facilitate the analysis of differences by sex and age. However, this was a limitation shared with most of the background described in the introduction on research conducted in this context during the pandemic.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

DG-Á contributed to the design of the study, reviewed the literature, interpreted the results, and wrote the manuscript. JH-L contributed to the design of the study, data extraction, data analysis, and review of the abstract and manuscript. RC-R contributed to the literature review, interpretation of the results, and review of the abstract and manuscript. All authors contributed to the manuscript and approved the submitted version.

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Psychological Well-Being in Teachers During and Post-Covid-19: Positive Psychology Interventions

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INTRODUCTION

One of the major consequences of Covid-19 in educational settings has been the transition from face-to-face instruction to emergency remote teaching in order to maintain teaching and learning quality standards (United Nations Educational Scientific Cultural Organization, 2020; Garcia et al., 2021). Studies have shown a marked increase in stress and burnout in school teachers (Pellerone, 2021) and technostress among university teachers during the pandemic as a result of different reasons both subjective and objective (Penado-Abilleira et al., 2021), moderate to low levels of stress, anxiety and depression in school and university teachers (Ozamiz-Etxebarria et al., 2021a). Fear of contagion and risk perception in the school context, and teacher with higher levels of anxiety considered that the possibility of reopening schools was not a priority (Weinert et al., 2021). A systematic review carried out on teacher health in times of Covid-19 (Holguín, 2021) has found that physical, mental and social health have been impacted. It is relevant to mention that only two studies were found related to this. One was about interventions for the prevention of physical symptoms (Kayabinar et al., 2020) and the other about emotional competencies (Roman, 2020).

Non-university teachers have reported an increase in psychosocial risks in working environments regarding limited resources, difficulties in organizational justice, interpersonal problems, role confusion and work overload, uncertainty management, psychosomatic disorders, and burnout as well as the responsibility of being the primary learning facilitator of children and teenagers (Prado-Gascó et al., 2020). One of the concerns expressed by teachers has involved assessments, including assessment tools and strategies, monitoring student learning and ethical issues related to students' behaviors (Jelińska and Paradowski, 2021).

In addition to other factors determined by education administrations, vaccination plans in some parts of the world have contributed to the gradual return to face to face instruction or at least a hybrid model of education. Nevertheless, teachers who have faced the prospect of going back to onsite teaching have experienced anxiety about contagion risk as well as falling behind or having difficulty keeping up with the planned teaching schedule and overall student progress (Wakui et al., 2021). Teachers who have returned to face-to face lessons have reported high levels of anxiety, stress, and even depression, all of which were likely exacerbated by the emotional experience they have gone through during the lockdown period, the uncertainty about contagion in schools and managing their workload from home (Ozamiz-Etxebarria et al., 2021b).

Teaching staff are not coming back to what was considered a "normal" school environment before the pandemic breakout (Darling-Hammond and Hyler, 2020; Ellis et al., 2020; Brunzell et al., 2021; Pressley, 2021a). Educational institutions are reopening after high levels of Covid-19 and with a current marked increase in variants such as Delta. In this context, it is worth considering that we may be coming back to school experiencing collective psychosocial trauma (Bergren, 2021; Gonçalvez-Boggio, 2021). A scenario that promotes teacher burnout (Pressley, 2021b). With

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the current educational situation, we must reflect upon how to promote teachers' psychological well-being both in the present-day and post-Covid-19.

In order to identify the research on teachers' psychological well-being in the context of the COVID-19 pandemic, a systematic review was carried out following the PRISMA method (Moher et al., 2009). Following each of the phases, a comprehensive literature search was conducted in three databases: SCOPUS, Web of Science (all collections) and EBSCO (all collections), using the keywords "wellbeing" OR "well being" OR "well-being" AND "teacher" OR "teacher" AND "positive psychology" AND "covid-19" OR "coronavirus" OR "2019ncov" OR "sars-cov-2" OR "cov-19" identified anywhere in the registry. The search for primary sources included only English and Spanish language scientific articles. The initial search yielded four results.

After discarding duplicate works, a total of three studies were identified. The analysis of each of them resulted in: (a) a qualitative research about the trauma approach in conjunction with applied positive psychology for elementary school teachers (Brunzell et al., 2021); (b) a study focused on coping strategies in relation to well-being, stress and negative emotions in language teachers at different teaching levels (MacIntyre et al., 2020); and (c) a theoretical proposal focused on methods and teaching strategies based on well-being and positive psychology for teachers but focused on student well-being (Chu, 2020).

Given the few studies found in the context of the COVID-19 pandemic, the intention of this article, which focuses its efforts on the contribution of positive psychology to teachers' well-being, is relevant. For this purpose, a new systematic review was conducted following the steps described above. However, the descriptors associated with COVID-19 were substituted by research oriented to applications or intervention programs ("program" OR "intervention"). In this case, 89 articles were found in the three databases consulted. Twenty-six of these were duplicates.

The titles and abstracts of 63 articles were read. The selection criteria were: (1) research focused on teachers, (2) positive psychology topics, (3) in English or Spanish. The final sample consisted of 12 research studies. We identified 66.7% ($n = 8$) quantitative paradigm studies, 33.3% ($n = 4$) with a qualitative design. Only 16.6% ($n = 2$) of them were published in Spanish. The findings highlight the fact that, although the rise of positive psychology applied to education has been important in recent years, the work developed has a greater emphasis on the context of student well-being. There is little research that considers the teacher from a person-centered approach, despite being an essential actor for the development of positive education (Rahm and Heise, 2019; White, 2021). Perspectives offered by Positive Psychology provide us with some important answers. Please note that references to "teaching staff" in this article refer to teachers working at different formal educational levels including preschool, primary, secondary, and university or higher education.

POSITIVE PSYCHOLOGY IN TEACHERS' WELL-BEING

Teachers' well-being is a complex construct, which has been conceptualized as the absence of negative conditions such as teacher's stress, demotivation and even burnout (Huertas and Dávila, 2020; Bastías, 2021). Teachers' well-being has also been studied as it relates to coping strategies and engagement and recovery from work (Pöysä et al., 2021). From the perspective of Positive Psychology, well-being may be analyzed with a holistic approach such as Seligman's PERMA model (Seligman, 2012) as well as in eudaimonic dimensions such as the multidimensional psychological well-being model proposed by Ryff (1989, 2014). It is important to understand that well-being is a complex construct that includes a variety of subjective indicators. Some of which are related to personal growth and self-actualization, which must always be considered in context. Research measuring teachers' psychological well-being has yielded interesting results. These may suggest guidelines for the development of psychosocial intervention strategies.

When focusing on psychosocial interventions, the strategies to be developed may better fit into an approach that favors health promotion, and prevention risk factors along with primary prevention of psychopathology. These may be universal interventions targeting all teaching staff. From a theoretical point of view, these interventions aimed at increasing the protective factors for mental health and well-being of teachers (Branand and Nakamura, 2017) are based on the Job Demands-resources Model (Bakker and Demerouti, 2013), the Theory of Flow and Optimal Experience (Csikszentmihalyi, 1988), the Classification of Character Strengths and Virtues (Peterson and Seligman, 2004), the Social Cognitive Career Theory (Lent et al., 1994), and the Self-determination Theory (Ryan and Deci, 2017).

Furthermore, previous research involving teachers at different educational levels has identified factors affecting teachers in the workplace. These should be considered when addressing risk reduction and burnout prevention (Carlotto and Câmara, 2017; Tabares-Díaz et al., 2020). The above mentioned factors include interpersonal variables such as emotional expression and regulation, motivation, self-efficacy, and teacher engagement (García-Renedo et al., 2006; Perandones-Gonzalez et al., 2014; Lozano-Paz and Reyes-Bossio, 2017).

In addition, context-bound variables related to peer support and collaboration, school work environment, school leadership and management, and the impact of public-school policies (Dávila, 2018) should also be considered. In the field of Positive Psychology, specific interventions aimed at promoting multidimensional psychological well-being have been implemented (e.g., multidimensional well-being workshops for teachers, Leal-Soto et al., 2014). Particular character strengths such as gratitude (e.g., counting blessings, Chan, 2010) can decrease symptoms of depression in teachers and increase their level of satisfaction (e.g., counting blessings vs. misfortunes, Chan, 2011, 2013). Mindfulness interventions may be used to strengthen personal resources, thereby reducing work stress among teachers (Taylor et al., 2015).

In the research laboratory of Jóvenes Fuertes Uruguay, multicomponent interventions aimed at promoting psychological well-being in teachers have been developed. The goals of the Positive Psychology Course Applied to Education (CUPPAE according to its acronym in Spanish) were to increase the psychological well-being of educational staff through the identification of their virtues and character strengths, and to provide training in teaching strategies to apply positive psychology in their classrooms. The study had a pretest–posttest design with teachers of various educational levels.

The intervention consisted of eight modules providing a formative journey through positive psychology, elements of well-being, character strengths, positive education and strategies, mental styles, resilience and optimism, mindfulness in conjunction with self-regulation, emotional management, empathy and compassion. The results indicated a significant increase in psychological well-being in each of its dimensions in the participating teachers before and after the intervention. It was concluded that the intervention presented satisfactory preliminary results (García-Álvarez et al., 2020).

The Jóvenes Fuertes research laboratory has developed an additional multi-component positive psychology intervention aimed at developing multidimensional psychological well-being and gratitude. This intervention uses a pre- and post-measurement methodology with a single group, and comprises eight sessions. In this intervention, teachers start from a Positive Psychology foundation, well-being models, and focus on each of the character strengths including an organized gratitude campaign in the school environment. Pre and post-tests results have indicated a marked increase in teachers' psychological well-being and gratitude. It was concluded that the intervention could be used to promote psychological well-being, gratitude and mental health in teachers (García-Álvarez and Soler, 2021).

The results of both studies suggest two significant findings. First, regarding continuous professional development, the main objective of the intervention must be to train teachers to apply positive psychology both in their own lives and to implement its principles in the classroom. Second, regarding the nature of the psychological intervention, the mental health of the teachers and the educational community as a whole must be promoted. The results of these studies provide recommendations indicating that any positive psychology intervention designed for teachers should integrate all aspects, including teaching practice, educational leadership, and school management. Similarly, these interventions should address specific situations related to teacher distress, as indicated by the prevention model in Keyes (2002) two-factor model (Kern et al., 2014; Brunzell et al., 2021; World Health Organization, 2021).

TEACHER WELL-BEING DURING AND AFTER COVID: IDEAS FROM ADVERSITY

The Covid 19 pandemic will continue to present challenges to the quality of education at many different levels. The following discussion by the authors suggests possible interventions or guidelines to maintain and promote teachers' well-being during a difficult time. According to Waters (2021), actions taken to promote school well-being should be systematized and based on scientific data to gather empirical evidence that will eventually be reported in academic or professional environments.

The authors promote goals to empower teachers through teaching practices that integrate wellness practices into their curricula. Creating interventions with a context-based approach that will foster skills to increase well-being in the classroom (e.g., Waters, 2021). Social relationships and connections are the building blocks of multidimensional well-being models. Relationships between teachers and students are paramount in the development of well-being and these have a special importance during the Covid-19 pandemic. Studies have revealed the relevance of the interaction between teachers and students in an online teaching environment (Alqurshi, 2020; Bao, 2020; Chanchí-Golondrino et al., 2021; Hamdan et al., 2021; Jelińska and Paradowski, 2021).

Consequently, it is important that interventions aimed at promoting teacher well-being include practical strategies to improve interpersonal interactions. These include emotional intelligence, empathy, assertiveness, compassion, etc., which can influence the socioemotional classroom environment and improve relationships between colleagues and teaching peers. Psychological working resources that enhance reflective teaching practices and improve teaching and learning should be promoted. These would include character strengths such as gratitude, creativity, love of learning, bravery, and others (White, 2021). Fostering teacher autonomy in decision making may be achieved with institutional support and a respectful leadership based on mutual trust and adjusted to different working conditions (Naegeli Costa et al., 2021).

The authors identify the importance of promoting flow experiences, which will lead to lasting engagement to teaching experiences as they create lesson plans and classroom materials, deliver lessons and other teaching duties. These flow experiences may prove to be protective factors against stressors, burnout, and teacher drop out (Millán de Lange et al., 2014). The authors stress the essential inclusion of a trauma informed care focus in well-being interventions for teachers during and post-Covid (Brunzell, 2021) as the pandemic may be experienced as a psychosocial trauma by the teachers (Gonçalvez-Boggio, 2021). This trauma-informed care perspective may be useful for teachers to help themselves and to better understand other members of the educational community that may need support in the re-adaptation process.

One of the proposals is the implementation of Professional Development Teacher Communities (Webb et al., 2009; Vaillant, 2019; García-Álvarez, 2020) focused on well-being as a systematic way to expand the knowledge oriented to the continuous development of teachers, both at a personal and professional level to improve the quality of education. In this regard, the role of educational leadership is key to implementing this initiative. In addition to strategic alliances with other specialists inside and outside the school such as psychologists, counselors, etc., it is important to consider the overlap between sectors either inside or outside the educational system. For example, the areas of labor and health (Karaman et al., 2021).

The benefits of this initiative will be the improvement of pedagogical practices, reconfiguration of professional teaching competencies, increased recognition of teamwork and the organization of work teams. The advice and help of teaching leaders and colleagues will be sought and examples of good educational practices identified. A systematic intervention oriented to medium and long-term outcomes must be framed with quality educational management and with the school as a construction of well-being spaces, a center for promoting mental health (García-Álvarez et al., 2021).

The professional teacher learning community can mobilize the factors that generate organizational learning with a clear management commitment open to continuous learning and a climate that promotes learning. Members of the educational community must be located in an environment that favors training and the exchange of experiences, and must have an infrastructure that allows the educational organization to function optimally in all its aspects. Valid and reliable psychometric scales to assess constructs related to teacher well-being should be included in any proposed study (e.g., Renshaw et al., 2015). Through this initiative, teacher empowerment would be promoted by involving teachers in decisions (Yusoff and Tengku-Ariffin, 2020). In conclusion, the authors call for the design of public policies for teacher training, professional development and retention in the education system to face the challenges ahead. Challenges that the political and educational actors of the system must assume with leadership.

AUTHOR CONTRIBUTIONS

DG-Á: formulation of the idea, initial and final writing, and constant revision. MS and LA-B: reviews, contributions, and final writing. All authors have contributed to the work and have approved the final version submitted.

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Webcams and Social Interaction During Online Classes: Identity Work, Presentation of Self, and Well-Being

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The well-being of children and young people has been affected by the COVID-19 pandemic. The shift to online education disrupted daily rhythms, transformed learning opportunities, and redefined social connections with peers and teachers. We here present a qualitative content analysis of responses to open-ended questions in a large-scale survey of teachers and students in Romania. We explore how their well-being has been impacted by online education through (1) overflow effects of the sudden move to online classes; (2) identity work at the individual and group levels; and (3) Students' and teachers' presentations of self in the online environment, with a focus on problematic aspects of webcam use. The results indicate that both students and teachers experienced ambivalence and diverse changes in well-being, generated by the flexibility, burdens, and disruptions of school-from-home. The identities associated with the roles of teacher and student have been challenged and opened for re-negotiation. Novel patterns have emerged in teachers' and Students' identity work. Failure or success at the presentation of self in online situations is relevant for the emotional valence of learning encounters, impacting well-being. Online classes have brought about new ways to control one's presentation of self while also eliminating previous tactics and resources. The controversy regarding webcams has captured this duality: for some, the home remained a backstage that could not be safely exposed; for others, the home became a convenient front stage for school. Well-being was affected by the success of individual and collective performances, and by student-teacher asymmetries. Overall, our study of online learning indicates powerful yet variable influences on subjective well-being, which are related to overflow effects, identity work, and presentation of self.

Keywords: well-being, online education, webcam, presentation of self, identity work

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INTRODUCTION

The COVID-19 pandemic has led to increased reliance on distance learning as a result of country-wide lockdowns and restrictions on in-person education (United Nations [UN], 2020). Among students and teachers, the effects of this abrupt shift have been ambivalent and diverse, with uneven combinations of positive and negative changes in well-being across different social categories. For example, the downturn in face-to-face instruction is expected to disproportionally affect teachers and students from disadvantaged communities, as well as those with previously poor education outcomes (Di Pietro et al., 2020). Significant segments of the student population became less engaged, or even lost touch with school,

on a global scale, in countries such as Turkey (Kurt et al., 2021), New Zealand (Yates et al., 2021), Romania (World Vision, 2021), and the United States. This global effect was due to a combination of lack of internet connectivity and other household difficulties (Domina et al., 2021). Students often perceived online learning to be less interesting, enjoyable, and educational (Garris and Fleck, 2020; Loperfido and Burgess, 2020). Simultaneously, some students benefitted from the increased flexibility and reduced face-to-face contact that is part of distance learning (Burns et al., 2020; Garris and Fleck, 2020). Likewise, previous research finds ambivalence and heterogeneity among teachers. Some appreciated the flexibility, while others felt overburdened and isolated with increased stress, anxiety, and depression (Ozamiz-Etxebarria et al., 2021).

Our study is a qualitative content analysis of responses to open-ended questions in a large-scale survey of teachers and students in Romania. We examine how the well-being of students and teachers was changed by online education by focusing on three dimensions: (1) the overflow effects of online schooling on schedules, role conflicts, and other sources of positive and negative affect; (2) the re-negotiation of digital identity at both the individual and group levels through identity work (Schwalbe and Mason-Schrock, 1996); and (3) Students' and teachers' presentation of self (Goffman, 1956) in online environments, specifically addressing the webcam dilemma (**Figure 1**).

Subjective well-being is a concept that refers to individuals' degree of satisfaction with their own lives, and it is typified by the predominance of a positive affect over a negative one (Diener, 1984). The turn toward online learning has shaped how teachers and students evaluate their lives, with important implications for their emotional states; and the impact has been multidimensional. *First, there have been overflow effects of the influence of online work and school on other spheres of daily life.* Heretofore private, teachers' and Students' homes have become public spaces, and their daily schedules have been modified to accommodate working from home, thereby radically changing traditional patterns of social interaction. There have been benefits from flexibility and saved time (for transportation to and from school, for preparing and dressing), but also costs from role conflicts and various additional requirements for distance learning (finding a place to study at home, problems with internet connectivity, and lack of appropriate devices, etc.). While certain people enjoyed withdrawing from public life and escaping constant scrutiny, this led to social isolation and feelings of loneliness in others (Burns et al., 2020; Villani et al., 2021). Moreover, the emergence of work-life conflict (Grünberg and Matei, 2019) varied with the presence or absence of young children in the family (Schieman et al., 2021), thereby leading to a heterogeneous reception of online teaching.

Second, teachers and students have confronted challenges to their school-related identities. Individuals create and recreate identities through social interaction. These identities are fluid, and people can change and adapt them to novel situations. Creating, maintaining, or changing identities requires individual and collective effort, which can be conceptualized as "identity work" (Schwalbe and Mason-Schrock, 1996). Individuals and groups develop signs (including labels, codes for interpretation, and rules of behavior) to indicate various features of the self. They use these signs to create images of themselves in interaction with others. Schwalbe and Mason-Schrock (1996) distinguish four distinct dimensions of identity work: determining group characteristics (defining), establishing the norms and rules of the group (coding), the existence of and/or creating occasions to express the identity of the group (affirming), and delimitation of those who belong to the group from the ones who do not (policing).

When we examine the shift to online education during the pandemic, it is apparent that the virtual environment stimulated *a reconstruction of identities* for both students and teachers. A recent study (Jones and Kessler, 2020) found that "the foundational pieces of teachers' identities have been significantly altered, if not removed entirely, due to COVID-19" (p. 7), and this holds true for students as well. Increased responsibilities were imposed on students and their parents for planning learning activities, while their opportunities to request or receive advice from teachers decreased. Because of the sudden shift, numerous students "were not prepared to manage their learning in a space that provided them with less everyday interaction with their peers and their professors" (Loose and Ryan, 2020). In addition, moving assessment activities online has increased risks of students cheating (Bilen and Matros, 2021), thus heightening teachers' suspicions and creating increased conflict between teachers and students.

Teachers also lost precious opportunities to connect and consult with peers, which affected their sense of collective identity and had a negative impact on their subjective well-being (Spicksley et al., 2021). They felt that the pandemic diminished their creativity, thereby reducing student engagement and exacerbating emerging forms of inequity and pandemic-related trauma among students, which degraded the teachers' own emotional experiences (Loose and Ryan, 2020; Anderson et al., 2021). Occasionally, teachers managed to recover from the initial shock, while relying on relationships with peers and remaining deeply concerned about vulnerable students (Kim and Asbury, 2020). An ambivalent, yet overall negative, experience with the shift to online education is also reported by a survey of teachers and students in Slovenia: "The lack of daily commuting, improved eating habits, and more time available for a family were the main reported advantages of WFH. The main issues, highlighted by respondents, were higher stress levels, lower study/work efficiency, and poorer working environment at home. When comparing the online educational process with the traditional one, the absence of traditional laboratory work, inadequate social interactions, and limitations of online knowledge assessment were identified as drawbacks by both students and educators" (Bilen and Matros, 2021; Drašler et al., 2021).

Occasionally, the online experience was perceived as exhausting, becoming a source of negative effect. This feeling is referred to as "Zoom fatigue" (Johnson, 2020; Marquart, 2020; Smith, 2021). Bailenson (2021) identified four causes for this syndrome: (1) the eyes are being used unnaturally, as everyone is staring at each other for a large amount of time and people's

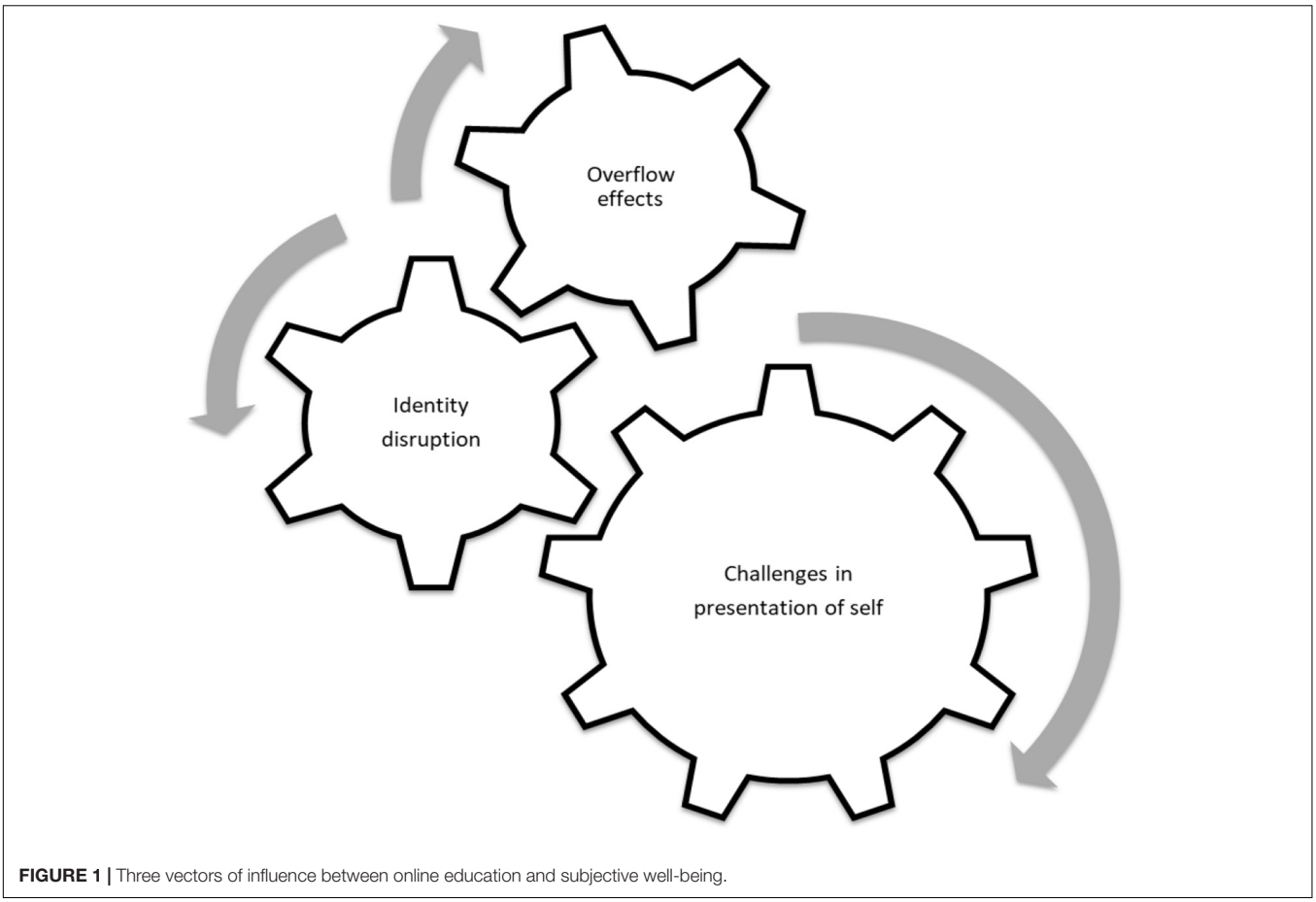

FIGURE 1 | Three vectors of influence between online education and subjective well-being.

faces on screens are larger than in reality—"*you're seeing their face at a size which simulates a personal space that you normally experience when you're with somebody intimately*"; (2) the cognitive load is higher because of the work required to surmise the non-verbal messages of others; in real-life interactions, these flow naturally and without effort; (3) seeing our own faces all day long makes us more aware of ourselves and more critical of our appearances—"*Zoom users are seeing reflections of themselves at a frequency and duration that hasn't been seen before in the history of media, and likely the history of people*"; and (4) there is a reduced ability to move and gesture during online activities, which negatively affects the creativity and efficiency of a meeting. Online interactions are perceived as artificial; even with cameras turned on, zoom fatigue is a problem for numerous individuals (Johnson, 2020; Mayer, 2020). Moreover, one might be distracted by one's own face and the attempt to look good and interested, which tends to negatively affect focus: "*While looking at students may be comfortable for instructors, for students, it can be an alien experience*" (Finders and Muñoz, 2021).

Third, the shift to online education implied that individuals had to suddenly present and defend their school-related identities exclusively in the virtual space, at the expense of face-to-face classroom situations. The concept of the "presentation of self," developed by Erving Goffman (1956), helps to elucidate how students and teachers managed their identities during online lessons. According to Goffman, individuals orient their actions depending on how they define the situation and how they would like others to perceive them. Both students and teachers were accustomed to curating their appearances in face-to-face educational interactions. However, online school required an adaptation of techniques as the "normal" was disrupted, and students and teachers both struggled to explore and exploit new ways of dealing with the virtual learning environment. Disrupted situations invite new registers of valuation, and combinations of old and new practices (Ciocănel, 2016, 2017). For example, the digital space offers the possibility of not being seen or heard, and the possibility of furtively moving attention to other digital activities, options that are unavailable in physical interactions. Shifts in the organization of the situation induce changes in the emotions experienced by interactants, who must cope with novel challenges in presenting their selves (Jderu, 2010). While Goffman (1956) theorized the presentation of self for face-to-face situations, the appearance of the internet made it increasingly relevant in digital spaces, particularly with the advent of social media (Pearson, 2009; Hogan, 2010; Bullingham and Vasconcelos, 2013). The context of massive digitization due to the COVID-19 pandemic and the sudden shift to distance learning have led to new arenas in which the presentation of self had to be tailored to cope with virtual situations (Flaherty and Rughiniş, 2021).

One of the foci of discontentment in online education during the COVID-19 pandemic has been the so-called "black boxes" phenomenon. This refers to the fact that students often prefer not to turn on their webcams during online classes (Castelli and Sarvary, 2020), despite teachers' requests to turn them on for improved interaction and educational results: *"Speaking to a room of black boxes and profile images is quite debilitating and, frankly, weird"* (Cooper, 2020). Teachers have been making efforts to increase student engagement during online classes, but they continue to occasionally encounter black boxes (Pearson, 2020).

The digital leap stimulated a global debate, with educational experts, teachers, parents, students, and journalists putting forward arguments for and against compulsory use of webcams in online classes (**Table 1**). There are three main considerations concerning the use of webcams: (1) invasion of privacy; (2) digital inequity; (3) bullying, affected well-being, and increased anxiety.

In certain cases, students felt anxious when asked to turn on their cameras as they did not want their classmates to be part of their private space or did not feel comfortable seeing their own faces all the time (Reed, 2020). To combat this situation, some states and schools regulated the use of cameras during online education and established clear policies that state that cameras must be turned on for all students (Cooper, 2020). Reed (2020) argued that there are cultural differences from one home to another that could impact the ways in which students experience such policies. For example, girls who wear hijab in public spaces might not wear it at home, but would be required to do so if forced to turn their webcams on. Thus, teachers must not invade Students' privacy: "*Allowing someone access to a live video of myself in my home is a privilege, not a right*" (Simoens, 2021). In addition, students have become more exposed to privacy and security risks. So-called "zoombombers" can infiltrate online classes and take personal information from the participants, occasionally even recording them (Moses, 2020) as not all schools have implemented privacy and security policies for online learning.

Digital inequity is another argument in favor of being flexible when it comes to camera policies in online classes. Students have varied socioeconomic situations and access to individual digital devices, efficient bandwidth, and space to study and attend online classes. Teachers must therefore question whether all students are able to use a webcam. In addition, some students have additional responsibilities, including housework or sibling carer activities, while attending online classes: *"It's a privilege to be a student that can dedicate every waking moment to their studies"* (Nicandro et al., 2020).

TABLE 1 | Opportunities and burdens of webcam usage during online education.

Opportunities	Burdens
1. Improved interaction, engagement, real-time feedback, and sense of community	1. Social and digital inequalities that affect availability and how people are perceived by others
2. Exercising control over students and monitoring their activity	2. Invasion of privacy
3. Similarity with in-person classes	3. Risks of bullying, anxiety, fatigue

Moreover, experts have expressed concern that forcing students to turn on their webcams might lead to increased stress and depression. Costa (2020) described how students and teachers might experience trauma from previous events and/or COVID-19 in a LinkedIn post: "*Our brains are doing exactly what they're supposed to be doing during this crisis: focusing on survival.*" At the same time, bullying can occur when someone has their camera on and a classmate finds something funny or intriguing; it is possible that they record videos of the incident and distribute them to people outside the class.

On the other hand, teachers and educational experts advocate the benefits of turning on webcams during online classes, particularly with regard to student engagement (Will, 2020). There are three main arguments for having cameras on: (1) improved engagement and a feeling of community, (2) monitoring students, and (3) similarity with in-person classes.

First, engagement benefits derive from the immediate feedback received by teachers when they are able to see Students' faces. Moreover, when students have their cameras turned on, they become more involved in the educational process as they attempt to present themselves as paying attention and doing the necessary work. Even though teachers are somewhere aware of Students' reasons for not turning on their webcams, they cannot hide their frustration with the situation: *"I don't want to guilt trip them and I know this is more about me than it is about them, but I can't help but be annoyed that I'm teaching to a bunch of unanimated squares every day"* (Fagell, 2020). Teachers also expect that having cameras on during online classes would increase the sense of community and make the interaction more human, helping students feel less isolated and enjoying the company of their classmates (Rudolph, 2021).

Second, in the online environment, teachers find it difficult to supervise Students' activity. Teachers describe situations in which they do not know whether the students were actually listening or had just logged on and disappeared. In turn, the students take advantage of their invisibility and find it easier to avoid answering questions, subsequently blaming their lack of participation on connectivity issues (Patrick, 2020). In this atmosphere of suspicion, teachers' assumptions of student rationality and enlightened self-interest give way to diagnoses of student irrationality and self-deceit (Toth, 2013).

Third, teachers aim to create interaction patterns similar to in-person ones: *"Searching for the familiar is a common approach to coping with these uncertain times. Staring at an empty box or just a name seems to make many instructors uncomfortable, yet feeling such discomfort does not give them the right to demand entry into Students' private spaces"* (Finders and Muñoz, 2021).

The Romanian approach to online education during the COVID-19 pandemic is similar to that of other countries. In March 2020, the Ministry of Education decided to close schools for a short period of time to control viral spread. During this first phase, the authorities did not institute clear regulations for transferring education to the online environment. The schools decided autonomously whether and how to proceed. By the end of April 2020, the government mandated online education, whether synchronous or asynchronous (Ministry of Education, 2020a) and, since then, the Romanian

schools experienced various educational scenarios (online, face-to-face, hybrid) depending on the local and national pandemic situation. At the time of writing, because of the severity of the Covid-19 pandemic, in late October 2021, the Romanian Government has decided to close all schools for a 2-week vacation, rather than reinstate online learning. The Minister of Education has decried the strong inequalities of access that distort online schooling and argued that a vacation is preferable to reinforcing such inequity (Andronie, 2021).

MATERIALS AND METHODS

This research relies on an exploratory and qualitative case study. We analyze Romanian Students' and teachers' experiences with online interactions and webcam usage in primary (grades 0–8) and secondary (grades 9–12) school. Our study examines a subsample from an online survey conducted in November 2020. The questionnaire was disseminated by the NGO "Impreuna" Agency for Community Development, and the National Students' Council in Romania, a country-level primary and secondary school Students' union.

A total of 9,401 students and 3,265 teachers from all 42 Romanian counties answered the questionnaire. The study relied on availability sampling. The questionnaire included 8 closed questions that were similar for students and teachers, assessing how each category perceives online education (**Annex – Questionnaire**). Results indicated that students felt that teachers did not engage them sufficiently in learning activities, and they used collaborative teaching mechanisms less, compared to face-to-face education; they also believed that some teachers were not successful in adapting to the specificity of online education (Hosszu and Rughiniş, 2021). The quantitative data analysis also indicated that there was a dominantly negative, yet mixed, perception of online classes among students and teachers. With regard to students, 27% described online classes as "interactive" in a single choice question, but 17% described them as "relaxing," 29% described them as "boring," 17% described them as "useless," and 10% selected the "other" option to mostly include negative attributes such as difficult, tiring, and stressful (Hosszu and Rughiniş, 2021, p. 4).

The current study focuses on a subsample of 5,372 students and 2,354 teachers who also nuanced their answers through the final open-ended question: "Please briefly describe your experience with online education." The number of words used by the respondents varied between 1 and 707. We eliminated duplicate responses and those with fewer than 10 words, as longer responses were required for an in-depth analysis. Open questions in a survey have the role of eliciting participants' stories in a less structured and limiting space, empowering the respondents to describe their own experiences. This dataset proved productive for identifying multiple and sometimes conflicting ways in which identity work and presentation of self-influence well-being, in online education.

The majority of students and teachers in our subsample are women from urban areas in Romania (**Table 2**). Even though the questionnaire was open for all pupils in primary and secondary school, most of the respondents in the student subsample (91%) were in high school (grades 9–12).

TABLE 2 | Students and teachers' subsample included in the analysis.

Subsample	Total	% Women	% Urban
Students	5,372	70%	86%
Teachers	2,354	93%	67%

We analyzed the findings based on three key concepts: overflow effects on well-being, identity work, and presentation of self. The units of analysis are the individual testimonials of students or teachers. We followed the six phase approach to content analysis articulated by Braun and Clarke (2006): (1) becoming familiar with the data by reading and re-reading the Students' and teachers' testimonies, (2) manually generating initial codes by finding patterns and differences in discourse within and between groups, (3) searching for relevant themes by iteratively identifying and grouping theoretically relevant codes, (4) reviewing emerging themes by excluding those that do not have enough evidence and combining those that are similar, (5) defining and naming resulting themes, and (6) writing the report. The thematic content analysis process was not linear, but reflexive and iterative. Peer debriefing through conference presentations, constant examination of data in light of previous studies, and reflexive documentation of codes and themes ensured trustworthiness at each step (Nowell et al., 2017). We developed the content analysis grid iteratively, by reading and re-reading open-ended answers related to the three concepts and identifying the relevant intersections (**Table 3**).

Taking into consideration the large dataset, we pursued an *a priori* thematic saturation (Saunders et al., 2018) related "to the degree to which identified codes or themes are exemplified in the data." Thus, for each of the three concepts (**Table 3**) we searched for codes and themes in Students' and teachers' open-ended answers, until we ceased finding significantly novel elements. We read the answers repeatedly, re-examining their significance for our research aims. The data proved to be rich in mapping personal experiences over a certain code or theme and, as Corbin and Strauss (2015) pointed out, the researcher can always "add new properties and dimensions to categories." This is also why we used multiple testimonies to illustrate the diverse patterns in discourse for both students and teachers. Students' and teachers' testimonials were coded based on their position in the database—for students the codes are between S1 and S5372, while for teachers the codes are between T1 and T2354.

We benefitted from having diverse backgrounds in our co-author team, combining teaching experiences in social sciences, in engineering, and in entrepreneurship education. This form of researcher triangulation (Denzin, 2009) helped us better capture the ambivalence of technologically mediated interactions, which can feel both empowering and depleting, at the same time.

The testimonies were coded by two of the authors, each rating independently all answers. Based on a random sample of 100 answers (testimonies) for both students and teachers, the proportion of overall agreement between the two raters

TABLE 3 | Indicators used in content analysis of open-ended survey questions.

Category	Definition and examples	Dimensions	Indicators
Overflow effects on subjective well-being	Influences on individuals' satisfaction with their own life and positive and negative effects (Diener, 1984) through changes in schedules, role conflicts, and requirements for work and learning intensity. Examples: "*I don't have time to eat anything, I don't have time to get up from the office; I sit for 6 h with my eyes on the screen, non-stop, in continuous stress*" (S1257). "*Me and the students feel tired, the eyes fill with tears, personal time no longer exists, we do not have adapted educational content*" (T543).	Positive evaluation	• Feeling safe and comfortable at home • Gaining the time previously spent in traffic or for preparations
		Negative evaluation	• Work/family role conflicts • Stress, anxiety, depression • Fatigue • Many hours spent in front of the screen (eye strain, back issues, sleep issues) • Pressure from supervisors (teachers, school principals, and official educational institutions) • Decreasing motivation and engagement • Missing in-person interaction
Identity work	Efforts made by individuals and groups to delineate, maintain, and adapt their identities (Schwalbe and Mason-Schrock, 1996). Examples: *"I am glad that some teachers are very involved and want to learn, they ask us for help" (S2981);* "*We learned that we are alone in this boat. The top of the hierarchy does not provide sustainable support for teachers*" (T103).	Defining and affirming	• Referring to group and/or individual • Defining the group • Missing the face-to-face, informal arenas that sustained diverse, nuanced identities (school breaks, extracurricular activities)
		Coding	• Strategies for adapting to online classes • Efforts for developing digital competences
		Policing	• Moral/informal sanctions • Blaming the other group • Unsatisfied with formal regulation
Presentation of self	Efforts made by individuals to present a convincing and convenient identity for an audience, and to receive validation from the audience, in a given situation (Goffman, 1956). Examples: "*I don't feel well at all. I'm an anxious person and I don't feel good in front of the camera. I feel watched and judged for my imperfections and other things*" (S2020) *"It is very unpleasant to teach in front of turned off webcams because you do not receive any feedback. In addition, many students stay in bed and may even fall asleep*" (T749)	Managing one's online appearance	• Preoccupation with one's looks • Preoccupation with how one's environment appears to others • Gaining and maintaining control of the situation
		Managing webcam activity and demands	Preoccupation with: • Privacy risks • Gaining and maintaining autonomy and comfort • Quality of feedback • Quality of teaching and learning • Quality of assessment • Legal requirements • Relationships and communities

was 83% with a Kappa value of 0.83, indicating a strong interrater reliability.

RESULTS

Overflow Effects of Online Classes on the Well-Being of Students and Teachers

To obtain an overview of dominant topics and affective reactions to online classes, we counted the number of times keywords related to well-being were repeated in Students' and teachers' testimonials (**Table 4**). We applied a Chi-Square Goodness of Fit Test to assess if keywords differ significantly between students and teachers. For 8 out of 10 words there is a significant difference (bolded in **Table 4**). Only for "concentration" and for "test" the *p*-values are higher than 0.05, indicating that the two keywords are used in comparable proportions by students and teachers. The most frequently used word by students in describing their experience with online education was "tired" or other derivates of the word (866 times). Occasionally, fatigue was accompanied by stress, anxiety, frustration, or depression. Some students described the online lessons as boring (284 appearances), while the teachers referred to the students as being bored during online activities. When analyzing the frequency of words used, the students were more preoccupied by the webcam debate compared to the teachers. Students also referred more to "stress," "fatigue," "anxiety," "bored/boredom," and "grades." One of the words that teachers used more frequently than students was "learning" or its derivates, as the teachers invoked their personal learning process in the online context and described how they adapted to the new educational format. Teachers also invoked "adaptation" significantly more often than students.

Through qualitative content analysis, we identify two perspectives on Students' changes in well-being, as described by the students themselves. On one hand, some said that online education made them feel less stressed than previously. These students felt safe at home, were comfortable with their space and family, and some even had additional time for hobbies or

TABLE 4 | Keywords repeated in students' and teachers' testimonials.

Keywords related to well-being	No. of times the word appears in Students' testimonials (*n* = 5,372)	No. of times the word appears in teachers' testimonials (*n* = 2,354)	Chi-Square (Sig.)
Stress	**293 (6%)**	20 (1%)	89.28 (0.00)
Fatigue	**866 (16%)**	95 (4%)	219.48 (0.00)
Concentration	169 (3%)	80 (3%)	0.34 (0.56)
Anxiety	**59 (1%)**	1 (0%)	23.68 (0.00)
Bored/boring	**284 (5%)**	16 (1%)	93.01 (0.00)
Camera/ webcams	**306 (6%)**	52 (2%)	45.04 (0.00)
Test	144 (3%)	70 (3%)	0.52 (0.47)
Grades	**164 (3%)**	39 (2%)	12.47 (0.00)
Learning	338 (6%)	**317 (14%)**	108.58 (0.00)
Adaptation	192 (4%)	**335 (14%)**	292.47 (0.00)

Significant values are highlighted in bold.

preparing for national exams: "*I can say that I feel quite safe considering that I am in my room. I like that I can wake up later and dress much lighter,*" (S4324, female, 10th grade) or "*Sitting at home, I find comfort and I can say that I do not dislike this, because it does not distract me from learning, on the contrary, it is easier for me to be careful and work correctly*" (S4688, female, 9th grade).

On the other hand, other students experienced online education as marred by anxiety. Fear regarding COVID-19 was coupled with familial anxiety arising from parental unemployment or other financial problems. The shift to online schooling involved additional layers of stress: (1) there was more homework from teachers, and students felt unprepared, (2) students had to spend many hours in front of screens both for online classes and for homework: "*I don't have time to eat anything, I don't have time to get up from the office; I sit for six hours with my eyes on the screen, non-stop, in continuous stress*" (S1257, female, 11th grade), and (3) students also received more or different forms of criticism and pressure from teachers: "*I have a feeling of increased anxiety lately due to threats of low grades, evaluations, and tests, or being counted as absent due to a video camera not being turned on. I feel as if the mental and emotional health of the students is much more neglected than it was before*" (S1257, female, 11th grade). These feelings were aggravated when students did not possess appropriate digital devices and space for study, or when students had additional household duties. Students also witnessed an increased pressure from teachers for subjects that were usually considered "less important" in face-to-face activities and had not previously been a cause for concern (such as Arts, Music, Sports etc.). Students noticed that certain teachers became more conscientious, as they were being more closely monitored by school management, by the parents who could hear the lessons, and by other possible spectators who had access to a recording from the lesson.

> *I understand that you are monitored, but to start learning music when we had previously studied completely different subjects or played different games during music hours is quite unnecessary. Making us jump around the house during Sports and be on the webcam, so as not to be marked absent is even more unnecessary (S1390, female, 10th grade).*

Furthermore, some students perceived as unfair the sanctions they received for being late, having issues with internet connectivity, or for dealing with private matters during the online classes: "*There are also teachers who shout at you when you need to do something at home and you are late for classes*" (S2475, female, 10th grade). For students, teachers' reactions appear as self-serving, following a double standard: "*When they have a problem, it's normal, and when we have a problem (the internet can't cope, or it's hard for me to work on the phone and turn on my microphone) we are 'terrible'*" (S3975, female, 11th grade). The students expected teachers to be more empathetic: "*We should be a team, we should not blame them for anything, and they should not behave as if everything is the same*" (S4167, female, 10th grade) or "*it is very frustrating and annoying, especially when they ask us to be patient. We must be patient with them, but why does no one have patience with us?*" (S3918, female, 10th grade).

In certain cases, Students' motivation decreased: "*The well-being decreases, the motivation no longer exists and the classes are more and more tiring, more inefficient. The number of absences is increasing for various reasons. Information cannot be retained as easily and probably in many cases all these obstacles and feelings end in severe depression*" (S3642, female, 11th grade).

The teachers also mentioned that their well-being was affected by both the changes to learning and education and the pandemic in general. They described feeling tired and unmotivated: "*Me and the students feel tired, the eyes fill with tears, personal time no longer exists, we do not have adapted educational content*" (T543, female). "*It's getting harder and harder, we (teachers, parents, student) are more and more demotivated*" (T274, female). Moreover, a few teachers were unable to see the potentially positive outcomes of their struggles (**Table 5**).

Students and Teachers' Identity Work in Online Education

The new online learning environment has incited students and teachers to adjust their identities and reconstruct their social interactions, thus protecting or enhancing their own well-being. In order to explore how students and teachers re-created their online identities, we used Schwalbe and Mason-Schrock's (1996) concept of identity work and its dimensions. We grouped "defining" and "affirming," because we witnessed respondents' identity definitions in their attempts to affirm them, in the open survey answers. We also identified new forms of "coding" and "policing".

TABLE 5 | Overflow effects on the well-being for students and teachers.

Dimension of well-being	Opportunities for positive affect	Burdens for positive affect
Students	Feeling safe and more relaxed at home Enjoying time spent with family Autonomy in organizing their time	Anxiety Boredom Social isolation: decreased extracurricular interaction with peers Many hours spent in front of screens Lack of access to digital technologies deriving from digital inequalities Sanctions and conflicts with teachers
Teachers	Personal development: Rising to the occasion by enhancing their digital skills and creating new teaching methods	Fatigue Role conflicts generated by the superposition of working and home time and space, and by multiplication of work tasks Lack of access to digital technologies deriving from digital inequalities

With regard to *defining and affirming* their identities, students usually referred to themselves using the plural pronoun "we" and defined themselves as in opposition to the other group-teachers. Most students expressed some criticism of their teachers in the survey. These criticisms included the following aspects: (1) they (teachers) are not well prepared for online teaching as they have limited digital skills—"*Teachers should have been trained by the Ministry so that they knew how to use online platforms*" (S13, male, 11th grade); (2) they (teachers) do not respect the rules and ask students to turn on their webcams, or even buy a webcam if they do not own one—"*Even if we say that it is not mandatory to turn on webcams, no one listens to us*" (S720, female, 11th grade); (3) they (teachers) give too much homework and believe students have more free time because they are at home; (4) they (teachers) are very suspicious and believe that students are cheating or lying—; "*If they hear a sound in our room then they immediately think that we are cheating and give us a 4 (grade)*" (S483, female, 10th grade). Students also felt that their voice did not matter and that no one really cared about their experiences: "*I am a student and, even if my voice were heard, no one will take it seriously, no one takes an interest in us, we know this*" (S4266, male, 10th grade).

Therefore, students *affirmed* their shared identity as a group using two layers of complaining techniques: (1) general complaints regarding the negative effects of online education (they are anxious, tired, unmotivated, etc., as discussed previously), and (2) complaints regarding teachers' inability to adapt constructively to online education, relying on threats and sanctions rather than positive motivation.

The students *coded* their identity into social norms and strategies to adapt to the online classes. One of these norms was to adjust timetables and dressing codes, relying on the flexibility of home etiquette: "*the good part is that, from home, we can eat more consistently during breaks than we did at school and we can get dressed in classes the way we want*" (S4140, female, 9th grade). Thus, most of the students mentioned that they enjoyed waking up later than before, because they did not have to prepare for or commute to school. Some preferred participating in online classes from their beds, while others did so because they did not have the opportunity to use a desk or an adequate chair. Moreover, while eating during classes was either forbidden or discouraged in face-to-face school, some students revised this norm and appreciated the ability to eat during class time, without being seen by others. Even so, all of these norms of acceptable comfort were challenged and even eliminated if the students had to turn on their webcams.

Students also devised norms to protect their image and private space. They attempted to defend their right to decide whether or not to turn on the webcam and considered that it was stipulated by Romanian regulations[1] *"I argue with all the teachers because they cannot understand a law given by the state and forced me to buy a webcam"* (S2167, male, 12th grade). In addition, the students mostly avoided turning on their webcams if it was not in fact enforced by teachers; thus, it became the informal norm to have them off: "*And if the law says that students do NOT have the obligation to keep the webcam on, teachers should understand that as well*" (S3965, female, 9th grade).

Furthermore, students *policed* their collective identity by formulating it in contrast and conflict with teachers: "*It irritates me that, sometimes, when some of my colleagues don't even have internet connection, electricity or the possibility to turn on the webcam, the teachers are intolerant, they make us liars, saying that these are just excuses for not attending classes*" (S264, female, 12th grade). Consequently, they also attempted to create some form of sanctions, whether formal or informal, for the teachers: "*A change could come also from the teachers, because if they would not act as if they were superior and as if we were robots, maybe our respect for them would come naturally and we would learn even in a time like this*" (S4583, female, 10th grade). At the group level, the decision to not turn on webcams acquired the secondary significance of a method for punishing teachers. Other forms of sanctions included limited participation and displaying a lack of motivation to learn: "*We are sometimes punished if we do not turn on the camera, which sometimes makes us act against the teacher and pay less attention*" (S2457, female, 9th grade). In contrast to Students' collective voice, the teachers usually *defined* their experiences with online education at an individual level, as they mostly felt alone in the process of adapting to online teaching. Teachers were affected by the reduction of meaningful interaction with their peers and students: *"I miss the physical presence of my students; I miss communicating with them and with my colleagues; I miss my Students' smiles*" (T293, female). Thus, teachers' well-being was influenced by the Students' refusal to turn on their webcams; indicating that it made them feel as though they were talking to no one and kept them from receiving feedback in real time: *"It's sad to talk to a class of students without seeing them"* (T12, female). Regardless, teachers

[1]According to the Ministry of Education, the students *"have the obligation to participate in activities carried out through technology and the Internet; otherwise, the student is considered absent and the absence is recorded in the catalog, except for in justified situations*" (Ministry of Education, 2020b). The formal norms do not mention if it is mandatory for students to have the webcam turned on in order to be counted as present in class.

expressed satisfaction with their personal progress in terms of their digital skills and capacities to teach online—"*I improved my digital skills both by participating in courses and individually; I discovered and created various materials that I use in online teaching*" (T2191, female).

The social norms and practices *coded* during online teaching varied between teachers ("*Many educational materials created by me, a lot of visual support and attention-grabbing/holding exercises*" (T26, female); "*I learn together with my students, we support each other in the instructive-educational process, discussions and debates, videos, worksheets on various platforms*" (T1213, female). The teachers constantly expressed concern for students who could not attend online classes due to a lack of access to devices, limited internet connectivity, lack of an appropriate space for learning, or other duties in the home. One of the norms the teachers adopted involved supporting these children in obtaining tablets or internet connections or giving them materials and exercises that could be done on paper without attending classes. The teachers were preoccupied with finding innovative teaching methods in order to help the students feel motivated. Even though some of the teachers were satisfied with the feedback they received from the students, others complained about their lack of response.

> *I found that the Students' motivation decreased despite the fact that I tried hard to come up with all kinds of interactive materials and make them feel less apathetic. They just want to be left alone. They don't turn on their cameras, I don't see them, I literally don't know what they are doing behind the monitor. I have no way of knowing if any of them need more support or if they are going through a difficult period. Sometimes I feel like I am talking to the wall (T1139, female).*

With regard to *policing*, teachers affirmed their group identity in relation to two categories of actors: (1) students and parents, who were portrayed as detached and uninvolved; and (2) the local, county, and national administration, who were perceived as making schooling more difficult through excessive bureaucracy and confusion. In several instances, teachers expressed the fact that "good" students continued to study, actively participate in classes, and do their homework, while the "not so good" students increasingly neglected the educational process, taking advantage of being unseen and uncontrolled during online classes: "*I believe that the only competence developed by online education is that of a spectator. Cameras off, microphones off.... Total indifference*" (T13, female).

In other cases, the fact that students and teachers experienced issues with online education became an opportunity for them to *support* each other in identifying strategies for adaptation. For example, students helped teachers use their digital devices and specific online platforms, while teachers who were concerned about their Students' emotional health, talked to them about their feelings: "*I am glad that some teachers are very involved and want to learn, they ask us for help*" (S2981, female, 11th grade); "*some teachers ask us for our opinion and we come up with suggestions for how to conduct our classes and it is very ok when that happens because they and we still discover the 'right way' to organize ourselves*" (S199, female, 9th grade) (**Tables 5**, **6**).

Regarding their relationship with the state, teachers mostly perceived that the Ministry of Education was not meaningfully involved: "*The ministry/government does not give a damn about the situation on the spot and only sends punishments and request after request. Everyone's well-being is no longer important, only threats and fear. It would be good for them to treat us and the children as human beings*" (T1059, female). In addition, the teachers believed the Ministry and other entities overloaded them with bureaucratic tasks and were obsessed with teachers proving that they were working: "*It is much harder to prepare for these classes, and the many requirements of the Ministry of Education and the stress they cause me take away from the time I could be using to prepare more interesting materials for children. I personally work more than 10 hours a day for school. My family is neglected*" (T1016, female); "*There are health problems caused by sitting for over 6 hours a day in front of the computer + mental exhaustion + destruction of eyes + radiation of the whole body + lack of time to solve personal/family problems!*" (T2193, female). Some teachers expressed an increased mistrust toward the higher administration: "*The lessons learned during this pandemic situation were to no longer trust those who lead us (. . .) and to manage everything alone*" (T1431, female). They felt that the responsibility for facing challenges fell on them alone: "*I understand the need for online education in these moments, but they put everything in our hands! We were neither trained nor prepared for such a deployment of forces*" (T21, female).

Online education removes precious arenas for Students' identity work, including breaks and free time before and after class. These intervals allowed students to present and develop

TABLE 6 | Students' identity work—opportunities and burdens.

Students' identity work	Opportunities for maintaining and developing school-related identities	Burdens for maintaining and developing school-related identities
Defining and affirming identities	Formulating a collective "We, the Students" General complaints about negative effects of online education Complaints about teachers' inability to adapt to online education	Anxiety Boredom Exhaustion Loss of peer-to-peer and informal social spaces: school breaks, free times before and after class
Coding new norms and symbols	Embracing the advantages of online education: flexibility of the household etiquette, waking up later, comfortable dress code Protecting their image and private space	Too much homework and too many assessments The emerging norms of online education were limited when the turned-on webcam was mandatory
Policing ingroup vs. the outgroup	Creating a group identity in opposition to teachers, seen as the "other group"	Moral/informal sanctions for the teachers Blaming teachers as the "other group"

multiple, nuanced facets of their identity in relation to one another, as peers, and in relation to their teachers. With the restrictions imposed by online school, these social spaces are lost: "*you spend a lot of time socializing 'face to face,' which is impossible in the online environment*" (S1207, male, 11th grade); "*there are some aspects of physical presence at school that no matter how dedicated, prepared and benevolent teachers may be, they cannot fulfill it through online education*" (S3570, female, 9th grade). Students decry the resulting monotony and emotional void: "*We were doing stupid things, but, at least, we had fun*" (S4559, female, 6th grade).

The online design creates multiple barriers, and some pupils felt as strangers, outsiders or robots: "*I don't feel like I'm in class, I miss my colleagues, my teachers, it's like I'm in front of a wall, the screen doesn't transmit my emotion*" (S2333, female, 9th grade); "*It is difficult for us, being between four walls, alone. Sometimes it seems like the world is standing still. It's empty, deserted, sad...*" (S1096, female, 9th grade); "*I don't feel like I belong to a class*" (S3818, female, 12th grade). Some of the teachers considered, as well, that online education is somehow useful, but limited in ensuring the flows of social interaction that students and teachers need to relate to one another meaningfully: "*The day-to-day meeting of the teachers with the students outlines the character and develops their personality. Online education is a farce*" (T1254, male), "*Online learning cannot be compared to face-to-face learning*" (T1160, female).

Students' and Teachers' Presentation of Self in Online Classes: The Webcam Dilemma

In face-to-face educational activities, one cannot participate without one's entire body being present in the classroom, but participation changes meaning in online classes. The students consider participation to mean being connected to the online meeting, without necessarily turning on their webcams or microphones: *"I believe that you can show interest in the classes even if you have your webcam turned off"* (S1767, female, 9th grade); "*if they can't see me, that doesn't mean I'm not paying attention*" (S4501, female, 9th grade); "*I can learn without seeing the teachers*" (S2487, female, 9th grade).

However, teachers complain about the scarce immediate feedback from students (through non-verbal gestures), as they felt unable to evaluate whether the students needed more clarification in real time ("*I don't have visual feedback, I'm not convinced that they understood*" (T128, female); "*I teach in front of a black screen. So, zero feedback*" (T368, female); "*The Students' assessment is unsatisfactory given that most of them do not turn on the webcams and you cannot see the quick feedback of your actions*" (T2171, male); "*Unfortunately, fewer and fewer students appreciate these efforts. It is very unpleasant to teach in front of turned off webcams because you do not receive any feedback. In addition, many students stay in bed and may even fall asleep*" (T749, female) (see also Castelli and Sarvary, 2020, p. 3566). Teachers drew their energy from their interactions with the students, and without it, they felt *"alienated"* or "*like strangers*" teaching in a non-human, unreal context—"*I miss my children through their physical presence, I miss the communication relationships with the children, with my colleagues, I miss the smiles of my students*" (T293, female) (**Table 7**).

Seeing what the students were doing during online classes gave the teachers the impression of having some form of control over the students and their educational achievements: "*We have extremely low control over Students' activity, especially when webcams are turned off*," (T1211, female); "*we have no control over the students, they are distracted from activities, they are not fully involved!*" (T20, female). The webcam debate also involves trust and the lack thereof. Teachers did not trust the students to own their educational process behind blank screens and instead suspected them of not paying attention or engaging in other activities. Occasionally, the students appeared to confirm these expectations, from teachers' perspectives, by insisting on not turning on their webcams. On the other side of the digital barricade, interpretations differed and reactivity influenced behavior. Even the students who did not mind using their cameras said they decided not to do it because of the teachers' obsession with sanctioning them if they were turned off: "*In general, I voluntarily turn on my webcam because it seems like common sense, but when it is made obligatory, I become reluctant, develop an issue with the teacher, and lose interest in the class*" (S3089, female, 11th grade).

Furthermore, due to teachers' mistrust, the assessments and grading in the online learning environment became a challenge for both parties. The teachers attempted to identify secure evaluation methods, to ensure that students would not cheat. For example, the students complained about 10-min tests that are impossible to be solved, while teachers limited the time with the aim of diminishing the possibilities of cheating: "*Scoring is unfair. We receive artificial grades (maybe even lower than we deserve) or we have unfeasible tests in terms of time (4 minutes for 10 questions of medium to high difficulty, not having time to read all the questions)*" (S3603, female, 11th grade). Students also denounced situations where teachers asked the students to close their eyes and put their hands behind their backs to

TABLE 7 | Teachers' identity work—opportunities and burdens.

Teachers' identity work	Opportunities for maintaining and developing school-related identities	Burdens for maintaining and developing school-related identities
Defining and affirming identities	Care for students Autonomy in organizing classes Enhancing their digital skills	Scarce opportunities for sharing their individual experiences Feeling alone in the process Neglecting their personal and family priorities
Coding new norms and symbols	Reorganization of teaching, homework, and assessments Receiving help from the students	Difficulties in developing digital skills and teaching methods
Policing ingroup vs. the outgroup	More focused on Students' potential and results Engaged in finding solutions for disadvantaged students	Unsatisfied with the formal regulations from local and central authorities Complaints about Students' and parents' detached attitude

ensure students were not using additional materials to answer questions: "*torturing students with listening with their hands behind their backs is not a solution, I believe that we have passed the communist era for some years and we should be evaluated differently, through teamwork projects and not encouraging 'grades hunters"'* (S3183, female, 10th grade). A few of the students believed that teachers need to focus on innovative teaching methods rather than expecting the students to reproduce the lesson verbatim: "*If the student wants to cheat, he will, most likely, find solutions and it is useless to waste your energy catching students who have not learned instead of focusing on teaching in a way that is as interactive and practical as possible*" (S2563, female, 11th grade). The grading and cheating issue is not new, but it became a more stringent aspect in online education, and it is linked with the teaching methods used therein. According to the students, the teachers should have identified more innovative teaching and grading methods and given up the memory tests with an increased focus on debates, team projects, and interactive evaluation: "*The Romanian school has not evolved at all in the last 20 years. The big problem of Romanian education is the mentality of teachers, who do not value the Students' knowledge, but their ability to memorize information*" (S3965, female, 9th grade). On the other hand, the teachers found it very difficult to assess the Students' learning progress in an online environment: "*The evaluation is almost impossible to do in the classic way. Online tests are very easy to fool. A student in the class solves the test and sends them to everyone in the class*" (T148, male). The teachers mentioned they had fewer possibilities for sanctioning the students who did not learn because the school administration and the Ministry of Education promoted the idea of being more indulgent with the students due to the difficult times they were undergoing: "*The trend is toward hyper protection for the students, not to give them (anymore)*" (T1988, male). According to the teachers' accounts, the parents also participate in their children presentation of scholarly selves by, for example, whispering the correct answers into the children's ears—"*Unfortunately, some parents intervene and whisper answers to students, believing that this helps them*" (T89, female); "*the only thing that bothers me in teaching online is the fact that some parents do not understand to sit at the back and not to whisper*" (T166, female).

Some of the students believed that turning on their cameras would allow others (classmates and teachers) into their private space, which would contribute to enhanced anxiety: "*I don't feel comfortable at all; I'm forced to turn on the webcam when it's not necessary to do so. I'm stressed all the time; I can't concentrate at all,*" (S779, female, 11th grade); "*I don't feel well at all. I'm an anxious person and I don't feel good in front of the camera. I feel watched and judged for my imperfections and other things*" (S2020, male, 10th grade). This concern was fueled by international reports (UNICEF, 2020) and personal experiences of students who were bullied by their classmates, who took pictures of them and then distributed them on different social media channels: "*Many students do not turn on their webcams because they are afraid that some of their classmates will take screenshots of them, and unfortunately, even if it is illegal, this often happens*," (S3878, female, 10th grade); "*the presence of other people during the lessons is a disturbing and dangerous factor, because some students may be ridiculed for their behavior or opinions*" (T89, female).

The students felt that the rest of the class was staring at their walls or at some other person behind them: "*I will never understand this necessity of opening the camera; a student can pay attention and be involved even without the teacher seeing his walls, his little brother coming into the room, or the cat walking on the desk*" (S4, female, 11th grade). When the webcams were on, the students could not control their appearances and could be labeled and judged by the spectators (students and teachers): "*All I feel is a constant fear that I will do something wrong or do something that will make the others laugh at me*" (S4501, female, 9th grade). One of the students said that she wanted to go back to school where *"my mother does not enter and call me to eat and my brother does not sleep in the same room*" (S1574, male, 9th grade).

Furthermore, the students were occasionally reprimanded by the teachers for the noise in their rooms, eating, or someone else talking in the room. There is some dissonance regarding teachers' expectations from the students in this regard: teachers wanted students to turn on their webcams, but they did not want the lesson to be disturbed by what was happening in Students' houses. The interactional frictions of online learning meant that the social distance between students and teachers often increased due to the lack of trust and mutual understanding (**Table 8**).

The teachers also feared their private lives appearing online, but, at least in our survey data, they mentioned it less than the students: "*I have difficulties due to the lack of a high-performance computer/laptop on which to design my lessons for my students, I am a single mother with 2 children, I did not receive any help, space is also a problem, I pay rent. I don't have time to help my children, the workload is very high*" (T2114, female); "*I lock myself*

TABLE 8 | Students and teachers' presentation of self and the webcam dilemma.

Presentation of self and the webcam dilemma	Opportunities for a competent presentation of self	Burdens for a competent presentation of self
Students	Autonomy in controlling their presentation of self by restricting general visibility, the information that they give off involuntarily and the intrusion of backstage elements in the front stage of school interaction	Overlapping of public and private stages of interaction Lack of an appropriate, isolated space for learning Professors' suspicions of dishonest behavior and coercive strategies The risk of being bullied by colleagues and intruders
Teachers	New teaching and assessment methods	Lack of control over the classroom Lack of feedback from the students Degradation of the emotional richness of interacting with students; feeling alone and abandoned by students Suspicion of Students' dishonesty or disengagement

in a bedroom while the grandmother stays with the children, but there are background noises and small disturbances" (T63, female). Further, there were situations in which teachers felt the intrusion of the school management during online classes: "*Laws are given, but interpreted at the discretion of the school principal who enters abusively, without prior notice at the online classes. It is chaos and only creates inconvenience!*" (T1063, female); "*For teachers no one did anything! Instead, now, the school principals and / or inspectors have started to enter our online classes on the grounds that they are 'monitoring us'!*" (T1830, female).

DISCUSSION

The sudden shift to online learning has disrupted the typical interaction situations in face-to-face education. The resulting anomie led to friction, relaxation, and innovation for both students and teachers. The impact on well-being has thus been heterogeneous and affected by systematic sources of inequality. Our results converge with previous research, documenting overflow effects from working and studying at home, disruption of student and teacher identities, and changes in tactics and resources available for a successful presentation of self. Our study also highlights the importance of collective identity work and the role of student-teacher asymmetries.

The teacher/student relationship is defined by both collaboration and subordination, by converging but also diverging interests, thereby resulting in a combination of supporting and conflicting interactions. *The sudden transition to digital settings has upended the relatively stable, established patterns of collaboration and adversity created in face-to-face education situations*. According to our analysis, professors and students have both lost and gained in terms of their methods of influencing their counterparts. The identities associated with the roles of professor and student have become open for re-negotiation and re-definition, with novel patterns of individualization and relationships, alliances, and community-building.

The presentation of self in online learning situations was a specific focus of this paper because of its relevance to the emotional valence of learning encounters. *Online classes have brought about new means of controlling one's presentation of self and to express oneself, while also disrupting previously employed tactics and resources*. In any interaction, participants make efforts to pursue a favorable definition of the situation and avoid interactional trouble, such as being embarrassed or giving out information that conflicts with their desired identity. Interactional trouble can be very stressful for participants, and the individual ability to control one's presentation of oneself and to handle negative events is highly variable. Consequently, there has been a systematic increase in uncertainty and in opportunities for both success and failure in controlling presentations of self. For some individuals, this change has amplified anxiety, fatigue, and stress, all of which have negative consequences on overall well-being. Conversely, others have experienced this transformation as an increase in autonomy, social relaxation, and time flexibility, leading to an enhancement in well-being. However, there are mixed scenarios as well. Personality traits and contextual factor, including the human, family, community, and technological resources available to students and teacher, have made the difference in their ability to cope with this disruption and transform it into a positive, rather than negative, subjective experience.

Examining identity work and the presentation of self also reveals how the impact of online learning was very much a *collective* result. Individual experiences depend on the joint, coordinated *classroom* performance when it comes to re-defining identities and managing failures and deviance. The *household* of an individual (whether teacher or student) also plays an important role in making room and time for online learning, which leads to either a stressful or a favorable learning and teaching atmosphere.

For certain people, the home remained a backstage, which could not be exposed without risking humiliation, while for others the home became a convenient front for learning performances, offering more comfort and reduced time costs than in-person school. There is an *asymmetry*: *students appreciated the freedom of low visibility more than teachers*, who systematically decried the lack of feedback and human connection. Still, *both students and teachers resented the alienation* brought about by the reduction of interactions to formal, classroom activities, as breaks and other informal situations vanished from the online version of the school.

There are *other asymmetries between students and teachers that amplified anomie, conflict and negative emotions in the classroom*. There is only one teacher for many students, with classrooms often enrolling more than 30 pupils. Teachers have formal authority, yet they can be overwhelmed by Students' diverse aims, tactics, and resources. Any solution fit-for-all to the challenges raised by the sudden digitalization of learning leads to mismatches and discontents. Professors' authority has also been eroded by their effort to keep up with technology, with pupils often displaying more tech savvy, the need to placate numerous administrative requirements, and the officially mandated relaxation of standards for student assessment.

It is also notable *what is absent from Students' accounts*. For example, there is no awareness of an increased fragmentation of attention caused by multitasking in the digital space, documented in studies of online learning (Ettinger and Cohen, 2020; Bruineberg and Fabry, 2021; Clinton-Lisell, 2021). Students do not register the abundance of digital stimuli as a loss of an opportunity for focus. While they do appreciate that *less* visibility and supervision is *more* freedom, they do not appreciate that *more* digital stimuli may, in fact, lead to *less* freedom in orienting their attention.

Another notably absent from our data concerns the *hidden benefits brought by opportunistic deviant behaviors for students and teachers*, enabled by the disruptive transition to digital learning. In both groups, there was opportunity for minimizing effort, missing classes, and cutting corners, as documented in journalistic investigations (Miron, 2021). These mutually accepted forms of deviance from formal requirements are not reflected in participants' own accounts and evaluations of this period.

This first instance of massive digital education was affected by participants' lack of preparation, with uncertain expectations, and rules that were missing, conflicting or frequently changing. A future recourse to online school will benefit from a better institutionalization and improved equipment and infrastructure but will inherit participants' fatigue and negative expectations. It is possible that persistent, systematic inequalities will become more pronounced as regards educational experiences and learning outcomes, as all participants have had time to adjust and use the uneven resources at their disposal to better accommodate this disruptive situation.

Overall, our study on online learning and its influence on subjective well-being points toward *ambivalent and heterogeneous influences of online school on well-being*, through generalized overflow effects and through failed or successful identity work and presentation of self. Depending on their individual and collective results in managing this sudden leap in the digital space, both students and teachers experienced various types and degrees of enhancement or degradation of their well-being. "Identity work" (Schwalbe and Mason-Schrock, 1996) and the "presentation of self" (Goffman, 1956) have proven to be useful sensitizing concepts for understanding the controversies related to online learning and, specifically, the use of webcams, and for mapping the Students' and teachers' stakes.

STUDY LIMITATIONS

This article is based on an exploratory, qualitative analysis of an availability-based subsample of students and teachers. Our qualitative approach was appropriate for identifying multiple and conflicting influences of overflow effects, digital identity work, and presentation of self on teachers' and Students' well-being. Through a comparative approach, we could highlight both congruent and contrasting perspectives. Although it is quite large, our sample is not representative of the entire Romanian student and teacher population. A quantitative analysis on a representative sample would add valuable information on dominant tendencies, main sources of variability, and the social stratification of well-being. Moreover, our subsample under-represents certain voices and experiences, such as respondents from rural areas, boys and male teachers, and primary school pupils and teachers. Further research should also discuss how the well-being of minority and other disadvantaged groups, including participants from poor households and pupils and teachers in schools from Roma neighborhoods, was affected during online education.

Another limitation of the study is that it does not include a quantitative content analysis of testimonies, as our approach was exploratory and in-depth, aiming to capture the nuances of the three processes of interest. In our future work we plan to use content analysis software, such as Alcete or Iramuteq, to conduct quantitative analysis, to compare relative frequencies of relevant keywords and to establish distinctive, typical profiles of concerns for students and teachers, respectively.

Students' and teachers' answers included a considerable number of positive evaluations and intimate stories and feelings. Even so, another limitation of the study might derive from a possible over-representation of the negative and more policy-amenable aspects of online education. Participants' answers were spontaneous and brief, elicited by a survey with possible policy impact. Therefore, it is plausible that students and teachers focused on criticisms and problems that could be addressed by authorities, rather than experiences with a higher personal relevance.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

AH and CR designed the study, reviewed the literature, and analyzed the data. RR and DR offered key technical support and analyzed the data. All authors contributed to the article and approved the submitted version.

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ANNEX

Questionnaire for Teachers

1. To what extent are you comfortable with delivering online classes?
   - To very large extent
   - To large extent
   - To moderate extent
   - To low extent
   - To very low extent
   - No extent
2. How did the quality of education change in 2020–2021 school year compared to the previous one?
   - It has increased
   - It has decreased
   - It has not changed
3. What do you need for increasing the quality of online classes?
   - High-performance personal computer /laptop
   - Adequate working space at home
   - Good internet connection
   - Educational content adapted to online context
   - Motivated students
   - Other
   - Nothing
4. How do you organize the online classes?
   - I organize all lessons according to the timetable
   - I organize part of the lessons using video platforms and for the rest I send individual worksheets
   - I only send individual worksheets for students
   - Other
5. What do you think is the main role you have in the online education system?
   - To facilitate education
   - To deliver information
   - To emotionally support the students
   - Other
6. What methods do you use for teaching in the online educational system?
   - Lectures and exercises
   - Discussions and debates
   - Watching audio-video materials
   - Other
7. To what extent do you succeed in adapting the educational content and teaching approaches to the Students' needs?
   - To very large extent
   - To large extent
   - To moderate extent
   - To low extent
   - To very low extent
   - No extent
8. To what extent will you continue to use digital methods and tools when schools will reopen for face-to-face activities?
   - To very large extent
   - To large extent
   - To moderate extent
   - To low extent
   - To very low extent
   - No extent
9. Please, briefly describe your experience with online education.

The questions were adapted for the students keeping the same meaning of the questions. One new question was added for the students:
How would you describe online classes?

- Interactive
- Relaxing

- Boring
- Useless
- Other

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What Matters in Online Education: Exploring the Impacts of Instructional Interactions on Learning Outcomes

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Instructional interactions, which includes student–student interaction (SS), student–teacher interaction (ST), and student–content interaction (SC), are crucial factors affecting the learning outcomes in online education. The current study aims to explore the effects of instructional interactions on individuals' learning outcomes (i.e., academic performance and learning satisfaction) based on the Interactive Equivalence Theory by conducting two empirical studies. In Study 1, we explored the direct relationships between instructional interactions and learning outcomes. A quasi-experimental design was used to manipulate the two groups of subjects ($n_1 = 192$; $n_2 = 195$), and the results show that not all of the three types of interaction can significantly positively predict learning satisfaction, among which ST cannot significantly predict learning satisfaction. When the total amount of instructional interactions is constant, adjusting the relative level of the three types of instructional interactions can effectively improve the learning outcomes to some extent. We further probed into the mediating effects of task value and self-regulated learning on the relationships between instructional interactions and learning outcomes in Study 2. We conducted an online survey and collected 374 valid data. The results showed that task values mediated the relationship between SS and learning satisfaction. In addition, SC can not only directly affect learning satisfaction, but also affect it through task value and self-regulated learning respectively, or *via* chain mediations of both task value and self-regulated learning. Our findings enrich the previous instructional interactions research and provide reference for online education curriculum design.

Keywords: instructional interactions, learning outcomes, task value, self-regulated learning, Interactive Equivalence Theory

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INTRODUCTION

The number of online learning users has exploded during the COVID-19 pandemic (Nikou and Maslov, 2021), with face-to-face instruction being replaced by online instruction (Dong et al., 2020; Velle et al., 2020). According to the statistics of China Internet Network Information Center (CNNIC), by June 2020, the number of online education subscribers in China had reached 381

million, accounting for 40.5% of the total number of Internet users (China Internet Network Information Center (CNNIC), 2020). Online learning, also known as e-learning (Ray et al., 2021) and distance education (Devkota, 2021), is a kind of education pattern which exploits internet and information technology. In this educational pattern, mutual interactions, timely communication, independent learning and resource optimization are the exceeding vital teaching organization activities (Xie and Zhang, 2004). Instructional interactions are processes of interaction and communication between students and learning environment in the teaching process that helps achieve learning objectives (Wang, 2016). Instructional interactions are the primary factor influencing learning outcomes in online education (Mary and Xiao, 2014), and are crucial to improving learning support services (Yang and Mo, 2010).

Although a body of previous studies focused on the direct relationships between instructional interactions and learning outcomes, few existing studies have paid attention to the allocation of classroom instructional interactions resources, and the internal mechanism of the above direct relationships. In fact, online resources are so limited that it's impossible to increase the variety of instruction indefinitely, especially during the pandemic (Mbydzenyuy and Silungwe, 2020). Issues about maximizing learning outcomes with limited resources need to be considered. Moreover, there exists inconsistent research conclusions about the direct relationships between instructional interactions and learning outcomes (Thurmond and Wambach, 2004; Bray et al., 2008; Sher, 2009; Kuo et al., 2013). Few researchers have explained this phenomenon. Even though it is speculated that there may be cognitive mechanisms involved in this direct relationship (Thorpe and Godwin, 2006), it has not been tested empirically. Therefore, this study intends to explore the optimization design of instructional interactions in online learning environment and the internal mechanisms of the relationships between instructional interactions and learning outcomes.

LITERATURE REVIEW

Instructional Interactions

The classical categories of instructional interactions contain student–student interaction (i.e., SS), student–teacher interaction (i.e., ST) and student–content interaction (i.e., SC) (Moore, 1989; Wang, 2016). SS refers to the process in which learners exchange knowledge, ideas or views on course content regardless of the presence of teachers; ST refers to the two-way communication between teachers and learners in the course of learning; SC refers to the process in which learners themselves explain and reflect on the learning topic or content. SS and ST are collectively known as interpersonal interaction (Thorpe and Godwin, 2006). Moore holds that all three types of instructional interactions are indispensable to ensure the success of online education, and the overall level of instructional interactions need to be constantly improved to ensure the maximum level of each type of instructional interactions (Bernard et al., 2009).

Anderson (2003) holds different views on the configuration of the types and quantities of instructional interactions in the course. They found that there are equivalent substitutions among the three types of instructional interactions in the process of affecting learning outcomes. The Interactive Equivalence Theory are therefore put forward. The core ideas of the theory are as follows: (1) As long as the level of one of instructional interactions is very high, it is enough to produce profound and meaningful learning, while the other two could be offered minimally, or even eliminated without degrading the teaching experience; (2) Even if the overall level of instructional interaction is not high and the amount of time and energy spent is not much, when more than one type of instructional interactions is high, it is likely to bring a more satisfying educational experience than those online education that takes more time and energy. That is, instructors can design only one or two kinds of instructional interactions by analyzing the needs of students in a specific learning environment, which can reduce teaching cost and improve flexibility on the premise of hardly losing teaching efficiency.

Likewise, Bernard et al. (2009) discovered that although higher and middle levels improved learning outcomes more than lower levels when considering the total level of instructional interaction, it did not mean that increasing any one kind of instructional interaction can improve learning outcomes. Instead, only increasing SC can the effect value of instructional interactions on learning outcomes be significantly increased. Some researchers also affirmed that SS or ST is not a necessary part of teaching. Instructional designs combined with "SS and SC" or "ST and SC" are better than the one combined with three instructional interactions (Bernard et al., 2009; Miyazoe and Anderson, 2012).

If equivalent substitution exists, appropriate instructional design can make a small number of instructional interactions achieve better learning outcomes. However, to date, a vast number of researches focus on how to improve the number of instructional interactions, ignoring the limited resources of learning resources. Therefore, it is necessary to pay attention to the maximize utilization of limited resources. We thus hypothesized: (H1) When the total amount of instructional interaction is constant, alterations in the relative level of SS, ST, and SC will lead to significantly different learning outcomes.

Learning Outcomes

The measurement indexes of online learning outcomes mainly include academic performance, learning satisfaction, continuous learning behavior or willingness (Ding and Wu, 2005). Previous studies have always regarded academic achievement as the representative of learning outcome in general (Joksimovic et al., 2015; Sucipto et al., 2017; Nabizadeh et al., 2019; Amer, 2020). Academic performance is an objective quantitative indicator of learning outcomes (Krchner et al., 2021), which represents the achievement of teaching objectives and students' mastery of knowledge. It is worth noting that academic performance should consider not only students' examination performance but also their usual performance, such as learning enthusiasm, creativity

and teamwork ability (Zhang, 2011). For example, Beldarrain (2008) defined the academic performance of online learning as the accumulated performance after learning at least 50% of the content of a course, including two module exams and additional course activities.

Unlike the popular use of academic performance in evaluating individuals' learning outcomes, affective variables are overlooked. Learning satisfaction is a quantitative indicator of students' overall satisfaction with online learning needs (Yang et al., 2014). Wan et al. (2017) proposed that user satisfaction should be taken as the key points of distance education resource administration given that it is key reference standard for online education service quality and learning outcomes. Understanding students' learning satisfaction is conducive to improving online education service quality and improving teaching quality evaluation system (Zeng et al., 2016; Jiang et al., 2021). A large number of studies have consistently agreed that learning satisfaction can positively and significantly predict continuous learning behavior or willingness (Angelova and Zekiri, 2011; Faize and Nawaz, 2020). It is representative to measure the affective cognition index of online learning by learning satisfaction (Faize and Nawaz, 2020; Jiang et al., 2021). Therefore, this study selects indicators of learning satisfaction and academic performance to measure learning outcomes subjectively and objectively.

The Impacts of Instructional Interactions on Learning Outcomes

The principle of interactive determinism in the Social Learning Theory conceives that the study of learning should not ignore the influence of social variables on human behaviors, thus emphasizing the role of observational learning, indirect experience and role models (Bandura, 1978). The indirect experience acquired by the learners through observing the behaviors of their peers or teachers in the learning process can play a role of substitute reinforcement for the learners, and thus facilitating their acquisition of corresponding behaviors.

The process of interpersonal interaction during online learning allows learners to have more opportunities to observe and learn, obtain indirect experience and find learning models, which has a certain impact on the satisfaction of students' learning expectations. If the degree of interpersonal interaction (i.e., SS and ST) does not meet expectations, students will be hindered in their learning process, feeling isolated psychologically, weakening their interest in learning, and thus causing dissatisfaction (Kuo et al., 2013, 2014). In addition, the online education's "separation" of time and space characteristics make direct experience for big discounts. Students are more likely to observe and learn by browsing the content on the platform, which leading to the learning quality depending largely on the interaction level between students and the platform content. The effective interaction content design can reduce network losses, improve learning satisfaction and academic performance (Xiao, 2017). Therefore, we propose that: (H2) Instructional interactions (SS, ST, and SC) can significantly positively predict learning outcomes.

The Mediating Role of Task Value

The motivation of an individual to complete a certain task is determined by his/her expectation of the possibility of success of the task and the subjective value given to the task (Eccles and Harold, 1991). In online courses, the more likely students are to achieve their goals and the more value they will gain from the course, the more motivated they will be to complete the course tasks. Task value refers to students' perception of the importance, interestingness, meaning of helping others, practical value and cost of course tasks (Eccles and Harold, 1991; Qi and Fang, 2005; Gong et al., 2016).

Task value plays a key role in the success of learning outcomes. When the task value of online courses is assessed as high level by students, they will tend to give higher overall evaluation and have more satisfactory experience (Lei et al., 2017). In other words, learning satisfaction will increase when individuals perceive the value certain things brings to them to meet expectations (Johnson et al., 2014). Furthermore, task value is determined by the characteristics of the course task itself and the needs of the learners themselves (Qi and Fang, 2005). Given task characteristics and individual needs will change correspondingly due to the intervention of external environment, task value perceived by individuals is not invariable. A tracking study shows that students' task value and self-efficacy can be changed with external effects (Johnson et al., 2014). Instructional interactions in online education are external stimulus provided to learners. When these stimuli act on individuals, they can arouse feelings of course value perception, such as interest and rewards. Through assimilation and compliance, this value perception can promote the creation of a high level of learning satisfaction experience (Sun and Li, 2011). In short, this study proposes that: (H3) Learners' task value perception can play a mediating role between instructional interactions and learning outcomes.

The Mediating Role of Self-Regulated Learning

Initial proposed in the Social Learning Theory (Bandura, 1978), self-regulated learning is further defined by Zimmerman (1989) as the process in which learners actively manage, promote and participate in their own learning activities in terms of metacognition, motivation and behavior. Based on the interactive determinism principle in the Social Learning Theory (Bandura, 1978), students' self-regulated learning will be affected by social and physical environment (Sun and Li, 2011).

Instructional interactions can promote information exchange between learners and teaching elements, such as teachers, classmates and learning resources, which guide learners to constantly adjust their learning according to their own cognitive structure. In the online education environment, the communication and cooperation between students, classmates and teachers are conducive to solve curriculum problems, stimulate students' learning motivation, and promote the autonomy of learning. The interaction between students and contents gives students autonomy in mastering learning progress. If students can control and adjust their learning autonomously in a planned way during the learning process, the possibility

of success in online learning will be greater (Dai, 2013), thus improving their learning satisfaction. Some researchers have confirmed that students' self-regulated learning plays a mediating role in the relationship between academic orientation and learning outcomes (Duan and Zhang, 2010). Therefore, this study proposes that (H4): self-regulated learning may play a mediating role between instructional interactions and learning outcomes.

In addition, since the more value students gain from the course, the more motivated they will be to complete the course tasks (Eccles and Harold, 1991), high-value tasks can make individuals get more rewards after completing the course, which stimulates students' learning motivation, and induces students' autonomous learning behavior (Qi and Fang, 2005). The higher the perceived task value of students in online courses, the more likely they are to show more self-regulated learning (Freeze et al., 2010). Therefore, this study further proposes that (H5): instructional interactions may also affect learning outcomes through the chain mediation of both task value and self-regulated learning.

The Present Study

To test our theoretical hypotheses, we are aimed to conduct two empirical studies. In Study 1, we adopt a quasi-experimental study to examine the direct relationships between instructional interactions and learning outcomes. Once the direct relationships are confirmed in Study 1, we would further explore the internal mechanisms underlying the direct relationships by conducting an online survey In Study 2.

Specifically, we expect the following relationships (H2–H5 can be seen in **Figure 1**): Learning outcomes can be effectively improved by adjusting the relative level of SS, ST, and SC as required (H1); and three types of instructional interaction can positively predict learning outcomes (H2a–H2c). In addition, instructional interaction can affect learning outcomes through the simple mediating effect of task value (H3a–H3c), self-regulated learning (H4a–H4c) and the chain mediating effect of "task value → self-regulated learning" (H5a–H5c).

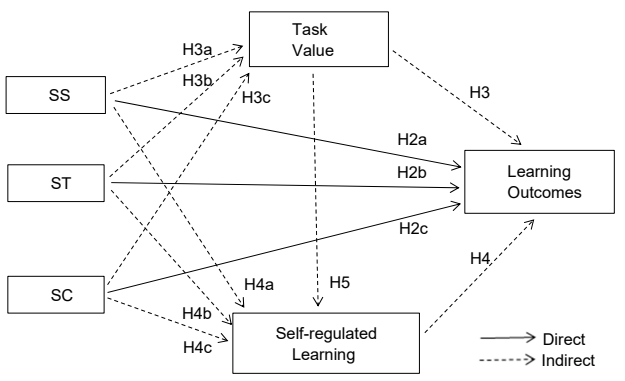

FIGURE 1 | Conceptual model. SS, student–student interaction; ST, student–teacher interaction; SC, student–content interaction. Similarly hereinafter.

STUDY 1

A quasi-experimental study was carried out to examine the direct relationships between instructional interactions and learning outcomes. We manipulated instructional interactions (i.e., total instructional interaction, SS, ST, SC) between two online classrooms by referring to the Interaction Equivalence Theory. Academic performance and learning satisfaction were devoted to measure the learning outcomes. Then the differences of students' learning outcomes under two instructional interaction designs were investigated, as well as the relationship between instructional interactions and learning outcomes.

Method

Participants and Procedure

The students who chosen online course of General Psychology in a university in Hubei, China, were randomly divided into two classes (i.e., Class 1 and Class 2). We collected 401 subjects' data in the two classes, and a total of 387 valid subjects were retained, with 192 from Class 1 and 195 from Class 2. The age distribution of the subjects ranged from 18 to 23 years old ($M = 20.15$, $SD = \pm 1.02$). In total, 86% of the subjects mastered the basic computer operation.

Participants were randomly divided into two classes, who shared the same course content and same tutors. The instructional interactions levels were manipulated by designing teaching. After the course was conducted for a period of time, we took questionnaires to measure the instructional interactions level and learning outcomes in different classes. The independent variables of this study were the level of three kinds of instructional interactions between two classes. Class 1 paid more attention to interpersonal interaction (SS and ST), such as participating in the discussion of questions raised by peers in the discussion forum, asking and answering teachers' questions through emails and discussion forums, etc. Class 2 pays more attention to the interaction between students and the learning content (SC), for example, more students are required to read texts or watch videos in the course task description.

In addition, in order to ensure that the field teaching experiment complies with psychological ethics and on the premise of achieving the research purpose, the developmental differences brought by the experimental operation to different classes of subjects should be reduced as much as possible. When manipulating the number of different kinds of instructional interactions, the total number of instructional interactions in the two classes is as consistent as possible. Moreover, we make course schedule, curriculum content, time, teachers, exam content, and goals consistent. To avoid the impress of proactive inhibition, course selection was restricted in the course elective system, students in the two classes had neither attended the courses offered by the relevant teachers nor studies the general courses of psychology in advance in order to ensure the objectivity and fairness of the academic performance, the teacher and teaching assistant will mark the grades separately in the evaluation of ordinary grades and exam scores. If the difference between the scores of the two raters is more than 10 points, the scores will

TABLE 1 | Factor loading of each item of instructional interactions.

Item	Factor loading		
	Factor 1	Factor 2	Factor 3
SS1	0.811		
SS3	0.806		
SS2	0.795		
SS5	0.789		
SS4	0.781		
SS6	0.557		
SC2		0.901	
SC3		0.835	
SC1		0.709	
SC4		0.462	
ST7			−0.803
ST4			−0.700
ST5			−0.697
ST6			−0.518

SS, student–student interaction; ST, student–teacher interaction; SC, student–content interaction. Similarly hereinafter.

be invalid and the scores will be graded again. The average valid scores given by the two raters will be recorded as the students' grades.

Measures

Instructional Interactions

This scale includes 19 items to measure three dimensions: SS (eight items), ST (seven items), and SC (four items) (Kuo et al., 2013, 2014). Each item was scored by five-points Likert-type (from 1 "very inconsistent" to 5 "very consistent"). The higher the score, the more interaction in learning. After item analysis and exploratory factor analysis, five questions with ambiguity, no significant difference between high group and low group, total correlation too large (>0.8) or too small (<0.3), and factor load less than 0.3 were deleted. Finally, a 14-item instructional interaction scale with three dimensions was obtained (see **Table 1**), which can explain 66.48% of variance. The scale has high reliability and validity: Cronbach's α coefficient is 0.91; Confirmatory factor analysis showed that the three dimensions were well fitted ($\chi^2/df = 2.29$, RMSEA = 0.16, SRMR = 0.06, CFI = 0.92, TLI = 0.90) (see **Figure 2**).

Learning Satisfaction

The seven-item was adapted from the scales developed by Kuo et al. (2014) and Gong et al. (2016). Five-points Likert-type were used for each item (from 1 "very inconsistent" to 5 "very consistent"). The higher the score, the higher the learner's satisfaction with online education. After conducting item analysis, two questions with a total correlation greater than 0.8 were deleted, thus resulting good reliability and validity. Factor loads of items ranged from 0.65 to 0.87, and the explanatory rate of measure variance was 68.20%. Confirmatory factor analysis showed that the three dimensions were well fitted ($\chi^2/df = 2.20$, RMSEA = 0.06, SRMR = 0.02, CFI = 0.99, TLI = 0.98). The Cronbach's α coefficient of this questionnaire was 0.88.

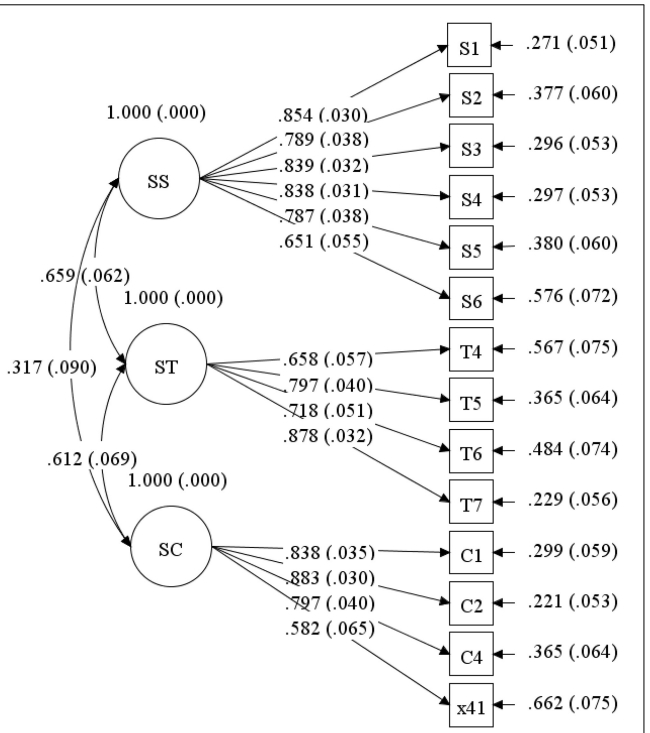

FIGURE 2 | Confirmatory factor analysis (CFA) of instructional interactions.

Academic Performance

The index of academic achievement consists of usual performance and examination performance: usual performance throughout the course is based on the length of students' online learning, online tests, frequency and quality of discussions, group collaboration and so on; Examination performance is mainly based on the recognition and reproduction of memorized knowledge in the test paper; Academic performance = 0.7 × usual performance + 0.3 × examination performance. In order to ensure the objectivity and fairness these scores, the lecturers and teaching assistants will mark them separately.

Results

Preliminary Analysis

Harman single factor test (Zhou and Long, 2004) was carried out, and the results showed that there were four factors whose characteristic root was greater than 1, and the variation explained by the first common factor was 36.83% (<40%). The data could exclude the existence of serious common method deviation. Correlation analysis of all variables showed that variables were positively and significantly correlated with each other (see **Table 2**). Except that the correlation coefficient between total instructional interaction and SS is 0.83, the correlation coefficient between other variables is less than 0.80. And the variance inflation factor (VIF) showed that it is greater than and close to 1 (see **Table 3**), which can exclude the problem of multi-collinearity between variables (Field, 2000).

TABLE 2 | Correlations of instructional interactions and learning satisfaction.

	SS + ST + SC	SS	ST	SC	Learning satisfaction
SS + ST + SC	1				
SS	0.83**	1			
ST	0.72**	0.32**	1		
SC	0.71**	0.30**	0.52**	1	
Learning satisfaction	0.67**	0.41**	0.55**	0.67**	1

*N = 384, **p < 0.01, values are reserved for two decimal places, same as below.*

TABLE 3 | Regression analysis of instructional interactions on learning satisfaction.

Explained variable	Learning satisfaction			Learning satisfaction
Explaining variable	**SS**	**ST**	**SC**	**Total instructional interaction**
β	0.13	0.03	0.80	0.56
Standard error	0.05	0.07	0.08	0.04
t	2.43*	0.43	10.62***	13.48***
p	0.02	0.67	0.00	0.00
Tolerance	0.72	0.56	0.72	
VIF	1.38	1.78	1.39	
R		0.58		0.59
R^2		0.34		0.34
Adjusted R^2		0.34		0.34
F		64.78***		181.67***
p		0.00		0.00

**p < 0.05, ***p < 0.001.*
For ethical reasons, only learning satisfaction was used to measure learning outcomes in regression analysis. Similarly hereinafter.

TABLE 4 | Independent sample *t*-test.

	M ± *SD*		*t*
	Class 1 (*N* = 192)	**Class 2 (*N* = 195)**	
Total instructional interaction	3.99 ± 0.39	3.92 ± 0.46	1.46
SS	3.74 ± 0.56	3.59 ± 0.64	2.41*
ST	4.21 ± 0.46	4.08 ± 0.54	2.53*
SC	4.14 ± 0.45	4.27 ± 0.57	−2.51*
Learning satisfaction	4.08 ± 0.49	4.19 ± 0.52	−2.24*
Academic performance	82.95 ± 7.64	87.03 ± 13.29	−4.13***
Examination performance	88.924 ± 7.00	87.39 ± 12.38	1.67
Usual performance	80.38 ± 9.74	86.51 ± 18.63	−4.53***

**p < 0.05, ***p < 0.001.*
Total instructional interactions = SS + ST + SC.
Academic performance = 0.7 × usual performance + 0.3 × examination performance.
Learning satisfaction and academic achievement are two indicators of learning outcomes. Similarly hereinafter.

Independent Sample *t*-Test

In order to explore the differences in the dimensions of instructional interactions and learning outcomes in the two classes, independent sample *t*-test was conducted for analysis. The results showed that (see **Table 4**) total instructional interaction (SS + ST + SC) ($t = 1.46$, $p = 0.15$) and examination performance ($t = 1.67$, $p = 0.10$) of the two classes were not significantly different. The SS ($t = 2.41$, $p < 0.05$) and ST ($t = 2.53$, $p < 0.05$) in Class 1 were significantly greater than those in Class 2. In addition, The SC ($t = -2.51$, $p < 0.05$), learning satisfaction ($t = -2.24$, $p < 0.05$), academic performance ($t = -4.13$, $p < 0.001$) and usual performance ($t = -4.52$, $p < 0.001$) in Class 1 were significantly lower than those in Class 2.

Regression Analysis

In order to ensure the authenticity and validity of the data, all variables except academic achievement were measured anonymously. That is, academic achievement does not correspond to other variables in the study at individual level. Therefore, regression analysis between academic achievement and other variables was not possible. When it came to regression analysis, only learning satisfaction was used to measure learning outcomes.

The study only conducts regression analysis on learning satisfaction of, SS, ST, and SC. The results showed that (see **Table 3**) total Instructional Interaction (SS + ST + SC) ($\beta = 0.56$, $t = 13.48$, $p < 0.001$), SS ($\beta = 0.13$, $t = 2.43$, $p < 0.05$), SC ($\beta = 0.80$, $t = 10.62$, $p < 0.001$) can significantly positively predict learning satisfaction; ST ($\beta = 0.03$, $t = 0.43$, $p = 0.67$) had no significant effect on the prediction of satisfaction.

Discussion

The results of *t*-test showed that there was no significant difference in total instructional interaction. The developmental difference between different groups of subjects brought about by experimental operation could be reduced by post-study intervention to some extent. Although the total instructional interaction between the two classes was almost the same, there were significant differences in SS, ST, and SC. That is, the degree of SS and ST in Class 1 was significantly higher than that in Class 2, and the degree of SC in Class 1 is significantly lower than that in Class 2. In addition, the learning outcomes (i.e., learning satisfaction and academic performance) of Class 1 was less than that of Class 2. Although there is no difference in total instructional interaction, the learning outcomes will be changed significantly due to differences in the level of three types of instructional interactions. These results verify H1.

The mean values of instructional interactions and learning satisfaction in the two classes was greater than 3, indicating that instructional interactions design did exist in the process of online education, and students were generally satisfied with online education. Moreover, there were significantly positive correlations between instructional interactions and learning satisfaction. Regression analysis results further showed that SS and SC has positive prediction function to the learning satisfaction, while ST cannot significantly predict learning satisfaction, which verifies the H2a and H2c.

In sum, not every type of instructional interaction can significantly predict learning satisfaction, and improving total

instructional interaction didn't necessarily improve learning outcomes. On the contrary, when total instructional interaction was fixed, adjusting the relative levels of SS, ST, and SC can effectively improve learning satisfaction. These results demonstrated the applicability of Anderson's (2003) Interaction Equivalence Theory.

STUDY 2

After confirming the direct relationship between instructional interactions (i.e., SS, ST, and SC) and learning satisfaction, we further obtained learner data from online education websites to explore the internal mechanism of instructional interactions affecting learning satisfaction.

Method

Participants and Procedure

Participants were recruited through course announcements and email notifications on online education platforms. In total, 421 questionnaires were collected, and invalid answers were deleted in accordance with the principles of "three standard deviations" and "repeated questions continuously and regularly." In order to ensure the directivity of the research results, the data of subjects with a very small proportion of college or below were excluded. Finally, 374 valid data were obtained, with an effective rate of 88.83%. There were 127 male and 247 female, with an average age of 21.90 (SD = 5.43) years. Undergraduates accounted for more than 90% of the total effective subjects. The majors of liberal arts (24.37%), science (23.11%), engineering (21.97%) and business (19.15%) accounted for more in the subjects. More than 85% of the subjects mastered basic computer operations.

Measures

Instructional Interactions

Same as the scale used in Study 1, The reliability and validity of this part are also great: Cronbach's α coefficient was 0.91; The results of confirmatory factor analysis showed that the dimensions of the scale were well fitted (χ^2/df = 2.29, RMSEA = 0.16, SRMR = 0.12, CFI = 0.68, TLI = 0.64).

Learning Satisfaction

Same as the scale used in Study 1, reliability and validity in this part are great: Cronbach's α coefficient was 0.88; Confirmatory factor analysis showed that the fitting index of the scale was good (χ^2/df = 2.20, RMSEA = 0.06, SRMR = 0.02, CFI = 0.99, TLI = 0.98).

Task Value

The scale which measures learners' assessment and perception of the interest, significance and serviceability of the online course, is compiled by Artino (2008) and Gong et al. (2016). It consists of six questions scored by seven-point Likert-type scale (from 1 "very inconsistent" to 7 "very consistent"). We deleted one item with factor load less than 0.5 and obtained high reliability and validity: Cronbach's α coefficient was 0.84; Confirmatory factor analysis showed that the three dimensions were well fitted (χ^2/df = 2.96, RMSEA = 0.07, SRMR = 0.02, CFI = 0.99, TLI = 0.98).

Self-Regulated Learning

The scale developed by Zhu et al. (2005) contains two dimensions of motivation adjustment and strategy adjustment, with a total of 69 questions scored by six-point Likert-type scale (from 1 "very incompatible" to 6 "very compatible"). The higher the score, the stronger the learner's self-regulated learning ability (Wang et al., 2010). The questionnaire had high reliability and validity: Cronbach's α coefficient was 0.88; Confirmatory factor analysis showed that the two dimensions were well fitted (χ^2/df = 3.01, RMSEA = 0.07, SRMR = 0.09, CFI = 0.68, TLI = 0.67).

Results

Preliminary Analysis

Harman single factor test was performed on the variables in this study (Zhou and Long, 2004), and the results showed that there were 17 factors whose characteristic root was greater than 1, and the variation explained by the first common factor was 24.30% (<40%). The data in this study could exclude the existence of serious common method deviation.

Table 5 presented the mean, standard deviation and correlation results of the main variables. The average scores on every questionnaire were above the median. And the correlation analysis of variables shows that the variables are positively and significantly correlated with each other. In addition, VIF shows that it is greater than 1 and much less than 10, which can exclude the problem of multi-collinearity between variables (Field, 2000).

SEM Analysis

We employed Mplus 7.0 software to conduct structural equation modeling to test the paths of instructional interactions (i.e., SS, ST, SC), self-regulated learning, and task value affecting learning satisfaction by using maximum likelihood estimation (ML) method. The results showed that the fitting indexes of structural equation model were good (χ^2/df = 4.37, RMSEA = 0.09, CFI = 0.94, TLI = 0.92, SRMR = 0.05) when the gender and computer proficiency of learners were controlled.

The path analysis results showed (see **Figure 3** and **Table 6**) that the SS had significant effect on task value (β = 0.15, Z = 2.17, $p < 0.05$), while non-significant effect on self-regulated learning (β = 0.09, Z = 1.13, $p > 0.05$) and learning satisfaction (β = 0.08, Z = 1.50, $p > 0.05$); ST had non-significant effect on task value (β = 0.02, Z = 0.31, $p > 0.05$), self-regulated learning (β = 0.10, Z = 1.23, $p > 0.05$), and learning satisfaction (β = 0.02, Z = 0.41, $p > 0.05$); however, SC significantly impacted on task value (β = 0.49, Z = 9.19, $p < 0.001$), self-regulated learning (β = 0.22, Z = 3.18, $p < 0.05$), and learning satisfaction (β = 0.44, Z = 8.33, $p < 0.001$); Moreover, task value could significantly influence self-regulated learning (β = 0.20, Z = 3.16, $p < 0.05$) and learning satisfaction (β = 0.31, Z = 6.03, $p < 0.001$); Self-regulated learning also significantly affected learning satisfaction (β = 0.12, Z = 2.21, $p < 0.05$).

TABLE 5 | Mean values, standard deviations and correlation coefficients.

Variables	*M* ± *SD*	SS	ST	SC	Task value	Self-regulated learning	Learning satisfaction
SS	3.35 ± 0.77	1					
ST	3.63 ± 0.69	0.55**	1				
SC	4.27 ± 0.53	0.29**	0.53**	1			
Task value	5.79 ± 0.77	0.29**	0.36**	0.57**	1		
Self-regulated learning	4.36 ± 0.46	0.29**	0.26**	0.32**	0.30**	1	
Learning satisfaction	4.33 ± 0.48	0.27**	0.50**	0.69**	0.60**	0.35**	1

**$p < 0.01$.

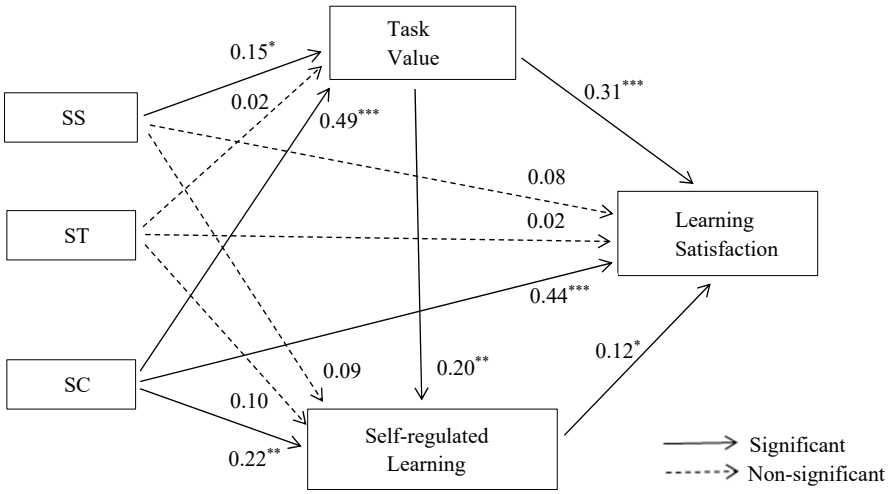

FIGURE 3 | Influence path of instructional interactions on learning satisfaction. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Control variables are not presented.

Mediation Analysis

We then still employed Mplus 7.0 software to conduct bootstrapping test (5,000 times) to respectively evaluating the mediation effects of task value and self-regulated learning between SS, ST, and SC and learning satisfaction. If zero is not between the upper and lower limits of 95% confidence interval, the indirect effect is significant (Hayes, 2009). The results of mediation analysis (see **Table 7**) showed that as for the indirect effects of SS on learning satisfaction, only the path of "SS → task value → learning satisfaction" was significant, with an effect value of 0.05 (95% CI = [0.01, 0.10] exclude 0), accounting for 35.71% of the total effect; The direct and indirect paths between ST and learning satisfaction were not significant; Among the indirect pathways of SC affecting learning satisfaction, the paths of "SC → self-regulated learning → learning satisfaction," "SC → task value → learning satisfaction," and "SC → self-regulated learning → task value → learning satisfaction," were all significant, and the effect values were 0.03 (95% CI = [0.01, 0.10] exclude 0), 0.15 (95% CI = [0.01, 0.10] exclude 0) and 0.01 (95% CI = [0.01, 0.10] exclude 0), which accounted for 5.84%, 24.19%, and 1.61% of the total effect, respectively.

Discussion

The results of the direct relationship were consistent with Study 1, and complement the mediating variables. SS and SC can influence learning satisfaction through the mediating effect of task value. H3a and H3c are verified. This suggested that task value was a key factor influencing learning satisfaction in SS and SC. When students perceive that the course is useful and meaningful, they are more likely to be satisfied with their expectations, then, generate satisfaction experience.

Furthermore, SC affected learning satisfaction through the mediation of self-regulated learning, which verifies H4c. Online learning means that students will have fewer external constraints in learning, so it requires students' self-regulation more than traditional learning (Artino, 2008). According to Moore (1989), SC refers to students' self-elaboration and reflection on learning, regardless of whether others are present. More interaction with course content means more autonomy. Self-regulated learning is a process in which individuals manage their own learning activities. In the online learning environment, if students can effectively arrange and adjust their learning, they will be more likely to participate in the course learning and have a high degree of learning satisfaction (Xu et al., 2017).

In addition, SC can influence students' learning satisfaction through the chain mediating effect of task value → self-regulated learning, which verifies H5c. From the perspective of motivational psychology, it can be seen that expectation and task value can improve students' learning motivation, facilitate the adoption of learning strategies, have a positive

TABLE 6 | Variable relation of regression analysis.

Regression equation		Fitting index		Regression coefficient and significance			
Explained variable	**Explaining variable**	***R***	***R^2***	β	***95% CIs***		***Z***
					Lower 2.5%	**Upper 2.5%**	
Learning satisfaction	Gender	0.71	0.50	0.04	−0.18	0.45	0.99
	Computer proficiency			0.03	−0.18	0.45	0.66
	SS			0.14*	0.02	0.12	2.39
	ST			0.04	−0.04	0.10	0.67
	SC			0.62***	0.86	1.10	13.70
Task value	Gender	0.58	0.34	0.01	−0.50	0.74	0.27
	Computer proficiency			0.12*	0.21	0.97	2.50
	SS			0.15*	0.02	0.16	2.17
	ST			0.02	−0.08	0.12	0.31
	SC			0.49***	0.74	1.06	9.19
Self-regulated learning	Gender	0.52	0.27	0.06	−0.69	3.43	1.10
	Computer proficiency			0.17**	1.22	3.91	3.09
	SS			0.09	−0.07	0.41	1.13
	ST			0.10	−0.08	0.56	1.23
	SC			0.22*	0.62	1.86	3.18
	Task value			0.20*	0.29	0.90	3.16
Learning satisfaction	Gender	0.76	0.58	0.03	−0.21	0.64	0.80
	Computer proficiency			−0.03	−0.40	0.15	−0.73
	SS			0.08	−0.01	0.09	1.50
	ST			0.02	−0.04	0.07	0.41
	SC			0.44***	0.55	0.82	8.33
	Task value			0.31***	0.19	0.34	6.03
	Self-regulated learning			0.12*	0.01	0.06	2.21

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
Boot CI lower limit and Boot CI upper limit refer to the lower limit and upper limit of 95% confidence interval obtained by 5,000 times extraction of percentile Bootstrap method for deviation correction, the same as below.

TABLE 7 | Hypothetical path test.

Hypothesis	Path	Effect	***95% CIs***		Relative mediating effect (%)	Whether the hypothesis is validated
			Lower 2.5%	**Upper 2.5%**		
H2a	SS → learning satisfaction	0.08	−0.01	0.09		No
H3a	SS → task value → learning satisfaction	0.05	0.01	0.10	35.71	Yes
H4a	SS → self-regulated learning → learning satisfaction	0.01	−0.01	0.03		No
H5a	SS → task value → self-regulated learning → learning satisfaction	0.00	−0.01	0.01		No
H2b	ST → learning satisfaction	0.02	−0.04	1.10		No
H3b	ST → task value → learning satisfaction	0.01	−0.03	0.04		No
H4b	ST → self-regulated learning → learning satisfaction	0.01	−0.01	0.03		No
H5b	ST → task value → self-regulated learning → learning satisfaction	0.00	−0.01	0.00		No
H2c	SC → learning satisfaction	0.44	0.82	1.10		Yes
H3c	SC → task value → learning satisfaction	0.15	0.11	0.20	24.19	Yes
H4c	SC → self-regulated learning → learning satisfaction	0.03	0.01	0.05	5.84	Yes
H5c	SC → task value → self-regulated learning → learning satisfaction	0.01	0.01	0.02	1.61	Yes

effect on learners' attention distribution and cognitive participation level (Artino, 2008; Jones et al., 2015). Therefore, the task value of the course can increase students' self-regulated learning.

GENERAL DISCUSSION

Interactive Equivalence Theory can explain a clear majority of instructional interaction designs, as well as the inconsistent

conclusions of previous studies to a certain extent. Despite few researchers pay attention to this theory, our findings verified the practicability of this theory, and the relationships between different types of instructional interactions and learning outcomes. Our study helps both scholars and practitioners understand the importance of different types of instructional interactions, and provide suggestions for optimizing resource allocation. In addition, since we confirmed the internal mechanisms between the instructional interactions and learning outcomes, instructional design can be adjusted purposefully and timely, so as to maximize the learning outcomes with limited resources and promote the further development of online education.

The Impacts of Student–Student Interaction and Student–Content Interaction on Learning Satisfaction

The increase of SS can reduce the sense of isolation of learners in the online education environment. Information exchange between students and increased opportunities for exchange of knowledge and experience can help students understand the nature of the course and master the course content deeply. In turn, it can promote the improvement of academic performance and satisfaction (Kuo et al., 2013). SC is a process in which learners interpret, organize and reflect on new knowledge on the basis of integrating existing knowledge through internal dialogue (Moore, 1989). This process of intellectual interaction with content is a necessary process for education (Moore, 1989), which will lead to changes in learners' understanding, perspective or thinking cognitive structure (Bernard et al., 2009). High quality course content and more SC can enable learners to have a more comprehensive understanding of the course, master the knowledge, and improve their course scores, learning satisfaction and task value perception.

Student–content interaction can predict learning satisfaction to a much greater extent than interpersonal interaction (SS and ST) in the statistical regression equation, which is consistent with the conclusion of previous studies that SC is the strongest predictor of learning outcomes (Kuo et al., 2013, 2014; Oyarzun et al., 2018). From the descriptive statistical results of the three instructional interactions, it can be inferred that students may pay too much attention to the learning content in the learning process and ignore or reduce interpersonal interaction (Li et al., 2014). In the light of the Interactive Equivalence Theory, when one of the three instructional interactions is at a high level, the impact of the other two instructional interactions on teaching effect and learning satisfaction will become less obvious (Anderson, 2003). There are differences in the importance that learners attach to the three instructional interactions (Rhode, 2009). SC is the easiest way for learners to operate and control, while ST is the hardest way to carry out in the online learning environment. The process of SC requires the least cognitive cost and technical restrictions (Anderson, 2003).

In addition, according to the observational learning in Social Learning Theory (Bandura, 1978), learners browse the interaction records between teachers and other students, as well as the interaction records between peers in the learning community, which can substitute and reinforce their own learning (Anderson, 2003). Interactive items between students and content (e.g., teacher notes, lecture slides) may serve as a substitute or complement to the teacher's presence (Ke, 2013). With the continuous development of information technology (e.g., storage capacity), SS and ST will be likely to gradually transform into SC (Anderson, 2003). Therefore, in the regression of the three kinds of instructional interactions on learning satisfaction, the ST regression coefficient is not significant, and the SS regression coefficient is relatively small, which may be because the interaction between learners and content replaces the role of interpersonal interaction in e-learning to some extent.

Task Value and Self-Regulated Learning as Mediator Variables

Interaction between classmates (Oyarzun et al., 2018) can facilitate student to evaluate course as useful, important and pleasure, that is, improving students' perception of the task value of the course. Less interaction between learners in online education will make learners feel isolated and less interested in learning; The content quality of courses are main concerned aspects for students, and the interaction with content is the most critical instructional interactions for students in online education (Tsang, 2010; Rodriguez and Armellini, 2013). Hence, SS, SC will enhance students' perception of the practicality and importance of learning courses, thus enhancing their learning satisfaction.

According to the interactive determinism principle of the Social Learning Theory (Bandura, 1978), individual cognition, behavior and environment are interdependent. Self-regulated learning is not an absolute functional state. Individuals will adjust their cognition, motivation and behavior under the influence of the external environment, then managing their own learning activities (Zimmerman, 1989). ST and SS belong to interpersonal interactions in instructional interactions (Moore, 1989), mainly referring to peer collaborative learning and teacher feedback. SC refers to students' self-interpretation and reflection on learning, regardless of whether others are present or not. Through the regression results of Study 1, we know that SC can replace SS and ST without affecting the learning outcomes. In short, SC is a key factor influencing students to manage their own learning activities. Moreover, learning satisfaction increases with the increase of self-regulated learning (Puzziferro, 2008; Xu et al., 2017). Therefore, our findings are consistent with previous studies, that is, SC can affect learning satisfaction through the mediating effect of self-regulating learning.

Instructional interactions affect the results of online learning by influencing learners' motivation and beliefs, personal behaviors and other factors (Pekrun, 2006). Motivational beliefs mainly include task value, self-efficacy and other aspects (Zhong et al., 2010). Autonomous learning is a personal act. Learners' motivational beliefs can promote self-regulation and self-management of learning. Therefore, SC can not only affect

students' learning satisfaction through the simple mediation of task value and self-regulating learning, but also affect students' learning satisfaction through the chain mediation of task value → self-regulating learning.

Limitations and Implications for Future Research

There are still some areas that need to be improved. First, there may be some individual differences in self-reported instructional interactions. Some researchers have shown that students' perception of instructional interaction is not necessarily equivalent to the level of instructional interactions actually designed in the curriculum (Thurmond and Wambach, 2004). Therefore, future research can adopt a combination of subjective and objective methods to measure the level of instructional interactions. Taking background behavior data analysis as an example, it can not only scientifically measure the level of instructional interactions, but also further analyze the relationship between actual instructional interactions and students' perceived ones.

Secondly, this study adopts quasi-experimental research, which cannot strictly control other variables in field teaching context, and the subject that can be designed is also limited. In addition, only a single course can be investigated, rather than the combination design of different types of instructional interactions. Therefore, future research can design multiple groups of participants through laboratory experiments and extend them to different curriculum areas (Bernard et al., 2009).

CONCLUSION AND IMPLICATIONS FOR PRACTICE

The current study is aimed to discuss the following research questions: (1) What are the relationships between instructional interactions and learning outcomes? (2) Whether there is interaction equivalence among SS, ST, and SC? (3) Whether task value and self-regulated learning play mediating roles in the above relationships? Through two empirical studies, that is, quasi-experimental research and online survey, the following conclusions are finally drawn:

(1) Not all of instructional interactions can significantly predict learning satisfaction. ST cannot significantly predict learning satisfaction, while SS and SC can significantly positively predict learning satisfaction; SC was the strongest predictor of learning satisfaction. (2) When the total amount of instructional interaction is constant, the types or quantity of instructional interactions can be adjusted according to the needs, which can effectively improve the learning outcomes to some extent. (3) SS can affect learning satisfaction *via* task value; SC can not only directly affect learning satisfaction, but also affect learning satisfaction through the simple mediations of task value, self-regulated learning and the chain mediations of "task value → self-regulated learning."

Our research conclusion can make some supplement to the traditional instructional interaction theory and provide guidance for online course design. First of all, accepted conclusion holds that three types of instructional interaction are irreplaceable (Moore, 1989), and the increase of each type of instructional interactions can improve learning effect. This study points out that when content is properly designed, SC may replace interpersonal interaction; adjusting the type and number of instructional interactions as needed can effectively improve learning outcomes. Actually, since teaching resources are limited, it is unrealistic to improve learning effect by increasing the instructional interactions continuously. Teachers should selectively improve certain types of instructional interaction according to the needs of students; What students don't need can be kept at a lower level or even eliminated. Besides, special attention should be paid to the quality of course content, and online platforms should minimize the technical difficulties of interpersonal interaction.

Secondly, the traditional instructional interaction study only considers the direct relationship without paying attention to the internal mechanism. Our study indicates that there are indeed indirect factors influencing the relationships between instructional interactions and learning outcomes, that is, task values and self-regulated learning. Therefore, teachers can design instructional interaction based on improving students' perception of task value, and embed clear learning feedback cases in learning content to build students' self-regulated learning.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethic Institutional Review Board of Central China Normal University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All the authors contributed to the study design and approved the final version of the manuscript for submission. YT and FZ collected the data. XL and XYL analyzed the data, drafted and revised the manuscript.

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Distance Learning and School-Related Stress Among Belgian Adolescents During the COVID-19 Pandemic

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To improve our understanding of the mental health consequences of the shift to distance learning during the COVID-19 pandemic, this study examined which factors are associated with increased school-related stress in adolescents. The sample consists of 16,093 adolescents, aged 12 to 18, who were enrolled in secondary education in Flanders, Belgium in May 2020. Stepwise binomial logistic regressions were used to investigate associations between the (online) learning environment, family-, and peer-related factors and increased stress in adolescents, controlling for sociodemographic characteristics. Results show that overcrowding, financial difficulties, and domestic violence are risk factors for increased stress, while social support and no material deprivation are protective factors. These findings suggest that, in addition to distributing the necessary materials for distance learning, also social policy efforts are required to compensate for the negative effects of distance learning. Without this, distance learning may fail to deliver equal educational opportunities and outcomes.

Keywords: COVID-19, pandemic, remote teaching, adolescents, distance learning, stress

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1 INTRODUCTION

The rapid spread of the COVID-19 pandemic from March 2020 onward turned homes around the world into classrooms in a couple of weeks, if not days (Bayrakdar and Guveli, 2020). As a reaction to the rapid spread of the virus, many countries closed schools nationwide, others implemented regional or local closures. As a result, the learning environment of 80% of the children and adolescents worldwide radically changed, with many schools forced to prepare and develop remote teaching overnight (Bol, 2020; Van Lancker and Parolin, 2020).

Aside from the educational benefits, schools provide structure and stability in young people's lives, develop talents and abilities, and stimulate social skills through interactions with peers and teachers (Alexander et al., 2001; Breen, 2004; Hout & DiPrete, 2006; Bayrakdar & Guveli, 2020). The rapid shift to remote teaching and distance learning is expected to have had a significant impact on learning outcomes of children and adolescents, widening existing inequalities with potentially long-lasting impacts on education and labor market outcomes. Burgess and Sievertsen (2020) estimate that closing schools for 60 days (12 weeks) would result in a significant decrease in test scores. In this regard, Maldonado and De Witte (2020) documented that Flemish (the northern, Dutch-speaking region of Belgium) adolescents who were in the final year of primary education during the COVID-19 school closures experienced significant learning losses, with a decrease in school averages of mathematics scores of 0.19 standard deviations and of Dutch scores of 0.29 standard deviations,

when compared to earlier cohorts. This is equivalent to losing half a year of learning. These findings hold when accounting for school characteristics and test results in earlier grades (Maldonado and De Witte, 2020).

The rapid closure of schools and the uncertainty regarding the return, the adoption and application of distance learning and remote teaching, and the crisis in society at large, had an adverse effect on the mental health of children and adolescents (Bozkurt et al., 2020; Ghosh et al., 2020; Guessoum et al., 2020; Lee, 2020). In a review of data of children's learning experiences during the COVID-19 pandemic, Di Pietro et al. (2020) point to heightened feelings of anxiety and stress in particular. Studies of students in secondary and tertiary education show that many reported increased stress due to insecurities about academic evaluations, potential study delays, and precarious home situations (Bozkurt et al., 2020; Crabbendam and Goes, 2020; Di Pietro et al., 2020; Xie et al., 2020). Also, earlier studies show that increased school-related stress among adolescents—both in regular times and in periods of quarantine during previous pandemics—is associated with decreased academic performances in the short term (Arsenio & Loria, 2014; Di Pietro et al., 2020). Kaplan, Liu, and Kaplan (2005) showed that this type of stress also has a significant scarring effect in the long term: it negatively affects academic performances of adolescents for up to 3 years.

While there is a large body of research on the psychosocial outcomes of large-scale disease outbreaks (e.g. SARS, Ebola, H1N1) and subsequent quarantine measures (Brooks et al., 2020), there are still important gaps in this literature. First, these studies are often conducted in the U.S. and in African and Asian countries, as many of these diseases were discovered and contained in these regions. Much less is known about the psychosocial outcomes among European populations, where such far-reaching quarantine measures have only rarely been deployed on a large scale (Brooks et al., 2020). Second, Lee (2020) identifies a lack of studies on the mental health effects of quarantine measures on children and adolescents, citing a "need to monitor young people's mental health status over the long term, and to study how prolonged school closures, strict social distancing measures, and the pandemic itself affect the wellbeing of children and adolescents" (Lee, 2020, p. 421). Particularly for adolescents, the current pandemic presents particular challenges as they are confined to their homes, forced to learn in sometimes precarious socioeconomic and/or family conditions, and away from their friends and peers.

Both the World Health Organization (WHO) (2020) and the American Psychological Association (APA) (2019) identify several key factors associated with stress among adolescents: the learning environment, the family or home environment, and peer contacts. As for the learning environment, which is considered to be the greatest source of stress (World Health Organization, 2020), distance learning requires specific resources (e.g., computer, reliable internet access, physical spaces suited for learning) that not all adolescents have access to, whether because of a lack of such resources at home, or having to share them with siblings (Solari and Mare, 2012; Bol, 2020; Brown et al., 2020). In such cases, school-related stress may increase because adolescents cannot keep up with their schoolwork. Furthermore, some parents may lack the cognitive and/or non-cognitive skills to assist their children with their schoolwork (Di Pietro et al., 2020), particularly among disadvantaged families. They may have factual knowledge about a certain subject but lack the procedural knowledge that is necessary for teaching and learning (Cooper, 2005). Another disadvantage suffered by adolescents from families in precarious socioeconomic conditions is that their parents may not be able to provide sufficient support to their children to study while at home, thereby reinforcing often already existing societal inequalities (Nash, 2003).

With regards to family-related factors, reports in several countries show that there was an increase in the incidences of domestic violence during lockdowns (Bradbury-Jones and Isham, 2020; Guessoum et al., 2020; Kofman and Garfin, 2020). This often has roots in psychological and economic stressors, both of which were more pronounced during the lockdown period (Brown et al., 2020). Specifically in terms of economic insecurities, many people were either forced to work from home or to not work at all, sometimes leading to significant long-term losses in household income—particularly among families already in precarious socioeconomic positions (Blundell et al., 2020; Brooks et al., 2020). Specific characteristics of the living environment also affect stress in adolescents. Since entire families were confined to their home for long periods, adolescents in families whose residences are smaller or whose families are larger, likely had little to no room where they could be alone and relax, or work for school. The lack of such a space has been known to increase stress (Brooks et al., 2020).

Adolescence is an important developmental period in the life course in which there is a heightened motivation for peer affiliation. Peers provide an important context for social and emotional support—although they can also be a source of stress (American Psychological Association, 2019)—, but in-person interactions are largely absent during times of physical isolation (Ellis et al., 2020). Distancing yourself from someone to whom you are emotionally attached, like peers, is a psychological stressor (Ammar et al., 2020). Therefore, it is important to remain connected in order to maintain an acceptable level of life satisfaction. As Ammar et al. (2020) showed, social participation through contact with friends is negatively affected by home confinement, revealing the importance of staying in touch (even while respecting the physical distancing measures) to keep an acceptable level of life satisfaction. Recent studies have found that maintaining digital social connections with peers is important for mental health outcomes during home confinement (Pancani et al., 2020). In their study on adolescent stress during the COVID-19 pandemic, Ellis et al. (2020) surprisingly found that more time connecting with friends digitally was associated with greater depression. The authors theorize that, during these stressful and confusing times, online conversations among adolescents may ruminate on negative feelings and excessive discussions of problems, thereby unintentionally escalating stress among adolescents (Ellis et al., 2020).

1.1 The Current Study

As a second wave of the pandemic affected much of Europe and North America in the fall of 2020, policy makers were initially reticent to avoid new school closures, recognizing the adverse impact on many adolescents and families. However, as infection rates rapidly increased and in some countries even surpassed those from the first wave, many countries saw no alternative but to close schools again, at least partially. Public health experts agree that subsequent waves are also possible (Smit et al., 2020), which implies that distance learning will likely play an important part of the learning experience of many adolescents worldwide in the months and years to come. In such a context, it is of utmost importance to better understand the determinants of stress in times of remote teaching. This is necessary to ensure that learning can continue as much as possible for all children and will help to avoid disparities in learning losses to materialize (with longer-term consequences in terms of higher education attainment, labor market positions and poverty).

It is still largely unknown which factors are associated with adolescents' school-related stress during home confinement due to the COVID-19 pandemic. Set in Belgium, this study aims to 1) understand how levels of self-reported stress differ between adolescents based on key sociodemographic characteristics like age, gender, and educational type, and 2) investigate the extent to which the (online) learning environment-, family-, and peer-related factors are associated with this increased stress. First, following Di Pietro et al. (2020), we hypothesize that a disruptive (online) learning environment (either through a lack of material or social support) will be associated with higher stress levels. Second, we expect that negative family living conditions (e.g. due to economic concerns or domestic violence) will be associated with higher stress levels (Brooks et al., 2020). Finally, we predict a dual role of peer contacts. In-person peer contacts are expected to be associated with lower stress levels (Ammar et al., 2020) while digital peer contacts are expected to be associated with higher stress levels (Ellis et al., 2020).

2 METHODS

2.1 Procedure

Data were collected by the Flemish Office of the Children's Rights Commissioner and the Children's Rights Knowledge Centre, who fielded a web survey from 11 May 2020 to 17 May 2020 in Flanders, Belgium. The survey was open to all Flemish adolescents and children and was widely promoted on social and traditional media in Flanders, resulting in a large dataset of children and adolescents (N = 44,030). These data were then made freely available to invite further investigation by scholars and policy makers on how Flemish children and adolescents coped with the lockdown measures (Kinderrechtencommissariaat et al., 2020)[1]. In Flanders, the National Security Council closed all schools in primary and secondary education on 16 March 2020. In the 9 weeks afterwards, remote teaching took place, but teachers were only allowed to repeat and practice previously taught materials. Organizing this teaching was the responsibility of schools and families, and the implementation and practice therefore likely differed across schools and between families (Maldonado and De Witte, 2020). From May 18 onwards, a limited number of Flemish schools reopened their doors, but most pupils remained at home until June 1.

2.2 Measures

The (*online*) *learning environment* was measured via six items, preceded by the statement "Classes don't go on like usual, but you still have schoolwork. How do you feel about that? If you agree, then indicate 'yes'. If you don't agree, indicate 'no'." To assess whether pupils now experienced more stress due to their schoolwork—the main dependent variable in this study—, this item was used: "I now have more stress due to my schoolwork (I feel uneasy or nervous)," with answer options of 1 = yes, 2 = no. The item was recoded so that 0 = no, 1 = yes. From this block of items, we also included three independent variables that were related to the online learning environment: "There's someone who can help me with my schoolwork" (social support), "It is too busy at home to work for school" (overcrowding), and "I have all the necessary materials I need to be able to work for school (internet connection, laptop or pc that I can use for schoolwork . . .)" (material deprivation). Again, answers were recoded so that 0 = no, 1 = yes.

2.2.1 Family-related indicators

In order to assess whether adolescents were living in precarious home situations, we used three items about financial difficulties, violence at home, or a lack of personal space at home. Regarding financial difficulties, we used the item "We have more difficulties at home because of the corona crisis to pay everything (like bills, food, clothing . . .)." Answer options were recoded so that 0 = no, 1 = yes, and 2 = do not know. As for domestic violence, we used "I sometimes have to deal with violence from an adult, for example someone beating me, pulling my ears, touching me when I don't want to, or yelling or cursing at me or laughing at me." Answer options were recoded so that 0 = no, 1 = yes. For lack of personal or private space at home, we used the item "I have a place for myself somewhere, where I can be alone and not be disturbed." Although this item does not specifically address the home, people were not allowed to leave their homes for any non-essential movements at the time of the survey. Therefore, this item could logically only apply to the home at the time of the survey. Again, answer options were recoded to 0 = no, 1 = yes.

2.2.2 Peer contacts

In order to assess how adolescents had peer contacts, we used data from three items: "I see my friends in real life, like before," "I see my friends in real life, but from a distance," and "I see or hear my friends digitally (e.g., through FaceTime, Google Hangouts, WhatsApp, Snapchat, TikTok, Facebook, Houseparty, Zoom, gaming . . .)." Adolescents were able to tick boxes for all options that applied to them, which means that each of these

[1]The data and surveys are available from https://www.keki.be/nl/coronakinderrechten.

TABLE 1 | Sociodemographic characteristics of the sample (n = 16,163).

	N	%
Age (mean)	15.71	—
Gender		
Male	4,473	27.7
Female	11,619	71.9
Other	71	0.4
Education type		
General secondary education	10,148	62.8
Vocational secondary education	1,646	10.2
Artistic secondary education	593	3.7
Technical secondary education	3,776	23.4

three options is a dummy-indicator (0 = not checked, 1 = checked).

2.3 Participants

For this study, we limited the total dataset of 44,030 participants to pupils enrolled in secondary education (n = 16,163), roughly the age group 12 to 18. Despite its large size, the data were not representative of the Flemish secondary education population: there was an overrepresentation of pupils in general secondary education (61.6% in the dataset, 42% in Flemish secondary education in 2018–2019), while pupils from vocation secondary education were underrepresented (10.2% in the dataset, 25% in Flemish secondary education in 2018–2019)[2]. There was also an overrepresentation of girls (71.9% in the dataset, 49.2% in Flemish secondary education in 2018–2019). For an overview of the study sample, see **Tables 1**, **2**. Because of its small group size, we set the "other" gender category as missing, resulting in a final sample of 16,093 Flemish secondary education pupils.

2.4 Analytical Plan

All analyses were conducted using SPSS Version 25. In **Table 2**, we observed that item nonresponse on most variables was limited (<1%), except in the three indicators regarding peer contact (30%). We found that a larger share of male pupils (37%), pupils aged 12–13 years old (38%), and those in vocational education (41%) did not answer these questions as opposed to female pupils (27%), those aged older than 13 years (30%), and those in general education (27%). About 32% of pupils in artistic and technical education also provided no response to these questions.

[2]Flemish secondary education starts from the age of 12 and is divided into four types. *General secondary education* provides a very broad, general education, mostly preparing pupils for higher education. *Vocational education* is highly practical and job-oriented, preparing pupils to enter the labor market directly following secondary education. *Artistic education* links general secondary education development with art practice, ranging from performance arts to display arts. Only about 2% of all Flemish pupils are enrolled in this education type. *Technical secondary education* offers a general education in some main courses (mathematics, languages …), but pairs this with more technical or practical courses. Pupils can continue into higher education but are also prepared to enter the labor market directly if preferred.

First, to explore differences in levels of stress by gender, age, and educational type, we conducted Fisher's exact tests. For this test, we categorized the age variable into four categories (12–13, 14–15, 16–17, and 18+), but we will be using the continuous version of this variable in subsequent analyses. Second, to explore the relationship between increased stress and the learning environment, family- and peer-related variables, stepwise binomial logistic regression analyses were conducted. Such an analysis estimates the probability that an observation falls into one of two categories of a dichotomous dependent variable based on one or more independent variables. In Model 0, we only included control variables (age, gender, education type). Model 1 included the independent variables related to the learning environment, Model 2 swapped these for the family-related variables, and in Model 3 we included peer-related variables. Finally, we concluded with a full model containing all independent indicators. Most of the independent variables in these analyses were dummy variables, with the exception of age (continuous), education type (nominal), and financial difficulties (nominal). As a robustness check, we replicated this stepwise logistic regression twice: with a weighted dataset (weighted by gender and education type; **Supplementary Table SA1**) and by limiting the analysis to pupils from general secondary education (**Supplementary Table SA2**).

3 RESULTS

The results of the Fisher's exact tests (**Table 3**) indicated that there was a statistically significant difference in likelihood of reporting stress by age ($F = 60.99$; $p < 0.001$), gender ($F = 113.48$; $p < 0.001$), and education type ($F = 102.94$; $p < 0.001$). Descriptive results showed that a higher share of older age categories, who likely had greater workloads, experienced more stress than younger age groups. As for gender, 58% of the girls indicated that they experienced stress compared to 49% of the boys. In terms of education type, about half of adolescents in general secondary education experienced stress, while this increased to around two out of three enrolled in the other three education types.

The results in **Table 4** indicated that the learning environment, family- and peer contact-indicators were associated with increased school-related stress during the lockdown. Indicators regarding the learning environment showed that adolescents who reported an overcrowded household situation were 3.50 times more likely to report increased stress ($OR = 3.50$; $p < 0.001$) than those without an overcrowded household situation. Those who reported social support (i.e. having someone who helps them with their schoolwork) and no material deprivation (i.e. having all the necessary materials to perform their schoolwork) were respectively 0.59 ($p < 0.001$) and 0.54 ($p < 0.001$) times less likely to report increased stress than adolescents without social support and with material deprivation.

The family situation also played a role in the likelihood of reporting stress. Adolescents who reported that their family was having financial difficulties due to the corona crisis were

TABLE 2 | Descriptive overview of school-related stress, learning-, family-, and peer-related factors in % (n = 16,163).

	School-related stress	Social support	Over crowding	Material deprivation	Financial deprivation	Private space	Domestic violence	Face-to-face contact peers	Face-to-face distance	Digital contact peers
Yes	55.3	70.2	22.9	8.2	8.5	84.3	8.5	6.0	32.9	63.5
No	44.3	29.4	76.7	91.4	68.9	15.5	91.2	64.2	37.2	6.7
Missing	*0.4*	*0.4*	*0.5*	*0.3*	*0.2*	*0.3*	*0.3*	*29.9*	*29.9*	*29.9*
Do not know	—	—	—	—	*22.4*	—	—	—	—	—

The italic values are merely respondents that were either missing or do not know.

TABLE 3 | Fisher's exact tests for associations between age, gender and education type, and increased stress.

	Fisher's exact test value	*p*-value	Proportion of pupils with increased tress
Age * stress	60.990	0.000	
12–13			50.1
14–15			53.4
16–17			56.5
18+			62.6
Gender * stress	113.478	0.000	
Male			48.7
Female			58.1
Education type * stress	102.935	0.000	
General secondary education			52.7
Vocational secondary education			59.2
Artistic secondary education			66.7
Technical secondary education			59.9

TABLE 4 | Binomial logistic regressions with increased stress due to schoolwork as outcome variable, and odds ratios of predictors.

	Model 0	Model 1	Model 2	Model 3	Full model
Age	1.09*** (0.01)	1.04** (0.02)	1.08*** (0.01)	1.08*** (0.01)	1.04** (0.01)
Gender (ref: Male)					
Female	1.45*** (0.04)	1.49*** (0.05)	1.44*** (0.04)	1.49*** (0.04)	1.47*** (0.05)
Education type (ref: General education)					
Vocational education	1.46*** (0.08)	1.28** (0.08)	1.09 (0.06)	1.35*** (0.07)	1.12 (0.09)
Artistic education	2.03*** (0.12)	1.86*** (0.12)	1.53*** (0.09)	1.84*** (0.10)	1.57*** (0.11)
Technical education	1.37*** (0.05)	1.30*** (0.05)	1.26*** (0.04)	1.36*** (0.05)	1.30*** (0.05)
(Online) learning environment					
Someone helps with schoolwork (*social support*)		0.59*** (0.05)			0.59*** (0.05)
Too busy at home to work (*overcrowding*)		3.50*** (0.06)			3.14*** (0.06)
All necessary materials available (*material deprivation*)		0.54*** (0.10)			0.59*** (0.10)
Family-related indicators					
Financial difficulties since corona crisis (ref: no)					
Yes			2.10*** (0.07)		1.62*** (0.09)
Do not know			1.56*** (0.04)		1.39*** (0.05)
Place for self to be alone			0.52*** (0.05)		0.71*** (0.07)
Domestic violence			1.42*** (0.06)		1.16 (0.09)
Peer contacts					
Face-to-face				0.87* (0.07)	0.80** (0.08)
Face-to-face from distance				0.88** (0.04)	0.95 (0.04)
Digital				0.88* (0.07)	0.99 (0.07)
Constant	0.19*** (0.23)	0.82 (0.27)	0.42*** (0.18)	0.28*** (0.21)	1.13 (0.26)
Nagelkerke R^2	0.03	0.12	0.07	0.02	0.13
N	16,092	15,950	15,972	11,219	11,213

Note: *p < *0.05;* **p < *0.01,* ***p < *0.001.*

2.10 times ($p < 0.001$) more likely to report increased stress than adolescents whose families had no financial difficulties, while those who did not know about their family's financial situation were 1.56 times ($p < 0.001$) as likely. As for adolescents who experienced domestic violence, they were 1.42 times ($p < 0.001$) more likely to report increased stress. Having a place for themselves decreased the likelihood of increased stress (OR = 0.52; $p < 0.001$).

Peer contacts seem to play a modest role in increased stress, as indicated by the limited explained variance from these indicators (2%). Overall, results indicated that those who reported having peer contacts—whether it be face-to-face (from a distance) or digitally—were 0.87 ($p = 0.02$) to 0.88 times ($p = 0.03$) less likely to report increased stress.

As for sociodemographic indicators, the results of the regressions pointed in the same direction as those in **Table 3**: girls had a higher likelihood to report stress than boys ($OR = 1.45$; $p < 0.001$), and those in vocational ($OR = 1.46$; $p < 0.001$), technical ($OR = 1.37$; $p < 0.001$), and especially artistic education ($OR = 2.03$; $p < 0.001$) had a higher likelihood to report stress than those in general secondary education. Increasing age was associated with a small increase in the likelihood of reporting stress ($OR = 1.09$; $p < 0.001$).

We conducted two robustness checks. First, the analyses were repeated after applying weights that ensured that the data were representative for the Flemish secondary school population by gender and education type (**Supplementary Table SA1**), but this did not yield different results. Second, we limited the dataset to students from general secondary education (n = 10,148), which is the education type that the majority of pupils in this dataset and in Flemish secondary schools are enrolled in, and repeated the analyses, now excluding education type as a control variable (**Supplementary Table SA2**). These results were in line with those from **Table 4**. See the supplemental materials for the full results of these robustness checks (**Supplementary Tables SA1, SA2**).

4 DISCUSSION

The COVID-19 pandemic presents a significant threat to adolescents' mental health outcomes (Guessoum et al., 2020). In many countries, schools were forced to close in the spring of 2020, prompting adolescents to move to remote teaching and distance learning at home. The studies that have been conducted on adolescents during the pandemic indicate that they experience increased stress due to insecurities about academic evaluations, potential study delays, and precarious living conditions (Bozkurt et al., 2020; Crabbendam and Goes, 2020; Di Pietro et al., 2020; Xie et al., 2020). Based on recent reports from the World Health Organization (2020) and the Amerixan Psychological Association (2019), we identified several factors that are associated with school-related stress in adolescents: the learning environment, family- and peer-related factors. This study provides evidence for the role of these factors in the increase of school-related stress among a large sample of adolescents enrolled in secondary education in Flanders, Belgium (n = 16,093) in May 2020. We find that the learning environment is the strongest predictor of stress among adolescents during the current crisis (with 12% explained variance), in line with findings during regular times (World Health Organization, 2020). Having social support at home (someone who helps with schoolwork) and a lack of material deprivation (by having the necessary equipment) decreases the odds of reporting greater stress, but overcrowding appears to play a much larger role. Adolescents who report that their household is too crowded to adequately complete schoolwork are 250% more likely to report increased stress than adolescents who do not report a crowded household. Several of these findings are in line with previous preliminary studies on the effects of distance learning during the pandemic on pupils in the Netherlands and Australia (see Bol, 2020; Brown et al., 2020; Crabbendam and Goes, 2020). Of all indicators in the study, overcrowding has the strongest positive association with increased stress, which is "likely due to disrupted sleep, lack of space to study and the impact of noise levels on concentration" (Solari and Mare, 2012, p. 464). Due to the high cost of housing, it is more likely that adolescents from families in precarious socioeconomic positions live in overcrowded homes (Brown et al., 2020), which is another sign that the COVID-19 pandemic exacerbates already existing educational inequalities.

Family-related factors also play a role: adolescents who report greater financial difficulties in their household since the corona crisis are more than twice as likely to report increased stress than adolescents who report no financial difficulties. Unsurprisingly, domestic violence is also associated with greater stress, as well as the lack of a private space for the adolescent to relax. Again, those from precarious socioeconomic backgrounds are more likely to be disproportionately affected by this. While the macro-economic fall-out of the lockdown measures forced many people into (temporary) unemployment, financial strains particularly increased among families already under strain prior to the crisis (Bradbury-Jones and Isham, 2020; Kofman and Garfin, 2020; Van Lancker and Parolin, 2020). Given that financial worries are known to be associated with a greater incidence of domestic violence, we again present evidence that the negative mental health consequences of the COVID-19 pandemic likely disproportionately affect adolescents in precarious socioeconomic positions.

Finally, we found that peer-related factors are also associated with increased stress, but less so than learning- and family-related factors. Overall, we find that having contact with peers—whether it be face-to-face or digitally—somewhat decreases the odds of increased stress. The negative association between digital peer contact and increased stress was contrary to our expectations, given Ellis et al. (2020) findings that more time connecting with friends digitally was associated with greater depression. However, digital peer contact no longer has a significant effect once it is considered in the same model with school- and family-related factors. This is not surprising given that time spent with family during recent home confinements has been found to be a far

stronger predictor of mental health than digital peer contacts (Ellis et al., 2020). As such, we must be cautious in interpreting the results of the peer contacts in this study.

4.1 Limitations

This study is not without its limitations. Given the local nature of the sample (only Flemish secondary school pupils), these results cannot be generalized, and we therefore encourage scholars to replicate this study in other countries or regions. Furthermore, as mentioned, responses were collected after a brief but intense media campaign on social and traditional media in Flanders in May 2020, resulting in a large sample (N = 44,030). However, not all adolescents are equally likely to be aware of the media campaign or participate in web surveys. Those from precarious socioeconomic situations who—for example—lack the necessary technical ability or equipment to access the survey are less likely to respond, which likely leads to a certain degree of selection bias in the sample. Although we have conducted several robustness checks (weighted sample, only pupils from a specific educational type), this selection bias remains a concern. Collecting information on representative adolescent samples would therefore be preferred in future studies.

Additionally, given that responses were collected through self-report questionnaires, there is a potential for social desirability reporting. As we do not know when or how adolescents completed the survey, it is possible that some sensitive questions (e.g. domestic violence) were not answered truthfully, for instance due to the presence of household members. Social desirability may also present itself in a different way: in the questions on peer contacts, adolescents may not want to reveal that they had face-to-face contact(s) with their friends during a time when this was not permitted by government regulations (thus explaining the large number of missing values here). Finally, we noticed that item nonresponse on items regarding peer contacts (around 30%) was much higher than for the other study variables (around 1%). There may be several explanations for this. The questions on peer contacts were presented at the very end of the survey and, given the survey's length, it is possible that younger respondents struggled to reach the end and dropped out (Galesic and Bosnjak, 2009). Furthermore, data from male respondents and those in precarious socioeconomic positions (which is more often the case for pupils in vocational education in Flanders) tend to be of lower quality in web surveys (i.e. by having fewer completed sets of responses) than data from female respondents and those in less precarious positions (Borgers et al., 2000). It is also possible that adolescents were unwilling to provide data for these indicators because they broke government-imposed rules regarding face-to-face social contacts during this time.

4.2 Implications for Practice and Policy

While many initiatives have been taken to make distance learning and remote teaching more effective (Daniel, 2020; United Nations, 2020), it is clear that only "material" efforts like providing adolescents with the necessary equipment to perform their schoolwork is not enough to combat the adverse mental health effects of distance learning. Without far-reaching social policy efforts that mitigate disparities in living conditions (i.e. overcrowded houses, financial difficulties) and support families, distance learning may fail to deliver equitable learning outcomes for all. For example, Di Pietro et al. (2020) suggest providing additional support to working parents if their children are expected to be at home on a regular basis by having a public fund devoted to financing (part of) parental leaves of working parents that need to support their children when it is their turn to stay at home. This could be essential to preserve employment for those who do not have the option of teleworking and who would face the concrete risk of having to leave their job to assist their children. Such a fund, along with the prohibition to dismiss parents who stay at home to support their children's learning activities, would probably alleviate some of the stress among adolescents (Di Pietro et al., 2020). At the same time, we would like to echo recommendations by UNESCO (2020) to plan distance learning. Specifically, they emphasize that it is vital to connect schools, parents, teachers, and students with each other. By creating communities that ensure human interactions—even if they are online—and enable social caring measures, possible psychosocial challenges that students may face when they are isolated can be addressed at an early stage (UNESCO, 2020).

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found here: https://www.keki.be/nl/coronakinderrechten.

AUTHOR CONTRIBUTIONS

DDC conducted the analyses and wrote the first draft of the introduction, methods, results, and discussion sections. KM and WVL thoroughly revised subsequent versions of the manuscript. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2022.836123/full#supplementary-material

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Depression, COVID-19 Anxiety, Subjective Well-being, and Academic Performance in University Students With COVID-19-Infected Relatives: A Network Analysis

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This study aimed to examine the relationship between anxiety, depression, subjective well-being, and academic performance in Peruvian university health science students with COVID-19-infected relatives. Eight hundred two university students aged 17–54 years (Mean 21.83; SD = 5.31); 658 females (82%) and 144 males (18%); who completed the Patient Health Questionnaire-2, Coronavirus Anxiety Scale, Subjective Well-being Scale (SWB), and Self-reporting of Academic Performance participated. A partial unregularized network was estimated using the ggmModSelect function. Expected influence (EI) values were calculated to identify the central nodes and a two-tailed permutation test for the difference between the two groups (COVID-19 infected and uninfected). The results reveal that a depression and well-being node (PHQ1-SWB3) presents the highest relationship. The most central nodes belonged to COVID-19 anxiety, and there are no global differences between the comparison networks; but at the local level, there are connections in the network of COVID-19-infected students that are not in the group that did not present this diagnosis. It is concluded that anxious–depressive symptomatology and its relationship with well-being and evaluation of academic performance should be considered in order to understand the impact that COVID-19 had on health sciences students.

Keywords: depression, COVID-19 anxiety, subjective well-being, academic performance, university students, COVID-19-infected relatives, a network analysis

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INTRODUCTION

The COVID-19 pandemic has affected physical and psychological health, causing high morbidity and mortality rates worldwide (Qiu et al., 2020). In view of this, quarantines and isolation have been useful measures to contain the impact of the infection (Brooks et al., 2020); however, it has also made people to experience greater psychological distress (Pfefferbaum and North, 2020), negative emotions, fear, and uncertainty (Mertens et al., 2020; Schimmenti et al., 2020). Studies on the consequences of the COVID-19 pandemic on mental health indicated negative effects in the general population (Salari et al., 2020; Xiong et al., 2020); specifically, in university

students (Son et al., 2020; Li et al., 2021). In this regard, a recent systematic review and meta-analysis research, which included 27 studies and the participation of 706,415 university students, indicated a prevalence of depression of 39%, anxiety of 36%, stress of 6.39–21.65%, post-traumatic stress syndrome of 2.70–32.74%, fear of 12.52%, and panic of 20.41% in this population (Li et al., 2021).

The mental health status of university students during the pandemic has been affected by exposure to COVID-19; specifically, by information about the disease in social networks that associated with demographic variables, such as gender and years, the study has caused a great impact (Cao et al., 2020; Tang et al., 2020). Likewise, a sense of instability has been caused by the interruption of face-to-face classes and the lack of family support in many university students (Copeland et al., 2021). Other stressors in the university students during the pandemic include prolonged periods of quarantine, fear of infection, frustration, boredom, financial loss, and others (Li et al., 2021). Moreover, during the pandemic, there was a heightened fear of becoming infected with COVID-19 or having a relative infected with COVID-19 (Choi et al., 2020; Khademian et al., 2021). In fact, one study indicates that having a relative infected with COVID-19 significantly predicts increased anxiety and depression in university students (Wang et al., 2020; Copeland et al., 2021) and that this population is three times more likely to experience symptoms of depression compared to students without relatives with this condition (Wang et al., 2020). Similar findings in the general population demonstrate that exposure to a relative with COVID-19 symptoms increases the amount of stress, anxiety, and depression in the individual (Mazza et al., 2020; Zhao et al., 2020). As depression demonstrates interconnectedness with well-being (Bartoszek et al., 2020; Blanco et al., 2020; Ceri and Cicek, 2021), it is timely to study self-esteem and suicide (Fonseca-Pedrero et al., 2021).

During the pandemic, students are concerned about their well-being (Cuschieri and Calleja Agius, 2020), which is significantly related to their learning outcomes (Fawaz and Samaha, 2021). In this sense, the presence of symptoms of anxiety and depression negatively affects academic performance (Bolatov et al., 2021). On the other hand, increased concern about academic performance has also been identified as contributing to increased levels of anxiety and depression in students during the COVID-19 pandemic (Son et al., 2020). Furthermore, the academic performance of university students may be affected by remote teaching due to limitations in acquiring the necessary technology and/or having adequate digital connections (Rudenstine et al., 2021).

Recent scientific evidence indicates that the psychological responses to the COVID-19 pandemic are complex and involve numerous interrelated factors (Taylor et al., 2020). In this sense, network analysis is useful for the study of the interaction between variables, allowing to evaluate the degree to which variables belonging to the same construct are reciprocally associated and the way in which different constructs interact with each other (Di Blasi et al., 2021). Network analysis has been widely used in research on mental health problems and psychopathology for some years (Robinaugh et al., 2020). Specifically, it has become a suitable method for the analysis of clinical variables (Costantini et al., 2015). The application of this methodology to health sciences, specifically mental health, makes it possible to assess how certain behaviors or symptoms are associated with others (Levinson et al., 2017; Blanco et al., 2020; Di Blasi et al., 2021). In fact, there is some research using the network approach in university students finding that in this population, worry, trouble relaxing, and depressed mood are core symptoms (Bai et al., 2021) and when an abusive condition exists, networks report links to negative mood, sleep, and concentration problems (An et al., 2021); as well as a reduced ability to tolerate distress is associated with increased symptoms of depression (Lass et al., 2020). Despite this, there are few studies of well-being in the university students using this methodology.

Even though network analysis studies have been conducted during the pandemic of COVID-19 (Abdul Karim et al., 2021; Zavlis et al., 2021), clinical features of depression and anxiety, as well as experiences of well-being may vary depending on sample characteristics, culture, socioeconomic status or stressors (Bai et al., 2021). This implies that the results of network analysis in a given group are not easily applicable to other groups. Therefore, network structures of anxiety, depression, or well-being nodes must be analyzed within a specific population. As above, compared to general adult samples, univeristy students have a high likelihood of experiencing stressors that reflect the effects of the current COVID-19 pandemic, which may trigger increased anxiety and depression in the university context (Wang et al., 2020; Copeland et al., 2021). However, to date, network analysis has not been used to evaluate the interconnections between positive or educational variables in university students of health sciences in Peru, nor in any other Latin American country.

Therefore, this study aimed to estimate network structure of anxiety, depression, subjective well-being and academic performance nodes in Peruvian university students of health sciences with COVID-19-infected relatives. Specifically, we sought to: (a) identify the interconnectedness between nodes; (b) identify core nodes; and (c) compare two networks according to whether or not students were diagnosed with COVID-19.

MATERIALS AND METHODS

Participants

There were 802 university students aged 17–54 years (Mean 21.83; SD = 5.31); 658 females (82%) and 144 males (18%). The sample size was determined *a priori* using a Monte Carlo simulation-based method (Constantin et al., 2021) which indicated 300 observations as minimally recommended; thus, the study far exceeded the estimated number. The selected sampling was non-probability *snowball* sampling because it started with a small number of initial contacts who met the research criteria (e.g., having COVID-19-infected relatives), they recommended other potential participants, and so forth

(Parker et al., 2020). For further details of the participants, see **Table 1**.

Instruments

Patient Health Questionnaire (PHQ-2; Yu et al., 2011) composed of two items with a response scale ranging from 0 to 3 (0 = No days, 1 = Several days, 2 = More than half of the days, 3 = Almost every day). The patient health questionnaire-2 (PHQ-2) is unidimensional and measures two main symptoms of depression. Higher scores indicate greater severity. The psychometric properties of the PHQ-2 were reviewed for the present study. Reliability was estimated by the omega coefficient (ω) which indicated acceptable internal consistency ($\omega = .74$) and internal structure by confirmatory factor analysis (CFA) which revealed excellent goodness of fit (RMSEA = .00; CFI = 1.00).

Coronavirus Anxiety Scale (CAS; Lee et al., 2020) composed of five items with a five-point Likert-type response scale (0 = Not at all, 1 = Rarely, less than a day or two, 2 = Several days, 3 = More than 7 days, 4 = Almost every day in the last 2 weeks). The coronavirus anxiety scale (CAS) is a unidimensional scale that measures anxiety response to COVID-19, with higher scores indicating greater symptom severity. It has evidence of validity and reliability in the Peruvian context (Caycho-Rodríguez et al., 2020). In spite of that, reliability was estimated for the sample under study ($\omega = .79$) and the internal structure by CFA considering only the items that were included in the network (item: 1, 3, 5) which showed an excellent goodness of fit (RMSEA = .00; CFI = 1.00).

Subjective Well-being Scale (SWB; Su et al., 2016) composed of three items with seven-point Likert-type response alternatives ranging from Strongly Disagree (1) to Strongly Agree (7). Subjective Well-being scale (SWB) is a unidimensional scale that measures the person's cognitive appraisal of his/her own life as satisfactory and a positive experience. It has good psychometric properties ($\alpha = .87$). In spite of that, reliability was estimated for the sample under study reporting good reliability ($\omega = .90$) and internal structure (RMSEA = .00; CFI = 1.00) of the items that were included in the network (items 2 and 3).

Self-reporting of Academic Performance (SAP) A single measure based on the proposal of Dominguez-Lara (2017), which allows for a quick exploration of the student's perception of his/her academic performance. This single-question form has shown a moderate relationship with the student's grade ($r = .48$).

TABLE 1 | Social demographic variables.

Variables	*f*	%
Sex		
Female	658	82.00
Male	144	18.00
Range of age		
≤19 years	305	38.10
20–22 years	277	34.50
≥23 years	220	27.40
Cycle		
Start (1–4)	394	49.10
Intermediate (5–6)	289	36.10
Final (7–12)	119	14.80
Diagnosis COVID-19		
Yes	223	27.80
No	579	72.20
Careers		
Nursery	91	11.30
Nutrition	105	13.10
Obstetrics	100	12.50
Psychology	414	51.60
Physical Therapy and Rehabilitation	92	11.50

The ranges of ages are made through quartiles.

Procedures

Initially, a research project was elaborated and accepted by the authors' university, which considered the ethical aspects of the Helsinki declaration (World Medical Association, 1964). Due to the pandemic, data collection was done through the Internet [Internet Mediated Research (IMR; Hoerger and Currell, 2011)]. Therefore, before answering the questionnaires, participants responded to an informed consent form explaining the purpose of the study, privacy and confidentiality of the information collected and data treatment. The collection began with the sharing of a *Google form* link to a group of students from a faculty of health who met the research criteria of having had a relative infected with COVID-19; then, they were instructed to share the link with classmates who also met this criterion and successively increasing the sample size. The collection was carried out between 05-09-2021 and 23-11-2021. The questionnaire took an average of 10 min to answer.

Data Analysis

Statistical analyses were performed with the R programming language in its RStudio environment (RStudio Team, 2020). The psychological network approach was used (Epskamp and Fried, 2018). Previously, the presence of redundant nodes (symptoms) was examined by checking pairs of highly related nodes ($r > .50$) through the *networktools* package (Jones, 2021). This is because redundant nodes distort the estimated network and centrality indices, such as expected influence (Hallquist et al., 2021).

The network was estimated with the *qgraph* library (Epskamp et al., 2012) and performed through a non-regularized partial network, using the *ggmModSelect* function; since the study is aimed to examine central symptoms and a Spearman correlation matrix due to the ordinal nature of the variables (Isvoranu and Epskamp, 2021), understanding that partial correlations establish correlations among other symptoms after controlling for the relationship with other variables (Epskamp and Fried, 2018).

The interpretation of the network is done by considering that each node (circles) is connected to other nodes by edges (lines) whose edge thickness denotes the strength of relationship. A green shade of the edge denotes positive relationship and a red shade denotes negative (Epskamp et al., 2018). The network was organized considering the Fruchterman–Reingold

algorithm (*spring* command) whose main characteristic is to place the strongest correlations in the center and the weakest ones in the periphery (Fruchterman and Reingold, 1991). In the case of comparisons, a *circle* organization was used to facilitate the comparison by placing the nodes in the same place for both groups.

Node centrality was performed using the expected influence index (EI) which is appropriate when the network contains positive and negative edges, because strength centrality may not predict accurately in such situations (Robinaugh et al., 2016). Other centrality measures, such as intermediation and closeness, were not estimated because they were not considered appropriate for psychological networks (Bringmann et al., 2019). In fact, a simulation study showed that both are strongly affected by sampling variation, making their use in psychology untenable (Hallquist et al., 2021).

The accuracy and stability of the edge weights are examined through the bootstrapping technique with the *bootnet* package. First, the accuracy consisted of repeatedly estimating a model with the sampled data and estimating a value for the edges. This allows the calculation of 95% bootstrap confidence intervals (CI) whose amplitude denotes the stability of the edges (Epskamp, 2020). Second, the stability coefficient (SC), indicating the maximum proportion of cases to be removed was calculated before at least 95% of 1,000 bootstrap correlations of the true and resampled centrality indices are correlated by more than .70; thus, the SC is suggested to be above .50 and not below .25 (Epskamp et al., 2018).

Finally, two sub-networks (students who were infected by COVID-19 and those who were not) were compared using the NCT library (Van Borkulo, 2015). The NCT uses a two-tailed permutation test in which the difference between the two groups is calculated across 100 replicates for each randomly regrouped individual. The null hypothesis is that both groups are equal at .05 level of significance.

RESULTS

Previous Assumption

Previously, we examined the presence of redundant nodes and found that the items CAS2 and CAS4, SWB1 were reiterative in the network. Therefore, they were removed before the estimation of the network.

Estimate and Accuracy of the Network

The *ggmModSelect* network for the data collected during the pandemic in university students are presented in **Figure 1**, and out of 11 possible nodes, only 8 were entered into the final model due to redundancy criteria. Symptoms from each theoretical community (PHQ, CAS, SWB, SAP) were clustered closer to each other. Average edge weights were found to be in the range −.18 to .76 and 12 of the 28 edges were non-zero. Intragroup edges presented positive and intergroup negative measures of association between mental disorders (CAS, PHQ) with well-being and performance. According to the network visualization each measure formed its own group. In particular, the strongest connection is presented by the PHQ1 node and SWB3 with a negative relationship.

Centrality

The central nodes according to EI (see **Figure 1**) were CAS3 ("I felt paralyzed when I thought about or was exposed to information about COVID-19"), CAS1 ("I felt dizzy when I read or heard news about COVID-19"). Thus, the two COVID-19 anxiety nodes were among the most central; while the least central one is self-reporting of academic performance (SAP).

Accuracy and Stability of the Network

The stability statistic (**Figure 2A**) for the expected influence index confirms robustness (CS coefficient = .75); thus, robust network inferences can be made. Also, the 95% bootstrap CIs were not large, meaning that they did not vary significantly between resamples (**Figure 2B**).

Comparison

At a general level, the networks can be observed to be invariant ($M = .21$; $p = .340$) and that the level of connectivity is almost identical ($S = .05$; $p = .760$). Likewise, when the relationship between adjacent matrices is examined using Pearson's correlation calculation they prove to be similar ($r = .90$). However, at the local level, the presence of connections between SAP-PHQ2, SWB2-CAS1, PHQ1-CAS3, and SWB3-PHQ2 nodes that are not present in the Without COVID-19 network is observed in the With COVID-19 network. Similarly, the relationship between SAP and PHQ2 is present in the Without COVID-19 network and does not appear in the other contrast network. Finally, the EI shows a greater difference in PHQ2 and PHQ1 (**Figure 3**).

DISCUSSION

This study is the first to examine the relationships between depression, COVID-19 anxiety, well-being, and academic performance in Peruvian university health science students with COVID-19-infected relatives; through network analysis. This approach allowed us to examine partial correlations between nodes, which consists of establishing relationships after controlling for the relationship between other variables (Epskamp and Fried, 2018). Thus, we were able to examine the interaction between the constructs (Di Blasi et al., 2021) related to mental health issues, such as wellness, COVID-19 anxiety, depression (Levinson et al., 2017; Blanco et al., 2020; Robinaugh et al., 2020), and self-evaluation of academic performance.

In this sense, the first objective was to identify the interconnection between the nodes, observing that nodes PHQ1 ("Feeling discouraged, depressed or hopeless") and SWB3 ("In general, I am very happy and enjoy life") presented the highest relationship. That is, depressed mood is related

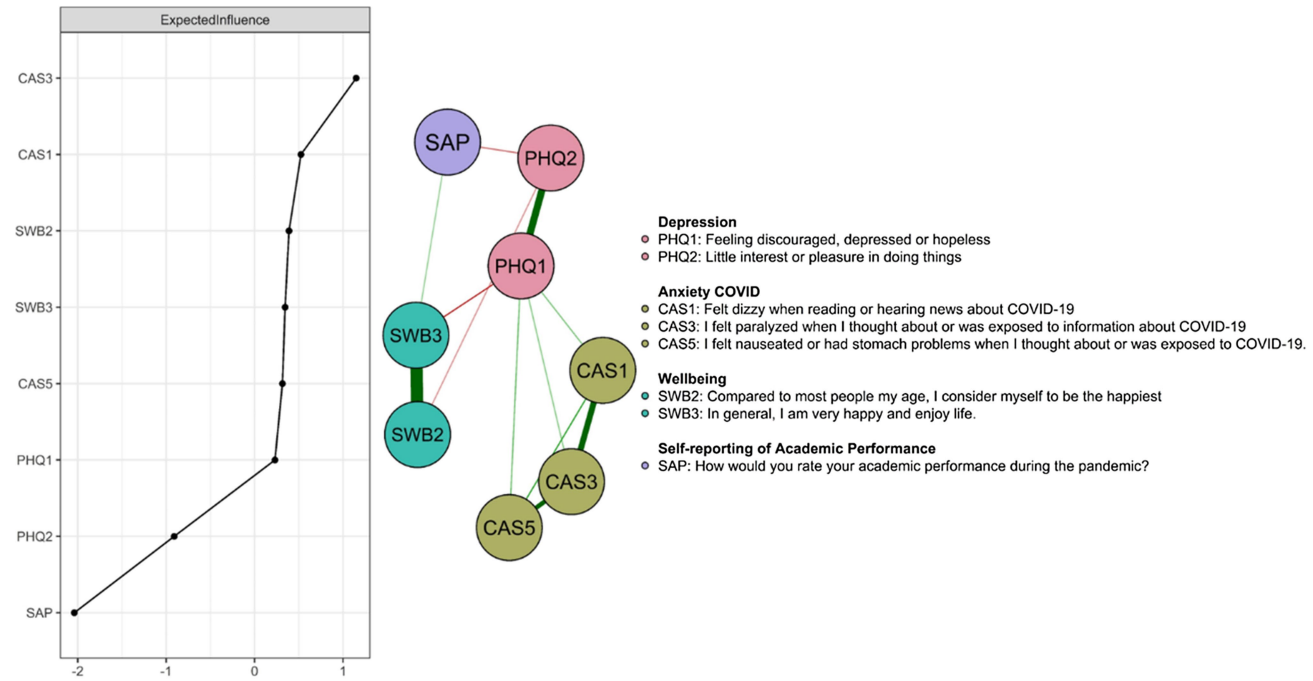

FIGURE 1 | Depression, COVID-19 anxiety, well-being, and academic performance in university students with COVID-19-infected relatives. The EIs are shown in the left panel. The phrasing of the coronavirus anxiety scale items was shortened in order to enter them in the Figure; for complete information on the items, see Caycho-Rodríguez et al. (2020).

to the experience of enjoying life; these findings are related to previous studies (Bartoszek et al., 2020; Blanco et al., 2020; Ceri and Cicek, 2021). In fact, this is to be expected because a study of health professionals estimated that the prevalence of depression during the pandemic reached 23% (Bartoszek et al., 2020), This situation suggests that this clinical symptomatology was also present in university students of health sciences. These findings suggest the need for positive interventions in health science students, which, according to a previous study conducted from the network approach, proved to be effective in reducing depressive symptoms (Blanco et al., 2020). They also emphasize that university students faced emotional instability during the pandemic (Copeland et al., 2021), which together with prolonged quarantine, fear of infection, boredom, and economic losses (Li et al., 2021) may have increased psychological distress in health science students.

A second objective was to identify the central node in the network. Thus, the two central nodes belonged to the COVID-19 anxiety community, such as CAS3 ("I felt paralyzed when I thought about or was exposed to information about COVID-19") and CAS1 ("I felt dizzy when I read or heard news about COVID-19"). These results indicate that anxiety about COVID-19 was found to be present as the most representative node in health science students. However, the study is not the first to demonstrate the importance of anxiety in university students during pandemic (Wang et al., 2020; Bai et al., 2021); but it is one of the first to examine from a network approach the relationships of this anxiety with depression, subjective well-being, and academic performance in health science students with relatives infected with COVID-19. In fact, this is important because previous studies in the general population of university students indicate that having a relative infected with COVID-19 significantly predicts increased anxiety and depression (Wang et al., 2020; Copeland et al., 2021) and increases three times more the risk of presenting depressive symptomatology (Wang et al., 2020).

A third objective was to compare the nodes according to whether the student presented COVID-19 or not. The findings indicate that globally the networks are invariant and the adjacent matrices are very similar. However, in the group of COVID-19-infected students, relationships appear between some nodes that are not present in the group of students who did not have COVID-19. First, SAP ("How would you rate your academic performance during the pandemic?") with PHQ2 ("Little interest or pleasure in doing things") this could reveal the impact of depressed mood on the evaluation of academic performance, which according to previous studies can be considered a central node (Bai et al., 2021), that together with some aggravating factors, for example, abuse in childhood may reveal the presence of sleep and concentration problems (An et al., 2021) negatively affecting academic performance and learning outcomes (Cuschieri and Calleja Agius, 2020; Fawaz and Samaha, 2021). Second, node SWB2 ("Compared to most

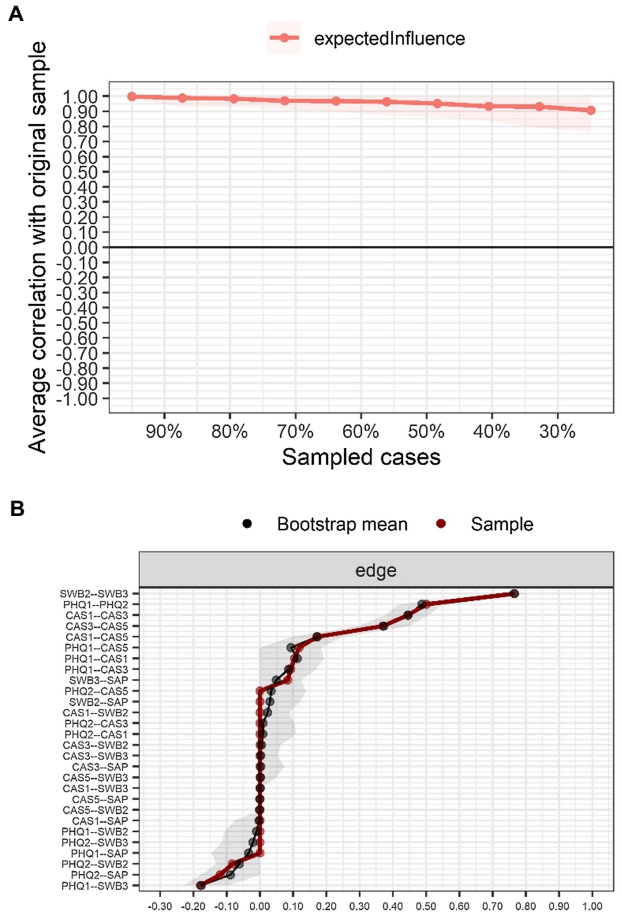

FIGURE 2 | Stability and accuracy of the network. **(A)** Stability of the EI centrality index; **(B)** Accuracy through the non-parametric bootstrap confidence intervals (95%) of edges estimated for the network.

people my age, I consider myself the happiest") and CAS1 ("I felt dizzy when I read or heard news about COVID-19"); this would indicate that a good state of physical health is necessary for a satisfactory evaluation of well-being (Melnyk et al., 2020). Third, PHQ1 ("Feeling discouraged, depressed or hopeless") with CAS3 ("I felt nauseous or had stomach problems when thinking about or being exposed to COVID-19"), suggesting that mood is highly correlated with being physically well; thus, people with illness demonstrate a greater predisposition toward depression (Melnyk et al., 2020). Fourth, SWB3 ("I am generally very happy and enjoy life") with PHQ2 ("Little interest or pleasure in doing things"), which is expected to appear in the network of people diagnosed with COVID-19 and not in people without this diagnosis. In fact, some previous studies warned of these results (Bartoszek et al., 2020; Blanco et al., 2020; Ceri and Cicek, 2021). These findings are relevant because they point to the presence of relationships of abulia and well-being in the population of students having relatives with COVID-19. Finally, in the network of people who did not present COVID-19, there is a relationship between SAP ("How would you rate your academic performance during the pandemic?") with PHQ1 ("Feeling discouraged, depressed or hopeless"), which is another symptom of depression. Here it is interesting to underline the existence of third variables in the performance evaluation, such as self-concept, self-esteem, and adverse experiences (Wong et al., 2019) that may have generated the absence of this interaction in the network of COVID-19-infected students.

The findings found present strong theoretical and practical implications. The fact that the core nodes of the network are COVID-19 anxiety provides support for models that emphasize the role of anxiety in the higher education setting (Wang et al., 2020; Bai et al., 2021). This is consistent with the substantial anxiety increase during the pandemic (Liu et al., 2021), which leads us to pay attention to anxiety in university faculties when blended learning is implemented in March 2022 in Peru. Secondly, it is interesting to examine the presence of greater interconnections of depressive symptoms in the group of students who were infected by COVID-19; apart from having had a relative infected by COVID-19, it warns of the need to provide protective factors for depression (Wang et al., 2020) because the conditions of personal adversity together with low tolerance to distress favor the presence of a negative mood, sleep, and concentration problems (An et al., 2021). In a practical way, it is expected that the results can be used to consider the anxious–depressive symptomatology in the prevention, diagnosis, and treatment plans of the psycho-pedagogical departments of the universities; which, as shown by this study, are related to the well-being and evaluation of academic performance. This is extremely important in health sciences students because once the containment measures are lifted and blended learning occurs in universities, they will be the most exposed to COVID-19 infection (i.e., professional practices and patient care support); ergo, an increase in anxiety toward COVID-19 infection (Bai et al., 2021). Finally, it is important to note that a COVID-19-infected family member affects the student's well-being by increasing stress, anxiety, and depression (Mazza et al., 2020; Zhao et al., 2020). In fact, if the family is understood as a system, the affectation of one of its members can cause changes in the other members. Specifically, the care required by a sick family member demands high levels of stress and depression, and the unpreparedness of family members to provide such care causes emotional exhaustion (Sheth et al., 2021).

Despite the interesting findings, the study has certain limitations. First, the participants were selected with a non-probabilistic snowball design. This affects inferences and hinders the ability to generalize. However, in some cases, probabilistic designs are complicated, and non-probabilistic designs tend to be preferred (Fricker et al., 2019); In addition, collecting random data virtually is complex during the pandemic. Second, there is a wide difference between those diagnosed and those not diagnosed with COVID-19, due to the sample design; nevertheless, it would be advisable in future studies to work with equivalent groups. Third, there was a difference in the number of women and

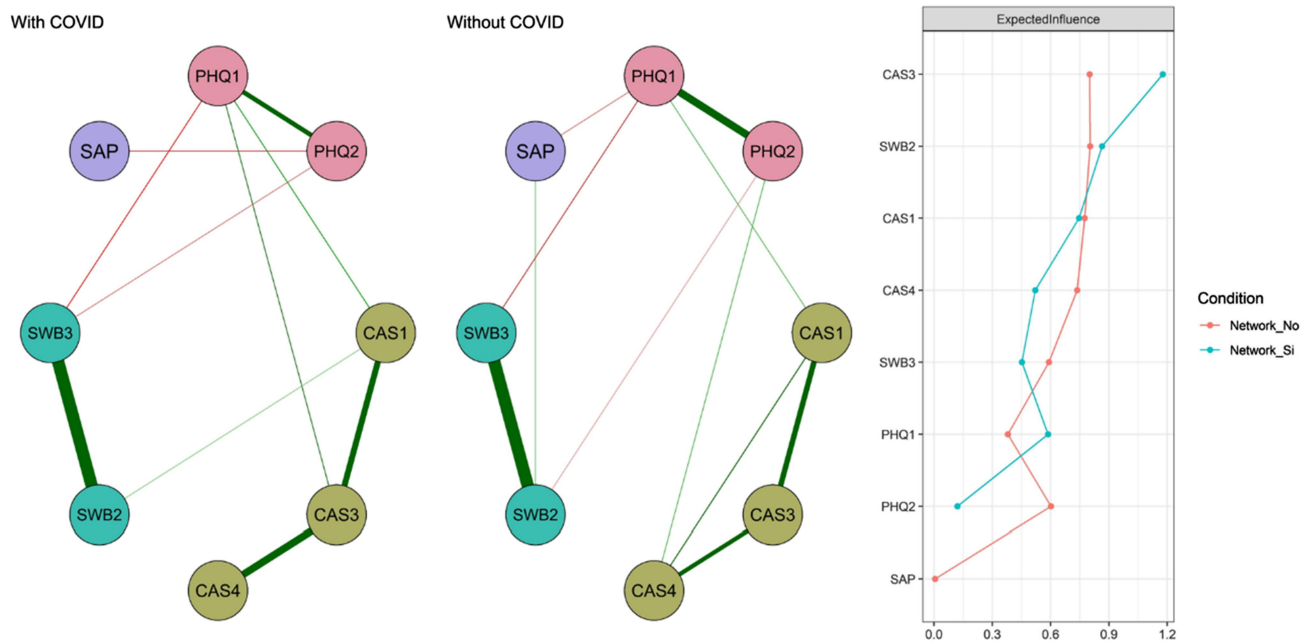

FIGURE 3 | Networks according to the presence or absence of COVID-19 diagnosis in the student. Network_No indicates the centrality measure for the Without COVID-19 group and Network_Yes for the With COVID-19 group.

men, which is to be expected because the proportion of women is always greater than that of men in health sciences careers; however, in future studies that seek to compare by gender, it would be ideal to reduce the sample differences according to gender. Fourth, the test items were phrased to incorporate expression *during the pandemic…* generating a retrospective evaluation of the participants; this evaluation of past behavior may have caused a bias; but these modifications may still be relevant in cross-sectional studies (Blome and Augustin, 2015).

CONCLUSION

In this paper, we examined the interaction between depression, COVID-19 anxiety, well-being, and academic performance in Peruvian university health science students with COVID-19-infected family members. The results indicate that the nodes of PHQ1 ("Feeling discouraged, depressed or hopeless") and SWB3 ("In general, I am very happy and enjoy life") presented the highest interconnectedness. The nodes with the highest centrality were also identified to be those pertaining to COVID-19 anxiety. In general terms, the networks behaved similarly in the comparisons; nevertheless, there are connections in the network of COVID-19-infected students that are not in the group that did not present this diagnosis. Finally, we encourage further examination of relationships on mental health variables in health sciences students to understand the impact of COVID-19 on this population.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Universidad Privada del Norte Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JV-L: conceptualization, investigation, methodology, supervision, formal analysis, and writing—original draft. TC-R: conceptualization, investigation, project administration, supervision, and writing—review and editing. KT-S: conceptualization, investigation, project administration, and supervision. KC-V: conceptualization, investigation, supervision, and writing—review and editing. All authors contributed to the article and approved the submitted version.

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Wellbeing of School Communities in the Context of COVID-19 Pandemic: A Qualitative Study in Chilean Low-SES Schools

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The COVID-19 pandemic continues to impact schools and how education is conveyed to students. One of the aspects that has gained strength is supporting the wellbeing of educational communities. The purpose of this study was to describe and understand the construction of school wellbeing during the pandemic, based on the notion of collective and sustainable wellbeing. Through a qualitative design, we conducted a study in four Chilean low-SES schools in which a national school mental health program is implemented. A total of 41 in-depth interviews and one group interview were conducted with students, parents, teacher, teacher assistants, school principals, psychosocial professionals, and the school mental health officers during the second half of the 2020 school year. Thematic content analyses showed that, while facing the school closure challenges, schools strived to protect students' and teachers' wellbeing. However, participants highlighted necessary conditions for sustaining the school community's wellbeing and mental health in the context of the COVID-19 pandemic: assuring digital connectivity for all students; coordinated work with families and within the school; strengthening networks; curriculum adaptation and diversified pedagogical strategies; and emotional support toward teachers, families, and students. We discuss these findings and their implications for a sustainable and collective perspective of the wellbeing of school communities in low-SES schools, as well as for policy, practice, and research from the perspective of schools for social justice and health promotion.

Keywords: mental health, wellbeing, school, pandemic (COVID-19), Chile

INTRODUCTION

The COVID-19 pandemic continues to affect school communities and the way education is conveyed to students. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020), the pandemic is the biggest school disruption in history. In this context, the World Health Organization (WHO, 2021) recommendations for schooling during

COVID-19 highlights the relationship between the education and the health of children, and seeks for countries to recognize and strengthen this link by paying attention to the conditions and opportunities that are generated to promote social wellbeing and mental health of the different members of the school community (Duff et al., 2016; Velasco, 2021). In spite of these efforts, the COVID-19 pandemic threatens to perpetuate and increase inequalities and vulnerabilities, especially in lower income countries (Organisation for Economic Co-operation and Development [OECD], 2021).

At the beginning of the pandemic, most countries took multiple actions to close their schools and continue with the provision of educational services focused on curricular advancement and the use of technologies for distance and remote education (Brítez, 2020; Moreno, 2020). School closure has not been equal in depth and breadth between and within countries, with longer full or hybrid forms of school closure affecting students and families from lower-SES backgrounds (Garrido, 2020). The consequences of school closures include adverse effects on children and adolescent's mental health and wellbeing, such as increases in an unhealthy lifestyle (Rajmil et al., 2021), symptoms of depression and anxiety (Meherali et al., 2021; Minozzi et al., 2021; Rajmil et al., 2021), and decreased life satisfaction (Rajmil et al., 2021). The impacts of the COVID-19 school closures on teachers have also been documented, and include burnout and stress (MacIntyre et al., 2020; Hascher et al., 2021; Pöysä et al., 2021). However, certain contextual aspects (e.g., school resources and collegiate support) as well as individual characteristics (e.g., coping strategies) have been identified as factors that help teachers to maintain their wellbeing (Hascher et al., 2021).

Teachers respond to students' academic, physical, and emotional needs through positive teacher-student relationships (Jones and Kessler, 2020), which contributes to students' wellbeing (Lavy and Naama-Ghanayim, 2020; Johnston et al., 2022). However, research on the ethics of care in the context of the pandemic has revealed that social expectations exist to a greater extent toward women teachers, who in a feminized career such as teaching, are often seen as those in charge of care and professional emotional management, playing multiple roles both for their own families and for the community educational (Rodriguez et al., 2022), which places the threat of increasing gender inequalities in teacher development (Kelleher, 2011; Gluz and Elías, 2020). In Latin America, digital connectivity and the economic resources that families own are worse and weaker in terms of availability, accessibility, acceptability, and adaptability (UN General Assembly, 1996) than those in Europe and Asia (Almazán, 2020; Reimers and Schleicher, 2020). This makes universal online or virtual learning practically impossible without adequate policies and resources (UNESCO, 2020), placing high levels of stress on teachers and leaving them to cope with their own individual resources for distance learning. Research in Latin American countries shows that teachers' efforts, in many cases, have shifted from the teaching of disciplinary contents to the emotional containment and concern for the wellbeing of their students (Ramos-Huenteo et al., 2020; Sáez-Delgado et al., 2020). Perhaps all of these factors, jointly, might explain why Latin-American research has shown that distance teaching during the COVID-19 pandemic has been harder for female teachers, for young teachers, and for those who teach in low SES schools (Gluz and Elías, 2020; Salas et al., 2020; López et al., 2021a; Troitinho et al., 2021).

Although recent studies have contributed knowledge on the wellbeing of different actors in the school (Organisation for Economic Co-operation and Development [OECD], 2017), their development is still incipient, and the approach is mainly from quantitative perspectives of individual evaluation, or qualitative reports of student's emotions and experiences (Scott et al., 2021). There are few studies that analyze the subjective experiences of the entire school community, but there is scarce evidence in the context of the pandemic crisis. In this study we understand wellbeing from a sustainability approach (Hargreaves, 2002; Shirley et al., 2020) and a collective perspective (Ramírez and Alfaro, 2018; Ascorra et al., 2021). The sustainable approach emerged in the 1980s (Suzuki, 2003) to refer to an interconnected system of durable human and natural value, where the survival and prosperity of species depends on maintaining the value of biodiverse environments (Hargreaves and Fink, 2000; Hargreaves, 2002). Applied to education, a sustainable approach asks about: (a) depth, referring to improvements that have human and moral value and support the learning and wellbeing of students and educators equally; (b) breadth, referring to improvements that extend beyond the individual level and highlight collective practices such as solidarity and cooperation; (c) length, referring to the prolonged duration of improvement over time with environmental impact; that is, improvements to students, teachers and schools that do not harm others; (d) diversity, refers to the non-standardization and homogenization of school processes; (e) restriction and renewal of energy, refers to the fact that changes should not overwhelm or exhaust human energies; and (f) conservation: refers to the recovery of the past to create the future.

The collective perspective of wellbeing aims to overcome the individual conception, which focuses on strengthening personal skills such as self-esteem and optimism to the detriment of collective skills such as cooperation (Ecclestone and Rawdin, 2016). Individual perspectives of wellbeing are criticized for overwhelming teaching and non-teaching professionals in schools to provide personalized attention to students, resulting in a predominantly individualistic culture (Gather-Thurler, 2004). In contrast, a collective perspective of wellbeing interprets wellbeing linked to the community, a territory, and a specific historical moment (Wyn et al., 2015; Ascorra et al., 2021). It also requires an organizational view of how to provide the conditions and opportunities for sustaining and strengthening the school community's collective wellbeing through the interactions between the material/physical conditions, the deep values and moral principles, and the interactions between the different school actors.

Although scarce, there are a few studies which begun to study collective perspective of wellbeing during the COVID-19 crisis. Rivero and Bahena (2021) in Mexico, which questioned educational relationships and student wellbeing, emphasizing the

interactions of the entire educational community. The study showed that general wellbeing is linked to the interaction of the different educational actors, and that this can be positive, even in virtual environments, in confinement, and in the midst of a crisis. In African countries, Ebersohn (2020) argues that a phenomenon he called "collective resilience" began to emerge. These are forms of spontaneous social and collective support within schools, aimed at promoting collective wellbeing. According to the author, the crisis contexts in Africa led people to mobilize different social resources, and in the scenario of the current pandemic, education is having a leading role from an intersectorial point of view. He argues that collective wellbeing in poor countries is only possible if support is activated in all directions and includes all actors in the school system.

Context of This Study

The health crisis for COVID-19 surprised the Chilean educational system in the context of a social outburst known as the Chilean 2019 Spring, and in the transition toward a more inclusive State, through a new Constitution which is under draft, and a more inclusive education, with a recently passed Law on Inclusion and Law on Public Education, both with gradual implementation. Pre-pandemic, the implementation of both laws came into tension with a parallel context of high stakes testing through a nationally standardized testing system (SIMCE) with high consequences for low-performing schools, including school closure. Research shows that the translation of education as a human right and as social inclusion is made "the Chilean way" (Sisto, 2020), through a voucher system based on student attendance and high pressure on student's achievement, that generates a consequent reduction of the curriculum focused on the high-stakes core subject areas of language and mathematics, and a tendency to apply differentiated treatments to low- versus high-performing students, with moral classifications of students as good or bad students based on their achievement (Ramírez et al., 2021).

The above context of the Chilean school system has been reported in the literature as a unique social space that allows analyzing market and accountability policies that pressure schools based on fear (Parcerisa and Falabella, 2017; Oyarzún, 2021). However, while it controls and monitors, the Chilean state also promotes educational policies that support schools in their wellbeing, such as the Life Skills Program (*Programa Habilidades para la Vida*, known as HpV). The HpV Program is a school mental health program that incorporates risk detection and prevention actions, providing pedagogical and psychosocial support that aims at vulnerable students, including support systems for improving school climate. The HpV Program is one of the world's largest school mental health programs in breadth and scope (Murphy et al., 2017).

This ambivalence makes it interesting to investigate how wellbeing is addressed in such a critical context as the COVID-19. In Chile, one of the main public concerns during the current pandemic crisis in the education system is the "wellbeing of school communities." This strong idea, wielded by both representatives of the College of Teachers and the Ministry of Education, comes into conflict when defining how to safeguard the wellbeing of school communities. During the COVID-19 crisis, the high-stakes SIMCE test and teacher evaluations have been suspended, but there has not been a policy of universal or prioritized access to technological devices and digital connectivity for lower SES students, leaving many students at the mercy of their families' resources and time to reduce barriers to access distance education.

The situation improved during the last semester of 2021 when public schools were authorized to allocate the budget of their School Improvement Plans (Plan de Mejoramiento Escolar, PME) to buy cell phones, tablets, and mobile data plans for students. However, during the year 2020, which is when the interviews of this study were carried out, many students from lower SES schools were experiencing the digital gap (Centro de Investigación Avanzada en Educación [CIAE], 2020) and were not yet advancing to in-person teaching. As opposed to many European countries, where schools were the last to close and the first to reopen, in Latin American countries including Chile, hybrid forms of in-person classes did not begin to appear until 2021 with unequal progress in favor of private schools. This meant that, for most students in public schools, more than a year and a half passed before in-person schooling was again available for them.

The government's strategy for the wellbeing of educational communities, and reducing learning gaps, also consisted of the creation of the "Aprendo en Línea" platform and a Digital School Library, without the consumption of the telephone data plan; the airing of the television signal "TV Educa Chile" to transmit educational entertainment content related to the curriculum of the first years of primary school; delivery of printed material in rural and vulnerable areas; a free Connectivity Solidarity Plan to provide internet for customers of some phone companies; the maintenance of food delivery by the JUNAEB (Public institution created by the Ministry of Education, responsible for providing support and scholarships to students) who supplies the School Meal Program; material for the socio-emotional accompaniment of teachers, students and families; and a proposal for curricular prioritization of learning objectives that was presented 3 months after the schools closed (Garrido, 2020; Belmar-Rojas et al., 2021).

In this context and based on the notion of school wellbeing as a collective and sustainable construct, the purpose of this study was to describe and understand how schools who cater for students from low-SES backgrounds generate and sustain the wellbeing of their school during a pandemic crisis.

MATERIALS AND METHODS

Design

In this study, we used a phenomenological-hermeneutic qualitative design (Willig, 2008; Fuster, 2019) that allowed us to understand the meanings and practices in a specific and contextualized way from the perspective of the actors themselves (Denzin and Lincoln, 2003; Flick, 2015). Specifically, the four phases recommended by Fuster (2019) were carried out, allowing access to an in-depth understanding of the meanings surrounding the everyday experiences in the educational reality:

clarification of assumptions of the research team, collection of the experience of educational communities in relation to collective wellbeing and the pandemic, reflections on the experiences lived with the people interviewed, and writing about this lived experience.

Participants and Data Production Techniques

The study was carried out in four schools in the central area of the country (see **Table 1**). The criterion to choose each school was its theoretical relevance which was given by the context of the digital gap generated by the lack of connectivity of the students due to the lack of availability and accessibility of technological resources. These conditions were present mainly in lower SES schools. Therefore, we selected state-funded schools – public schools and privately subsidized – that met the following criteria: (a) the students come from families of low socioeconomic levels, (b) all the schools had the Life Skills Program (HpV), which is a psychosocial intervention program that incorporates risk detection and prevention actions providing pedagogical and psychological support for vulnerable students (Murphy et al., 2017).

We conducted a total of 41 individual in-depth interviews. The sampling was intentional, and sought to cover the diverse experiences, perspectives, ideas, and opinions of school principals, teachers, teaching assistants, psychosocial professionals, families and students, in the different school cycles of primary schools (which in Chile include preschool, elementary and middle school). All these actors were selected because they were characteristic cases of each school, since they had been working for more than 3 years or had a relationship with the school, participated actively in different activities to deal with the consequences of the pandemic, and agreed to participate in the interviews. Despite this narrow selection, this study sought to. To this end, we contacted the interviewees with the help of each school's administration, and stopped collecting information when new themes ceased to emerge (see **Table 1**).

Table 2 shows the interview scripts for each type of school actor. As can be observed, interviews followed a general overall sequence in which we asked about participants' general school experiences and emotions during the COVID-19 pandemic; classroom, school, and cultural/policy factors related to this experience; and their evaluation and future expectations.

Procedure and Ethical Considerations

The interviews were carried out during August to October 2020 by one of the members of the research team through the Zoom virtual communication platforms. Interviewers agreed previously on the conditions and confidentiality protection. This agreement was supported by the signature of the researcher and participant of the letter of consent following the regulations of the Bioethics Committee of first author's institution. All participants signed informed consent forms, and students signed informed assent forms. The most important ethical safeguards with the students were in the interview process, where we were careful not to ask questions that could revive fearful experiences that could induce re-traumatization (Watson et al., 2022). We asked them to tell us about their needs through simple examples that would allow us to describe a common day, and we avoided delving into experiences of great discomfort. In addition, we emphasized that if they wanted to withdraw or call their mother or father, they were completely free to do so whenever they wanted. The results of this study produced inputs for the HpV Program to promote the wellbeing of school communities in the COVID-19 context as part of its programmatic actions, and therefore, the main results of this study were informed to the program's central and regional teams.

Data Analysis

Data were analyzed using content analysis. This analysis responded to the phases of content analysis of the phenomenological-hermeneutic method. First, successive readings were made of the entire corpus and then, preliminary coding was done for each actor in order to have a manageable subset of data (Fuster, 2019). To do this, we organized the information around the themes of the interviews, assigning emergent codes within each theme. We constructed a total of 213 codes. Those that had more associated textual quotations were categorized by grouping them into large common themes. We did this procedure within each group of actors (teachers, families, students, etc.) and then, we contrasted them in order to have a global and broad look at the themes in a cross-sectional way (Denzin and Lincoln, 2003; Flick, 2015). In this way, we obtained six broad and common categories, some of which are more represented within some actors (see **Table 3**).

RESULTS

Results from the thematic content analyses showed that, when in the face of a major crisis, schools strived to protect students' and teachers' wellbeing. During the course of the interviews, however, participants revealed that certain conditions are needed to sustain the safeguard and wellbeing of the school community in the present and future. **Table 3** presents the general categories per type of school participant. The results show six dimensions that characterize, from the voices of the school community, the necessary conditions to promote and protect their wellbeing in the context of the COVID-19 pandemic: (i) assuring digital connectivity for all students; (ii) coordinated work with families; (iii) coordinated work at school; (iv) strengthening networks; (v) curricular adaptation and diversified pedagogical strategies; and (vi) emotional support toward teachers, families, and students.

Assuring Digital Connectivity for All Students

One of the most important aspects raised by principals and teachers in all schools was the importance of promoting the conditions to ensure digital connectivity of all students. In this regard, one of the principals pointed out that one of the main problems was that in her school, the students come from families with low economic resources, so they do not have the means to pay for internet connection:

TABLE 1 | Participants and data production techniques.

Participants	Type of school administration	School vulnerability index (% of low-SES students)	Region	Participants interviewed	Individual interviews (N)	Group interviews (N)
School 1	Municipal	92%	Valparaíso	Principal	1	
				Teachers	3	
				Education assistant	1	
				Parents	3	
				Students	3	
School 2	Municipal	89%	Valparaíso	Principal	1	
				Teachers	3	
				Education assistant	1	
				Social worker	1	
				Parents	3	
				Students	2	
School 3	Subsidized private	94%	Valparaíso	Principal	1	
				Teachers	3	
				Education assistant	1	
				Parents	3	
				Students	3	
School 4	Subsidized private	94%	Valparaíso	Principal	1	
				Teachers	2	
				Education assistant	1	
				Parents	2	
				Students	2	
HpV program				Program officials		1
Total					41	1

"We have a vulnerability index, the last one given to the school is more than 90%, therefore, it is very high, the parents do not have connectivity, and generally, there is only one cell phone, and the mother who works or the father who arrives in the afternoon uses that cell phone, and that is the reality."

(School Principal, School 3).

While schools remained closed, the internet system became a fundamental tool to continue remote and distance education. In this sense, the emphasis was placed on the importance that all students, as well as the different actors of the school community, had access and good connectivity to promote the learning and "not some more than others."

"I believe that [sighs] *obviously in this way, strengthening all the shortcomings that we are encountering along the way, having better connectivity, that we all have access, not that some more than others, eh, that they take us all the same, in the sense that, without seeing who is a teacher, who is a principal, who is an assistant, but that we are all a contribution and that we have the same, eh accesses, eh. and obviously strengthening everything in which we are a little weaker, to be able to support the parents more* (.) *so that they too can, eh, have, eh, the possibility of being able to participate in this and that their children learn."*

(School Principal, School 2).

To ensure connectivity, schools reorganized the available resources with the cost of running out of budget for other activities:

"Today we are working on our school improvement plan with the purchase of tablets for all students, the 434 students of our school, plus a Bam, which is a modem for connectivity for the 434 students, that meant running out of money, without resources, for other initiatives that were proposed or that I was thinking of a-, initially, but as long as I cannot connect with my students I cannot do any other activity, everything else is postponed and here there is a basic need that must be met."

(School Director 2).

Based on this new reality and conditions, school principals and teachers mentioned that progress must be made toward improving connectivity for remote and distance education, the management of ICTs, and technological implementation, allowing adaptation to the new future virtual scenario. In this regard, a teacher points out:

"So maybe I don't know if as a government I would say hey, just as they have guaranteed food, they have guaranteed connectivity, in the same way that students here in Chile have a reduced transport fare, they could have reduced connectivity [fare] *up to high school, and even college students, they could have reduced connectivity* [fee], *to me that is a question that kept me spinning, that is, the only way that we can have and make sure that the child has access to education is that he is only connected, it's the only way."*

(Teacher, School 2).

Close Coordination With Families

Another aspect mentioned by the different actors of the school was the importance of maintaining a close relationship and

TABLE 2 | General interview scripts per actor with sample questions.

	Overall school experience during COVID-19	Classroom factors	School factors	Cultural factors	Evaluation and future expectations
School Principals	How has your experience as a school principal during the pandemic been?	During the pandemic, how has the learning process been conducted? What has worked well? What needs to be improved?	Regarding management, how has the school supported pedagogical and socioemotional needs? Which actor have played a key role in school management in this crisis context?	Regarding educational policies, what is your opinion -and experience- regarding how the health crisis has been managed? Concerning the management of this school, how has your experience been regarding the supports and pressures in this crisis context?	From the role you play in school, what have been the most favorable and unfavorable aspects you have experienced during this crisis context? ¿ What do you expect should happen in the future?
Teachers	How has your experience as a school teacher during the pandemic been?	During the pandemic, how is the learning process being conducted? How was the planning, preparation of material and implementation of classes been conducted?	How has your relationship with the different actors of the school community?	Regarding educational policies, what is your opinion -and experience- of how the health crisis was managed?	From the role you play in school, what have been the most favorable and unfavorable aspects you have experienced during this crisis context? ¿What do you expect should happen in the future?
Teaching assistants	How has your experience as a teaching assistant during the pandemic been?	During the pandemic, how is the learning process being conducted? What is the role that teaching assistants had during the non-face-to-face period of classes?	How has your relationship been with the various actors in the educational community?	Regarding educational policies, what is your opinion -and experience- of how the health crisis was managed?	From the role you play in school, what have been the most favorable and unfavorable aspects you have experienced during this crisis context? ¿What do you expect should happen in the future?
Parents	How has your experience as a family been during the pandemic with this school and its activities?	During the pandemic, how has the learning process been conducted? What were the requirements made by the school, and how has this affected your family?	How has your relationship been with the different actors of the school community?	Regarding educational policies, what place does school take for you as a family in this pandemic? How was the experience of reconciling family and work with school life been?	From the role you play in school, what have been the most favorable and unfavorable aspects you have experienced during this crisis context? ¿What do you expect should happen in the future?
Students	How has your experience as a student been during the pandemic with this school and its activities?	During the pandemic, how has the learning process taken place? What works well? What needs to be improved?	How has your relationship been with the different actors of this school?	Regarding educational policies, what is your opinion about the general situation of the country and how this has affected the "school at home?" How has the experience of reconciling family with school life been?	From the role you play in school, what have been the most favorable and unfavorable aspects you have experienced during this crisis context? ¿What do you expect should happen in the future?
Skills for Life Program officers	How has your experience as an executor of the Life Skills Program during this pandemic been?	During the pandemic, how has the learning process been conducted? What worked well? What needs to be improved?	From the role you play, in what aspects have you been able to participate and influence the school management?	Regarding educational policies, what is your opinion -and experience- of how the health crisis has been managed? As for working at a school, how has your experience been regarding the supports and pressures to do your job in this crisis context?	From the role you play in school, what have been the most favorable and unfavorable aspects you have experienced in a crisis context? ¿What do you expect should happen in the future?

Access to the complete version of the scripts is available upon request to the first author.

TABLE 3 | Analytical categories per type of school participants.

Categories	Participants					
	Principals	Teachers	Psychosocial professionals	Parents	Students	HpV
Assuring digital connectivity for all students	x	x				
Coordinated work with families	x	x	x	x	x	
Coordinated work at school	x	x	x	x	x	
Strengthening networks	x	x		x	x	
Curriculum adaptation and diversified of pedagogical strategies	x	x		x	x	
Emotional support toward teachers	x	x	x	x	x	x

coordinated work between the school and the families. The coordinated work became essential in the context of a pandemic since contact with students, especially those who are in pre-school and primary, is through parents and/or guardians. This contact implies a new challenge for the schools, since it means, first, knowing the reality that each family is experiencing:

> *"We began to interview each of the parents, we called each of the parents by phone, we made WhatsApp groups of the classes with all the parents, once we implemented this survey and more or less, we knew how many people had access to the Internet and who did not, we began to work differently, we began to record videos."*

(Special education teacher, School 2).

This first task not only implies having a comprehensive view of the reality of the families but also of each of the members of the school staff. In all schools and to all types of school participants (see **Table 2**), this contributed to the collective sense that *the school cared* and that families were not going to be left alone:

> *"Before starting with the printed material, the first thing that was done was a work of connection with the families via cell phone. We spend all the minutes, all the* [digital] *plans of all the school staff* [which were self-funded by each staff member] *eh, the* [psychosocial] *duo* [school psychologist and social worker] *and the [director's] team, calling the families and calling the staff themselves, the teachers themselves, the workers themselves, that is, we considered that it was important that to move forward, we had to have our workers connected and feeling that we were worried about them, it was the first thing, and secondly, for the families, that they saw that the school had not left them alone."*

(School Principal, School 2).

Therefore, for the schools, one lesson learned from the health crisis was that a necessary condition to favor the learning and wellbeing of the students was maintaining close and permanent contact with the families:

> *"Well, I think it has to start from generating spaces of trust, starting with that. Because, for example, I have always tried to the students and the parents "whatever you need, you just call us," and this was achieved at the beginning* (.) *This was a whole process, at the beginning, a process of adaptation. Now I believe that it is necessary to start from the base of generating trust, of understanding that even though we do not know each other that much because we are all new at the school."*

(Teacher, School 1).

Families highly valued the fact that schools maintain permanent contact with them and attend to their different needs. For them, "closed contact" means establishing an open-school system that allows them to make consultations and receiving guidance from teachers to provide better support in their children's homework:

> *"Once a week the school is open for all kinds of inquiries, or especially now to the, for everything for the eighth year that I had to apply for, for the high school because, sometimes, and even the school is the one that looks for the parents who forget to apply for the children* [referring to the School Admission System for entering high schools in schools who are only k-8]."

(Parent, School 4).

> *"More has happened to me in mathematics, that has been hard for me, they say they are ready eh exercises and they are badly done, but eh I had to correct this and that and if you* [as a parent] *don't know how to do it, she (the teacher) writes me, in fact she even sent me a draft in a notebook so that I could understand it better, and the fact is that I understood it better and in this way one* [as parent] *can explain it* [to his/her child]."

(Parent, School 4).

In the same way, students recognized the efforts and concern of their schools in using different strategies to ensure that students could access and remain in school:

> *"The school has also been very concerned about students who do not have internet to attend classes. They have a transport that goes to the community, for example, from here in Cartagena where I live, to Quisco and El Tabo, which will deliver guides so that the students are not totally lost."*

(Student, School 1).

Coordinated Teamwork at School

Another of the conditions necessary to promote the wellbeing of the school community was coordinated teamwork at school. This aspect was especially raised by school principals, school staff, parents, and students, who argued that holding periodic meetings of the management teams with other school-level stakeholders as well as knowing the opinions of the entire school community are a key aspect to making consensual decisions that are pertinent to the changing needs of the health crisis:

> *"In fact, we had the last meeting with the school council, which we are also complying with that rule of the four* [annual] *meetings*

and everything and sending it to the provincial [school district authority]. *And we had the president of the student body give us super good ideas, she said "I can also cooperate," and that is something that we did not exploit, the capacity of the students."*

(School Principal, School 3).

In this regard, students positively value when teachers generate the instance to talk with them about education in the current times of pandemic:

"There are some teachers who there is nothing to say [meaning they are great], *because yesterday, at least with the principal and some of the technical staff that there are in the school, they called me and some other classmates for a meeting similar to this one, to talk about the, the education in the pandemic,* [to talk about] *teachers, to talk about ourselves, about the vision that we have as students, about the online classes. On what things we could contribute to make the classes better."*

(Student, School 4).

Simultaneously, the importance of collaborative work between teachers is emphasized, which allows maintaining good working relationships, as well as benefiting from the support of their peers, especially in the new remote and distance education scenario with the consequent use of ICTs:

"Other colleagues, it has been, uh, super good because we had like the time and, of course, now that we are on the subject of social networks, one asks the other "hey, what did you do? How did it work? Look, you know I have this idea, I want to do something", and between conversations, we support one another. Among colleagues, at least, the support is working super well, eh, the coordination we have between us is working super well."

(Teacher, School 2).

Another aspect that is central to schools is the fact of strengthening coordination with the psychosocial teams of the schools. In Chile, the psychosocial team is the name given to the coordinated work of school psychologists and social workers (López et al., 2021a). Coordinating with them is known as especially relevant to meet the various needs and demands of the pandemic:

"The difficulties that each of the families present, we now have, great support is formed, eh, psychological, of school climate [team], *we have a counselor. This year created something that, was not as strong before and now it is happening, and we are caring a lot for all the families who are with many problems, because there are many cases that we do not even know what is happening, so it is about reaching out the largest number of people."*

(School Principal, School 1).

Parents helping each other is also recognized as a facilitator:

"For example, many parents don't have [access] *to connect to YouTube, but it is not only for example to share the videos among us, that is, we download it, we send it to them, and so they can have access."*

(School Principal, School 4).

Finally, students also recognize how important it is to maintain the bond and contact with their classmates as a way of helping and accompanying each other:

"Among friends, eh, we talk so as not to lose communication, which is the most important thing. Because, with the issue of the pandemic, the communication, I, in many cases it has lost a lot, a lot of strength. Because we are all locked up, and the. And the physical contact that may exist, which existed before when classes did not exist, right, it's not there now. So, one must cope by talking to people, not losing contact and that is what we do."

(Student, School 4).

Strengthening Social and Emotional Support Networks

One aspect highlighted by schools to favor the wellbeing of families and students in the context of a pandemic is related to generating and/or strengthening social and support networks with other ministerial and local programs. The articulation with networks is mentioned, not only through work done by psychosocial pairs who can focus on vulnerable situations but also through the support that the Ministry of Education and the municipalities can provide to schools:

"In other words, here the support networks for the schools are fundamental, the work that [names the HpV Coordinator in the school] *does with his people, the work that the Ministry will have to do as well, the work that the municipalities have to do, that is, we will have to unite all these positive forces to make this happen."*

(School Director 1).

In this sense, one of the contributions most mentioned by the management team was the support received by the school mental health program (HpV) and by the drug prevention program SENDA, as well as the work carried out by the school psychosocial teams:

"HpV on one side, SENDA is also helping us in the same way, which is in [emotional] *containment, the DAEM* [municipal authority] *has a unit that deals with psychosocial issues that also supports us* [although] *more, I would say farther away than close, but they do things, and the other for example, is the work that my psychosocial duo is doing, right? So, we maintained this contact with SENDA, HpV and we are quite good, the material that arrived is good, eh. I hope, I hope that my colleagues can also implement it."*

(School Principal, School 1).

This support from the networks is also perceived as very relevant for teachers, since they recognize that the activities generated, especially by the HpV Program, allows student to access other types of social and emotional supports:

"Look, I think there is something super important, very important, at least that I, I insist, I value it very much, and it is the HpV program. (. . .) *When they come to school it's like, to the courses, it's like "oh, how delicious!" and "how beautiful the activity was" and suddenly they leave them* [emotionally, cognitively] *touched."*

(Teacher, School 3).

Likewise, from the perspective of the parents and students, one of the aspects most mentioned was the management and coordination that both the schools and the municipalities carried out to ensure that families receive the States' public-school food for lower SES students:

"We have received here at home, we have been receiving the [food] *box from the JUNAEB* (National Board of Student Aid and Scholarships)*, and, the municipal truck also delivered, passed by delivering merchandise."*

(Parent, School 1).

"We received it, yes, yes, and they also made like another box of merchandise when eeh they knew that one did not, because they were pending if they had eeh, what's it called, parents working, some were left without work and they supported them in giving them another box of merchandise, they came to leave it at your house, pending if something was missing, and all."

(Parent, School 1).

Curriculum Adaptation and Diversified Pedagogical Strategies

Curricular aspects have been a central aspect that schools must rethink to generate the best conditions for remote and distance learning for all students. In this sense, schools reflected on the amount of content required by the national curriculum and prioritized those contents that they considered essential:

"So, we are talking about the fact that today the Chilean curriculum is extensive and could definitely, eh, certain essential learnings are prioritized over others that are not so essential, because they are contained in the previous ones, Ehm, they are more inclusive, umm, they are more integrative. So, under this view, indeed the school to come will be completely different from the school that is and the one that existed before."

(School Principal, School 2).

In this context, one of the crucial tasks for the management team and the teachers is to generate the curricular adjustments that allow delivering the necessary and pertinent contents to this new educational reality:

"But all the students have a job that is equivalent to four weeks with two guides per subject, uh, prioritizing language subjects, we prioritized, in the first instance, as a school, without [previously] *receiving ministerial instructions, that we were going to prioritize language, mathematics, science and history, and in the last two years of high school, the modules that are essential for technical-vocational track, which are approximately two to three modules for each specialty, no more, not the 6 or 7 that* [usually] *exist."*

(School Principal, School 2).

In turn, school staff considered necessary to rethink the most pertinent pedagogical strategies to the situation, especially considering that for many students these new educational conditions affected their motivation. In this sense, apart from being able to ensure the technological conditions that allow remote and distance education, school staff emphasized the importance of generating educational scenarios in which the students can make inquiries and talk about their experiences. However, they recognized that this was not always achieved:

"Somehow, we are not comfortable with what online classes are because, there is very little space for the student to talk with the teacher. Not exactly about a subject, because, although that is what classes are supposed to be for, you still need the space to talk about any type of subject and, and for the conversation to come out of how one exactly is doing [meaning]*, how the student feels."*

(Student, School 4).

This is an aspect that was also mentioned by parents, for whom it is necessary to incorporate more recreational activities, which in some way compensate for the confinement and lack of activity of the students at home:

"Therefore, due to so much confinement, an activity like interactive, which can make them, like, play, I don't know, as if they were in classes, as if they had an equal [peer]*, they are children, therefore an interaction, like in games."*

(Parent, School 1).

From the parents' perspective, teachers must maintain a close relationship and a diversity of responses to the educational needs of their pupils to facilitate their learning process:

"For example, if he [her child] *has problems in math, she* [the special ed teacher] *tells him, ok let's see, show me the exercises they sent you, he sends the exercises to her and she explains how by video call, or now they also use Meet which is the same as Classroom, she explains to him how he must do it. But she is always aware of him, she is always calling him"*

(Parent, School 1).

Emotional Supports for Teachers, Families, and Students

One of the aspects most highlighted by all the interviewed participants was the need to generate different spaces of containment and emotional supports directed toward teachers, families, and students. This is because the health crisis has different effects on people's lives and schoolwork:

"The [psychosocial] *pair, from the point of view of containment, was initially working by telephone, calling person by person, student by student, parent by parent, each one of the school staff, right? What was the objective of this first connection? containment. It was that, bind and contain, nothing more. After that, when we started with this pedagogical material work plan, we also began to advance with the [psychosocial] duo, and what do we start doing with the duo? Begin to focus certain cases over others,* (.) *we began to focus according to certain needs, and then there began to be a monitoring of certain families in specific for violation of rights."*

(School Principal, School 2).

A significant aspect in this sense was to provide containment and support toward teachers, given that one of the situations that they usually experience is demotivation in the context of remote and distance teaching with turned-off screens or non-connected students.

"So I always tell them "but calm down, they must have this ability to understand that it is not easy for anyone, that is, it is not that the student devalues your work, but simply maybe he fell asleep," because, of course, in this remote context there is no student in the room, where control is held by one, the teacher, and that is the teacher's greatest deficiency, in the sense of understanding, not everyone has the ability nor capacity for change, not everyone has the capacity to be flexible."

(School Principal, School 2).

"From the psychologist and the social worker, who are the psychosocial team, we had, that is, received eh, like these tips, right, so that we don't get overwhelmed although we know that the same is. Let's see, it's something that has to do with a process, it's not like I say overnight "I'm not going to get overwhelmed" and it goes away, isn't it, right? But, I mean, there are instances

[designed for them as teachers]." (School teacher 4).

For parents, it was also essential that some spaces and activities exist to allow students to distract themselves and forget about the daily worries that families experience:

"But I still believe that there are children who may, like they need, for example, something to distract them, something to get them out, as I told you something to get them out of their world because they still, they are so like locked up that they need something, that makes them forget their worries or what, they are so involved in their parents' concerns."

(Parent, School 1).

Similarly, for students, it was very relevant that teachers maintain closeness and were interested in their lives and situations and not only dedicated time to imparting content during class:

"That's where I tell you that it depends on the teacher, because I can take my hat off for a teacher, that she is one hundred percent worried about us, she takes the time to be able to talk with us, to ask us how is the, our situation before starting the class and directly starting to pass the subject. She cares about us. But there are teachers also in another case, at the other pole, who only start class, start recording and begin to explain, explain, explain and don't give the time to perhaps think that the student is not understanding them and pause and be able to explain exactly what the student is not understanding." (Student, School 4).

Finally, the support and containment toward the students was a primary task for the implementers of the HpV Program, from which they adapted their intervention strategies to better reach the students: for the team, one of the main tasks to perform in the context of a pandemic is to generate activities with students.

"We have had difficulty to generate these virtual encounters, and therefore, we made the decision to continue with this, to intervene in the same way with the children, more than anything in terms of containment, to support them, in what their own process is also with the pandemic, and also consider its dimensions of risk."

(HpV Group Interview).

DISCUSSION

The COVID-19 pandemic continues to impact low and lower-middle-income countries and the most disadvantaged children and adolescents in each country. While protecting a population from the ravages of the disease is clearly important and even more so when the health infrastructure is poor, a key question is how to address the impact of the pandemic in school communities and how education is conveyed to students, which if left neglected can have dramatic long-term consequences for the wellbeing of school communities.

The Health-Promoting School (HPS) approach proposed by WHO more than 25 years ago seeks that countries and schools recognize the relationship between education and health and promote principles of equity, sustainability, inclusion, empowerment and democracy (Velasco, 2021). This perspective considers that all aspects of the school have an impact on the health of students, and at the same time, that school is so much more than academic learning. Therefore, the school should educate in the promotion of physical and mental health, as well as social wellbeing. The school has an obligation to provide a healthy environment through the implementation of structured and systematic policies and action plans that consider the holistic experience of students, teachers, and non-teaching staff. The HPS model a flexible model that adapts to the characteristics and culture of schools and countries. The model proposes that a health promoting school environment is one in which there are policies for the promotion of collective and integral health of all school members; a physical environment that includes buildings, grounds and school surroundings; a social environment that caters for the quality of the relationships between school community members; individual health skills and action competencies, like healthy eating, daily physical activity, developing social skills and health literacy; community links; and health services collaborations (Velasco, 2021).

Findings show that school principals and teachers conceive the digital gap as a barrier to students' and their families' wellbeing. Therefore, digital connectivity during the COVID-19 school closure period of the pandemic is viewed as a basic condition for school wellbeing (see **Figure 1**). Following the HPS model, the digital gap was conceived both as lack of adequate physical environment, as well as of equitable educational policy. In their discourse, participants raised issues of availability, accessibility, acceptability, and adaptability of technological resources necessary for distance education were raised. These "4 A's" form part of the United Nation's (1998) criterion for assessing the State Parties' implementation of the right to education as a human right. Therefore, in the context of the COVID-19 pandemic, the findings of this study suggest that school staff consider digital connectivity as a crucial part of the right to education. However, their discourse also considers a quest for inclusion: assuring digital connectivity for all students and also for school staff (Ainscow, 2020). In this regard Chile's educational policy during the pandemic did not plan nor implemented a universal digital access policy to the decentralized school processes, nor, during the first 6 months, provided extra budget. Rather, publicly funded schools had to use available resources and budgets meant for other purposes. Participants felt a lack of support from the Education Ministry and municipalities, but at the same time they highly expected this support. The educational communities considered that public policy did not provide responses with the urgency required, nor dealt with educational inequality. This perception of lack of support may imply a deep drain of energy that can lead teachers, students and their families to experience mental health difficulties. Although existing public psychosocial support programs which follow the

FIGURE 1 | Conditions for a collective, sustainable wellbeing of school communities during the school-closure period of the COVID-19 pandemic: Summary of research findings.

WHO approach, HpV and SENDA, are positively valued in the context of the pandemic, it seems that schools expected more from their authorities, especially from government authorities.

Three other conditions for school wellbeing that were raised by participants are theoretically aligned with HPS's recommendations for providing a quality social environment, community links, health services collaborations, and developing individual competencies. Findings show that, in the face of the current health crisis, the primary concern of the educational communities was mutual support and the wellbeing of everyone (Ebersohn, 2020; Rivero and Bahena, 2021). The strategies for achieving this was through close connection and coordination with families; coordinated teamwork at school; emotional supports for students, teachers, and families; and by strengthening support networks (see **Figure 1**). The close connection and coordination with families, which had not been as present pre-pandemic, was a major objective during the first half of the first year of the pandemic with required major efforts in the case of the digitally non-connected students. With time, sense of accomplishment in connecting and working with families helped widen the sense of the "school community". In the schools studied, this was done first by drawing the school staff closer together through what they called coordinated teamwork, and then working coordinately to connect with families in order to reach out and engage students. The literature on school connectedness suggests that these kinds of strategies facilitate positive student-teacher relationships (Zullig et al., 2011) which are highly relevant for school belongingness (Allen et al., 2018) and students' wellbeing (Chu et al., 2010), while at the same time protecting students from engaging in risky behaviors (Drolet et al., 2013), and preventing school dropout (Zullig et al., 2011). Probably, these kinds of local strategies might partly explain why the school drop-out rate did not increase after the pandemic school year of 2020, considering the previous year rate (Rivero and Bahena, 2021).

We conclude that the school communities' discourse is aligned with a perspective of sustainable and collective wellbeing. On the one side, and in line with the theoretical assumptions of this study, the schools participating in this study emphasized the collective character of school wellbeing during the pandemic. Phrases such as "the student is not alone in the classroom"; "it's not just about the students' wellbeing, it's also about our teachers', school staff's and families' wellbeing" were repeated throughout the interviews. Certainly, the lack of digital connectivity throughout the school closure period placed a great amount of stress on teachers and school staff (UNESCO, 2020). In order to cope, the contextual aspects such as school resources and collegiate support identified by Hascher et al. (2021) have

helped teachers maintain their wellbeing (Hascher et al., 2021) and respond to students' academic, physical, and emotional needs through positive teacher-student relationships (Jones and Kessler, 2020). The findings of the present study are consistent with López et al. (2021b) findings that students' wellbeing is permeable to their perception of their teachers' wellbeing (Shirley et al., 2020). On the other hand, the results show that students in the context of a pandemic have valued even more the presence and closeness of their teachers, highlighting as relevant being able to feel cared for and welcomed in their needs. Consistent with the literature reviewed, these results show the high demand that has fallen on teachers, which, as we pointed out, is strongly feminized (Kelleher, 2011; Gluz and Elías, 2020), who have had to take on care roles toward their families as well as toward their students, with a strong impact on their own wellbeing and health (Salas et al., 2020; Troitinho et al., 2021; Rodriguez et al., 2022).

The ways in which the participants of this study construed a collective notion of school wellbeing, and the different forms of connections, coordination, and collaborations through which this took place, is similar to spontaneous social supports that Ebersohn (2020) suggests have emerged in African educational communities at the beginning of this pandemic (Ebersohn, 2020), and to the closely knitted interactions of the entire educational community that Rivero and Bahena (2021) observed in Mexico. Perhaps, as these authors pose, in the context of weak national or regional-level policy supports which are frequent in developing countries, the COVID-19 crisis has led schools to mobilize different social resources from different actors and in many directions, granting education a leading role from an intersectorial point of view (Ebersohn, 2020). As Vélez (2011) points out, in the context of crises, societies expect schools to restore hope and stability. In line with Hascher et al. (2021) findings, this study provides qualitative evidence that this is being done through carefully planned day-to-day coordination among the school staff, with families and with existing support networks found.

Recent research on school during the COVID-19 crisis in Latin American countries shows a shift from teaching disciplinary contents to the emotional containment of their students (Ramos-Huenteo et al., 2020; Sáez-Delgado et al., 2020). In effect, many participants in this study highlight emotional containment as a major strategy given student's and families' emotional needs during the pandemic, as a consequence of vital changes in family economy and due to the health-related issues of the crisis. What this study shows is that teachers' and school staffs' spontaneous responses to students' emotional needs through reaching out and listening to them, when coordinated and supported by available support from in-school and out-of-school mental health services, can promote the school community's collective resilience (Ebersohn, 2020) and help prevent serious mental health issues. However, this study also shows that the educational side of the HPS approach during crises must also be dealt with. In line with other qualitative studies of students' experiences during COVID-19 in other parts of the world, our findings suggest that one of the biggest struggles for children and youth has been remote learning and maintaining academic routines (Branquinho et al., 2020; Scott et al., 2021). In absence of digital connectivity, students have to deal with the frustrations and consequences of not being able to connect. The adults in the participating schools recognized that, in this context, the curriculum needs to be adapted and that a key element for sustaining a collective wellbeing, is through curriculum diversification. Parents and students recalled and were thankful of the many different forms in which their school provided them with direct pedagogical support while not being able to connect online, and considered these supports as fundamental for maintaining their wellbeing. This suggests that a systems approach is needed that may address both students' as well as teachers', families', and school-staffs' collective –and not just individual- wellbeing (Alfaro et al., 2015; Harding et al., 2019; Ahmadi et al., 2020; Shirley et al., 2020). Otherwise, individual or group interventions aimed at strengthening students' self-esteem and coping abilities, run the risk of reinforcing the "diminished" student of social and educational programs for "vulnerable" students to the detriment of collective competencies of cooperation and collaboration (Ecclestone and Rawdin, 2016).

On the other hand, a sustainable perspective of school wellbeing seeks the wellbeing of the whole school community and looks for lasting solutions over time (Hargreaves, 2002). Regarding Hargreaves and Fink. (2000) call for the breath, depth, length, diversity, and conservation of educational change, the findings from this study suggest that an ethics of multiple cares dominates within and between school actors are deeply rooted in participant's voices and actions. Connection and caring are not just top-down human and moral values from the school principal or principal's team but also between equal peers: between parents, between teachers, between students. Therefore, this depth is also breath in the sense that coordination is multiple and at multiple levels of the school system. However, sustainability in terms of length and conservation during and after the pandemic, are tied to issues of welfare, in this context very much linked to safeguarding an equitable access to digital connectivity which would allow students to access different forms of remote learning. The diversity of the sustainable discourse of the participants of this study, are also linked to the possibilities of offering diverse curricula and pedagogical strategies for different leaners, and in the assumption that there is no "one size fits all glove" for safeguarding a collective wellbeing. But most of all, what findings from this study suggest is that the principle of conservation of the collective/sustainable wellbeing approach during the school closure period of the COVID-19 pandemic requires policies and actions that assure digital connectivity, tightly knit coordination, and direct and indirect emotional supports that may allow teachers and school staff to not feel overwhelmed or to exhaust human energies to such levels that a collective, sustainable wellbeing is no longer possible, but on the contrary, to renew energies (Hargreaves and Fink, 2000; Hargreaves, 2002). The curricular flexibility adopted by the educational community in the four schools from this study can be understood as an expression of a sustainable approach to wellbeing, capable of questioning diversity, that is, capable of rejecting the standardization and homogenization of school processes (Hargreaves and Fink, 2000; Hargreaves, 2002). However, these school efforts should be accompanied by policies

at the central, district and school levels that allow community agency, and provide means and resources for the school to articulate a collective response to the emergency according to its particular context.

Limitations and Future Venues

This research faced various obstacles that are relevant to consider. While some correspond to an adaptation of a research design, such as the application of techniques given the context, other types of limitations are related to the scope and understanding of the phenomenon. Field work took place during the first year of the pandemic in Chile, a period that began in March 2020. This involves three key antecedents. First, the schools participating in the study were experiencing a high demand for homework because of actions to mitigate the effect of the pandemic. Secondly, the methodological design of this research tried not to increase the consequences of the pandemic; therefore, tools were selected that would facilitate the use of the times and spaces of the participants, who were not conducting in-person meetings. Thirdly, we recognize improvement in the governments' responses concerning the research phenomenon after our phase of interviews with the participating schools, particularly with respect to the digital gap. As a consequence, a limitation that emerges is that it was not possible to carry out a participatory design that allowed collecting information and analyzing it collectively with the actors involved.

Albeit these limitations, the main contribution of this study is the evidence that, in highly unfavorable contexts of schools in contexts of poverty amidst the COVID-19, these schools can and do manage to place the collective wellbeing of the school community as a priority. This is expressed through the generation of collective spaces of aligned with an ethics of care. These spaces of collective include close coordination with students' families. In the context of the Chilean neoliberal educational market, where parents are perceived and treated as clients of the educational service, schools usually struggle in the relationship with families (López et al., 2012). This crisis in particular has led schools to work more closely with families, to reach out to them and engage in positive relationships in order to reach the students. Findings show that this has activated many positive school-family bonding processes that protect wellbeing. Daring to innovate in different forms of relationships, they have also learned that they are capable activating support networks for the benefit of the student's wellbeing and that of the rest of the school community, including themselves as teachers and school staff.

Future lines of research on wellbeing from a collective wellbeing and sustainability approach require new research questions concerning the modes and effects of the different forms of hybrid and in-person ways in which students have been returning to (the physical grounds of) school. This study was conducted in 2020, when vaccines were not available and the return to school was not clear. However, at the end of the 2021 school year more than 80% of the Chilean population has received two doses of vaccine including children, and schools have been operating in different forms of in-person teaching, albeit important inequities in terms of the school's socioeconomic backgrounds: while most private schools returned at the beginning of the 2021 school year (i.e., March 2021), most public schools returned when only 4 months were left of the school year (i.e., October 2021). For the beginning of the 2022 school year starting March, the Chilean government has mandated in-person teaching with no limited classroom capacity. These different forms of "going back to school" need to form part of relevant research questions. Likewise, it is also necessary to analyze how the policies taken at the central and district levels can affect the diversity, depth and breadth of the strategies developed by the educational communities. These elements should be considered for the design, implementation, and evaluation of future educational policies and actions.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because Life Skills Program may apply some restrictions. Requests to access the datasets should be directed to VL, veronica.lopez@pucv.cl.

AUTHOR CONTRIBUTIONS

VL, LR, PA, JÁ, CC-A, and AMS contributed to conception and design of the study. VL and LR led the execution of the study. TC, HO, LR, and VL performed the interviews. RL-C performed and updated the literature review under the supervision of LR and VL. VL, LR, and RL-C wrote the first draft of the manuscript. PA, CC-A, JÁ, and PJ wrote the sections of the manuscript. All authors contributed to data analysis, manuscript revision, read, resubmission, and approved the submitted and resubmitted version.

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Serious Games as a Method for Enhancing Learning Engagement: Student Perception on Online Higher Education During COVID-19

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The COVID-19 pandemic has enforced social isolation in many countries worldwide, which forced teachers at all levels of education, including the university context, to adapt new teaching strategies. This study presents a method developed in this regard, that is, serious games were used as a complement to synchronous online classes to ensure the continuity of pedagogical activities in a physiology course at Universidad Andrés Bello, Chile. Using serious games is a strategy in the field of gamification, which is a commonly used learning strategy for online teaching as necessitated by COVID-19. This study is quantitative in nature and conducted a questionnaire survey on 108 second-year undergraduate nursing students to determine their perception about this innovation. The results demonstrate that the students well valued the proposed pedagogical innovative model in terms of motivation and engagement. Moreover, they reported that the model can serve as a meaningful learning experience. These perceptions suggest that the model is an efficient strategy for implementing the physiology curricula in the context of online teaching. Moreover, the results imply that the model should be applied to other courses and disciplines in the undergraduate program and provide support that it is a valid strategy for face-to-face teaching. Lastly, the finding points to the potential of the model to be explored as a learning strategy in the age of education post-COVID-19.

Keywords: serious games, gamification, engagement, active learning, education innovation, student motivation

INTRODUCTION

The COVID-19 outbreak disrupted the teaching and learning processes in higher education given the context of social isolation required to mitigate the spread of the pandemic. The ensuing scenario led to the rapid transition to online pedagogical strategies to ensure the continuity of the learning process and to provide implement social distancing at the same time. After learning shifted to online platforms, many areas were more affected than others due to the abrupt transition to online

lectures and activities. At the university level, online transition was particularly difficult for courses and undergraduate programs in the STEM fields (science, technology, engineering, and math) and health sciences. The reason underlying this notion is the specific features of learning strategies in these areas, including active lectures, hands-on laboratories, and research projects, among others, which require highly specific technology for developing online courses (Iheduru-Anderson and Foley, 2021; Pagoto et al., 2021; Jeffries et al., 2022). These characteristics of the time of crisis in higher education have also been present in the COVID context of Chilean universities. Some of the most important challenges in our country are related to three major areas: financial, inequality and learning logistics (Funk, 2021). The COVID outbreak has forced the higher education system in Chile, as in the rest of the world, to rapidly develop new didactics and pedagogical strategies to ensure continuity of learning (Funk, 2021; Guzmán Droguett et al., 2021). The training of higher education staff and academics in the use of new technological tools and platforms has been one of the main responses implemented both at governmental and university level, identifying that the use of appropriate technology was essential for the continuity of the teaching-learning processes during the pandemic.

In this context, COVID-19 has forced institutions to shift from traditional face-to-face classes to online ones by initially adopting emergency learning strategies, which are temporary adaptations during the crisis due to the lack of time for planning. Moreover, intentional strategies were later adopted, where a pedagogical team not only delivers contents but also develops strategies centered on learning (Cruea, 2020; Rapanta et al., 2020; UNESCO, 2020). Among others features, online modalities require flexibility and access to technology for students and teachers to ensure the continuity of learning processes. However, important negative issues have emerged from these online strategies, such as loss of student motivation and engagement, decreased attention, poor time management, and negative effects on the psychosocial well-being of students, which result in impaired learning (Rivera-Vargas et al., 2021). Face-to-face teaching, particularly for subjects and programs under the health sciences, is irreplaceable. However, the use of technologies can be incorporated to assist the teaching process during times of crisis. This aspect can be considered an opportunity to develop directed teaching strategies based on technology, which can be used to complement and strengthen learning processes during times without crises (Lira et al., 2020). Thus, the challenge is to develop strategies that encourage student autonomy and to increase motivation, engagement, and attention, which are substantial elements for learning improvement.

Several teaching strategies have been developed to ensure academic success during the pandemic with the objective of maximizing the knowledge acquisition of students by enhancing motivation, self-efficacy, and engagement (Hartnett, 2016; Hsu et al., 2019; Chiu et al., 2021). Among the different strategies, the use of games or game elements in a non-entertainment environment to promote learning is generally known as *gamification* (Dichev and Dicheva, 2017), which has been implemented in online courses. The use of this method has produced positive results in the COVID-19 context (Nieto-Escamez and Roldán-Tapia, 2021; Rincon-Flores and Santos-Guevara, 2021). Moreover, gamification has been used in different subjects, such as business (Pakinee and Puritat, 2021), computer sciences (Liénardy and Donnet, 2020), and chemistry learning (da Silva Júnior et al., 2020a,b), as well as biological sciences courses, such as biology (Kalleny, 2020; Lobet et al., 2021), microbiology (Dustman et al., 2021), physiology (Moro et al., 2020; Hennekes et al., 2021; Herkes et al., 2021; Kane et al., 2022), and medical and nursing education (Gentry et al., 2019; Malicki et al., 2020; O'Connell et al., 2020; van Gaalen et al., 2021).

Against this background, this study presents an experience using gamification, in a format of serious-games activities for learning, in a physiology course for nursing students at Universidad Andrés Bello. The implementation of these activities in online teaching enabled us to ensure the continuity of our learning process with the students during academic confinement due to the COVID-19 pandemic. The results of the analysis provide answers to the following research questions (RQ) in terms of the appraisal of the students about the gamified learning experience:

RQ1: What is the appraisal of students about using serious games for learning experience and engagement?

RQ2: What are the possibilities and limitations of these gamification strategies?

THEORETICAL FRAMEWORK

Developing effective learning through student-centered strategies implemented in online teaching requires that students develop several characteristics, such as self-discipline, motivation, and autonomy (Goulão and Menedez, 2015; Kirmizi, 2015; Roddy et al., 2017; Duchatelet and Donche, 2019). These features are relevant for online learning across all disciplines, including the sciences (DiBenedetto and Bembenutty, 2013; Higgins et al., 2021a,b) and health courses (Hayat et al., 2020; Shorey and Lopez, 2021). In the context of the study, physiology for undergraduate students in the health sciences is a particularly challenging subject, because it presents high levels of complexity. Furthermore, it requires a solid foundation by understanding the basic concepts of the biological sciences, as well as by relating these concepts with those of the subject to understand the functions of the different systems of humans (Michael, 2007; Slominski et al., 2019). It also presents large amounts of content imparted through time-limited lectures, which requires the need for significant engagement, self-efficacy, and autonomous work among students to achieve the desired learning outcomes.

A strategy widely used to improve learning in online education during the COVID-19 pandemic has been gamification, which applies different game formats to the learning environments [see the review by Nieto-Escamez and Roldán-Tapia (2021)]. Using games in various educational contexts has been previously investigated, where positive results were obtained in terms of learning improvement (Dichev and Dicheva, 2017). Recent research demonstrates that using games in education promotes social interaction (Waytz and Gray, 2018), improves mental

health (Cruea, 2020), and reduces isolation (Valkenburg and Peter, 2009). These results suggest that using games promotes a state of well-being that facilitates meaningful learning.

Using games in education is a strategy that requires the active participation of students in the learning process (Campillo-Ferrer et al., 2020). To ensure effectivity, games must promote interaction; be creative and engaging; and be a motivator to stimulate participation and deliver immediate feedback (Lira et al., 2020; Nieto-Escamez and Roldán-Tapia, 2021). Several studies demonstrate that games, in general, encourage creativity and innovation; increase engagement, self-efficacy, and motivation; encourage collaboration; improve attention and concentration; and improve academic performance (Banfield and Wilkerson, 2014; Nietfeld, 2018; Campillo-Ferrer et al., 2020; Nieto-Escamez and Roldán-Tapia, 2021).

Among the types of games developed, serious games or games for learning are those that focus on education, information delivery, and practice of skills. In a broader definition, serious games could be understood as an interactive computer application for educational purposes, which has a challenging objective, incorporates some concept of scoring, and imparts in the user a skill, knowledge or attitude that can be applied in the real world (Bergeron, 2006). The design of serious games considers different features such as tracking correct answers as assessment, environment including game fiction, and a challenge proposed with rules to achieved it, with or without a complex hardware design and with different player-game interaction styles, from traditional ones using keyboard and mouse click, to virtual reality modes (Bedwell et al., 2012; Gorbanev et al., 2018). In terms of the educational purpose, the benefits of serious games can be explained from different pedagogical perspectives, including constructivism, humanism and cognitive, facilitating learnings and skills development in different areas from business and industry to medical education (Wu et al., 2012).

Serious games are learner-centered approaches, where the student controls the learning process in an interactive manner (Ricciardi and De Paolis, 2014). For example, educational computer games enable students to elaborate strategies, achieve goals, and consider previous knowledge when facing a problem-solving situation, which is expected to develop cognitive skills, such as memory, attention, and critical thinking (Rondon et al., 2013). However, the results of studies on serious games are non-conclusive when comparing the acquisition of contents and performance in tests between online and traditional learning (Rondon et al., 2013; Nieto-Escamez and Roldán-Tapia, 2021). Nevertheless, students report increased motivation when information is delivered through serious games (Nieto-Escamez and Roldán-Tapia, 2021), including when serious games are applied specifically to physiology courses (Moro et al., 2020). Due to the huge variation in the design of the experience, a comparison among studies is difficult. However, certain key features emerge as critical to learning improvement and motivation, such as clear rules and goals, degree of entertainment, questions of appropriate complexity, feedback, and new problems to be solved (Bellotti et al., 2013; Rondon et al., 2013).

Given the context and theoretical framework, the current study developed a learning model experience using serious games for application to a physiology course for undergraduate nursing students. The general objective of this study is to assess the appraisal of students in terms of whether the application of game-base pedagogy can enhance their behavioral and attitudinal skills for learning through online education during COVID-19 at Universidad Andrés Bello in Chile.

MATERIALS AND METHODS

This section presents a description of the teaching innovation model; the context in which it was developed; the methodology used in the research; and the procedure for analyzing the results.

Innovation Context

The physiology course is offered during the first semester (March–August) of the academic year for undergraduate nursing students in their second year at Universidad Andrés Bello in Santiago, Chile. A total of 267 students, who were enrolled in the physiology course at the first semester for 2021, were invited to participate. The course was conducted entirely in an online format to students without previous university experience in face-to-face lectures due to COVID-19-related lockdown, which occurred during academic year 2020 (the first year of university for students).

The cohort was divided into four class sections for lectures and synchronous activities during the semester and provided with access to a *virtual classroom* supported by a learning management system (LMS) called Blackboard.

Human physiology courses for health careers present different curricular approaches in institutions around the world, ranging from an integrated model that teaches aspects of physiology in conjunction with other basic biological sciences to the more traditional model of teaching physiology in a systems-based, non-integrative nature with other areas of biological knowledge. Both pedagogical approaches present benefits and challenges in their implementation (Hasan and Sequeira, 2012; Fernando et al., 2020; Adams and Dewsbury, 2022), and both systems are currently considered valid for the teaching of human physiology. In our case, at Universidad Andrés Bello in Chile, the teaching of human physiology for nursing students is based on a curriculum whose didactic approach is based on systems-based teaching. The syllabus is classified into seven units, where each is associated with the specific concepts and mechanism of one system of the human body. All units are evaluated using a summative final assessment with multiple-choice questions. Among the conceptual units of the course, our innovation was exclusively developed in the context of endocrine physiology, which is particularly difficult unit among those defined by our syllabus, because the subject requires a solid theoretical foundation on previous courses in basic sciences.

Pedagogical Model Design

The objective of the study was to generate an educational strategy model that enables students to learn in a playful environment and allowing them to select where and when they can conduct the activities. Moreover, instant feedback is ensured during this

process. At the same time, we aimed to motivate students to take responsibility for their learning and to collaborate in organizing their study time.

We developed five serious game activities[1] using the Genially© platform. The design of the games was based on templates and extensions suggested by the platform (e.g., escape room and quizzes). The games progressed through increasing levels of difficulty and comprised content aligned with lower taxonomic levels (memorize or recall) to higher abilities (advanced relations and application). The final game (number five) was proposed as an integrative activity, which is based on a clinical case study that includes all topics covered by the lectures. The objective of the first four games was to consolidate the concepts discussed in each online synchronous lecture and to self-assess learning in the intervened unit using the previous game activity. The games contain different teaching and assessments activities, such as drag-and-drop classification, paired-item questions, conceptual maps, and multiple-choice questions. Each activity includes feedback for answers and access to complementary learning resources. All games were proposed as asynchronous activities to the students.

From a didactic perspective, the games were design in terms of brief interactive activities which strengthen the content previously delivered by synchronous lecture, based in a flipped classroom methodology. The learning objective for each game is aligned with one of the learning objectives assessed in this unit of the syllabus. For example, in Game 1, students are faced to a breakout room game type, related with general characteristics of hormones and its mechanism of action. Through three different "missions," in a clicker mode of interaction, students answer questions about hormone classification, solubility properties, types of receptors, and molecular mechanisms. The learning objective for this game was classify hormones by its chemical nature and recognize action mechanism related with receptor type. In games 2, 3, and 4, a multiple-choice questions game was designed. In this games, different hormonal axis and its effects were assessed, in which student complete missions by selecting the correct answers. For these games, learning objectives were recognize the hormonal axis and its regulation mechanisms, and relates hormones to their physiological effects. For the final game (Game 5) a context of medical emergency was given to the game, which was design based on clinical cases. Students resolved the case by answered multiple-choice questions, with a learning objective of relates hormones alterations with several sign and symptoms described in the patient of the clinical case. For the final multiple choice question assessment of the unit, the same learning objectives were evaluated for all students, including those who voluntary decided not to play games.

The games were delivered sequentially to the students immediately after a corresponding synchronous lecture (one lecture per week) across 6 weeks. Games 1 and 2 were released at week 1; Game 3 during week 2; and Game 4 during week 3. Lastly, Game 5 (the integrative concepts game) was released during week 6 given its connotation of a gamified activity for the preparation of the final evaluation of the unit. The students accessed the games through individual accounts on the LMS (Blackboard). Doing so enabled us to monitor student access and usage data per game. The general instructions for these activities were presented to the students in the first synchronous lecture of the topic. They were informed that playing games is an individual choice they make. Given this context, the game was available online to students 24/7 with no limited attempts per student for each game.

Participation in the study was considered voluntary, where the students also provided informed consent. Participation was tracked according to the number of game access through LMS. The frequency of game access exerted no influence in the assessment grade for multiple- and non-playing students.

Research Methodology

To analyze the appraisals of the students about their learning experience using serious games, the study developed a quantitative approach based on data obtained from the survey.

Instrument

The appraisal of the students was assessed through the online survey, which was designed by the authors using Microsoft Forms and was associated with institutional e-mail accounts of the students. The survey comprised 15 items rated using a five-point Likert-type scale (Joshi et al., 2015) and assessed the extent to which the students "strongly agree" to "strongly disagree" (from 5 to 1 at Likert-type scale) to the statements. The survey was disseminated at the end of the examination period of the unit (after the final summative assessment) over a 2-week period. The reliability of the test was assessed using Cronbach's alpha (α). The survey design also contains a final open-ended question, where students were invited to submit any positive or negative perception regarding any aspect of the activities related to serious games.

Sampling Design

The participants (n = 267) were invited to use the serious game activities designed as a complementary material for synchronous lectures. Out of the total participants, 211 (79.03%) conducted one of the games at least once during 6-week endocrine physiology unit. A total of 3,358 games were played with attempts ranging from 1 to more than 50 times and with Game 1 as the most played one. During the intervention, the students conducted the activities during all days of the week with high rates of access from Wednesday to Friday, whereas usage was preferent at night hours.

Out of the 267 students, the study obtained 108 valid responses to the survey for a response rate of 40.5%. Cronbach's α (test reliability) reached 0.92 (high reliability). The error for the sample was set to 7% with a confidence level of 95%. Unfortunately, the pandemic situation, which forced the transition to online classes, did not enable sufficient interaction with students to motivate them to answer the survey. In addition, the survey was available to students at the end of the semester, which is the time of the year in which students are overloaded with activities at the end of the academic semester.

[1]All serious games developed are free to access (in their original language – Spanish) through following links: Game 1: https://bit.ly/Game1-UNAB; Game 2: https://bit.ly/Game2-UNAB; Game 3: https://bit.ly/Game3-UNAB; Game 4: https://bit.ly/Game4-UNAB; and Game 5: https://bit.ly/Game5-UNAB.

Moreover, evidence exists that online surveys are much less likely to achieve response rates as high as those administered on paper despite the use of various practices to increase this rate. Data clearly indicate that the face-to-face administration of surveys results in high response rates (Nulty, 2008; Yetter and Capaccioli, 2010). In addition, Silva and Duarte (2014) argued that most individuals use the Internet for entertainment and recreation, which makes them discount requests for participation in research surveys, which results in a low response rate. These factors should be considered when determining the margin of error.

Analysis Proposal

Data obtained from the survey were recorded and analyzed anonymously. The results of the Likert-type rating are presented as a percentage of responses (or the total number of responses) for each question. For description and interpretation, the percentages for *strongly agree* and *agree* were considered positive results; *neither agree nor disagree* was considered neutral; and *disagree* and *strongly disagree* were noted as negative results.

For analysis, data were classified into four categories, which group the questions related to the competencies and skills considered important to online learning, as described in the theoretical framework (Goulão and Menedez, 2015; Kirmizi, 2015; Roddy et al., 2017; Duchatelet and Donche, 2019; Ferrer et al., 2022). The four categories are attitudinal competencies (three questions), student self-efficacy (three questions), academic performance (six questions), and the student's perception of future impact (three questions).

The category of attitudinal competencies enables the analysis of the results in relation to the manner in which the method used enhances the motivation and engagement of students in learning. Student self-efficacy is related to aspects associated with self-discipline, autonomy, and time management and their impact on student learning. Aspects related to academic performance are analyzed in terms of the evaluation of the appraisal of the students about the usefulness of the strategy using serious games for the preparation of summative course assessments. Finally, analysis considers the perception of the students of the future impact of the method, in which responses are analyzed in relation to their assessment of the usefulness of this strategy in future learning scenarios, such as face-to-face learning activities, other units of the physiology course, and its use in other subjects under the nursing undergraduate program.

For questions with high neutral or negative results, the opinions of the students as elicited by the open-ended question in the survey are presented as examples of detailed information for exploratory analysis. Excerpts of the opinions of students are presented as quotes in the section "Results."

RESULTS

The results of the survey were presented as the percentages of responses for each question, which were classified according to the abovementioned categories. A general analysis of the results indicates high frequencies of the responses *strongly agree* or *agree* for the majority of the questions. This finding suggests that the students generally positively evaluated the use of serious games as a learning strategy.

Attitudinal Competencies

Questions on the motivation, engagement, and confidence in concepts of the students were classified under this category (**Table 1**). In terms of motivation, 87.9% of the respondents report that performing serious game activities improves motivation to study the theoretical contents associated with the activities (strongly agree: 54.6%; agree: 33.3%). Moreover, 90.8% (strongly agree: 63%; agree: 27.8%) perceived that performing the serious games improved their engagement in the learning process. In relation to confidence in the concepts learned, 86.1% reported that this strategy improved their confidence. These results align closely to one of our objectives of the use of serious games as learning strategy, which suggests its effectiveness in enhancing motivation, engagement, and confidence in learning.

Self-Efficacy

Concepts related to this category include the perceptions of students about their abilities and behaviors to learn and to accomplish their academic activities. In this line, we analyzed the appraisal of the students regarding improvement and attention and concentration the optimization of time management to examine physiology concepts using serious games as learning activities.

Table 2 presents the results, where more than 70% of the respondents believe that playing serious games improved concentration during study, whereas more than 80% (totally agree: 55.6%; agree: 26.9%) reported that playing serious games

TABLE 1 | Percentage of responses to questions on attitudinal competencies.

Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Playing the serious games increased your motivation to study	54.6% (59)	33.3% (36)	8.3% (9)	3.7% (4)	0.0% (0)
Serious games improve your engagement in the learning process	63.0% (68)	27.8% (30)	8.3% (9)	0.9% (1)	0.0% (0)
Performing serious games improve your confidence in concepts learned	60.2% (65)	25.9% (28)	7.4% (8)	5.6% (6)	0.9% (1)

TABLE 2 | Percentage of responses to questions on self-efficacy.

Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Playing the serious games improves your concentration during self-study	44.4% (48)	33.3% (36)	18.5% (20)	2.8% (3)	0.9% (1)
Performing serious game activities optimize personal study time	55.6% (60)	26.9% (29)	13.9% (15)	1.9% (2)	1.9% (2)
Your concentration and class attention improves by performing serious game activities	42.6% (46)	31.5% (34)	19.4% (21)	2.8% (3)	3.7% (4)

TABLE 3 | Percentage of responses to questions on academic performance.

Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Playing the serious games improves the learning of the associated concepts	59.3% (64)	31.5% (34)	8.3% (9)	0.9% (1)	0.0% (0)
Performing serious games facilitates doing seminar activities	36.1% (39)	24.1% (26)	27.8% (30)	11.1% (12)	0.9% (1)
Performing serious games facilitates study for weekly assessments	32.4% (35)	25.0% (27)	29.6% (32)	11.1% (12)	1.9% (2)
Performing serious games facilitates study for final assessment	40.7% (4)	32.4% (35)	13.9% (15)	7.4% (8)	5.6% (6)
Performing serious game activities was a significant learning experience	60.2% (65)	25.0% (27)	13.9% (15)	0.0% (0)	0.9% (1)
Do you feel well prepared for unit assessment by performing serious games	44.4% (48)	29.6% (32)	14.8% (16)	8.3% (9)	2.8% (3)

optimized their personal time for study. Moreover, 74.1% of the students agree (or strongly agree) with the fact that serious games improve concentration and attention during synchronous classes. The results strongly suggest that using serious games as a learning strategy exerted a positive effect on the self-efficacy of students, which is relevant for meaningful learning.

Academic Performance

The questions in this category (**Table 3**) are intended to evaluate the assessment of the students in terms of whether using serious games directly prepared them to obtain better outcomes in the summative assessments of the unit after the application of the strategy.

The results indicate that 90.8% of the students considered that serious games improved learning, whereas 85.2% positively appraised that playing serious games was a meaningful learning experience.

Among the survey questions, a high frequency of neutral responses (neither agree nor disagree) was obtained for questions on whether serious games facilitated the preparation of the students for the weekly summative assessments of the subject (57.4%). The same result was found for the question on whether serious games are useful for the preparation of the seminar activities of the course, which are problem-solving or case-study activities conducted on a weekly basis (29.7%). Both questions also exhibited the highest negative percentage in the survey at 13 and 12%, respectively. Furthermore, only 44.4% of the respondents considered the performance of serious games to be positive in the preparation for the final assessments of the unit (neutral responses: 14.8%; negative responses: 11.1%).

Considering these questions with high neutral and negative results, we conducted an exploratory analysis of the opinions of the students using responses to the open-ended question to correlate the results with specific information. Several opinions from students are in line with the neutral/negative appraisal of the relationship between serious games and summative assessments. This aspect provided certain clues about the lack of alignment between game content and the level of difficulty of assessments. The following excerpts are examples of the opinions of the students correlated with this observation.

> *The questions in the gamified activities should have been more application-oriented because most of the questions were memory-oriented, however, the activity is quite innovative and engaging.*
>
> *Maybe the games should be more similar to the assessments in difficulty, with a limited time to answer, with better feedback for the wrong answers. . ..*
>
> *I think that if the activities were a little more complex, with more final assessment style questions, they would be more useful, although they are already good. . .*
>
> *The activities should be more difficult, because they are based on basic topics, and there is no equivalency in the assessments of the course.*

These opinions are consistent with the perception that the contents of the serious games are only partially aligned to the difficulty levels of assessments, which suggests a possible explanation for the high rates of the neutral/negative results related to academic performance appraisals and the preparation of students for assessments using serious game activities. Nevertheless, the results indicate that 90.8% of the students positively appraised the use of serious game for improving their learning about the concepts of the unit.

Future Impact

To evaluate the perceptions of the students whether serious games should be applied to other learning contexts, such as in face-to-face teaching or in other courses of their undergraduate program, three questions were analyzed. **Table 4** presents the results, which indicates that 81.7% of the students considered that the application of serious games to other

TABLE 4 | Percentage of responses to questions on the perception of students about the future impact of the model.

Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Other lectures would be more significant if they used serious game activities	67.6% (73)	24.1% (26)	6.5% (7)	0.9% (1)	0.9% (1)
The serious game activities will be useful in a face-to-face lecture mode	80.6% (87)	13.0% (14)	3.7% (4)	1.9% (2)	0.9% (1)
Using serious game activities in all units of the lecture will improve students' performance	80.6% (87)	13.9% (15)	4.6% (5)	0.0% (0)	0.9% (1)

courses could exert a positive impact. In addition, more than 90% of positive responses were obtained when asked about their perception of whether these activities will be useful in the face-to-face format of the course and whether using serious games in the entire physiology course would improve academic performance.

These results of the four categories suggest that the application of serious games should be considered as a positive strategy for future courses, including physiology, in face-to-face learning.

DISCUSSION

This article presented the result of our evaluation of the appraisal of students regarding the use of serious games as a learning strategy for online learning, which was imposed in Universidad Andrés Bello, Chile, due to the COVID-19 outbreak. Four main categories emerged from the survey on student perception with the objective of characterizing the proposed pedagogical model in an exploratory manner. In general, the students well received the model given its nature as a method for enhancing learning. However, certain results are important to the discussion of previous research on gamification.

In the current study, the majority of students reported improvements in motivation, confidence, and engagement to study the theoretical concepts of the subject using serious games. Gamification has been related to increased intrinsic and extrinsic motivation in learners (Rutledge et al., 2018; Moro et al., 2020; Nieto-Escamez and Roldán-Tapia, 2021). Moreover, goal setting and flow theories link enhanced motivation and engagement through gamification activities given that the learners present an appropriate state of well-being (Landers, 2014; Huang and Hew, 2018). Considering the results for attitudinal competencies and the general perception that physiology is a difficult subject (Michael, 2007; Slominski et al., 2019), the use of serious games may be associated with a positive effect in the well-being of students, which could be related to their perceptions about motivation, engagement, confidence, and overall learning enhancement appraisal, according to theories. This aspect is important to online teaching given the negative psychological effects of COVID-19-related lockdown in students. Nevertheless, further research and appropriate assessment of the psychological impacts of the use of serious games in the context of online learning is required.

Furthermore, the results demonstrate a highly positive appraisal in enhancing self-discipline, autonomy, and personal time management for study among the students. This finding is related to results for self-efficacy. Along this line, the results are aligned with those of previous research, which demonstrated that the use of games in the learning context is associated with statements related to self-determination theory (Landers, 2014; Richter et al., 2015). Scholars propose that enhancing autonomy and other self-efficacy features in students is an important characteristic for effective learning, particularly in online environments (Goulão and Menedez, 2015; Roddy et al., 2017; Duchatelet and Donche, 2019). Moreover, the results are in line with those of previous research that reported that gamification promotes the autonomy of students as an important factor for positives outcomes when using games as a learning strategy (Banfield and Wilkerson, 2014; Landers, 2014; Campillo-Ferrer et al., 2020; Rincon-Flores and Santos-Guevara, 2021).

In the context of using gamification strategies for online teaching during COVID-19, several studies report enhanced learning outcomes based on questionnaires and objective test results that focus on the perception of students (Nieto-Escamez and Roldán-Tapia, 2021). In the current study, the appraisals of the students were more negative in terms of being well prepared for objective assessments. The preliminary exploration of the opinions of students in relation to academic performance suggests a probable misalignment between the design of the content of serious games and the levels of difficulty of assessments. These results emphasized that a review of the design of our game elements and disciplinary content is necessary to improve learning outcomes using the proposed pedagogical model. This notion is presented given that clear rules and goals in the game, an appropriate degree of entertainment, questions with appropriate complexity, and feedback are key features for improving learning through gamification (Bellotti et al., 2013; Rondon et al., 2013). An assessment of objective test scores is also required for the appropriate validation of the proposed pedagogical model in terms of performance in academic test. Apart from the high frequencies of neutral appraisal by the students about preparation for assessments using serious games, the results highlight that the students considered the use of serious games in physiology a meaningful learning experience.

The study presented a pedagogical model, which uses serious games as a complement to synchronous lecture in online teaching. The model comprises five game activities, which are in line with gamification characteristics. It intends to support the teaching of a particular unit of the physiology course, which

students defined as a very difficult subject in the undergraduate nursing program. Based on the perceptions of students, the students well valued the pedagogical model in terms of enhancing motivation and engagement to learn. The results, which are in line with those of several studies on the use of gamification in undergraduate biological sciences and physiology courses, enabled the validation of the model for application to the learning context, especially online. Moreover, the results demonstrate that the students highly appraised the implementation of the pedagogical model to the rest of the physiology syllabus and to other subjects in the undergraduate program. This finding suggests the possibility of continuing the use of this model not only for the physiology course but also for other courses in biological sciences and other disciplines. Previous studies on gamification have previously described this aspect (Dichev and Dicheva, 2017; Gentry et al., 2019; Malicki et al., 2020; Moro et al., 2020; Dustman et al., 2021; Nieto-Escamez and Roldán-Tapia, 2021; Pakinee and Puritat, 2021; Rincon-Flores and Santos-Guevara, 2021; van Gaalen et al., 2021).

This pedagogical model, which generates a playful learning environment, can serve as an innovation strategy for online or hybrid education systems, because this more frequent environment for students promotes learning in a more relaxed environment, reduces anxiety, and avoids a stressful or overwhelming environment (Iheduru-Anderson and Foley, 2021). On the one hand, previous studies reveal that students prefer hybrid education systems, multiple resources, and complementary technologies (Pagoto et al., 2021). On the other hand, society must be prepared for the threat of a new pandemic, which may replicate the teaching conditions experienced in 2020 and 2021. Along this argument, the current results point to a highly valued relationship between the perceptions of students and the use of this model of learning through serious games in face-to-face learning, which is one of the challenges for the field of education in the post-COVID-19 era. Nevertheless, we suggest that further research is required to evaluate the other benefits of using serious games to achieve desired learning outcomes. This need emerges due to the lack of evidence to date that support gamification or serious games as better strategies than traditional ones in terms of outcomes. Further research is also required to analyze the psychology and theories that underlie the positive results presented in this paper in particular and on the use of serious games in general, and about the transition from COVID-online teaching back to face-to-face teaching.

CONCLUSION

The study concludes that the proposed pedagogical model is highly appraised by students in terms of enhanced motivation, engagement, and meaningful learning experience. This educational strategy model seemingly improved learning in a specific area, as we applied it to a physiology course. However, the method can improve transversal cognitive skills that contribute to the development of the students. In the last few years, the advance of social networks, online games, and various technological tools have prompted teachers to incorporate them into formal learning activities.

The COVID-19 outbreak of the last few years has *hastened* this decision not only due to the impossibility of conducting face-to-face classes but also due to objective or maintaining the attention of students during online classes.

Within this framework, integrating serious games to the learning of concepts that may be complex for students is a seemingly attractive idea. In our case, the application of serious games to the learning of the concepts of one of the units of the curriculum was very well received and valued by the students. In turn, the students provided the researchers with opinions and recommendations for improving these activities. The pedagogical model is a type of a strategy based on learning and serves as an environment that students can use at any moment deemed pertinent. This flexibility enables the students to self-manage learning and self-evaluate the lesson contents. However, further research is required to analyze the effect of this model on objective assessments scores and other psychological characteristics related to the learning of complex subjects, such as physiology.

Based on these results, we provided responses to the research questions as follows:

RQ1: What Is the Appraisal of Students About Using Serious Games for Learning Experience and Engagement?

Students perceive that performing serious game activities improved not only their motivation and commitment to the learning process but also their confidence. Although they do not perceive that playing serious games facilitated their preparation for the weekly summative tests and the final evaluation, they believe that it improved concentration during study and optimized personal study time. In addition, they indicate that serious games enhanced learning and considered them meaningful learning experiences. At the same time, they indicate that performing serious games could exert a significant impact if applied to other subjects; that their use would be useful in face-to-face learning; and that using serious games throughout the subject would improve academic performance. The data are supported by the opinions expressed by the students in the open-ended question.

The students perceive the physiology course as an especially difficult discipline in the field of health. A few of the factors associated with this perception are the nature of the discipline, the traditional teaching methodology (mainly through lectures, where an extensive amount of content is covered within limited periods of time), and the requirement of higher-order cognitive skills to which the students are unaccustomed to using (Michael, 2007). In this context, a change in the traditional didactics of teaching can be considered a good strategy especially through the incorporation of methodologies that enable students to approach concepts considered complex in an attractive manner and related to the technological tools they frequently use. Given the perception of the students about the physiology course, serious games can provide an interesting environment for

knowledge acquisition, improvement in interest, motivation, and the enhancement of the learning achievements of the students.

RQ2: What Are the Possibilities and Limitations of These Gamification Strategies?

Regarding the limitations and given the perceptions of the students, certain contents of serious games should be reviewed and modified, such that they fit better with the different evaluation formats used in the course. However, it is not only necessary to analyze the coherence of the serious games with the strategies and cognitive levels of the subject assessments, but it is also relevant to analyze our pedagogical proposal of the use of serious games in terms of the pedagogical-didactic design of the whole teaching process. It is possible that the most negative perceptions obtained in this study, related to the students' opinions about playing serious games and the perception of readiness for the subject assessments, is due to the fact that in the didactic sequence in which our serious games are used, the pedagogical objective with which it was designed is lost, and that finally the students understand the activity from a viewpoint of preparation for the evaluation, rather than as a learning activity in itself. Further didactic design research is required to add new evidence to the use of serious games in different didactic sequences for physiology and other basic sciences subjects.

This revision, which is based on feedback obtained from surveys through the comments of students, will enable us to optimize the game contents and design to enhance the perception of students regarding the use of serious games to improve their preparation for summative assessments. Further research should consider other sources of information, such as objective test results (for a quantitative analysis of the effectiveness of serious games), and/or interviews and discourses analyze from students and teachers (regarding the contribution to and support of the model to the overall learning process), to strengthen the pedagogical and psychological conclusions about using serious games as an didactic strategy for enhance learning of physiology and others biological sciences areas.

In terms of possibilities, we believe that these activities cannot only be improved but can also be useful for application to other units of the course and other disciplines beyond physiology or biological sciences courses. The evaluation of the students suggested that the model can be used in other units of the same course and even in other subjects of the same undergraduate program. Considering that our curricular approach to the subject is systems-based, this type of strategy could be useful for a didactic transition toward a more integrated study of the function and regulation of human physiology. In addition, this type of strategy can be used in other basic science subjects outside the area of physiology.

In recent times, scholars have questioned the forms of assessment used in the academic environment. Thus, serious games could be used as an alternative method for assessing student learning. In fact, serious games can be used to revalidate concepts discussed in previous classes to reinforce learning, which presents increased difficulty for students. The model can also be used as an evaluative method for synchronous and asynchronous activities. Therefore, they can be used for activities related to online and face-to-face learning. Based on the results, which indicated that more than 90% of the students reported that serious games can be useful for face-to-face learning, we suggest the use of serious games as an innovative strategy during face-to-face learning in the post-COVID-19 era.

Our results presented here are in line with several previous reports about using gamification and serious games, and its positive effects on learning, but we encourage to keep assessing this methodology in different disciplines and courses, particularly in the context of return to face-to-face teaching mode around the world, exploring the effects of gamification in the post-COVID age.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the Local Legislation and Institutional Requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

SG and MA-C conceived and designed the research. SG, MA-C, and JC developed the games activities, analyzed the data, interpreted the results, and drafted, edited, and revised the manuscript. All authors approved the final version of the manuscript.

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Emotional Wellbeing: The Impact of the COVID-19 Pandemic on Women Academics in South Africa

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After the World Health Organization declared COVID-19 a pandemic on 11 March 2020, countries around the world responded with state-mandated lockdowns. Emerging data on the adverse psychological impact of the lockdown shows that women as a whole are among the most vulnerable groups. This study explores the specific stressors manifesting for women academics during lockdown and their toll on emotional wellbeing. A qualitative interpretive analysis of responses from 2,029 women academics showed participants experienced frustration, weariness, anxiety, and being overwhelmed as the result of emotional taxation from three sources: home responsibilities, social milieu, and work environment. The work-life merge that occurred during lockdown seemed to have a concertina effect on emotional wellbeing as participants were pressured to manage an inordinate number of responsibilities at once. The specific consequences of the concertina effect found in this study highlight opportunities for the academy to better support the wellbeing of women academics.

Keywords: emotional wellbeing, women academics, work-life merge, stressors, emotional taxation, COVID-19 pandemic, South Africa

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INTRODUCTION

After the World Health Organization declared COVID-19 a pandemic on 11 March 2020 (American Journal of Managed Care, 2020), countries around the world responded with state-mandated lockdowns that have persisted in various forms up until the time of writing. To varying degrees and for different periods of time, these lockdowns have involved the closure of "non-essential" businesses, organizations, and services, including public schools, public universities, and childcare and domestic services, forcing those who can work from home to do so. There has been an outpouring of studies from around the world on the physical and psychological impacts of confinement, social isolation, unemployment, and remote working on women academics due to the lockdown. In a post-pandemic world, there is concern that the living conditions imposed on households during the lockdown may exacerbate pre-existing disparities for male and female academics over longer term, and that institutional policies must be created to respond to the specific challenges facing women academics.

The emerging data from multiple continents shows that, as a whole, women are more vulnerable to the adverse impacts of lockdown: higher rates of job loss and greater work disruption (Carli, 2020); increases in household and childcare workload (Collins et al., 2021); higher levels of stress (Kowal et al., 2020; Pieh et al., 2020); worse sleep quality (Morelli et al., 2020); and more symptoms of mental health disorders, including depression, anxiety, and post-traumatic stress disorder (Ausín et al., 2020). These studies point to a range of different factors and circumstances that influence the

physical and psychological wellbeing of women: their profession and working situation, whether they are single or partnered, whether they have children, and the nature of their social interactions – for example, whether they live alone. Consequently, women in the academy are reporting a unique set of challenges and experiences during lockdown.

Studies exploring these phenomena over the past year have been conducted with academic cohorts in many countries, but not yet in South Africa. Further, few studies have explored the actual experiences of women academics during the pandemic over a large sample size to identify sources or mechanisms that may be detrimental to their wellbeing and careers. This research aims to fill this gap by providing a clearer understanding of how women academics have been affected by the COVID-19 pandemic to inform policy decisions. This study examines the experiences of 2,029 women academics in South Africa during the lockdown period, as reported in an open-ended questionnaire, to determine the impact of the pandemic on their emotional wellbeing and work experiences.

LITERATURE REVIEW

Women Academics in Lockdown

Increased Work Demands

The rapid change in working dynamics for academics during lockdown, with the near-exclusive adoption of online teaching tools and communication platforms, has increased work demands. In a self-reflection on her work-from-home experiences during COVID-19, academic Boncori (2020, p. 681) describes the extreme emotional labor demanded by the nature of digital work at this time: "I wish I could just go back to sleep now, but my brain has gone into analytic overdrive and I start to consider assessment options, blended delivery plans, staff cover issues, student welfare and a million other matters".

The heightened demands of teaching during the pandemic extend beyond adapting to new technology. The psychological impact of the pandemic on university students is placing greater pressure on lecturers to provide students with emotional and psychological support. Numerous studies have shown the increased experiences of depression and anxiety amongst university students (Islam M. A. et al., 2020; Majumdar et al., 2020; Marelli et al., 2020; Odriozola-González et al., 2020; Rehman et al., 2020). This pattern is more pronounced in countries like South Africa, where high levels of inequality mean that large proportions of the population that were already vulnerable prior to the pandemic are experiencing extreme precarity during lockdown (Arndt et al., 2020; Chirisa et al., 2020). Supporting vulnerable students therefore becomes paramount and compounds the academic challenge of online teaching and supervision for academics.

For some, the professional threats imposed by the pandemic are far greater than productivity losses and high work demands. Crook (2020) explains that academics with precarious contracts, such as adjunct faculty, will likely see their larger career and financial prospects diminish.

Beyond concrete work demands and job insecurity, there are additional experiential impacts to consider. Gao and Sai (2020) write about how, as early career researchers, their professional development was threatened by the circumstances of lockdown through the lack of human interaction with colleagues and informal learning opportunities that come with being part of a shared organizational space. They further describe how the "silence" and drop in communication that has taken place as work has moved online serves to enhance their otherness as young, single, female academics. This, in turn, provokes fear and anxiety in them that dissuades their engagement in traditional forms of academic discourse.

Although the increased work demands experienced during the pandemic can affect both sexes, there are circumstances that will be described below, which explain why women can be affected to a greater extent than their male peers.

Balancing Family and Career

Parenthood has emerged as the greatest differentiator between the working experiences of male and female academics during the pandemic. In a survey of 460 academics working across eight countries, Yildirim and Eslen-Ziya (2021, p. 5) found that although the gender gap in the lockdown working conditions of male and female academics is weak, "the gap becomes alarming for women with children." Myers et al. (2020) also picked up on variations in impact by field and found that women scientists with young children were hit hardest of all by the reduction of their time for research. One explanation is that "motherhood is seen as the limit, as the role that cannot be abandoned, even not for teaching duties" (Minello et al., 2020, p. 9).

Several studies and accounts have emerged from the community of women academics reporting similar patterns of struggle with the increased pressures of balancing parenthood and professional demands (Boncori, 2020; Gourlay, 2020; Guy and Arthur, 2020; Yildirim and Eslen-Ziya, 2021). The closure of public schools and the loss of formal childcare service during the pandemic is a major reason for this increased pressure on working mothers (Crook, 2020). Of course, the inequities between women and male academics prior to the pandemic – in terms of lower representation in the academy and lower publication rates – are well documented (Santos and Cabral-Cardoso, 2008; Beaudry and Larivière, 2016; Howe-Walsh and Turnbull, 2016; Helmer et al., 2017; Holman et al., 2018; Kamerlin and Wittung-Stafshede, 2020). However, in an autoethnographic study of their own experiences caring for young children during lockdown, Guy and Arthur (2020, p. 897) explain how "being a working mom is tough, but being a mom during COVID is more difficult than we could have ever imagined".

There are additional concerns about how the disproportionate childcare demands on junior women academics, compared to men and women without children, will disrupt their tenure track (Cardel et al., 2020; Myers et al., 2020). Indeed, in their 10-year study of the effects of family on academics prior to the pandemic, Mason et al. (2013) found that the single biggest inequity was the negative effect family had on early-career women academics, compared to its neutral impact on men.

As Pereira (2020) points out, in spite of the real impact of motherhood on the work experiences of female academics, it is important to acknowledge the limitations and the boundaries of parenthood as a cause of gender inequality in academia, and particularly during the pandemic. Historical disparities between male and female academics in terms of tenure, research output, and other measures of academic productivity have been documented as the result of structural factors, including resource allocation, stereotyping, work climate, and family and household responsibilities (Oleschuk, 2020). Most of these factors are internal to academic institutions, not homes and families. There are also many instances in which male academics who are fathers face the same burdens as female academics who carry the bulk of parenting responsibilities in their families.

Pereira (2020) also notes that the excessive and narrow focus on productivity in terms of research publication as the ultimate metric of parity between academics elides other aspects of the academic productivity (such as teaching, curriculum development, student support, and administration) that are upheld by women academics and are insufficiently valued. It also fails to capture the experiences and wellbeing of academics as human beings. Taken together, the challenges of increased workload and household responsibilities during lockdown pose a threat to the emotional wellbeing of women academics, which holds implications for their success and performance as both professionals and human beings.

Emotional Wellbeing

The construct of emotional wellbeing is a useful lens for examining the experiences of women academics due during COVID-19 pandemic for its focus on how day-to-day events impact an individual. Emotional wellbeing "refers to the emotional quality of an individual's everyday experience – the frequency and intensity of experiences of joy, fascination, anxiety, sadness, anger, and affection that make one's life pleasant or unpleasant" (Kahneman and Deaton, 2010, p. 16489). This construct is particularly relevant in the COVID-19 era because of the way the heightened uncertainty has hampered individuals' ability to plan their lives beyond the immediate term (Islam S. M. D. et al., 2020; Settersten et al., 2020). The pandemic has shrunk lives to daily and weekly goals. The quality of individuals' experience over these short periods of time therefore becomes all the more significant as indicators of their overall wellbeing.

A more general look at the factors that contribute to emotional wellbeing highlights the unique ways women academics in lockdown might be affected. As Lades et al. (2020) found in their review of the literature on the enhancers and detractors of emotional wellbeing, the combination of the activities limited by the lockdown conditions and those increased by it, suggests a major threat to emotional wellbeing. Activities like time spent in nature (MacKerron and Mourato, 2013), interpersonal interactions (Gonza and Burger, 2017), and walking (Hanson and Jones, 2015), all promote emotional wellbeing but have been dampened in various ways by the pandemic. Meanwhile, "time spent alone, engaged in social media use, and caring for children" (Lades et al., 2020, p. 2) have been shown to reduce emotional wellbeing. It would therefore be expected that the lockdown is taking a toll on the emotional wellbeing of women academics. However, studies exploring how different daily activities are experienced during a pandemic or outbreak scenario are extremely limited in both number and method. Further, the studies of women academics during the pandemic have yet to examine emotional wellbeing as an indicator of individual happiness or fulfillment.

Of course, for women academics who are also parents, the threat to emotional wellbeing extends into the home. The wellbeing of parents during the pandemic has been shown to decline, particularly for those who have lost their source of childcare (Patrick et al., 2020). Overall, the conditions have created increases in day-to-day stressors for parents with negative impacts on their mental health (Brown et al., 2020; Fontanesi et al., 2020; Marelli et al., 2020; Russell et al., 2020). Arthur describes the emotional toll of the combination of reduced productivity and increased childcare challenges: "[it] leaves me feeling empty and vulnerable to not earning the respect, validation, and connection of others" (Guy and Arthur, 2020, p. 894).

Current Study

Given the compounded challenge of professional gender disparities in academia and lockdown measures, this study explores the experiences of women academics in South African universities during the COVID-19 pandemic and the impact of these experiences on their emotional wellbeing.

METHODOLOGY

This research was conducted as part of a wider study of women academics during the COVID-19 lockdown in South Africa. In an effort to slow the spread of COVID-19, the South African government announced a nationwide lockdown on 23 March 2020, which started three days later. Under this mandate, all non-essential businesses, schools, and public universities were closed, and academics were constrained to work from their homes.

The data collection took place from July to September 2020. This means that the experiences described by participants stretched across the stages of hard lockdown ("level 5", 27 March-30 April; "level 4", 1 May-30 May; "level 3", 1 June-17 August), which were characterized by intense restrictions on movement and activity, through to the eased stage of the lockdown ("level 2",18 August-20 September).[1] During all the stages of lockdown, South African universities were closed to face-to-face teaching and only minor exceptions were made with institutional permission, meaning academics were working from home throughout the data collection period. The average time to complete the survey was 22 min and no inducements of any kind were offered to participants.

Data Collection and Sample

Data for this study draws from the qualitative component of a cross-sectional study of 2,029 academic women working in 26

[1]See https://www.gov.za/covid-19/about/about-alert-system for further information on the lockdown stages.

South African universities. An online survey that predominantly contained quantitative Likert scale questions as well as open-ended questions was distributed to women academics at institutions. Ethical clearance for the study was granted by the relevant university's Research Ethics Committee. The ethical review process was followed by gateway clearance certificates in 25 universities; in one case, the research team was given permission by senior management to directly contact women academics at their university. Participation was voluntary and informed consent was obtained from the respondents through the online survey.

To ensure confidentiality and protect the identities of participants, the universities asked that the researchers limit the demographic information collected to career stage and parent status. The career stage of the study participants included established, mid-career, experienced, and early career academics (**Table 1**).

Just over half of respondents (53.6%) had children, while the 382 (18.8%) had children under the age of 6 in the home and 798 (39.3%) had school children ages 6-18 in the home. (Note that some respondents had children in both these categories).

Data Analysis

The study takes an interpretative, qualitative approach. The online survey contained an open-ended question for participants to discuss their experience of the pandemic. The subset of qualitative data from this portion of the data comprised more than 200,000 words and was included in this analysis. A conventional qualitative content analysis was performed, in which codes were generated from the text data. Given the large sample size, the open-ended nature of the qualitative question, and the amount of textual data, the aim was to identify common experiences among the group and possible relationships between the adverse impacts of the pandemic and the unique experiences or circumstances of women academics during the lockdown (Elo and Kyngäs, 2008). A content analysis was therefore best suited to the study as it allowed the researchers to explore how and why the pandemic affected participants' emotional wellbeing based on their general and subjective descriptions of how lockdown affected them, rather than in response to questions probing specific mechanisms or issues identified *a priori* (e.g., child care, isolation, health issues). Hence, the approach reflects a commitment toward using the individual and subjective expressions of women academics to develop deeper understandings of their common experiences (Flick, 2015).

The selected analytic process allowed the researchers to transform the data utilizing a six-step framework as proposed by Coleman and Unrau (2008). The coding of the qualitative data was performed using Atlas.ti 8 software. The benefit of using this software tool is that it allowed open coding in multiple rounds with many analytical layers that could be screened and sorted to pursue sub-topics in keeping with the Coleman and Unrau (2008) framework.

TABLE 1 | Participant career stage.

Participant career stage	n (%)	Children	n (%)
Established (16+ years)	527 (26.0%)	No children	941 (46.4%)
Mid-career (11–15 years)	393 (19.4%)	Children	1088 (53.6%)
Experienced (6–10 years)	504 (24.8%)		
Early career (0–5 years)	605 (29.8%)		

In the first step, data were prepared through extracting all written responses to the open-ended question of the survey. Confidentiality was maintained and anonymity ensured through removing the identifying information, namely participants' academic institutions. During the extraction process, each researcher became familiar with the entire data set independently before coding and interpretation commenced. In this way, allowance was made for meanings to emerge from the data instead of being prescribed.

The next step – reviewing of data – required each researcher to individually comb the data for responses that related to the theme of emotional wellbeing under lockdown conditions and screen these for contextual relevance. Responses were therefore filtered using relevant search terms: emotion and wellbeing. Because the open-ended question allowed participants to describe their experiences in all manner of terms that related to the adverse impacts of the pandemic, the data was intentionally filtered for explicit references to "emotion," rather than references to "psychological," "mental," or "physical" issues, before screening them for meanings related to a toll or negative effect on wellbeing.

Steps three and four involved first- and second-level coding. First-level coding involved generating a series of meaning units or codes where similarities and differences in responses were identified in broad code families. The researchers then compared codes and, where required, these were reorganized through constant comparison. This process was also conducted for data validation, allowing researchers to compare, test, and verify their interpretations with each other, and to reclassify the data where necessary. Meaning units that were similar were subsequently allocated to the same categories. Similarly, second-level coding involved identifying differences and similarities between categories.

The fifth step – interpretation of the data – involved the development of conceptual classification systems that identified the relationships between the main themes. Here, discussion also took place between the researchers on the most meaningful and revealing excerpts to best illustrate the key themes, and to ensure their meaning had been fully and accurately captured.

Data Validity

In addition to the data validation measures taken during first-level coding, data validity was ensured during the sixth step of analysis, which related to confirming trustworthiness of the findings (Coleman and Unrau, 2008). Here, different researchers reviewed and confirmed credibility, dependability, transferability, and confirmability of the data interpretations. All three authors were well versed in qualitative analysis and were part of a research team on the broader study project. Therefore, a different yet equally experienced and competent set of five researchers reviewed the data interpretations for credibility, as a form of "member checking" (Bazeley, 2013). This process

allowed for alternative perspectives to be voiced and for changes and further clarifications to be made where appropriate (Leedy and Ormrod, 2019). Relatedly, confirmability was achieved by researchers "practicing reflexivity" to determine their biases or opinions that might impact their interpretation of the data (Guba and Lincoln, 1982). The researchers therefore reflected on their roles as academics when analyzing data.

Dependability was ensured by collecting data in the same way across participants, accurately documenting the data, and using the exact words of respondents in the findings (Given, 2008), all of which were done for this study. Although it is not possible to generalize findings from a non-probability sample, transferability is possible by generating deep descriptions and contextualizing them to make them applicable in other contexts (Guba and Lincoln, 1982). The initial data filtering of the open-ended responses, which creates the opportunity for rich description, screened for deep responses that provided sufficient context and lend themselves to transferability. The demographic data collected also provided useful context for this purpose.

RESULTS

This study explored the experiences of women academics during the COVID-19 pandemic to understand impacts on their emotional wellbeing. The effects of the pandemic took a toll on the emotional wellbeing for many women in the academy, who expressed a sense of frustration, weariness, anxiety, and being overwhelmed. We refer to this as 'emotional taxation'. The three sources of emotional taxation that emerged from the qualitative data were work environment, home life, and social milieu (**Table 2**). Of the 2,029 respondents, 340 (17%), discussed emotional taxation of some kind. The frequency of the themes was counted per dataset, allowing for responses to contain multiple themes, and leading to a total of 638 entries, despite there being 340 datasets considered.

The emotionally stressful experience of the blending and converging of all aspects of women academics' lives in one space and period of time is encapsulated in the following extract:

> You have to be the emotional rock for everyone and meet the demands of work and in the end your tank is running on empty. But you must smile. You cannot debrief yourself from work on your way home so that you can nurture your family. Work and home life are blended, and neither is getting the attention it needs. Your family asks you why you are grumpy all the time. Because the new normal is not normal at all. The uncertainty is psychologically taxing, and this affects home life and work life. (Established academic and mother of one primary school student and two high school students)

Work Environment

The work environment – through colleague interaction and student support and involvement – was the first source of emotional taxation.

> *Toll: Emotional burden on students and students' insufficient e-learning setup*

TABLE 2 | Impact of lockdown and sources of impacts for women academics.

Category	Themes/Sub-themes	Description	Frequency
Impact of lockdown	Emotional taxation	Frustration, weariness, anxiety, being overwhelmed	340
Sources	Work environment		319 (94%)
	Tolls	Emotional burden on students	
	Responses	Students' insufficient e-learning setup Providing continuous support (academic, emotional, financial) for students Lack of resources (devices, tools, and support) for virtual learning Lack of clear planning from the university Juggling family responsibilities with work obligations Burnout Supporting fellow academics via WhatsApp Brainstorming with team and fellow teachers	
	Home life		187 (55%)
	Tolls	Increased household responsibilities	
	Responses	Loss of support structures Burden on single parents Isolation in the home No connection to workplace Prioritizing needs of family (partner, child, other members) over the self	
	Social milieu		132 (39%)
	Tolls	Caring for friends, family, community members outside the home	
	Responses	Constant digital communications Lack of social outlets (non-home, non-work activities) De-prioritization of work Engaging in spiritual practices	

The new nature of work engagement, primarily through online platforms, compelled women academics to devote large chunks of their time to work activities. Attending to the practical and emotional requirements of fearful and anxious students was clearly the most time-consuming of all the tasks facing academics. Reaching out and responding to students placed more demands on their time during lockdown, as they felt it important to regularly check in on their students' wellbeing and ensure that they had the resources and support they needed to continue to be productive. This engagement was mentally, financially, and emotionally draining.

> I was not prepared for the emotional toll it would have. It is challenging when you have to maintain an online presence for students, responding timeously to queries. And providing support to students that extends beyond academic work. (Established academic with one child in primary school and another in high school)

> I spent my own money in buying students data and have no regrets about this, but I feel for the students who are left behind despite the enormous effort my university had put in place to try and support the students – the need was just too great. (Established academic with no children)

> As I have been actively involved with my students on platforms such as WhatsApp, I sometimes spend several hours with them discussing practical work. Their frustration of inadequate devices at home to do practical work (cell phones, tablet/laptops) had a

direct impact on my ability to teach. (Experienced academic with no children)

Toll: Providing continuous support for students

Women academics were most concerned about the provision of student support. Large numbers of students, already experiencing deeply concerning mental health challenges before lockdown, had been placed under additional stress by the pandemic. A sense of personal responsibility to support students and check in on those who had not responded to any university communication was evident.

As most of their data availability was after midnight, they got immediate support from me as I was still awake working, e.g., students asking via WhatsApp about the work at 2 am, got an answer within seconds to minutes from me. This of course came at the cost of sleep. (Established academic and mother of two teenagers)

Toll: Lack of resources for virtual learning

Women academics experienced further challenges when dealing with vulnerable students while having no training, resources, or related expertise to do so:

The emotional "burden" of the student struggles was very difficult to deal with. It almost felt like I needed debriefing as I was dealing with the vulnerable students that desperately needed to come back to campus. These students have such intense struggles and hearing about it was very difficult to deal with. (Established academic with no children)

Emotionally you are not coping because you know your students are going through the same issues. They are no longer removed from the social circumstances that make life difficult. They are now in the middle of difficult circumstances and there is not much you can do to support them. (Early-career mother of two primary-schoolers)

The stress of trying to help our disadvantaged students is taking an extreme toll on staff. I don't know how we are going to manage completing this year without suffering with burnout or having a mental breakdown. There is no physical, emotional, or psychological support for what we are having to endure. (Established academic with no children)

Toll: Lack of clear planning from the university

Disturbingly, in some instances, academics received little support, encouragement, guidance, or practical assistance from their employers in navigating the changing environment.

I have been overwhelmed by the university's opacity in planning and failure to communicate strategies in this time. (Early-career academic with no children)

Lecturers have worked extremely hard to support their students – including emotional support. The Department of Student Counseling has been entirely absent until the end of July – leaving lecturers to do far more work in the emotional arena. (Mid-career academic with no children)

I was not provided with sufficient resources in terms of laptop, printing equipment, etc., and I would need to fork out of my own pocket without the possibility of reimbursement. The communication received from the institution also negatively impacted my emotional wellbeing. (Mid-career academic with no children)

Response: Juggling family responsibilities with work obligations

As a result of the additional demands on time, very few academics had the time, energy, or mental space to devote to research. One mid-career academic with a kindergartner and an adolescent shared how she could not submit her revised publication by the stipulated date and received *"little sympathy despite my efforts to actually reply in the end."* She was frustrated, as she felt she had been held to the same standard as single and male counterparts and *"to compare me with others who do not have children and can work freely, puts me under tremendous stress because I have to work and try three times as hard (and am three times more burnt out)."*

Response: Burnout

Because women academics were on call at all times of the day and held themselves responsible for the time-consuming and emotionally draining plight of students, co-workers, and families, many experienced burnout:

I spent a lot of time on my phone to encourage others. The result is that I am exhausted! Like many females, I put myself last. I am proud that I cope under the circumstances, I do what I need to do, but I know from past experience that I need to take time for myself. I am a typical candidate for burnout. (Mid-career academic with one child in primary school and one in high school)

I feel bad if I don't do everything in my power and more to support [students]. There is, however, nobody that supports my work-related emotional strain and burnout. I am very tired. I have been working seven days a week since the lock down started. (Mid-career academic with no children)

Response: Supporting fellow academics via WhatsApp and brainstorming with team

In the normal course of the workday, during which academic colleagues would have chatted regularly, communication had dwindled; some academics had attended only a few group meetings since the lockdown commenced, and it had left them somewhat directionless and adrift. As a result, heavy strain was placed on heads of department (HoDs) and those in managerial roles who had wider responsibilities – beyond their academic roles – to their academic communities in providing emotional support to their teams:

As HoD, I have an online meeting with our student representatives in the department every two weeks not just regarding the academic program, but very much regarding the emotional health and safety of the entire student's cohort. The situation across the board created great anxiety and uncertainty among staff. (Established academic with no children)

The lockdown made my role as manager very difficult. I am used to being at the office most of the day with an open-door policy and colleagues can have real-time discussions with me and among each other. During lockdown, we have to schedule formal meetings, people keep their cameras off, I can hear in their voices that they are stressed out and I feel totally out of control.

(Established academic with a child in primary school and another in high school)

Others had more positive experiences:

I work with a dynamic team. We have continued to meet using online platforms but most of the meetings are supportive discussing how everyone is feeling, addressing the isolation, providing support for our clinical colleagues who are treating COVID patients. (Established academic with no children)

Support from fellow colleagues in the form of WhatsApp messages/groups and online Google meetings were a saving grace. We were able to talk about the new way of working, support one another professionally and personally. (Mid-career academic with no children)

Home Life

The next source of emotional taxation, potential distress, and strain experienced by women academics was home life, which included all the personal interactions, household responsibilities, and experiences that happen there.

Toll: Loss of support structures and increased household responsibilities

The absence of support structures such as schools, extended family, friends, or hired help made it almost impossible for women academics who were parents to devote energy to any meaningful academic task and resulted in a sense of frustration and exhaustion that left them emotionally tired.

The gender burden was observed by several respondents, leading to feelings of discontent:

The labor of shopping, cooking, cleaning, and dealing with health and welfare matters for a network of loved ones is falling heavily on women. (Experienced academic with no children)

I have drawn up a roster with regard to the housework which needs to be done but this hasn't worked out satisfactorily and I find that I have to first clean the house before I can get started on my university work. I have also experienced resentment toward my husband and children because of this. (Established academic and mother of a high school student and two younger children)

Academics found that their emotional work in their families had doubled through having to be understanding and calm, and providing comfort to others. In their opinion, this spoke directly to the socialization of gender roles.

Toll: Burden on single parents

While women in traditional family units expressed their distress and discomfort, single parents similarly reported an uphill battle, feeling emotionally strained, with little available support and opportunity for self-care:

Lockdown is particularly stressful for single parents as support structures such as friends, elderly family members, etc., are no longer accessible. (Early-career academic with a child in primary school)

Everything was just way too much, all at the same time. It was just my daughter and I in the house. I found this really demanding on me. I had to keep it together for the child and myself. All this when I was emotionally down and drained. (Established academic with an adolescent child)

As a single mom, at home with two small children it is impossible to pretend it's business as usual. I have a very good work from home set up but doing academic work with little kids interrupting me is impossible. Taking care of their emotional and physical needs is obviously my priority. (Early-career academic with two young children)

Toll: Isolation in the home and no connection to workplace

Living alone had its own challenges too, especially when coupled with being new to a university and in an unfamiliar city:

The emotional stress/trauma of the hard lockdown was very, very difficult to cope with. I was relatively new to the university and to the area so had absolutely no local support system. It is very difficult to concentrate on academic work when you're stuck at home and have to cope with all of this all alone. (Early-career academic without children)

Another academic confided that living on her own had a very detrimental effect on her wellbeing, as she was a very extroverted person and found it very difficult to energize herself alone at home. This caused her to become very depressed, to the point that she had suicidal thoughts.

The home environment, typically a place of refuge from the stresses and strains of work, became an emotionally charged space for women academics during the pandemic, even when home life was not or had not been a source of strain and distress.

Response: Prioritizing needs of family over self

Women academics struggled with further challenges, as they not only had to support children emotionally, feed their families, and keep their homes liveable, but also had to deal with family members' realities:

I had to cope with my own anxieties and help my children cope with theirs. Both my children, one at school and the other, first year at university, had their own online learning challenges to deal with. We had to cope with home space becoming office spaces, classrooms, and lecture halls. (Experienced academic with one adolescent child and one child at university)

It took a few months for me to get into some sort of routine. My husband also worked from home and is in a very demanding job, so my needs were always the last to be met. On many days I felt like I wasn't coping [and I] had some days where I was really down and unproductive. (Early-career mother of two teenagers)

Social Milieu

The last source of emotional taxation and potential emotional distress was the social milieu, which involved extended family members and friends.

Toll: Caring for friends, family, community members outside the home

Friends of women academics had also faced challenges, including the death of loved ones, income-loss, loneliness, and mental health issues, while family members faced increased

childcare pressures, anxiety, financial stress, and sickness. Much of the time of women academics had been spent on emotionally supportive conversations and the provision of practical support.

Women academics confirmed the significant amount of time and emotional energy spent in trying to support family members and friends who were not coping. One experienced respondent with no children described her responsibility *"to ensure all those we know who need help are taken care of and also to support those who help others. This care took two to three days of the week."* With regard to their own parents, a mid-career respondent described how she *"had to take responsibility for my elderly mother who lives on her own, and whom we have told not to go out at all. All her account payments, grocery shopping, and other responsibilities have become mine."* This was echoed by other academics who had either taken the responsibility of keeping older parents safe or were concerned about parents who were not physically close.

Toll: Constant digital communications

The work of supporting others resulted in further emotional strain on the already over-stretched academic:

> As time went on, I found the constant digital communication started becoming unsustainable for me, emotionally. It began to drain me, and I had to begin setting even stricter boundaries with my devices, my time spent reading of the news, following up on people, and responding to every message. (Early-career academic with no children)

Response: De-prioritization of work and engaging in spiritual practices

Meeting the emotional needs of others required good support structures within the academic's own home, where, for example, partners were fully involved in setting up and maintaining routines and had assumed a hands-on role in child-rearing and household chores. Although the relief of being able to be present and supportive for loved ones was evident, the emotional burden of care was taxing in terms of time, motivation, and energy. Respondents coped through a variety of strategies that included reprioritizing, self-talk, and faith.

> There have also been days where I have accepted that it is all too much, and I need to spend half a day doing non-work activities if my mental health is going to survive this protracted crisis. (Early-career academic with no children)

> I also felt emotionally drained. The positive thing about it is that I became more human and more humble [and] started praying more. (Experienced academic with no children)

Putting others first and juggling multiple responsibilities meant that one experienced academic and mother of a teenager had to "*defer my own course to finish at a later date. I feel defeated and yet I feel guilty about it – like I should be able to cope. I've always felt strong and resilient until now.*" This highlights the emotional price women academics had to bear, with a fellow experienced academic without children adding that "*the impact at home leaves me negative and stressed out which has a direct impact on my own academic studies.*"

Toll: Lack of social outlets

Yet, as the extracts reveal, even coping strategies had limitations and caused feelings of frustration and distress.

> I feel completely emotionally spent but I cannot be; there is no room in our life for me to unravel. I have to maintain my cool and keep going. There is no chance for me to clock out of this situation; so, like so many other women, I have to put everything else before myself and it is making me deeply miserable. (Early-career mother of an infant)

> I can't go to church to recharge emotionally. I participate in online services, but it is not the same. Everything is just too much. (Established academic with no children)

DISCUSSION

Work-Life Merge

The conditions of the pandemic lockdown took an emotional toll on many women academics, who recounted their experiences of stress, burnout, and fatigue. From the detailed descriptions they offered of the unique challenges that arose from the lockdown, it is clear that this emotional taxation is due to what Fetherston et al. (2021) refer to as "work-life merge." As a consequence of the hard lockdown imposed in South Africa, home space merged with workspace as academics' houses became offices and classrooms. This held great consequences for how women academics lived and worked, and for their emotional wellbeing. Within this merged space, our findings suggest there were three predominant sources of taxation on emotional wellbeing for women academics: home life, social milieu, and work environment.

Participants who were partnered parents reported an unequal burden between themselves and their partners in sharing the heightened family responsibilities related to childcare and household maintenance. These findings may provide additional support for those of Yildirim and Eslen-Ziya's (2021) about the role of parenthood in the gender gap between the working experiences of male and female academics during lockdown. While several women academics used the lockdown as an opportunity to reconnect with their children, many were overwhelmed by feelings of guilt, depression, and anxiety at now being expected to cope with all aspects of their family, work, and social lives at once. This was exacerbated for single parents, who had little to no support.

Under strict lockdown, childcare and home assistance were limited and, in line with Crook (2020), participants reported that school closures and the unavailability of childcare services increased their workload, causing significant emotional stress. Single academics and new recruits described the emotional toll of isolation in similar terms as Gao and Sai (2020). For them, the merger of their work lives into the home space was threatening because they could not connect with colleagues, receive support from the university, or feel part of a workplace, which impacted their productivity and sense of themselves as academics. Participants indicated that prolonged isolation could lead to periods of hopelessness and self-doubt, severely hampering their emotional wellbeing. The response to this stress was to self-moderate their workload and spend more time on

non-work activities to preserve their mental health. This likely meant that they were reducing their research and other less urgent work as a coping mechanism, although it is not clear how effective this strategy was for maintaining emotional wellbeing.

With regard to other sources of emotional taxation, women academics were often juggling not just home-related responsibilities but the emotional needs of extended family and friends in their social milieu. During this time, concern for the wellbeing of others weighed heavily on participants. Time spent on supporting others further eroded the time women academics could devote to personal wellbeing and drained their already low reserves. Participants reported using a number of coping mechanisms, such as prayer and self-care, with varying degrees of success. Although they did not necessarily cite their interaction with colleagues as a coping mechanism, they discussed these interactions in very positive terms, which corresponds with Guy and Arthur's (2020) top recommendation for addressing mental health stressors.

Work and Wellbeing

It has previously been established that women academics are inclined to view their roles as more than mere jobs, but as integral to their identity and a place where they can contribute (Rosewell and Ashwin, 2018). By one interpretation, the work environment was the most emotionally taxing source, as it consumed so much time, which put pressure on other responsibilities and placed high emotional demands on academics. The responsibility of checking in with students to ensure they were coping with remote learning drained even the most able academics. Boncori (2020) described these demands of online teaching as emotional labor that exceeds normal job requirements. The women academics in this study, who were particularly challenged by the hardships facing their disadvantaged students, reported the impact of that labor on their emotional wellbeing in terms of fear of burnout and emotional breakdowns.

For women academics in leadership roles, the lockdown created challenges with professional communication and support, which required them to take on even more responsibilities on top of their demanding work and family responsibilities. Participants shared a sense that while the university communicated the message that lecturers should care for their students, they offered little in the way of guidance or resources for academics to do this effectively, requiring some participants to purchase materials for their students. This led to participants experiencing self-directed feelings of frustration and anger, and having concerns that they were emotionally exhausted.

Concertina Effect

Overall, this study showed that the work-life merge of lockdown acted as a concertina on the emotional wellbeing of women academics, manifesting in extreme increases in levels of stress as they struggled to manage their household, social, and work responsibilities all at once. This is to say nothing of the negative impact on their academic output: disruption of their studies, delays in research, or reduced writing, examples of which are already emerging in the literature on academic gender gaps during COVID-19 (Andersen et al., 2020; Gabster et al., 2020). Investigating the reasons for these patterns through interviews with women academics, Minello et al. (2020) found that one key cause is the precedence that teaching is taking over writing for women academics. The activities of holding online classes, monitoring students, and preparing different types of lectures are extremely time consuming, and, as our findings confirmed, the challenge of making time for all of them is exacerbated for women who have the dual role of academic and caregiver – whether that is care for children, family members, friends, students, or colleagues.

In her study of the online working experiences of academics during the pandemic, Gourlay (2020, p. 809) describes how "performing the university" in this way places a complex set of practical and emotional demands on academics by rendering "the private and domestic space hybrid, complex, and compromised". According to her analysis, the emotional taxation on academics in the pandemic era – the very experiences voiced by our participants – is inextricably linked to a limited conception within the greater academic community about what digital engagement actually is, and what its implications are for how academics perform it.

CONCLUSION

As the work-life merge is expected to carry on indefinitely in higher education, universities need to be aware of its adverse impacts on the emotional wellbeing of women academics, with severe implications for their families, students, colleagues, work, and own personal wellbeing. These findings of the specific challenges facing women suggest the ways in which universities and the academic field can mitigate the emotional toll on women, such as alleviating the emotional labor burden on women by finding other avenues to support students; extending deadlines, adjusting requirements, and lowering demands on academics with young children and complex personal situations; and providing emotional support by ensuring regular communication and engagement between academics and their colleagues.

For women academics themselves, many in the field have already been forthcoming with recommendations for managing the practical and psychological challenges of working in lockdown (Guy and Arthur, 2020; Kowal et al., 2020; Minello et al., 2020). As Restubog et al. (2020) find of parents working from home during lockdown, practicing emotional regulation by actively discussing positive events with family members and colleagues, or adopting an adaptability mindset toward career changes, is a useful and available lever for managing one's own emotional wellbeing.

LIMITATIONS AND FUTURE RESEARCH

The data considered in this study were drawn from a larger study of South African universities and the findings may be specific to the local context and the lockdown conditions within the country at the time of the data collection. The study would have benefitted from the inclusion of male academics as participants to ascertain

whether certain stressors were gendered and in what ways. Future studies may wish to seek views across demographic categories, career stages, disciplines, and geographical sites. A further avenue for exploration would be an in-depth qualitative study to explore the redress measures sought by women academics to alleviate challenges to their wellbeing.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because, as part of the agreement for access with all universities, we undertook to keep the dataset completely confidential. Requests to access the datasets should be directed to CW, cyrillwalters@sun.ac.za.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Stellenbosch's Research Ethics Committee: Social, Behavioral and Education Research – ethical clearance number REC-2020-15216. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LR and AB conceptualized the manuscript's focus, proposed the objectives, prepared the draft manuscript, and wrote all the sections. CW conceptualized the original broader study from which the data were drawn and collected all the data. All authors contributed to the article and approved the submitted version.

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Teaching Presence vs. Student Perceived Preparedness for Testing in Higher Education Online English Courses During a Global Pandemic? Challenges, Tensions, and Opportunities

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In the context of a global pandemic that started in 2020, the Chilean higher education institution Universidad Andrés Bello (UNAB) faced the challenge of giving continuity to its already established blended program for English courses while also starting the implementation of a high-stakes certification assessment for its students using the Test of English for International Communication (TOEIC) Bridge. This study sought to evaluate how much of a mediating factor online teaching presence could be in the context of test preparation within a language course in aspects related to autonomous learning and perceived learning outcomes. A mixed-methods approach was used. It included a survey applied to 1,642 eligible students of the English program. These quantitative data were complemented with students' comments and teacher interviews. After triangulating quantitative and qualitative data, teaching presence was clearly perceived to be a relevant aspect of the online experience in the studied courses. However, both students' and teachers' voices evidenced pervasive challenges and tensions that hinder the potentially transformative benefits that online learning is expected to bring about.

Keywords: online education, English–second language, student preparedness, teaching presence, autonomous learning

INTRODUCTION

This study is situated in a setting of efforts, challenges, and a worldwide emergency. First, both national and institutional efforts have been made to improve the teaching and learning of English as a foreign language. Globally, there is a need to learn and understand English as it is demanded at every educational level, from primary to tertiary education, due to its status as Lingua Franca and its relevance for industry and the spreading of knowledge (Kabilan et al., 2010). Second, there is an understanding that any educational context set in the twenty-first century can be considered digital education due to the use of networks and learning management systems (Anderson and Rivera-Vargas, 2020), so in that sense, this study also deals with the challenges of online education. Finally, a context of a global pandemic means that Chilean Universities "moved all educational activities

to a virtual teaching model using existing institutional software and/or publicly available digital platforms" (Sepulveda-Escobar and Morrison, 2020, p. 587).

In 2012, the Chilean higher education institution Universidad Andrés Bello (UNAB) started implementing a blended approach for the English language program that based its implementation decision on research about online language learning (Johnson and Marsh, 2013). This process has been centered around experiences and evidence which are still the main guidelines for program decisions since then. UNAB included courses for English learning for a total of 500 h over a period of four terms in undergraduate programs. These UNAB students are expected to reach the B1 level according to the Common European Framework of Reference (CEFR) (Universidad Andres Bello, 2016, p. 7). To reach the 500 h committed in the program, a blended model is used to combine activities performed autonomously by students on an online platform and weekly face-to-face practice sessions with the teacher. This is the reason why research on blended learning has been critical in understanding the impact and benefits of this mode for the Department of English (Johnson and Marsh, 2014).

Since 2021, UNAB has decided to use the Test of English for International Communication (TOEIC Bridge) as a benchmark to assess students' English language performance at the end of the four-term program. This test is particularly useful as it helps assess English skills for work and is used by companies as a reference for hiring (Nae, 2020). The application of this test involved teacher training and preparation for teachers, students, and coordination teams to face this new challenge in the best possible way. Owing to the high stake's nature of this test, it requires proctoring and should be taken face to face, which was an added challenge to the process due to the context of sanitary restrictions posed by the pandemic.

The UNAB faced the implementation of the TOEIC Bridge in a context where the SARS-CoV-2 (COVID-19) outbreak in 2020 had called for the use of fully online teaching in schools and universities in many countries due to confinement measures (Cancino and Avila, 2021). During 2020 and 2021, English courses at UNAB were taught using a fully online mode of delivery, where the main difference from previous years was the switch to synchronous weekly practice sessions instead of face-to-face meetings between teachers and students. There was also extensive use of the official institutional online platform Blackboard Collaborate to be able to meet the requirements of the academic program (Cancino and Avila, 2021). This change from face-to-face classes to online learning required teachers to acquire new roles and competencies (Atmojo, 2021). Although teachers had had some experience with distance education, in the sense of having used technology mediating the educational experience (Anderson and Rivera-Vargas, 2020), the sudden transition from a bimodal environment into a fully virtual one represented a challenge for everyone involved in the process.

Considering all the challenges mentioned previously, the English Department decided to implement a learning community for teachers in order to concentrate all of its training and preparation efforts on configuring a space of "professional learning." It is defined as the practice of teachers in support of their pedagogical and content knowledge as well as their teaching practices with the purpose of improving students' learning and their own relevance in the field (Slagoski, 2019). It is also relevant to mention that various regional studies recognize in teacher preparation a key factor in educational progress (UNESCO, 2013, 2014). Anchored in this new learning community for the teachers of the department, the coordination team organized a series of training activities and webinars centered around the TOEIC Bridge test preparation during the first term of 2021. During these encounters, there was a collective interpretation of the challenges and potential students' concerns with the new test. Furthermore, teachers collaborated to find the best practices that might have a bigger impact on improving students learning and preparedness (Vaillant, 2019). The intention was to make sure that teachers' presence in their online courses was seized and perceived by their students.

Universidad Andrés Bello's Test of English for International Communication Bridge Test Implementation

As previously mentioned, UNAB has made the teaching and learning of English as one of the core elements within its educational model by including this skill as part of the educational seal which is integral to the graduation profile of students (Universidad Andres Bello, 2016), following a global trend relating to labor market expectations and graduates' employability (Sandoval and Ormazábal, 2021). The English program for most undergraduate students consists of four courses. During the first term of 2021, students who were enrolled in the 4th and last course of their English program were considered for the first batch of TOEIC Bridge test takers. This first group of students voluntarily registered to take the test face-to-face. As part of the process, the coordination team prepared satisfaction surveys for both teachers and students so they could assess the preparation process. The feedback obtained from those surveys helped identify improvement opportunities and best practices. These were condensed into a document that was socialized with the teaching team. They also informed the implementation for the second term of 2021 when the TOEIC Bridge test was no longer voluntary for students, so preparation and practice became even more relevant. Key aspects, such as mock tests and personal practice material, together with in-class practice material and activities were woven into the program based on the initial feedback from students and teachers. The results of the satisfaction survey for the second term are presented in this report and are also aimed at informing future implementation procedures, consolidating an iterative model of implementation that incorporates feedback in a loop of continuous improvement.

Self-Regulated Learning

Increasing student motivation through autonomy in learning, the effective use of digital tools and rapport between students and teachers are some of the most relevant and researched aspects of the online education experience (Rivera-Vargas et al., 2021). Therefore, the institution decided to focus its initial efforts

on empowering teachers so they could eventually prepare and practice with their own students to face the TOEIC Bridge test with higher levels of confidence by "inserting strategies that encourage the student to work autonomously" (Rivera-Vargas et al., 2021, p. 3371). These strategies can be identified within the self-regulated learning framework, where students use metacognition abilities to think proactively, perform, and self-reflect (Dignath and Büttner, 2008; Ergen and Kanadli, 2017). This framework is defined as an active and constructive process in which individuals set their own learning goals, regulate their cognition, motivation, and behaviors, and are directed and limited by their own goals and contextual features (Pintrich, 2000). Throughout the years, there have been different self-regulated learning models, but most of them have forethought, performance, and self-reflection as major components (Carter et al., 2020). The current study will focus on the performance component, which is related to the strategies that students use to help their own learning and stay focused on tasks, and the self-reflection component, which is related to students reflecting on their performance and evaluating the learning process and outcome (Carter et al., 2020).

Teaching Presence

Considering the emphasis on teacher preparation, another theoretical framework of relevance for this study is the Community of Inquiry (CoI), which is a collaborative constructivist model of online learning processes that helps inform research and practice (Garrison et al., 2010). This model is comprised of three critical components, namely, cognitive presence, social presence, and teaching presence. This research focuses on teaching presence, which is defined as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson et al., 2001, p. 5), which involves the organization of content, planning, and instructional guide of an online course. According to previous research, courses with higher levels of teaching presence can provide clearer course structure and more relevant contents that could eventually help students achieve higher efficiency and better learning outcomes (Garrison et al., 2010; Garrison, 2017). Teaching presence can also significantly predict students' satisfaction (Akyol and Garrison, 2008; Arbaugh, 2008; Maddrell, 2011; Miller et al., 2014; Kyei-Blankson et al., 2016; Yang et al., 2016; Lim, 2018; Shea et al., 2019) and perceived learning in online courses (Shea et al., 2003, 2019; Akyol and Garrison, 2008; Arbaugh, 2008). It is relevant throughout the implementation of an online course, from the design and facilitation to the content knowledge communication, and it has been conceptualized by three subdimensions, namely, instructional design and organization, facilitating discourse, and direct instruction (Caskurlu et al., 2020).

This study aims to assess how much of a mediating factor teaching presence can be when confronted with self-regulated learning components of performance and self-reflection, both understood as indicators of perceived learning, which is also a valid indicator of learning outcomes (Shea et al., 2019). These relationships become relevant considering that the relationship between teaching presence and learning outcomes and their interactions is a valuable research focus (Zhang et al., 2022). There have been studies that have investigated the link between teaching presence and perceived learning, but findings have been inconsistent. This may be due to the possibility that the relationship between teaching presence and perceived learning could be moderated by factors related to context, course types, and other individual factors (Zhang et al., 2022).

In this study, we aim to answer the following question: Is teaching presence a mediating factor to assess students' perceived learning outcomes when preparing for an international exam to certify their level of English in an online course?

In relation to the guiding question, it is important to clarify that *perceived learning outcomes* refer to the dimensions of performance and self-reflection that are present in self-regulated learning models (Carter et al., 2020).

METHOD

The study was carried out using a mixed-methods approach. It implies the use of quantitative and qualitative data gathering strategies in different phases of the study (Pereira-Pérez, 2011) and, in this way, a more accurate perspective of the phenomenon can be obtained, making our perceptions more complete, holistic, and integral (Hernández et al., 2006; Riazi and Candlin, 2014).

In the first phase of the study, a Likert-type scale questionnaire was used as a quantitative data gathering instrument. The construction of this scale was based on the elements of the CoI survey that are related to teaching presence (Anderson et al., 2001). The instrument constructed for this study included three dimensions, namely, teaching presence, performance, and self-reflection. The instrument included seven statements that were related and aligned to each of these dimensions. Once it was designed, the instrument was validated by an international expert in the teaching and learning of English in online courses.

The first four items (**Table 1**) were used to assess the aspect of teaching presence from the CoI framework. Items 1 and 4 were aligned with statements 1–3, respectively, from the CoI survey, which are part of the subdimension *Design and Organization* of the CoI instrument. Item 2 was aligned with item 11 of the CoI survey, which is part of the *Direct Instruction* subdimension, and item 3 was aligned with item 6 of the CoI survey, which is part of the *Facilitation* subdimension (Anderson et al., 2001).

Items 5–7 were used to evaluate the aspects of self-regulated learning. More specifically, statements 5 and 6 assessed performance, and item 7 assessed self-reflection, by means of which students were able to evaluate their perceived preparedness to face the TOEIC Bridge test (**Table 2**).

Sample and Participants

The instrument was applied to 1,642 students enrolled in the last course of the English program for undergraduates. This figure corresponds to the total number of students eligible for taking the test. A total of 387 students responded to the survey,

TABLE 1 | Survey item alignment and teaching presence.

N°	CoI survey items	Present study survey items	
1	*Design and Organization* 1. The instructor clearly communicated important course topics. 2. 2. The instructor clearly communicated important course goals.	1. I received timely information about the structure and objectives of the TOEIC Bridge exam.	Teaching presence
2	*Direct Instruction* 11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	2. I received the information during the course about the TOEIC Bridge exam and I understood the question types and sections it comprises.	
3	*Facilitation* 6. The instructor was helpful in guiding the class toward understanding course topics in a way that helped me clarify my thinking.	3. I received the information during the course about the TOEIC Bridge exam and I understood the benefits of taking it	
4	*Design and Organization* 3. The instructor provided clear instructions on how to participate in course learning activities.	4. I had instances of practice and preparation during some sessions of my English IV course.	

which corresponds to a margin error of 4.36 with a confidence level of 95% (Netquest, 2022)[1]. *Microsoft Forms*[2] was used to set up the instrument and 2 weekly reminders were sent to students to encourage in participation. Results were collected in the corresponding spreadsheet linked to the form and then tabulated to get percentage data for each item and for each of the 5-point scale elements.

Students' and Teachers' Voices

In the second phase of the study, a semi-structured interview was constructed and applied with four teachers who participated in the study. This interview was validated by an international expert in educational research. To supplement the data obtained from the Likert-type scale administered to students, the instrument included an optional open comments section that gathered complementary information about their thoughts on the preparation process for taking the TOEIC Bridge test. Regarding the interviews, both the interviewer and interviewees had an active role in the interaction since they have shared the qualities that are relevant to the study, such as (a) being teachers of the English Department of the institution and (b) having taught the courses which prepared the students for taking the TOEIC test during 2021. The topics of the semi-structured interviews for teachers were aligned with the items from the student Likert-type scale instrument, and they were presented and used during the interviews (**Table 3**).

Apart from these questions, the four interviewed teachers were also able to add any further comments about the process of implementation, preparation, and application of the test. When presenting teachers' quotes, they are followed by a T and a designated number for individualization purposes. The same

[1] shorturl.at/dfvJN

[2] https://forms.office.com/r/Bbst5cy1iP

TABLE 2 | Survey alignment and self-regulated learning.

N°	Present study survey items	Self-regulated learning (SRL)
5	I had access to and used the complementary practice and preparation material like the TOEIC Skill-building course available on the English Discoveries Platform.	SRL–Performance
6	It seemed to me that the complementary material was appropriate in my preparation for the TOEIC Bridge exam.	
7	I felt prepared to take the TOEIC Bridge exam.	SRL–Self reflection

TABLE 3 | Teacher interview guidelines.

Topics	Semi-structured interview guidelines
Topic 1: Teaching presence	About design and organization of the course
	1. Were you able to communicate relevant aspects of the course related with the TOEIC Bridge test preparation (objectives and structure)? How?
	2. Were you able to use the complementary preparation material like the TOEIC Skill-building Course? How was the experience with your students?
	About Facilitation and Direct Instruction
	1. Were you able to explain to students the structure and benefits of taking the TOEIC Bridge test? How?
Topic 2: Self-regulated learning	About performance
	1. Were your students able to access and practice with the complementary preparation material? What was their assessment of this material?
	About self-reflection
	1. Do you think students felt prepared for taking the TOEIC Bridge test? Why?

principle was used when presenting students' quotes, which are followed by an S and a designated number.

In the third phase of the study, qualitative and quantitative data were triangulated to generate preliminary conclusions that were derived from the discussion and conclusion of the study.

RESULTS

The results are presented by triangulating the quantitative data from the survey and the voices of the students who emerge from their written opinions and those of the teachers who emerge from the semi-structured interviews conducted.

The analysis will be presented and organized along the dimensions of teaching presence, self-regulated learning, performance, and self-reflection. A preliminary synthesis will be presented at the end of each section.

Teaching Presence

Understanding that teaching presence implies a teacher who facilitates and makes use of direct instructional methods to share content knowledge with students throughout an online course (Caskurlu et al., 2020), it can be seen that students identify it specifically in *Direct Instruction* (question 2 of the survey), which shows a level of agreement of 86% among those who were consulted (**Table 4**).

On a more specific analysis, we found a relationship between the students' perception of the question *I had instances of practice and preparation during some sessions of my English IV course*, in which 85% agreed, with the following comments written in the surveys related to the teacher's preparatory role for the exam:

"Our teacher prepared us very well and I was happy with my performance" (S1).

"The teacher answered all doubts and was very kind and accurate to comment about this exam" (S13).

"My teacher was excellent. Having done other certification tests in the past, the teachers would scare us talking about its difficulty and importance, but our teacher was very emphatic and prepared us a lot, but without exaggerating about the test" (S5).

Another group of quotes shows that students have a high appreciation of their teachers and different strategies used to prepare them for the exam. Among these strategies, students highlight reminding, reinforcement, and the use of the platform tools, such as announcements and synchronous sessions, which are stated in the following excerpts:

"It was entertaining to prepare it each class, which made me be much more prepared to take this important test. . .My teacher was very good, which enhanced my learning even further" (S8).

"Our teacher prepared us well. . .she indicated its importance both in online classes and in the announcements" (S22).

In the same way, the teachers consulted agree with the students' assessment and perception of their presence as a support in the preparation process for the exam, as can be seen in the following quotations:

"I emphasized the relevance of the test for their future" [. . .] "When I received a mail with a question from a student, I would send an announcement with the answer as a reference for the whole class" (T2).

"Due to the student's profile and career I have to adapt the material to cater to their specific needs" (T3).

"There were 3 or 4 weekly announcements on my part" [. . .] "I had to insist" [. . .] "I used apps to complement their work" (T1).

"I received a lot of mails asking about information present in the announcement. . .I had to use a lot of time repeating information about the test" [. . .] "But I also thought it was important to empathize with students" (T4).

TABLE 4 | Survey results for teaching presence.

	Teaching presence						
Questions	**Total N°**	**Strongly agree %**	**Agree %**	**Neutral %**	**Disagree %**	**Strongly disagree %**	**Total %**
I received timely information about the structure and objectives of the TOEIC Bridge exam.	387	58%	30%	6%	2%	3%	100%
I received the information during the course about the TOEIC Bridge exam and I understood the question types and sections it comprises.	387	63%	26%	6%	1%	4%	100%
I received the information during the course about the TOEIC Bridge exam and I understood the benefits of taking it	387	55%	28%	11%	3%	3%	100%
I had instances of practice and preparation during some sessions of my English IV course.	387	61%	25%	8%	2%	5%	100%
Average		59%	27%	8%	2%	4%	

The information from the quotes shows that teachers used platform tools to keep in constant communication with their students, such as announcements. In addition, they developed supplementary materials and used digital resources in addition to the platform resources to ensure that students were practicing their second language skills.

It is important to note that, although most of the students' opinions are positive, only 18% of the students made written comments, which could suggest that they perceived a lesser presence of their teacher, but not to the extent that they were willing to mention him/her. Within the percentage of the responses, it was possible to identify examples with negative evaluations, as evidenced in the following quotes:

"I thought the TOEIC preparation was insufficient, the preparation units were few and very similar to the conventional units of the course" (S16).

"The test advanced too fast without offering the possibility of repeating the audio. . .awful experience" (S7).

The selected quotations reveal, on the one hand, that the students do not seem to find the preparation units challenging and, on the other hand, they are not clear about the requirements and formats of the test. The first quote suggests that the students did not really know the structure of the test, which implies having only one opportunity to listen to the recorded audios. The second quote could imply a lack of adaptation of the available materials. Both situations can be related to either the lack of teacher presence or the problems of student interaction with the course content.

Although the comments are aligned with the students' remarks, the teachers' perceptions focused mainly on what they did to transmit their knowledge. There was no explicit mention of whether they ensured that the students understood and comprehended the concepts and instructions that were being given. The teaching presence perceived by students, according to Caskurlu et al.'s (2020) meta-analysis, should contribute to the development of metacognition and self-regulation skills by providing "practical insights on how to be actively involved in the course thereby constructing their knowledge through collaboration, interaction with others, and experiencing others' points of views" (Caskurlu et al., 2020, p. 11). In contrast, the learning community for teachers should analyze the type of response given to students, beyond a reminder and/or suggestion, as this community should support a process of collective learning and an interest in pedagogical strategies (Vaillant, 2019).

Despite the fact that the analysis shows the forms of teacher presence that are effectively perceived by students, it is still incipient, especially because the elements of paradigms that are deeply rooted in the more traditional pedagogies of transmission and direction of learning by the teacher still persist (Charbonneau-Gowdy and Cechova, 2017). This means that despite the efforts at the national and institutional levels, education continues to be perceived only as the dissemination of knowledge and content in virtual learning environments (Anderson and Rivera-Vargas, 2020). This is still far from the constructivist and collaborative process that online learning hopes to develop and contribute to the new professional scenarios, through resources, such as synchrony and the use of various digital resources that strengthen autonomous learning.

Self-Regulated Learning

Performance

In terms of the performance variable, questions 5 and 6 refer to this aspect. Notably, 78% of the students agree that they had access to and used the supplementary materials available on the platform (**Table 5**). In addition, 89% of the students agree that the supplementary material was appropriate for the preparation of the exam. However, the percentages of the neutral option increase by 11 and 12%, and the percentages of the disagreement options decrease by 10 and 8%) (**Table 5**).

The perception of the accessibility and usefulness of the test preparation materials are reinforced by the voice of the students in the following quotes:

"Excellent preparation to take the test, the practice material in the platform is very similar to the actual TOEIC test" (S12).

"The preparation is comprehensive, although it requires a lot of time but that can be solved with good organization" (S3).

"In general, very good preparation, although I wish we had more time to practice with the teachers" (S14).

"Excellent way of working, very dynamic and fun" (S15).

However, not all students who responded to this part of the survey have the same opinion as evidenced by the following quotes:

TABLE 5 | Survey results for self-regulated learning (performance).

	SRL–Performance						
Questions	**Total N°**	**Strongly agree %**	**Agree %**	**Neutral %**	**Disagree %**	**Strongly disagree %**	**Total %**
I had access to and used the complementary practice and preparation material like the TOEIC Skill-building course available on the English Discoveries Platform.	387	51%	27%	11%	4%	6%	100%
It seemed to me that the complementary material was appropriate in my preparation for the TOEIC Bridge exam.	387	49%	30%	12%	3%	5%	100%
Average		50%	28%	12%	4%	6%	

"I thought the TOEIC preparation was insufficient, the preparation units were few and very similar to the conventional units of the course" (S16).

"The practice in class was not the same because they didn't give us the time constraints demanded in the real TOEIC" (S18).

"I didn't like the fact that we could listen to questions many times and only once in the actual test. The conditions in the preparation test should be the same as in the real test" (S20).

"Improve practice for the test, maybe create tutorials and specific review sessions for that" (S23).

In contrast, teachers' voices give us clues as to how they perceive what the students say, and the following quotes give evidence of their perceptions:

"Many students pass the course just because they complete self-paced activities" (T3).

"The number of students engaging with the practice material is low. Many of them work and had to watch the recordings later. Although attendance, to the synchronous sessions, was low, those who participated in sessions really took advantage of them" (T1).

"Students are afraid of making mistakes" [. . .] "We should reward students' effort" [. . .] "We should help them explore the language and not dwell on grammar jargon too long" (T2).

"TOEIC should be compulsory and needs to be part of the course grades." [. . .] "Students should perceive this test as an experience" (T4).

To summarize, it can be observed that the students highly value the presence of their teachers regarding their potential performance, both at the level of perception and in an evident way in some of the quotes. However, in contrast, it can be noticed that the students' voices externalize the responsibility for what happens in the courses in terms of their potential performance in the test. Even when they express themselves negatively, they only mention what happened and not what they could have done together with the teacher to improve their English proficiency and perform better in the exam. The previous point seems to align with the fact that "efforts to increase student engagement remain generally unsuccessful" (Charbonneau-Gowdy, 2018, p. 56).

In contrast, teachers' voices follow an understanding of the importance of context and the impossibility of bringing the content successfully to any space and to any student (Anderson and Rivera-Vargas, 2020). There is also a perception of poor student performance due to a lack of engagement with the content and attendance problems, which have been exacerbated by the context of confinement and entirely virtual interactions that affected student participation. This has been supported by the reports of absenteeism, no use of cameras and microphones, and a general reluctance on the part of the learners to engage online (Charbonneau-Gowdy et al., 2021).

It is evident when contrasting the discourses that both students and teachers externalize the success or failure of the results on each other. However, it would be interesting to find out how both actors are involved in teaching and its real improvement. In contrast, how students really impact their performance based on their self-regulation and autonomous behaviors when learning. This is particularly relevant in an educational environment that was influenced by COVID-19 restrictions, which changed the way lessons were delivered and the use of online platforms that forced students and teachers to adapt to the new circumstances (Cancino and Avila, 2021). The teaching presence in virtual spaces is understood as the facilitating factor of active environments where teachers and students share ideas and opinions and where social presence is demonstrated through engagement in collaborative discussions (Charbonneau-Gowdy et al., 2021). Clearly, this needs to have an impact on motivation of students so that, regardless of the circumstances, they can make the most of the design of learning activities.

Self-Reflection

In this study, self-reflection refers to *the subjective perception of students own preparedness to face the TOEIC Bridge test*. It is interesting to note that in question 7, only 68% of the students agreed with the statement. This shows a 10% decrease in agreement with respect to their perception of their performance in the test and 18% decrease in relation to the assessment of the teaching presence in the test preparation course (**Table 6**).

Nevertheless, there is evidence of students' and teachers' assessment of the preparation of the test, as the following quote shows:

"Preparation for this test was really good [. . .] we knew the dynamic of the test [. . .]I felt prepared in a way, but nervous" (S6).

"Students were enthusiastic about the test, but they didn't trust their skills" [. . .] "We should start TOEIC preparation from the first course" [. . .] "Students get to course four unprepared" (T2).

In summary, both students' and teachers' perceptions point to the possibility that teacher presence alone is not sufficient to ensure that students feel prepared for a major assessment. These comments shed light on some other factors that could affect students' readiness and may well inform future iterations of implementation. It is also important to note the very low rates of participation in the comment section of the instrument and the willingness of students to share their opinions, which could imply that the teaching presence is still insufficient in making students aware of their role in the learning process.

TABLE 6 | Survey results for self-regulated learning (self-reflection).

		SRL–Self reflection					
Questions	**Total N°**	**Strongly agree %**	**Agree %**	**Neutral %**	**Disagree %**	**Strongly disagree %**	**Total %**
I felt prepared to take the TOEIC Bridge exam.	387	40%	28%	22%	4%	5%	100%

We should also consider that social presence and having high expectations of students' learning, independent of their socio-cultural status, can be directly related to students' performance in the exam. Due to this, "Further ethnographic, social-based research [. . .] is at the heart of uncovering the contextual issues that are unique to each setting" (Charbonneau-Gowdy, 2018, p. 65).

DISCUSSION AND CONCLUSION

We started this report by setting the study in a context of efforts, challenges, and a worldwide emergency. As an initial discussion point, we can focus on the efforts made by the institution to empower its team of English teachers by means of a virtual learning community. This community helped prepare teachers and tried to make sure their presence was perceived by their respective students while preparing for the TOEIC test. Although limited to this institution, the survey results seem to confirm that these efforts are headed in the right direction, since students indicated high levels of agreement in all subdimensions with direct instruction evidencing the highest percentage. These results confirm the importance of considering teaching presence when designing and implementing online courses (Caskurlu et al., 2020). However, these results complemented with our qualitative data also suggest and may confirm that contextual factors are important in "how teaching presence impacts perceived learning, and how individual factors moderate the association" (Zhang et al., 2022, p. 9).

Second, we now know that the worldwide emergency of the COVID-19 pandemic brought new challenges to teaching and learning for students and teachers alike. These challenges resonate with the lingering tensions between what is needed to support learners and what it means to provide enough guidance, structure, and support in an online course (Carter et al., 2020). Qualitative data from the teacher interviews and students' comments attest to the relevance of teachers' role in helping students become more self-regulated learners. In that sense, we agree with the importance of teachers using metacognitive strategies to increase students' achievement and self-regulation in different learning environments (Ergen and Kanadli, 2017).

Students' comments on performance also show that teaching strategies need to be consistent and discussed within the learning community of teachers if the goal of improving learning and preparedness is to be met (Vaillant, 2019), especially considering the iterative model of implementation of preparation and practice for the TOEIC Bridge test and the updates on best practices that it proposes. Although teaching presence was perceived by students in this study and confirmed by some of the comments of both students and teachers, it is still unclear if it influenced performance since the interviewed teachers expressed concerns regarding students' attendance and engagement in the context of online teaching and learning (Charbonneau-Gowdy, 2018).

It was interesting to notice that the perceived levels of teaching presence did not necessarily translate into higher levels of perceived preparedness. Furthermore, Teacher 2's remarks hint at the issues of confidence in their own skills and issues with planning the preparation of a course. They even hint at possible issues with placement instruments and assessments that allow students to reach the last course "unprepared." These issues, although relevant and enlightening for future research, should make us reflect on the actual ways in which teachers and students are interacting in online courses and how technology is being used. This is especially relevant if we aim to truly transform student–teacher interactions and roles to finally reach the original promises of digital technologies for a more connected and collaborative learning experience (Anderson and Rivera-Vargas, 2020). We have probably reached a point where we should finally focus on aligning theory and practice on online learning to find solutions that could go beyond the challenges posed by the pandemic (Charbonneau-Gowdy et al., 2021).

When confronting the guiding question of this study *Is teaching presence a mediating factor to assess students' perceived learning outcomes when preparing for an international exam to certify their level of English in an online course?* with the results obtained through the different instruments applied, we can see an alignment between the survey results, and students' and teachers' comments about the strategies and methodologies used during preparation for the TOEIC Bridge test. These results seem to be in line with other studies that indicate that teaching presence predicts student satisfaction (Akyol and Garrison, 2008; Arbaugh, 2008; Maddrell, 2011; Miller et al., 2014; Kyei-Blankson et al., 2016; Yang et al., 2016; Lim, 2018; Shea et al., 2019). When incorporating qualitative data, we realize that perceived teaching presence does not necessarily equate to increased performance and self-reflection (understood in this study as *perceived learning outcomes*). On the contrary, it hints at deeper issues that are related to how the expectations of online learning pushing toward more constructivist ways of teaching and learning have yet not been reflected in reality (Anderson and Rivera-Vargas, 2020). In light of these findings, we agree with the need to apply grounded research to put into practice innovations and new instructional design models which should be based on contemporary e-learning theories (Charbonneau-Gowdy et al., 2021). This is particularly relevant considering that low attendance and engagement have been commonplace since the pandemic started in 2020, with online classes being the only viable option for some time to ensure continuity in the institution's academic activities (Cancino and Avila, 2021).

Considering the limitations of this study, we can first point out that it was carried out with students studying in one semester. Future studies could be carried out to compare the results of students over two or more semesters to identify potential differences among levels. Second, the number of teachers interviewed was four, so future studies including more teachers could generate further insights into the challenges they face when dealing with online courses. Although students' voices were included through their comments, a future study could consider interviews and focus groups that could produce richer perceptions about their experience. Finally, students' results in the TOEIC Bridge test were not considered. In a future study, they could be included to enrich the analysis and triangulation of quantitative and qualitative data from students and teachers about their perceptions of exam preparation.

With the expected and gradual return to normal face-to-face classes in 2022 in Chile, future research on the subject could analyze the same aspects of teaching presence and self-regulated learning. The aim would be to identify potential differences that online and face-to-face exam preparation may have on students' and teachers' perceptions. Considering Charbonneau-Gowdy et al.'s (2021) suggestions, it would also be interesting to explore the potential impact that different methodologies, such as "project-based learning," could have on the interaction between students and teachers within online language courses in higher education.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

RM worked on surveys, analysis, and writing of the manuscript. MF and PB worked on reviewing and proofreading of drafts. All authors contributed to the article and approved the submitted version.

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Self-Regulated Learning and Academic Performance in Chilean University Students in Virtual Mode During the Pandemic: Effect of the 4Planning App

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Research on the use of smartphone apps with the aim of developing *self-regulated learning* (SRL) and increasing academic performance of university students in virtual mode, as a result of the COVID-19 pandemic, is recent and scarce. The present article shows the results of a study that analyzed the effect of using the 4Planning app with an intra-curricular approach on SRL and on the academic performance of 119 1st-year psychology students in virtual mode, at a Chilean university (M_{Age} = 22.81, SD_{Age} = 6.52). The research was conducted with quantitative methodology and a quasi-experimental design, with pre- and posttest measurements of an experimental group and comparisons with three control groups. The results show that students who used the app during 10 weeks of the first academic semester 2021: (1) increased SRL self-report, (2) increased academic self-efficacy, and (3) obtained higher academic performance, compared to those who did not use it. The above occurs because the 4Planning app activates functions of the self-regulatory system of goal-directed behavior, which allows exercising the capacity of self-direction and self-influence on this type of behavior in the particular context of academic performance, which produces SRL. It is concluded that the 4Planning app is effective in developing self-regulation and improving the academic performance of 1st-year university students, in virtual learning mode.

Keywords: self-regulated learning, mobile app, academic performance, college students, academic self-efficacy, 4Planning app

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INTRODUCTION

The transition between secondary education and higher education is a critical stage, in which students may present shortcomings in competencies required for learning when they enter university, implying in many cases dropout or delay in educational trajectories (Dörrenbächer and Perels, 2016; Moreno-Marcos et al., 2020; Padilla-Petry and Vadeboncoeur, 2020; Sáez-Delgado et al., 2021). The development of competencies such as willingness to learn or autonomy requires personal, group, and institutional efforts (Sáez et al., 2018;

Lobos et al., 2021a). In addition, the entry of the 2020 and 2021 generations of students occurred in particular conditions generated by the COVID-19 pandemic, due to the fact that countries adopted measures to deal with contagions and deaths (Organización Mundial de la Salud, 2020). Physical distancing, prevention measures, the vaccination process, and quarantine confinement have had a significant impact on the social, economic, physical, and mental aspects of people (Organización Mundial de la Salud, 2020; CEPAL, 2021). In the latter, increases in depressive, anxious, and academic stress symptoms have been identified, as well as alterations in sleep and eating routines, all of which affect the wellbeing of university students (Bao et al., 2020; Andrades-Tobar et al., 2021; Sekban and İmamoğlu, 2021).

The pandemic, the expansion of training processes in various areas and stages of life, and technological development and its daily access have driven the creation of virtual training environments. These environments offer innovative learning instances, because they imply changes in the teacher-student relationship, in the student–student relationship, in the access and management of information, in the strengthening of new competencies, etc. (Rivera-Vargas et al., 2021). Although people who begin to study in virtual environments tend to develop skills and competencies that allow them to adapt to these environments (Almusharraf and Khahro, 2020; Rivera-Vargas et al., 2021), teaching has not been standard for all, because it depends on technological barriers associated with socio-economic differences of students and their families, which exponentially increases the gaps in the conditions in which they learn (Almusharraf and Khahro, 2020; Tsolou et al., 2021). Institutions, teachers, and students worldwide have endured a rapid and forced change in the modality of teaching and learning generated by the pandemic, for which they were not prepared and which has had an impact on students' experiences with their education (Lobos et al., 2021b). This new context has been called as *emergency remote teaching* (ERT) to differentiate it from other forms of teaching through virtual media, but which are planned and accessed voluntarily (Bozkurt and Sharma, 2020). Lobos et al. (2021b) investigated the beliefs of Chilean university students about their opportunities to learn and maintain their academic performance during the ERT period and found that most students presented negative beliefs about their learning (e.g., believing that their performance would be worse during this period).

Virtual learning environments intensified the role of the student as an active agent, because less external control is exercised over some aspects of their behavior (e.g., whether they are really paying attention to the class). Moreover, compared to secondary education, in higher education, there is also less external control, activities are more flexible, the relationship between teachers and students are more distant, and academic demands are more complex (Dresel et al., 2015; Sáez-Delgado et al., 2021). Therefore, the development of the capacity for self-regulation, the strengthening of autonomy, and the competencies and skills required for learning face-to-face, virtual, or hybrid modalities becomes more relevant (Almusharraf and Khahro, 2020).

However, in most generations entering university, a proportion of students present low levels of self-regulation of their learning process (Vassallo, 2011; Dresel et al., 2015). This ability is especially challenging to achieve medium- and long-term goals, as occurs in the academic context (Zimmerman, 2002), predicts the performance of university students (Alotaibi et al., 2017; Ergen and Kanadli, 2017), and is associated with dropout from the educational system of university (Bernardo et al., 2019; Bäulke et al., 2021) and high school students (Sáez-Delgado et al., 2021). *Self-regulated learning* (SRL) is the process by which people transform their mental capacities into academic skills, learning by themselves proactively, self-generating thoughts, feelings, and behaviors aimed at achieving the academic goals they set for themselves (Zimmerman, 2002; Panadero, 2017). The psychological processes involved in self-regulation are cognitive in nature. One example is forethought, which allow people to form beliefs about what they can do (*self-efficacy*), set goals, anticipate consequences of their eventual future actions, plan courses of action that produce the desired results, self-motivate, and guide their actions in an anticipatory and self-corrective manner.

Being a 1st-year student in higher education is a condition of potential risk, because novices, unlike those with greater expertise in an area, try to regulate their learning in a more reactive way, find it more difficult to set specific goals, monitor themselves systematically, and tend to attribute their performance to deficiencies in their skills, which is associated with lower personal satisfaction and defensive reactions. In addition, a smaller proportion of people who are initiated into a discipline immediately derive self-motivational benefits from SRL. In contrast, students with greater self-regulation vary their study methods and practices to discover new strategies for self-improvement, detect small gains in their learning, and increase their self-satisfaction and self-efficacy for performing at a high level of ability, so they increase the amount of study and practice, which predicts expertise (Zimmerman, 2002). In addition, those with greater expertise in an area tend to perform more SRL practices, compared to the more novice (Cleary and Zimmerman, 2001) and those with better performance use more of the sub-processes considered in Zimmerman's model (DiBenedetto and Zimmerman, 2010).

Given that smartphone, tablet, or computer apps are easily accessible and everyday tools, especially by students (Kortabitarte et al., 2018; Hartley et al., 2020), studies have identified that using smartphones in the service of learning generates positive academic outcomes (Anshari et al., 2017; Nguyen et al., 2018; Ariel and Elishar-Malka, 2019; Dalvi-Esfahani et al., 2020) and that using them for non-academic purposes (e.g., to check virtual social networks) burdens students' cognitive resource management by being a source of distraction when studying and when performing academic tasks outside of class (May and Elder, 2018; Aharony and Zion, 2019), which is associated with lower academic performance (Lepp et al., 2015; Chen and Yan, 2016). A small, recent body of research evaluates the impact of asking students to self-regulate their learning using apps (Xu et al., 2018; Foerst et al., 2019; Hendikawati et al., 2019; Kim et al., 2019; Loeffler et al., 2019; Broadbent

et al., 2020; Hartley et al., 2020). Lobos et al. (2021a) used the self-regulation of learning model proposed by Zimmerman (2002) to design the 4Planning app for smartphone, with the aim of evaluating its impact on the SRL of 473 1st-year engineering students in face-to-face mode, belonging to seven Chilean universities, during the first semester of 2019. Using this app involves planning, evaluating, and correcting one's own actions to achieve academic goals, in the context of a semester course, in intra-curricular modality. Lobos et al. used a quasi-experimental design, with pre- and posttest measurements of a control group and an experimental group, and identified that using the 4Planning app generates that students self-report a higher frequency of SRL practices, compared to those who do not use it.

As part of their research, Lobos et al. (2021a) systematically reviewed interventions that promoted SRL in college students using smartphones. While the seven studies they identified consider academic performance in argumentation, only two incorporated it as a dependent variable in their models (Xu et al., 2018; Hartley et al., 2020), but the proposed interventions did not generate a statistically significant impact. In addition, there is only one study of the effect of the 4Planning app on SRL, in a sample of engineering students, in face-to-face modality, without pandemic, and also did not consider performance as a dependent variable (Lobos et al., 2021a). According to Bandura (1977) and Zimmerman (2000), self-efficacy is sensitive to variations in the context in which students perform, which justifies investigating SRL in the particular modality of teaching and learning virtually, due to the COVID-19 pandemic. It is also unknown whether the frequency of use of the 4Planning app is linearly associated with academic performance. The ability to self-regulate is not a trait that is either possessed or not (Zimmerman, 2002), which requires measuring its presence as a continuous variable. Lobos et al. (2021a) did so categorically (uses vs. does not use the app). Also, longitudinal research is needed on the development of SRL skills, during more specific and shorter periods such as, for example, the 1st year of college (Panadero, 2017). Finally, research on these variables in the Chilean population is proportionally less than that generated in other countries. In this context, the aim of the present research was to analyze the effect of using the 4Planning app on the self-report of performing SRL practices, self-efficacy, and academic performance of 1st-year psychology students, from a Chilean university, in virtual mode due to the pandemic.

The 4Planning app was designed using the phased SRL model by Zimmerman (2002) as a framework, which is derived from Bandura's *social cognitive theory of self-regulation* (Panadero, 2017). Bandura (1987, 1991) posits that the very cause of people setting goals and taking actions to achieve them lies in the fact that they possess a self-regulatory system, which gives them the capacity for self-direction and self-influence over their purposive behaviors. In order to achieve a goal, the intention and desire to reach it is not enough. It is necessary to exert self-influence on one's own motivation and behavior, continuously reflecting on one's own behavior and reacting to its consequences. Thus, people self-regulate their thoughts, feelings, motivations, and actions in the different contexts in which they set out to achieve goals.

Self-regulation of purposeful behavior occurs through four functions (Bandura, 1991). The *self-monitoring function* consists of paying adequate attention to one's own performance, the conditions under which it occurs, and the immediate and distal effects it produces. It provides information for setting realistic goals and evaluating progress toward them. It also allows for self-diagnostics by identifying the significant characteristics of the social environment that explain our behavior. In addition, self-monitoring generates self-motivation, because when people pay continuous attention to how they perform, they set goals for progressive improvement, which generates evaluative self-reactions that mobilize efforts to achieve them. The second is the *judgmental function* and corresponds to the evaluation of one's own performance using personally constructed standards, one's own previous performance and/or that of other people in similar situations.

The third function of the self-regulatory system corresponds to *self-reactive influences*, through which we create incentives for our own actions and anticipate the affective reactions that will arise when we evaluate our performance. This has a regulating effect by affecting motivation, because when people condition their self-satisfaction on obtaining certain achievements, they motivate themselves to expend the necessary effort to obtain the desired performance. Thus, both anticipated satisfaction with desired achievements and dissatisfaction with insufficient achievements encourage actions that increase the probability of obtaining the expected performance. *Self-efficacy* is the fourth function of the self-regulatory system. People develop beliefs about their abilities to control their own functioning and the events that affect their lives. These beliefs influence their decisions, aspirations, effort, and perseverance in facing obstacles, whether their thought patterns are self-enhancing or self-enhancing, and their vulnerability to stress and depression. Thus, for example, the more self-efficacious a person considers him or herself to be, the higher his or her goals will be and the more committed he or she will feel to achieving them. On the other hand, those who doubt their capabilities are easily deterred by obstacles and failures.

In the context of academic performance, the activation of the functions of the self-regulatory system provides the capacity to exert self-direction and self-influence on behavior aimed at achieving academic goals, which generates SRL. For Zimmerman (2002), this type of learning occurs in three cyclical phases that affect each other. The *forethought phase* encompasses the processes that occur before efforts are made to learn. It includes task analysis, setting academic goals, and planning strategies to achieve them, as well as self-motivational beliefs, including self-efficacy, outcome expectations, intrinsic valuation given to a task, and to the learning process itself. The *performance phase* encompasses the processes that occur during the performance of learning efforts and includes self-monitoring and self-observation. Self-monitoring is exercised through imagery, self-instruction, focusing attention, and developing strategies to approach tasks. Self-observation, on the other hand, includes self-registration of personal events or those generated by self-experimentation, in order to identify the causes of such

events and, thus, to act correctively if necessary. Finally, the *self-reflection phase* encompasses processes that occur after making efforts to learn and based on their results. In this case, there is the student's self-judgment process, through self-evaluation and causal attribution of his performance. Also, there are the student's self-reactions, in terms of self-satisfaction and positive affect, defensive responses to poor performance, or adaptive responses, such as making adjustments in the way of studying.

For Zimmerman (Panadero, 2017), the self-regulatory system and its functioning in the academic context as SRL correspond to a feedback loop. For cybernetic theory (García and Wittezaele, 1994), a system maintains its movement toward a goal, thanks to the fact that it possesses a flow of information about the effects of its actions and the degree to which it reaches the proposed goal. The actions and effects that bring it closer to the goal are maintained, while those that move it away are eliminated. Therefore, SRL implies producing and receiving information that allows one to exercise corrective self-control over one's own actions, in order to achieve academic purposes.

As described in detail in the methodology of this study, learning to use the 4Planning app requires students to participate in nine group sessions, focused on learning outcomes that generate the activation of the functions proposed by Bandura (1991), as well as those considered in the SRL model proposed by Zimmerman (2002). From all of the above, it is expected that using the 4Planning app will have a positive effect on the self-report of SRL, self-efficacy, and academic performance, because it demands that students use and develop integrally their self-direction and self-influence capacities, planning their activities, exercising corrective, conscious, and deliberate self-control over their own cognitions, emotions, and actions related to their academic performance, which will allow them to perform the necessary activities to achieve the performance goals that they continuously and progressively set for themselves.

Consistent with the above, the present research hypothesizes that, between the pre- and posttest measurements, students who use the 4Planning app (experimental group), compared to those who do not use it (control group), will increase their self-report of SRL (*hypothesis 1*) and self-efficacy (*hypothesis 2*). Therefore, in the posttest, they will present higher self-report of SRL (*hypothesis 3*), higher self-efficacy (*hypothesis 4*), and higher academic performance (*hypothesis 5*). Furthermore, in the experimental group, the frequency of use of the 4Planning app will present a directly proportional relationship with the self-report of SRL (*hypothesis 6*), with self-efficacy (*hypothesis 7*), and with academic performance (*hypothesis 8*). Finally, SRL self-report and self-efficacy will present a directly proportional relationship with each other (*hypothesis 9*) and with performance (*hypotheses 10* and *11*, respectively).

MATERIALS AND METHODS

Design and Participants

A quasi-experimental, longitudinal design was used. Participants were 119 Chilean 1st-year psychology students, in virtual teaching mode, from a private university located in the Biobio Region ($M_{Edad} = 22.81$, $SD_{Edad} = 6.52$). Students voluntarily self-assigned to the experimental condition (using the 4Planning app) or to the control condition (not using the app). For ethical considerations, participation was voluntary, so random assignment to the study conditions was not possible. The composition of both groups changed between the pretest measurement (March 2021) and the posttest measurement (July 2021). In the pretest, students in the experimental group ($n = 48$) and those in the control group ($n = 49$) who responded to the full battery of instruments, which included the SRL self-report and the academic self-efficacy scale, were considered. In the posttest, 50 students used the 4Planning app, but only 38 provided the SRL and self-efficacy self-report, while 30 students from a control group provided information on these same variables. Finally, the comparison of academic performance was made between the 50 students in the experimental group and 69 students in a control group.

Instruments

Self-Regulated Learning Practices Scale

The SRL practices scale of Bruna et al. (2017) was used, which was constructed to describe the frequency of use of SRL strategies, corresponding mainly to the study readiness phase. It is composed of 11 items (e.g., "I identify what my study purposes are") and the response format is Likert-type with seven response options (1 = never to 7 = always). Vergara et al. (2019) analyzed its psychometric properties in a population of university students and identified a one-factor model with an adequate fit ($N = 716$; CFI = 0.98; TLI = 0.97; RMSEA = 0.05). For their part, Lobos et al. (2021a) identified a reliability of 0.89 in the pretest application of their study. In the present investigation, the internal consistency (Cronbach's alpha) in the pretest was 0.89 and in the posttest 0.90.

Academic Situations Specific Perceived Self-Efficacy Scale (EAPESA)

It is a unifactorial scale designed by Palenzuela (1983) to measure the global appreciation of competence in the academic environment. It is composed of 10 items (e.g., "I consider myself sufficiently capable to successfully face any academic task") with a Likert-type response format with four alternatives (1 = never to 4 = always). Escobar and Pérez (2017) analyzed the psychometric properties of this scale in a sample of Chilean university students and identified a unifactorial structure and adequate internal consistency (Cronbach's alpha = 0.87). In the present study, the reliability was 0.87 in the pretest and 0.88 in the posttest.

Academic Performance

It was measured with the evaluation instruments that each teacher designed to evaluate the contents of her subject. The evaluation scale ranges from 1 to 7 points, where the higher the score, the higher the academic performance.

Frequency of Use of the 4Planning App

The pedagogical sequence of the 4Planning app proposes the systematic progress of the student through a series of sessions with activities that must be developed stage by stage, as they achieve the objectives that each session establishes. Each student will advance according to his or her pace, motivation, and prioritization of work in the pedagogical sequence. This implies that not all students obtain the same level of progress or fulfillment of stages, which will be reported to the teacher at the time of feedback in the interface. We will call this progress compliance "frequency of use of the app." The information is obtained through a report in an Excel table that indicates the level of progress of each student.

Procedure

Within the framework of a teaching innovation project financed by the Universidad Andrés Bello, Chile, the use of the 4planning app was implemented in two 1st-year courses, in the day and evening programs of the psychology degree. Four teachers participated in four courses with a total of 200 students enrolled in the programs. The teachers worked together with the students on the pedagogical sequence of the app at the beginning of each class and during the week feedback was given through the application interface.

Description of the 4Planning App

The 4Planning app (Lobos et al., 2021a) was developed in the context of the project entitled "Intracurricular model for facilitating self-regulated learning competencies in university students," which aims to promote the development of SRL strategies in university students. The app is particularly innovative because it involves the use of smartphones, making it intuitive to use. It presents a design focused on the user (young people), their needs and preferences. The pedagogical sequence includes didactic strategies of: (a) gamification, by obtaining scores, badges, and recognition messages, (b) transmedia narrative, which is deployed through multiple media, and (c) communicative tone adapted to the user, in the case of university students. Students participate in nine sessions, each associated with a specific learning outcome (see **Table 1**), in which they are invited to use different self-regulation strategies.

The 4Planning app is used in intra-curricular mode, so that the sessions are developed in the context of one of the semester courses, through intentional actions of the teacher in the virtual classroom. In addition, the student, in an autonomous manner, works each session in his or her available time outside of class, thus strengthening the learning achieved in the classroom. The application consists of two environments, one for student management and the other for teacher management. The latter is in charge of reporting the students' performance progress and is also the space where feedback on the actions performed by the students can be given. The feedback provided by the teacher to the inputs, comments, and/or activities submitted by the students through the app accompanies and guides the student's process, allows instructions to be given, clarifies doubts, praises, and motivates them to continue completing the activities. Peers also provide feedback to each other.

TABLE 1 | 4Planning sessions and learning outcomes.

N	Session name	Learning outcomes
1	Study purposes	Reflects on his/her purposes of study (what he/she is.
2	Goals	Defines two goals for the subject, with respect to the purposes indicated in session 1.
3	Daily schedule for the week	Evaluates the distribution of time and makes
4	To-do list for the subject	Makes a list of things to do in the subject.
5	Development and prioritization of academic tasks	Updates daily to-do list.
6	Organization and balance of activities	Develops a to-do list according to importance and urgency.
7	Planning and preparing me individual study for assessments	Prioritizes to-do list items according to importance and urgency.
8	I plan and prepare my group study	Plan and prepare the group study.
9	I take advantage of learning in class	I fulfill basic behaviors for learning in class.
	Digital closure	I evaluate what I have learned.

Source: Lobos et al. (2021a).

Each session includes a motivational video, an infographic on the topic of the session, interaction activities with the app associated with the specific strategy of self-regulation of learning and an activity commitment that the student develops outside the virtual environment. The last session incorporates an activity where the student evaluates the usefulness of the experience of the developed session. In addition, the app delivers feedback messages that indicate to the student what to improve for future performance in each of the strategies promoted in each session.

Data Analysis Strategy

To describe the study variables, measures of central tendency and variability were calculated (Keppel, 1991). To describe the variation of the study variables between the pre- and posttest, the Wilcoxon test for related samples was used. To compare the levels of the variables between the control group and the experimental group, the Mann–Whitney U test was used and to describe their relationship, Spearman's correlation coefficient was used (Siegel and Castellan, 1972).

RESULTS

The Shapiro–Wilk test indicated that the SRL presented a non-normal distribution in the pretest in the experimental group ($p < 0.01$), in the posttest in this same group ($p = 0.00$), and in the control group ($p < 0.05$). The same was observed in the case of academic performance in the control group ($p < 0.05$). Therefore, abnormality was assumed for all study variables and nonparametric tests were used to contrast the hypotheses.

The descriptive data of the study variables are presented in **Table 2**. In the pretest, the Mann–Whitney U test for independent samples did not identify statistically significant differences between the control group and the experimental group in the levels of SRL ($p > 0.05$) or self-efficacy ($p > 0.05$). In the posttest, the experimental group presented higher SRL ($p < 0.05$), higher self-efficacy ($p < 0.05$), and higher performance ($p < 0.01$), compared to the control group. In addition, the Wilcoxon test for related samples indicated that, between the pre- and posttest, the experimental group increased SRL ($p < 0.01$) and self-efficacy ($p < 0.01$), while the control group did not increase SRL ($p > 0.05$) or self-efficacy ($p > 0.05$; **Table 2**).

Table 3 shows the Spearman correlation coefficients between the study variables identified in the posttest in the experimental group. The frequency of use of the 4Planning app presented a positive and medium correlation with academic performance ($r = 0.38^{**}$, $p < 0.01$; $n = 50$), a small, positive correlation with self-reported SRL ($r = 0.28^{*}$, $p < 0.05$; $n = 38$), and a non-significant correlation with academic self-efficacy ($r = -0.13$, $p > 0.05$; $n = 38$). The SRL showed a positive, small, and non-significant correlation with performance ($r = 0.24$, $p > 0.05$; $n = 38$) and with self-efficacy ($r = 0.22$, $p > 0.05$; $n = 38$). The latter variable showed a positive correlation of medium size with performance ($r = 0.29^{*}$, $p < 0.05$; $n = 38$).

DISCUSSION

Research on the effect of smartphone apps on the self-regulation of learning and academic performance of online students in the pandemic mode is scarce and recent. In this context, the main results of this study indicate that 1st-year psychology students who used the 4Planning app to develop their SRL, during 10 weeks of the first academic semester of 2021, in virtual mode as a result of the pandemic, obtained higher performance academic performance, higher self-report of performing SRL practices, and higher academic self-efficacy, compared to students who did not use it. These results are discussed below.

Using the 4Planning app generated higher academic performance compared to not using it, which supports hypothesis 5, and the higher the frequency of app use, the higher the academic performance, in accordance with hypothesis 8. The size of this effect is medium and is detected despite the fact that both variables presented dispersions of different magnitude, which makes it difficult to model their relationship linearly. Unlike previous studies that have attempted to improve learning by using apps (Xu et al., 2018; Hartley et al., 2020), both results of the present study show that the 4Planning app generates a qualitative and quantitative change in the performance of those who use it. Similar to how Woottipong (2022) explains the results of his intervention, aimed at developing the SRL of university students in a context of face-to-face and virtual interaction, the effect of the 4Planning app on academic performance occurs because it activates in an integrated manner different functions and processes involved in the self-regulation of learning. Thus, for example, reflecting on the purposes of study (Session 1) requires the use of self-monitoring in the forethought phase. In this phase, students made an intrinsic assessment of the task to be addressed and of the learning process itself, analyzed the nature of the task, and activated self-efficacy beliefs, as well as expectations of results. All of the above contributed to the setting of more realistic and progressively demanding goals (Session 2). Both processes generated self-motivation and positive disposition to learning and the selection of actions aimed at achieving the goals set, which were distributed in specific weekly schedules (Session 3). These learning outcomes, as well as those of all app implementation sessions, are produced by a self-regulated learner (Zimmerman, 2002), because they involve as: (a) setting attainable goals, (b) intensively using strategies to achieve them, (c) self-monitoring performance looking for signs of progress, (d) restructuring the social and physical context to be compatible with goals, (d) effectively managing personal time, (f)

TABLE 3 | Spearman's correlation coefficient between the study variables in the post-test in the experimental group.

Variable	1	2	3	4
1. Frequency of use of 4Planning	-			
2. Self-report of self-regulated learning	0.28*	-		
3. Academic self-efficacy	–0.13	0.22	-	
4. Academic achievement	0.38**	0.24	0.29*	-

*Significant at the 0.05 level.
**Significant at the 0.0 level.

TABLE 2 | Descriptive data of the study variables in the control group and in the experimental group.

Variable	Control group				Experimental group			
	n	*M*	*Md*	*SD*	*n*	*M*	*Md*	*SD*
Pre-test								
Self-report of self-regulated learning	49	5,03	5	1,09	48	5,12	5,27	1,18
Academic self-efficacy	49	1,85	1,8	0,48	48	1,84	1,9	0,46
Post-test								
Self-report of self-regulated learning	30	5,05	5,45	1,25	38	5,71	6,09	1,03
Academic self-efficacy	30	1,86	1,9	0,48	38	2,15	2,1	0,43
Frequency of use of 4Planning	-	-	-	-	50	7,8	5	5,95
Academic achievement	69	5,15	5,5	1,15	50	5,87	6,05	0,99

self-evaluating the methods used, (g) attributing causes to the performance achieved, and (h) adapting future methods.

The presence of other factors also explains the dispersion of academic performance observed within the group of students who used the app. The students took the course from start to finish, so that during the semester they activated, to some degree, all the psychological functions considered in Zimmerman's three-phase model, also affecting academic performance. However, the 4Planning app focuses on the preparatory thoughts phase, so that the psychological processes conceptualized in the other phases were not under experimental control during the app implementation sessions. It is suggested that future versions of this app propose learning outcomes for all three phases of the model, so that the stimulation of self-regulated learning better fits its circular nature (Zimmerman, 2002). In this way, it could be experimentally evaluated whether, taking into account the above, the app expands its influence on the SRL and academic performance of those who use it in a virtual and in a face-to-face learning context.

A second result indicates that, between the pre- and posttest, students who used the 4Planning app increased self-reported SRL compared to those who did not use it, which supports hypothesis 1. This result is similar to that identified by Lobos et al. (2021a) with Chilean engineering students and is consistent with the results of studies that have also used apps to develop SRL of Indonesian (Hendikawati et al., 2019) and Australian (Broadbent et al., 2020) university students. Furthermore, in accordance with hypothesis 3, in the posttest, the self-report of SRL was higher than that of students who did not use the app. Finally, the frequency of app use presented a directly proportional relationship, of small size, with this self-report, which supports hypothesis 6. Using the 4Planning app requires students to perform self-regulatory practices, while the SRL self-report scale indicates the degree to which students consider that they performed such practices. Therefore, the self-report of performing SRL practices increased because students indeed increased the frequency of self-regulatory practices, which was ascertained by them employing self-monitoring and self-observation. However, both functions are selective attention processes and the authors of the main SRL models consider that the psychological functions involved in self-regulation, can also operate automatically, implicitly, or non-consciously for the learner (Panadero, 2017), so that an absolute correspondence between the actions effectively performed and the self-reported ones are not to be expected.

The third result indicates that the 4Planning app increased the academic self-efficacy of the students who used it, compared with those who did not use it, which supports hypothesis 2. Although none of the app implementation sessions contemplated strengthening self-efficacy beliefs as a learning outcome, students may have considered that using the app would help them achieve their goals. In addition, using the 4Planning app engages students in exploration and awareness of their capabilities (i.e., self-monitoring), which nurtures their beliefs about their ability to achieve academic goals. By seeing themselves involved in setting goals and taking actions to achieve them, their self-efficacy beliefs would have developed positively. This is due to the fact that the set of psychological functions involved in self-regulation constitutes a system, so that the modification of one of its parts affects the others and the whole system, just as the functioning of the whole system affects its parts (García and Wittezaele, 1994). For this same reason, SRL self-report and academic self-efficacy presented a positive correlation with each other, which supports hypothesis 9 of the study and is consistent with previous studies that relate both variables (Zimmerman and Schunk, 2008; Woottipong, 2022). For example, Follmer (2022) designed an SRL strategy for use by undergraduate students in a statistics course and identified that those who used it obtained higher academic self-efficacy and greater learning of statistics. On the other hand, the literature shows that students tend to meet the performance expectations that teachers form of them (Gentrup et al., 2020). During the implementation sessions, the students received support and encouragement from the course teachers, who had a high level of conviction about their own ability to guide the students and the positive effect using the app would have, which contributed to developing their beliefs about their own ability to achieve the goals they set for themselves.

The frequency of use of the 4Planning app was not linearly associated with academic self-efficacy, which does not support hypothesis 7. Self-efficacy develops, is specific to performance domains, and depends on different factors (Bandura, 1977; Zimmerman, 2000), which allows us to hypothesize that, during the semester, students were elaborating their self-efficacy beliefs about the course in which the use of the app was incorporated. The cyclical nature of the self-regulation of learning produces that the self-reflection associated with previous efforts to learn affects subsequent forethought. Thus, for example, the self-reaction of dissatisfaction with one's own performance leads to lower levels of self-efficacy and less effort to learn (Zimmerman, 2002). Regarding the above, Winne posits that "a vital feature of SRL is cycles of information flows rather than a uni-directional flow of information. Some cycles are internal to the person and others cross the boundary between person and environment" (Panadero, 2017, p. 21). For his part, Zimmerman (Panadero, 2017, p. 20) states that as:

> My cyclical model of SRL elaborates these triadic components and describes their interaction in terms of repeated feedback cycles. Thus, any variable in this model (e.g., a student's self-efficacy beliefs) is subject to change during the next feedback cycle.

Self-efficacy beliefs determine how people explain their successes and failures. Those who consider themselves highly effective tend to attribute their failures to insufficient effort, while those who consider themselves ineffective attribute it to low ability. In addition, they influence decisions, aspirations, effort, and perseverance in facing obstacles, whether thinking patterns are self-enhancing or self-supportive and vulnerability to stress (Bandura, 1991). Therefore, the students' academic

performance during the semester, as well as their self-reactions, determined the other two phases, for better and for worse. Those who obtained less than expected could have decreased their self-efficacy and their efforts to learn, while those who obtained more could have increased them. All of the above show that (holding other factors constant) the cyclical nature of the self-regulation process, and the nature of self-efficacy, can contribute to or deteriorate academic performance (Panadero, 2017). Self-efficacy beliefs can distort the "objective" information available to achieve a goal. Unlike a material system (e.g., a freezer), people have an opinion about their ability to perform actions and achieve goals. Therefore, they may underestimate or overestimate this capacity, which explains the occurrence of phenomena such as positive synergy and negative synergy, in which it is observed that performance is not completely predictable from the resources that an observer can identify in a person.

Another result identified that SRL self-report presented a small correlation with academic achievement, which supports hypothesis 10. The scale used in the present study to measure SRL (Vergara et al., 2019), was developed in a hypothetico-deductive manner, considering the literature and expert judgment, and focuses on the first phase of Zimmerman's model (Lobos et al., 2021a). However, the more processes of the different phases of this model are stimulated, the higher the performance (Cleary et al., 2006). Therefore, the students' academic performance was also influenced by self-regulatory practices not considered in this scale, since it contemplates only a sample of the total number of possible practices. It is pertinent to continue inductively identifying other self-regulatory practices used by students with high learning levels and to evaluate their impact using an experimental design. Doing so would allow prescribing a greater diversity of self-regulatory practices that increase the prediction and theoretical understanding of academic performance.

The last result of the present study showed that self-efficacy and academic performance presented a positive correlation, which supports hypothesis 11. This result is consistent with that of reviews showing that both variables covary in different student populations (e.g., Multon et al., 1991; Honicke and Broadbent, 2016). Also, it coincides with those reported in Latin American (Alegre, 2014) and non-Latin American (Follmer, 2022) populations.

The results of the study show that the frequency of use of the 4Planning app presented a higher magnitude covariation with academic performance, compared to the correlation observed between SRL self-report, self-efficacy, and performance. Bandura (1991) states that motivation and self-efficacy are necessary, but not sufficient to achieve a goal. It is necessary to engage, effectively, in self-regulatory practices of the actions that make it possible to achieve it. The SRL scale provides the students' self-report of the frequency with which they consider that they executed certain self-regulatory practices. On the other hand, the indicator of use of the 4Planning app is the record that the system provides of the frequency with which they actually carried out such practices. Therefore, the best predictor of academic performance was the actual and practical involvement in self-regulatory behaviors.

The results of the present investigation should be interpreted considering some limitations. The small sample size did not allow us to perform statistical analyses that have greater statistical power and require normally distributed variables. For example, multiple regression to identify the predictive capacity of our study variables with respect to academic performance. In addition, three control groups of students were considered because the participation changed during the semester and students were self-assigned to the study conditions and the sample selection was non-random. However, self-assignment did not generate that, in the pretest, the experimental group presented statistically significant differences in the self-report of SRL nor in self-efficacy. Furthermore, in the pretest, in the experimental group, the self-report of SRL and self-efficacy did not present significant associations with the use of 4 Planning (both $p < 0.01$). On the other hand, the effect of the 4Planning app on SRL identified in the present research was the same as that identified by Lobos et al. (2021a) using a control group that did not change its composition between the pretest and the posttest and with a large sample composed of 473 engineering students from seven Chilean universities, located in different geographical and sociocultural contexts.

In general terms, the results of this study, contextualized in the line of research where they are inserted, show that the joint work of teachers and students supported by the use of accessible technology and everyday use by current generations, develops self-regulation, and increases the academic performance of students from careers as dissimilar as engineering and psychology. The foregoing shows that the capacity for self-regulation is a transversal competence and that its development can take place in a relatively short time at the beginning of higher education, in face-to-face learning mode, and also in virtual mode.

In particular terms, the results of the present study constitute empirical evidence in favor of the ecological validity of the hypothesis of the effect of the 4Planning app on the SRL and on the academic performance of 1st-year higher education students in virtual mode. This effect occurs because using the app activates functions of the goal-directed behavior self-regulation system, which allows exercising the capacity for self-direction and self-influence in the particular context of academic performance. The app is versatile, communicative, and includes gamification. It is recommended for use in an intra-curricular context, for adolescents and young adults entering higher education, to develop their SRL and increase their academic performance. The results of the study confirm that to achieve a goal it is not enough to desire it, but it is necessary to act purposefully because "inspiration exists, but it must find you working" (Pablo Picasso, w/i).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AJ contributed to designing the study, reviewing the literature, designing and data analysis, interpreting the results, discuss the results, and write and revise the manuscript. JS contributed to designing the study, reviewing the literature, and write and revise the manuscript. PF contributed to the implementation of the experiment and the revision of the manuscript. All authors contributed to the article and approved the submitted version.

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Impact of Techno-Creators and Techno-Inhibitors on Techno-Stress Manifestations in Chilean Kindergarten Directors in the Context of the COVID-19 Pandemic and Teleworking

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The research objective was to predict the impact of techno-creators and techno-inhibitors on the different manifestations of technostress in kindergarten directors in the context of the COVID-19 pandemic and telework. The participants were INTEGRA Foundation kindergarten directors, from a sample of 567 kindergartens in Chile. To measure the technostress manifestations, the RED-TIC questionnaire was used as an instrument, and concerning techno-creators and techno-inhibitors, those established in previous research were considered. The partial least squares structural equation modeling (PLS-SEM) methodology was used, and the model estimation was performed using SmartPLS version 3.0 software. It was obtained that techno-creators correlate positively and significantly with the technostress manifestations. A negative correlation was found between techno-inhibitors and technostress manifestations and techno-creators, but not significant for skepticism and inefficacy manifestations. Therefore, it is concluded that techno-creators lead to technostress manifestations, however, techno-inhibitors did not show a significant effect in reducing these manifestations in the sample studied.

Keywords: mental health, technostress, techno-creators, techno-inhibitors, information-technology, education, work, information overload

INTRODUCTION

The incorporation of information and communication technologies (ICTs) into people's daily lives has had both positive and negative side effects (MacKay and Vogt, 2012). Although ICTs offer indisputable benefits, such as allowing to maintain family contact, especially in remote or rural locations, which would have a positive impact on people's wellbeing, or others, such as facilitating work allowing to take advantage of waiting times and adapting work times

to the working people's needs (Pearson et al., 2017). A special attention should be paid to the possible negative consequences, since their use at work can generate technostress given the mental demands required by their use (Macías-García, 2019).

Technostress is defined according to Tarafdar et al. (2007) as the stress experienced by people due to the use of information systems, derived from the demands that these systems cause on the individual and its study has been increasing exponentially in recent decades (Bondanini et al., 2020; Salazar-Concha et al., 2021). Among the consequences of occupational technostress are decreased job satisfaction, decreased user commitment to the organization, increased conflict, and role overload, reduced productivity, performance, and innovation during their use at work (Tarafdar et al., 2007, 2010, 2011, 2014; Jena, 2015).

Regarding wellbeing, the World Health Organization (World Health Organization, 2021) incorporates this concept in the health definition, describing it as a state of complete physical, mental, and social wellbeing, and not only the absence of disease or illness. The International Labour Organization (1995) also mentions this concept within the occupational health objective, which defines it as the promotion and maintenance of the highest degree of physical, mental, and social wellbeing in workers in all occupations. On the other hand, Martínez (2011) incorporates the wellbeing notion when defining technostress, referring to it as a manifestation that hurts the physical and mental wellbeing of the almost mandatory ICT implementation in the work, leisure, and private life spheres.

But in a more specific and relevant to this study, Diener et al. (2002) define subjective wellbeing as "cognitive and affective evaluations of one's own life; these evaluations include emotional reactions to events, as well as cognitive satisfaction judgments. Thus, subjective wellbeing is a broad concept that includes pleasant emotions, low negative mood levels, and high life satisfaction" (p. 63), and subjective wellbeing can also be defined as a construct composed of a cognitive component that alludes to people's satisfaction and their satisfaction with specific or global aspects of their existence, and an affective component, which refers to positive mood states (García-Viniegras and González, 2000; Arita, 2005). Moreover, Diener (2006) adds that subjective wellbeing consists of the different evaluations that people do of their lives, the events that take place in them, their bodies and minds, and the circumstances in which they live.

The environment in which activities are developed, the work environment, or other factors derived from working conditions, associated with the life rhythm that is imposed nowadays, can lead to occupational stress in workers (Macías-García, 2019). Thus, conditions that create technostress can be considered stressors and constitute work demands that require effort on the part of workers leading to tension and stress feelings (Pfaffinger et al., 2020), and negative work outcomes (Srivastava et al., 2015), which lead to a reduction in workers' wellbeing (Paschoal et al., 2015).

Therefore, technostress should be considered a particular threat to wellbeing (Nimrod, 2018). Also, the lack of wellbeing in teachers affects the academic performance of students, and in the case of teachers, it can produce bewilderment, dissatisfaction, transfer requests, desires to leave school, absenteeism, burnout, stress, feelings of guilt, reactive neuroses, depressions, anxiety, etc. (Hué, 2009). To promote wellbeing, the work environment must be adapted to the needs of workers (Stich et al., 2019). According to Molino et al. (2020a), technology use acceptance has been positively associated with work engagement, which is related to workers' sense of wellbeing. On the other hand, wellbeing is found to be related to job satisfaction (Barrientos, 2005) and good job performance (Pavot and Diener, 2004).

The COVID-19 pandemic, which started on December 1, 2019, in Wuhan City, China (Huang et al., 2020), made most organizations face the challenge of introducing telework practices, because of the health measures proposed by the health authorities (Angelici and Profeta, 2020; Tokarchuk et al., 2021). Telework refers to the performance of work generated with the ICT support and performed outside the established organization (Belzunegui-Eraso and Erro-Garcés, 2020).

Due to the emergency installation of this telework modality using information and communication technologies during the pandemic of COVID-19, several studies have been conducted on technostress at different educational levels, for example, at the level of primary and secondary education, higher stress levels have been reported in teachers due to online education (Truzoli et al., 2021), with greater anxiety and fatigue manifestations for female teachers (Estrada-Muñoz et al., 2021), and decreased job performance (Cahapay and Bangoc, 2021). On the other hand, at the higher education level, in the study by Dahabiyeh et al. (2022), it is mentioned that the technostress creators were associated with burnout and decreased teacher productivity, and in the research by Penado-Abilleira et al. (2021), it was found that the teachers who suffered the most from the negative technological consequences were those who were older, with more years of experience and, consequently, who held a higher position.

Although the adoption of teleworking allows the operation of educational institutions to continue and maintain contact between work teams (Ramadani et al., 2020), the conditions related to the use of technologies can be creators of technostress, affecting the wellbeing of workers, the establishment of mitigation measures that inhibit technostress becoming relevant (Jena, 2015), is that the objective of this research is to predict the impact of techno-creators and techno-inhibitors on the different manifestations of technostress in directors of kindergartens. In the context of the COVID-19 pandemic and teleworking.

LITERATURE REVIEW

Technostress Manifestations

According to Salanova (2003), technostress is a negative psychological state related to the use of ICTs resulting from the perception of a mismatch between technological demands and the personal resources available to face the use of these technologies, which leads to a high unpleasant psychophysiological activation level, and to the development of negative attitudes and thoughts toward the technology use and the individual capacity to use them. In this sense, if technostress manifests itself with a high unpleasant physiological activation level, we speak of techno anxiety, and if it does so with tiredness and exhaustion feelings, we speak of techno fatigue; in both

cases accompanied by skeptical attitudes and ineffectiveness beliefs (Salanova et al., 2007). Therefore, the variables that construct technostress correspond to anxiety, fatigue, skepticism, and ineffectiveness produced by the interaction with technology (Salanova et al., 2007).

Precursors of Technostress

There are mainly five precursor conditions of technostress, described as techno-creators, to which ICT users may be subjected; these conditions correspond to techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Tarafdar et al., 2011; Jena, 2015). Techno-overload refers to the need for information processing of different tasks simultaneously with the use of technological devices; techno-invasion occurs when technology invades personal life and privacy, with the need to be constantly connected anywhere and at any time; techno-complexity is defined as the complexity associated with the use of ICTs that makes it necessary to spend time and effort learning how to use them; techno-insecurity is the feeling that technology threatens the maintenance of employment; and techno-uncertainty is a stress factor due to the constant updates and changes in ICTs, which do not allow users to develop an experience base (Tarafdar et al., 2007, 2011; Jena, 2015). Given the above, this research examines the influence of techno-creators on the manifestations of technostress.

Then, techno-creators, leading to technostress manifestations, have affectations at different levels, both personal and occupational; at the personal level, techno-creators can affect health (Ayyagari et al., 2011; Jena, 2015), provoke negative emotions (Wang et al., 2020), generate prolonged stress (Salo et al., 2019), and even induce work-family conflict (Molino et al., 2020b). At the workplace level, techno-creators have been associated with decreased job satisfaction (Al-Ansari and Alshare, 2019), organizational commitment (Hung et al., 2015), job performance (Christ-Brendemühl and Schaarschmidt, 2020), and productivity (Tiwari, 2021). In this research, the following techno-creators reported by Jena (2015) are considered: to be forced by ICT to live with very tight time schedules, to be forced to change habits to adapt to new developments in technology, to have to sacrifice the personal time to keep current on latest technologies, feel that the personal life is being invaded by ICT and not to find enough time to study and upgrade the technical skills. The following hypotheses are presented in this regard (see **Figure 1**).

H1: Techno-creators correlate positively with skepticism.
H2: Techno-creators correlate positively with fatigue.
H3: Techno-creators correlate positively with anxiety.
H4: Techno-creators correlate positively with inefficacy.

Technostress-Inhibitors

There are situational conditions, called technostress-inhibitors, involved in the stress reduction derived from the use of ICT, which would act as moderators, playing an important role in reducing the non-beneficial consequences caused by the introduction of these technologies in organizations (Ragu-Nathan et al., 2008; Tarafdar et al., 2019). Techno-inhibitors, when implemented in organizations, could mitigate the stress associated with ICT use by decreasing the techno-creator effects resulting from technology demands (Salanova et al., 2007; Fuglseth and Sørebø, 2014). The main ones reported in the literature are, facilitating literacy, which allows increasing technological knowledge; organizational technical support; facilitating participation, involving workers in the adoption and development of ICT; and supporting innovation, through mechanisms that encourage experimentation and learning (Tarafdar et al., 2011; Li and Wang, 2021). Moreover, in this research, the influence of technostress inhibitors on the technostress manifestations and techno-creators is examined.

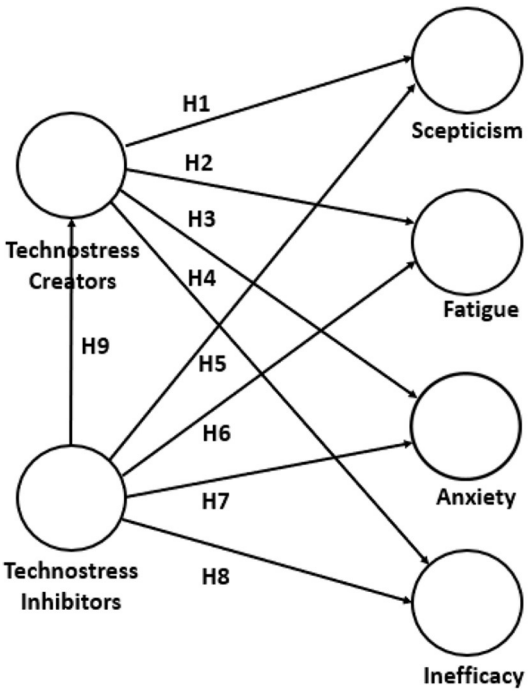

FIGURE 1 | The conceptual model under study.

In this research, the following techno-inhibitors reported by Jena (2015) are considered: the organization provides clear documentation to use new technologies, the organization emphasizes teamwork in dealing with new technology-related problems, the technology help desk is responsive to end-user requests, the organization rewards for using new technologies, and the organization consults before the introduction of new technology. The hypotheses put forward are mentioned below (see **Figure 1**):

H5: Techno-inhibitors will correlate negatively with skepticism.
H6: Techno-inhibitors will correlate negatively with fatigue.
H7: Techno-inhibitors correlate negatively with anxiety.
H8: Techno-inhibitors correlate negatively with inefficacy.

TABLE 1 | Respondent characteristics.

	Frequency	Percent
Region		
Santiago Metropolitan	118	20.8%
Maule	59	10.4%
Los Lagos	56	9.9%
La Araucanía	51	9.0%
Biobío	50	8.8%
Valparaíso	49	8.6%
Libertador General Bernardo O'Higgins	44	7.8%
Coquimbo	32	5.6%
Ñuble	24	4.2%
Los Ríos	22	3.9%
Tarapacá	18	3.2%
Aysén of General Carlos Ibáñez del Campo	12	2.1%
Antofagasta	11	1.9%
Atacama	8	1.4%
Magallanes and the Chilean Antarctica	7	1.2%
Arica and Parinacota	6	1.1%
Total	567	100.0%
Area (urbanization)		
Urban	463	81.7%
Rural	104	18.3%
Total	567	100.0%
Kindergarten category		
A (190 ≤ babies and children)	34	6.0%
B (100 ≤ babies and children < 190)	166	29.3%
C (babies and children < 100)	367	64.7%
Total	567	100.0%
Working-age (years, y)		
$0 < y \leq 10$	130	22.9%
$10 < y \leq 20$	286	50.4%
$20 < y \leq 30$	138	24.3%
$30 < y$	13	2.3%
Total	567	100.0%
Team of collaborators (c)		
0	16	2.8%
$0 < c \leq 10$	139	24.5%
$10 < c \leq 20$	175	30.9%
$20 < c \leq 30$	146	25.7%
$30 < c$	91	16.0%
Total	567	100.0%
Gender		
Female	564	99.5%
I prefer not to say it	3	0.5%
Total	567	100.0%
Age (years old, y)		
$20 < y \leq 30$	32	5.6%
$30 < y \leq 40$	226	39.9%
$40 < y \leq 50$	224	39.5%
$50 < y \leq 60$	78	13.8%
$60 < y$	7	1.2%
Total	567	100.0%
Number of people you live with		
0	22	3.9%
1	52	9.2%
2	121	21.3%
3	172	30.3%
4	120	21.2%
5 or more	80	14.1%
Total	567	100.0%

H9: Techno-inhibitors correlate negatively with techno-creators.

Thus, the conceptual model in Figure proposes to test whether techno-creators are positively correlated with technostress manifestations and whether techno-inhibitors are negatively correlated with technostress manifestations and techno-creators.

MATERIALS AND METHODS

Participants

The kindergarten directors of Fundación INTEGRA participated, based on a sample of 567 kindergartens in Chile.

Respondent Characterization

Table 1 shows the characteristics of the respondents, who are distributed regionally according to Chilean population concentrations and the presence of Fundación INTEGRA's educational centers. A high percentage of these kindergartens are in urban areas (81.7%), serving groups of <190 infants and children (94%), and whose directors have between 1 and 38 years of work experience in education, with a mean of 16.4 years ($\sigma = 7.3$ years), who are identified in 99.5% of the cases as female, and who are identified in 99.5% of the cases as being of the female gender. They have between 0 and 100 collaborators in charge with an average of 19 people ($\sigma = 13$ persons), their age fluctuates between 24 and 65 years ($\bar{x} = 42$; $\sigma = 8$ years), and they live with between 0 and 14 people ($\bar{x} = 3$; $\sigma = 3$ persons).

Procedure

A national self-response survey was applied to a sample of directors of kindergartens and/or nurseries in the Integra Foundation in the context of the COVID-19 pandemic, and telework during the second semester of 2021, which considered the measurement of the technostress manifestations, techno-creators and techno-inhibitors, and a respondent's sociodemographic characterization.

To measure the manifestations of technostress, the RED-TIC questionnaire is used as an instrument (Salanova et al., 2007), previously employed in the Chilean educational setting

(Estrada-Muñoz et al., 2020, 2021; Vega-Muñoz and Estrada-Muñoz, 2020), and composed of 16 items, which are queried using a Likert – type scale (never – 0, a couple of times a year – 1, once a month – 2, a couple of times a month – 3, once a week – 4, a couple of times a week – 5, every day – 6).

Regarding techno-creators and techno-inhibitors, we consider those established in Jena's (2015) research, composed of 5 items each, which were measured on a Likert-type scale (strongly disagree – 0, disagree – 1, neither agree nor disagree – 2, agree – 3, and strongly agree – 4).

On the other hand, a respondents characterization was made, considering the following: region in Chile from where they were performing their work in telework mode, urban or rural kindergarten/daycare center sector, kindergarten/daycare category center according to the children attending number, years working in the educational field, dependents number, gender, age and the number of people with whom they live.

Statistical Analysis

Since the article's objective is to predict the impact of technostress-creators and technostress-inhibitors on the different technostress manifestations, the partial least squares structural equation modeling (PLS-SEM) is the methodology that allows for meeting this objective, given its predictive power, (Hair et al., 2017; Weidlich and Bastiaens, 2017; García-Fernández et al., 2018; Shmueli et al., 2019; Tan et al., 2020; Zhang et al., 2020; Dash and Paul, 2021; Al-Jundi et al., 2022).

According to Hair et al. (2017), PLS-SEM models allow the prediction of key constructs, and their evaluation comprises 2 stages: the measurement models evaluation and the structural model evaluation. Using empirical measures, the first stage seeks to determine the relationships between the items and constructs, and the second stage focuses on the relationship between the constructs of the theoretical model established.

First Phase: Measurement Model Evaluation

The proposed theoretical model is only composed of reflective measures, i.e., the items are manifestations of the established constructs. Therefore, the reflective measurement model must show that the items that make up the construct have internal consistency (Cronbach's alpha and Composite Reliability) and Convergent Validity, which allows identifying how the items belonging to a construct correlate (Outer Loading, Average Variance Extracted). Finally, it is necessary to ensure that the constructs comply with the Discriminant Validity, which is to ensure that a construct is unique and different from the other constructs of the established model (no interval of the construct combinations the Heterotrait-Monotrait Ratio (HTMT) must include the value of 1).

Second Phase: Structural Model Evaluation

Once it is verified that the constructs are reliable and discriminant, the model is validated. First, the constructs' collinearity that makes up the model is ruled out, then the bootstrapping technique that is used to check that the hypothesis's directions (signs) are those established in the theoretical model, and the relationships relevance of each hypothesis is examined to ensure that they are significant. To determine the model predictive power within the sample, the adjusted R^2 coefficient of determination is used, but to check the model predictive relevance outside the sample, the blindfolding technique is used, which gives the Stone-Geisser Q^2 value. Finally, the effect on the predictive power (f^2) and relevance (q^2) of each endogenous construct when each construct is omitted from the model is evaluated.

Table 2 presents the criteria to be met by each of the model evaluation phases. The PLS-SEM model estimation was performed using SmartPLS version 3.0 software (Ringle et al., 2015).

RESULTS

Reflective Measurement Model Evaluation

Tables 3, **4** show that the model constructs meet the criteria for convergent and discriminant validation. Regarding convergent validation 2 items, r15 and t9, present external loadings below 0.7, but the recommendation of Hair et al. (2017) to keep these items in the construct is followed, since their Average Variance Extracted (AVE) is >0.50.

TABLE 2 | Evaluation criteria.

Evaluation of the reflective measurement model	Internal consistency reliability	Cronbach's alpha (α) ≥ 0.70
		Composite Reliability (CR) ≥ 0.70
	Convergent Validity	Outer loading ≥ 0.70
		Average Variance Extracted (AVE) ≥ 0.50
	Discriminant validity	Confidence interval HTMT doesn't have 1
Evaluation of the structural model	Collinearity: Variance Inflation Factor (VIF) < 5	
	Predictive power (R^2 adjusted): 0.25 (weak), 0.50 (moderate) and 0.75 (significant).	
	Magnitude and significance of the path coefficients when p-value ≤ 0.05.	
	Predictive relevance Q^2 >0	
	Effect size ($f2$): values of 0.02, 0.15 and 0.35 are considered small, moderate, and large effects.	
	Effect size ($q2$): values of 0.02, 0.15 and 0.35 are considered small, moderate, and large effects.	

TABLE 3 | Results of reflective measurement model evaluation.

Factor	Item	Convergent validity		Internal consistency reliability		Discriminant validity
		Outer loading	AVE ≥ 0.50	Cronbach's	Composite	Confidence interval
		≥ 0.70		α ≥ 0.70	Reliability (CR) ≥ 0.70	HTMT doesn't have 1
Skepticism	r_1	0.802	0.808	0.796	0.866	Yes
	r_2	0.738				
	r_3	0.804				
	r_4	0.801				
Fatigue	r_5	0.859	0.922	0.918	0.942	Yes
	r_6	0.911				
	r_7	0.917				
	r_8	0.898				
Anxiety	r_9	0.849	0.893	0.874	0.913	Yes
	r_10	0.827				
	r_11	0.865				
	r_12	0.859				
Inefficacy	r_13	0.809	0.908	0.836	0.878	Yes
	r_14	0.871				
	r_15	0.592*				
	r_16	0.726				
Technostress creators	t_1	0.762	0.861	0.857	0.898	Yes
	t_2	0.808				
	t_3	0.841				
	t_4	0.833				
	t_5	0.745				
Technostress inhibitors	t_6	0.797	0.833	0.815	0.868	Yes
	t_7	0.784				
	t_8	0.753				
	t_9	0.684*				
	t_10	0.751				

**External loads below 0.7.*

TABLE 4 | Confidence Intervals.

Interval	2.50%	97.50%
SKE -> ANX	0.533	0.684
FAT -> ANX	0.682	0.778
FAT -> SKE	0.485	0.632
INE -> ANX	0.916	0.986
INE -> SKE	0.547	0.703
INE -> FAT	0.653	0.742
TC -> ANX	0.503	0.633
TC -> SKE	0.273	0.436
TC -> FAT	0.617	0.715
TC -> INE	0.432	0.562
TI -> ANX	0.126	0.273
TI -> SKE	0.093	0.200
TI -> FAT	0.162	0.320
TI-> INE	0.116	0.206
TI -> TC	0.152	0.318

TABLE 5 | Inner Variance Inflation Factor (VIF) values.

Factors	ANX	FAT	INE	SKE	TC
TC	1.042	1.042	1.042	1.042	
TI	1.042	1.042	1.042	1.042	1.000

Evaluation of the Structural Model

The model does not present critical collinearity levels as shown in **Table 5**, so it is possible to estimate the power and predictive relevance of the model.

Figure 2 shows the final estimates of the model and with the data in **Table 6**, it can be affirmed that only hypotheses 5 and 8 are not significant. It can also be seen that Technostress Creators (TC) have a positive and strong relationship with the fatigue factor (FAT, 0.573), as well as a positive and moderate relationship with the factors Anxiety (ANX, 0.495), Inefficacy (INE, 0.466), and Skepticism (SKE, 0.290). Regarding Technostress Inhibitors, the model shows a weak negative relationship with the factors

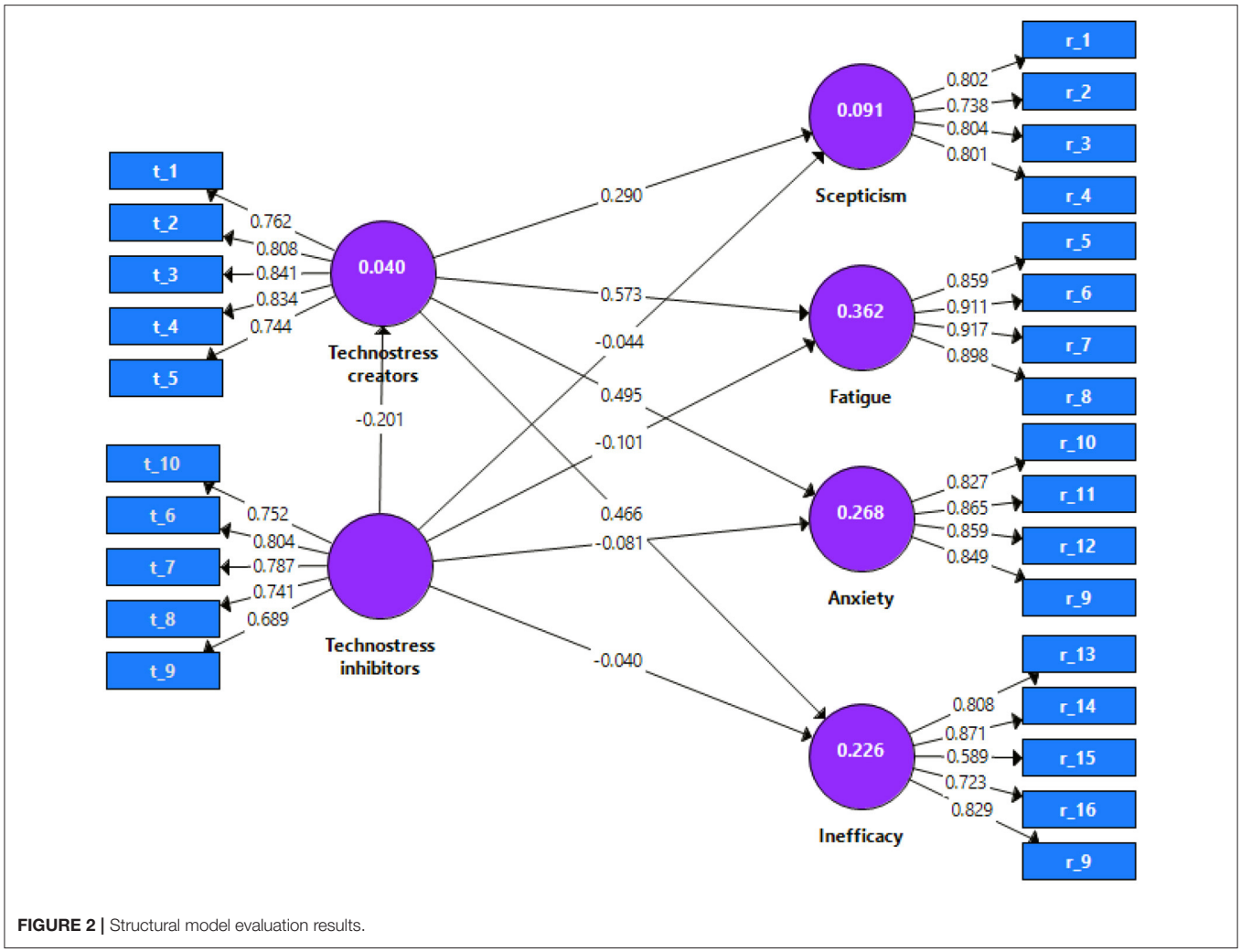

FIGURE 2 | Structural model evaluation results.

Technostress Creators (TC, −0.201), Fatigue (FAT, −0.101), and Anxiety (ANX, −0.081).

Regarding predictive power and relevance in **Table 7**, the Anxiety (ANX) and Fatigue (FAT) factors have moderate predictive power (0.360, 0.265, respectively). On the other hand, the Inefficacy (INE), Skepticism (SKE), and Technostress Creators (TC) factors have a weak predictive power (0.222, 0.088, and 0.039, respectively). All Q^2 values being greater than zero, the factors have predictive relevance.

The impact on the predictive power (f^2) of excluding Technostress creators from the model is large for the fatigue factor (0.494), the effect is moderate for the anxiety (0.321), and inefficacy (0.269) factors, and there is a weak impact on the skepticism factor (0.088). On the other hand, excluding Technostress inhibitors does not show large or moderate effects, but small effects, so this construct could be eliminated from the model. The effect on the predictive significance (q^2) of excluding Technostress creators from the model is large for the fatigue factor (0.350), the effect is moderate for the anxiety factor (0.196), and there is a weak impact on the inefficacy (0.121) and skepticism (0.048) factors. On the other hand, when excluding Technostress inhibitors, small effects are presented in the model predictive relevance, which confirms that this construct does not contribute to predicting the factors of manifestation of technostress.

DISCUSSION

This research aimed to predict the impact of techno-creators and techno-inhibitors on the different technostress manifestations in kindergarten directors in the context of the COVID-19 pandemic and telework. The manifestations described by Salanova et al. (2007) were considered, and as for the techno-creators and techno-inhibitors, those established in the research by Jena (2015) were included.

According to the research results, it is verified that techno-creators (Jena, 2015) correlate positively and significantly with the technostress manifestations, as described by Salanova et al. (2007). In this sense, it is worth noting that, this positive correlation is strong for fatigue, and moderate for skepticism, anxiety, and inefficacy. In other words, the techno-creators considered lead to technostress manifestations in the sample studied. These positive correlations coincide with previous research, which also mentions that the main techno-creators

TABLE 6 | Structural model evaluation results.

Hypothesis	Path	Path coefficients	*P*-value	Result
H1	TC -> ANX	0.495	0.000	Yes
H2	TC -> SKE	0.290	0.000	Yes
H3	TC -> FAT	0.573	0.000	Yes
H4	TC -> INE	0.466	0.000	Yes
H5	TI -> SKE	−0.044	0.134	No
H6	TI -> FAT	−0.101	0.003	Yes
H7	TI -> ANX	−0.081	0.025	Yes
H8	TI -> INE	−0.040	0.153	No
H9	TI -> TC	−0.201	0.000	Yes

TABLE 7 | Power and predictive relevance results.

Factor	R^2 Adjusted	Q^2	f^2 exclude TC	f^2 exclude TI	q^2 exclude TC	q^2 exclude TI
ANX	0.265	0.180	0.321	0.009	0.196	0.002
SKE	0.088	0.051	0.088	0.002	0.048	0.000
FAT	0.360	0.285	0.494	0.015	0.350	0.008
INE	0.222	0.114	0.269	0.002	0.121	−0.001
TC	0.039	0.025		0.042		

leading to technostress correspond to techno-overload, techno-invasion, and techno-insecurity (Ayyagari et al., 2011; Suh and Lee, 2017; Florkowski, 2019).

On the other hand, regarding the correlation between techno-inhibitors (Jena, 2015) and technostress manifestations (Salanova et al., 2007), it was found that, although the correlations are negative, which supports the hypotheses raised, the correlation between techno-inhibitors and the skepticism and ineffectiveness manifestations, is not significant, and as for the fatigue and anxiety manifestations, a weak negative correlation is shown, as well as when correlating techno-inhibitors with techno-creators. Even though studies such as Califf and Brooks (2020), where it is argued that literacy facilitation acts as a techno-inhibitor on techno-creators such as techno-complexity, techno-insecurity, techno-invasion, and techno-overload, Hang et al. (2022), in which it is mentioned that techno-inhibitors such as literacy facilitation and the provision of technical support help workers cope with technostress, neutralizing the negative effects of techno-creators, the evidence to reliably support that the most commonly reported techno-inhibitors in the literature have a relevant impact on the technostress manifestations and techno-creators, is scarce, and even contradictory results are reported. In this regard, Jena (2015) is cited, who argues that techno-inhibitors restrain techno-creators, however, according to Li and Wang (2021), literacy facilitation programs, as a techno-inhibitor, could stimulate the development of techno-creators, as they may add new sources of stress.

Most studies argue that techno-stressors are associated with turnover intention (Califf and Brooks, 2020), adverse work outcomes (Borle et al., 2021), and significantly and negatively affect workers' well-being (Salo et al., 2019; Hang et al., 2022). According to the research of González-López et al. (2021), technostress, at the individual level is related to, abandonment of daily activities, increased loneliness, lack of concentration, irregular sleep patterns, avoidance of real-life problems, reduced hygiene and eating problems, at the group level with, social, family and privacy problems, and at the professional level with, absenteeism, missed deadlines and failure to achieve objectives.

Studies in the context of the COVID-19 pandemic highlight that telework is associated with technostress (Hinojosa-López et al., 2021) and work-home conflict, decreasing job satisfaction and performance (Camacho and Barrios, 2022). Therefore, it is important to inquire about what measures are most effective to inhibit technostress at work, especially in the educational system (Chauhan, 2017), where the use of ICT in telework mode, during the pandemic of COVID-19 became imperative (Sangster et al., 2020).

Regarding the effect of techno-inhibitors on manifestations of technostress, research must be extended to other factors proposed in the literature, in addition to the classic factors, such as, for example, cultural segmentation, which refers to the organizational culture that favors the separation between work and personal life (Kim et al., 2015), the establishment of breaks during the working day (Tarafdar et al., 2019), or other strategies such as the implementation of positive technology, scientific and applied approach to the use of technology to improve the quality of personal experience that can lead to increase the wellbeing of workers and prevent technostress (Brivio et al., 2018).

From a practical point of view, imposing the use of ICTs without considering the capabilities, needs, and limitations of workers, and without implementing strategies to mitigate the risks associated with the use of these technologies, can generate technostress. Thus, this research contributes to increasing knowledge regarding the influence of techno-creators and techno-inhibitors on the technostress manifestations, making available to practitioners which are the factors that most affect technostress, and based on this, generating strategies to prevent the conditions that contribute to increasing the stress associated with the use of ICT in the workplace, to provide and promote healthy work environments that promote wellbeing in workers.

CONCLUSION

Based on the research results, it is concluded that techno-creators and techno-inhibitors correlate positively and negatively, respectively, with manifestations of anxiety, skepticism, fatigue, and ineffectiveness, and that techno-inhibitors have a negative association with techno-creators, in the kindergarten directors who participated in the study in the COVID-19 pandemic and telework context. Specifically for the techno-creators case, all correlations were significant, which allows corroborating their impact and prediction on the technostress manifestations, and for the techno-inhibitors case, it is not predictable their influence on techno-creators and the technostress manifestations, especially for skepticism and ineffectiveness since the correlations were not significant. Therefore, the

techno-inhibitors considered in the studied sample did not show the expected effect, which is to generate a significant reduction in the technostress manifestations.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

AV-M and CE-M: conceptualization, formal analysis, and project administration. DC and SM-P: methodology. SM-P: software. AV-M and JB-G: validation. DC, AV-M, and SM-P: data curation. CE-M, NC-B, and SM-P: writing—original draft preparation. AV-M: writing—review and editing. JB-G: supervision. AV-M, NC-B, and DC: funding acquisition for publishing fees. All authors have read and agreed to the published version of the manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.865784/full#supplementary-material

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E-Portfolio as an Evaluative Tool for Emergency Virtual Education: Analysis of the Case of the University Andres Bello (Chile) During the COVID-19 Pandemic

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The pandemic had serious implications for university education, specifically due to the transition from face-to-face teaching to online methodologies. This article analyzes the perception of students undergoing speech therapy from a Chilean University about the E-portfolio incorporation as an evaluative tool during the emergency virtual teaching due to the COVID-19 pandemic. From quantitative research, a survey of 38 questions based on Likert scales was applied to 108 penultimate year undergraduate students. The survey demonstrated that there is an improvement in the methodology and teaching support, as well as in the creativity and professionalism of the students.

Keywords: E-portfolio, formative evaluation, higher education, students perception, pandemic (COVID-19)

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INTRODUCTION

Before the arrival of the COVID-19 pandemic, higher education had to shift abruptly from a face-to-face workspace to a virtual workspace (Revilla-Cuesta et al., 2021; Telyani et al., 2021; Tang et al., 2021). And Chile was no exception, as the pandemic had affected the different educational levels, particularly the higher education sector. For instance, the authors Rivera Olguin et al. (2021) along with a group of university teachers evidenced that due to the COVID-19 pandemic, most of the teachers revealed a lack of knowledge regarding the management of digital technologies. In addition, due to the non-existence of an objective model of virtual education, it brought about blind spots in content, methodology, and evaluation. Other studies have shown difficulties related to the interaction methods with the students, laboratories, and professional practices (Revilla-Cuesta et al., 2021). In fact, these authors agree that despite the problems faced in teaching practices, some continue with the same traditional performances, but behind a computer screen. During the pandemic, the teachers don't have time to prepare themselves for the teaching transition, which involves shifting from traditional teaching to an online teaching platform and transforming their practices based on the learning, motivations, interests, and academic commitments of students (Toquero, 2020; Daumiller et al., 2021). So, the present study aims to contribute to the development of the field of study regarding the perceptions that university students have about their educational experience which due to the pandemic had to migrate to online learning environments. Although research have been carried out on the use of portfolios and their impact on the training outcomes of university students (Welsh, 2012; Riquelme et al., 2011; Revilla-Cuesta et al., 2021), only a few studies in Chile

formatively evaluated the perceptions of students in the implementation of an E-portfolio model in the online context. Thus, this study justifies the desire to search for the perceptions presented by students at the university level about the educational experience encountered by them during the implementation of the E-portfolio as a model for a formative evaluation. This was done through the introduction of the course "Design of Management Project in Speech Therapy," which due to the COVID-19 pandemic was made to shift from a face-to-face learning environment to an online mode. In addition, the following questions must be solved: What are the benefits of E-portfolio to students' learning? Is E-portfolio an appropriate tool for the formative assessment of an online course? Thus, by answering these questions, this study proposes a formative evaluation model, through E-portfolio, and its implementation in an online context to support learning in higher education.

THEORETICAL FRAMEWORK

Effects of COVID-19 on Learning

Although the concept of online teaching is not new, the COVID-19 pandemic has strongly promoted this teaching methodology around the world. Due to the pandemic, students of all educational levels could no longer attend school, challenging institutions to virtualize their academic activities while maintaining their quality (Toquero, 2020). These emergencies, along with associated difficulties and obstacles, impacted teachers in terms of content organization, teaching methodology, and online assessment. Simultaneously, it had a psychological impact on students and on the performance and objectives linked to their learning, which means that it caused a significant impact on their cognitive and emotional processes (Schiff et al., 2020; Rahiem, 2021).

Moreover, while some studies have shown that the transition from face-to-face teaching to online teaching is a good practice, others have shown the opposite results. For example, researchers Daumiller et al. (2021) in a study on attitudes, exhaustion, and cognitive commitment among teachers and students showed that the teaching and learning approaches in the online transition were positive. In addition, other studies showed that in times of pandemic situations, communication has been ineffective in student–teacher and teacher–student interaction, which translates into challenges for effective learning (Telyani et al., 2021).

The above-mentioned difficulties, combined with the restrictions of not being able to relate to friends and family, affect the motivation and interaction of students, -leading them to failure in their learning in the long term. According to Bandura (1989), the process of socialization between student and teacher must be effective and affective, such that it is possible to mobilize quality learning that positively impacts the cognitive processes. At the same time, it is emphasized that the technology used in an online environment does not determine meaningful learning (Ahmed et al., 2020).

E-Portfolio and Evaluation

An E-portfolio refers to a collection of work that each student develops through collecting, selecting, organizing, reflecting, and presenting their understandings and growth over time. E-portfolios have been increasingly used in higher education as a facilitator of formative learning and assessment (Rodríguez et al., 2013). In addition, an important component of the E-portfolio is the student's reflection on the work of the individual activities, as well as the general reflection on the set of activities contained in the portfolio (Paulson and Paulson, 1991; Nahadi and Siswaningsih, 2021). Other authors underline that a digital portfolio is a powerful tool that includes active methodologies that focus on promoting permanent and autonomous learning in students, and it is a platform where they can deploy transversal skills and critical thinking (Sarwandi and Wibawa, 2022).

An exploratory study on the perceptions of 40 university students regarding the integration of E-portfolios showed that they valued this experience in terms of promoting learning communities (Nahadi and Siswaningsih, 2021). Another study on the use of these learning tools showed that they facilitate student collaboration, peer feedback, stimulation of reflection, professional development, and formative assessment (Bolliger and Shepherd, 2010). Along the same lines, the authors Nahadi et al. (2015) agree that the evaluation of the E-portfolio supports the learning process of students and that it evaluates the data compiled from the activities developed during the training process, both cognitive and affective. In fact, feedback in formative assessment tends to improve students' learning outcomes, as well as their mental processes about the content delivered to them by the teacher.

It should be noted that the use of an E-portfolio as an evaluation model in the university educational field is a topic that has not been well researched. However, various investigations have highlighted its potential to visibly analyze the student's performance in an integral way, which is not possible to measure in a concrete way through tests (Barret, 2010; Firman et al., 2018; Nahadi and Siswaningsih, 2021). In summary, the E-portfolio is a didactic strategy and a complement to the professional and academic development of students from a methodological and evaluative perspective, allowing them to develop reflective and creative practice, collaborating working skills identity and the use of technology Apps.

METHOD AND CONTEXT

Context of University Andrés Bello

This study is carried out at the School of Speech Therapy, Andrés Bello University of Chile. The study program includes a set of subjects that are linked to the management of entrepreneurship and innovation projects, among which is the subject "*Management Project Design in Speech Therapy*," which we use to intervene with the proposal of the use of E-portfolio. This subject pays tribute to the scope of the graduate profile "*Research projects and management in speech therapy*," specifically in the learning outcome: "To Develop a speech therapy management project with its respective ethical

considerations, which contributes to the development of the discipline for the benefit of people and their community."

Specifically, the purpose of the subject is to integrate skills and knowledge built throughout their training, which allow the student to develop knowledge strategies for the design of management projects in speech therapy, keeping in view the community problems and the concordant theoretical ethical framework. At the end of the course, the student is going to be able to determine and identify problems in the areas of speech therapy related to management, and design management projects that are relevant and essential for the community and its environment (Universidad Andrés Bello, 2019).

Methodological Design

The objective of this study is to analyze the perception that university students have about their educational experience at the time of the implementation of a formative evaluation model. This was done based on the implementation of the E-portfolio during "Project Design of Management in Speech Therapy" course, which was virtualized full-time due to COVID-19.

First, the study subjects were organized into six sections of approximately 20 students each, and for the implementation of the E-portfolio for 4.5 months, each section in charge of a teacher was organized into groups of five students. They were asked to develop a project that would be organized and presented through the portfolio on a weekly basis to the teacher, who, on the one hand, would give feedback in writing through a workshop and, on the other hand, would provide summative assessment in the eighth and fifteenth week. In addition, self-assessment and co-assessment rubrics were organized and designed for the evaluation.

The research adopts a quantitative approach, and includes a descriptive design with cross-sectional temporality. A Likert scale survey was applied to the entire population of the study at the end of the course. In addition, and as a complement, it was decided to apply the following open questions taken from the author Welsh (2012): What are the best aspects of the evaluation and feedback during the use of the E-portfolio? What are the best aspects of evaluation used in the E-portfolio methodology? and What aspects of adaptation in the students' learning did the teacher consider during the application of the E-portfolio?

Participants

In total, 127 students enrolled in the subject of Management Project Design in Speech Therapy at the Andrés Bello University. This study was carried out during the first half of 2021 in an online mode. All students who completed the subject and did not exclude the course before the end of the semester were included in the study population. Finally, 108 participants answered the survey voluntarily, corresponding to a confidence level of 95% and a margin of error of ± 3 in relation to the representativeness of the sample on the universe.

Data Collection Procedures and Techniques

To measure students' perceptions of the evaluative experience using E-portfolios, a survey of the perception of the methodological use of the portfolio designed and validated by Riquelme et al. (2011) was used. It should be noted that this was adapted and contextualized to the nature of the subject, based on a methodology of theory created through the focus group technique by students, teachers, and specialists in the area. The level of agreement or disagreement among the respondents was measured by means of a Likert Scale graduated from 0 to 4, where 0 corresponds to completely disagree, 1 disagree, 2 you are unsure or have no opinion, 3 agree, and 4 completely agree; in the case of negative statements, the graduation is the other way around.

The reason for selecting this instrument is because it addresses all the study variables, such as students' learning, organization and evaluation, methodology and teaching support, creativity, and integration. Furthermore, of a total of 43 statements raised in the original survey, five were eliminated for reasons of context and disciplinary nature, leaving only 38 statements distributed in each of the variables mentioned. In addition, as part of the objectives, the reliability of the survey was measured by the Cronbach method, and the internal consistency of the data was evaluated through the calculation of Cronbach's alpha coefficient, using the SPSS statistical software (George and Mallery, 2003).

Table 1 shows that, in general, the instrument has an acceptable internal consistency with a mean Cronbach alpha > 0.7. However, the variable organization and evaluation presents an alpha < 0.6, which means that it is questionable in terms of the number and types of statements that are responsible for measuring this construct.

The survey was applied virtually to the representative sample of students, who were distributed in six different sections with a maximum of 20 per group; each section was headed by a teacher.

Analysis Method

To obtain the information, a Likert scale survey was used. Subsequently, the data obtained were analyzed in the SPSS22 quantitative analysis software. To obtain the information regarding the use of the E-portfolio, three questions were administered to all the students. Then, the audio format of their statements was transcribed to obtain relevant information units on our study variables through the qualitative analysis software VERBI Software (2007).

Next, we categorized the information units, which meant assigning them codes to identify the subject and category of study, and the latter information was obtained from the variables considered in the quantitative instrument. In **Table 2**, the codes and categories used are presented.

TABLE 1 | Cronbach's alpha by study variable.

Study variable	Cronbach alpha	Distribution of statements by variable N°
Students' learning	0.976	23
Organization and evaluation	0.597	4
Methodology and teaching support	0.889	7
Creativity and integration	0.869	4

For example (**Table 3**) $S25_{13}OE$ the subscript indicates that proposition 1 comes from information unit 3 of student 25 corresponding to the Organization and Evaluation (OE) study category.

These propositional units were exposed in the main results associated with the study variables: students' learning, organization and evaluation, methodology and teacher support, and creativity and integration.

RESULTS

The details of the information obtained from the survey applied to 108 students are given in the following text. The results are presented according to the study variables: students' learning, organization and evaluation, methodology and teaching support, and creativity and integration. On the vertical axis of the graph, the value 0 corresponds to completely disagree; 1, disagree; 2, you are unsure or have no opinion; 3, agree; and 4, completely agree, while the horizontal axis shows the statements related to each of the variables considered in this study.

Students' Learning

Figure 1 clearly shows that the students show a highly marked tendency toward maintaining the E-Portfolio for future courses, as they very much agree that it was well organized and, therefore, is very useful for the development of skills associated with the responsibility of solving a problem located and contextualized in the society. On this point, participants agree that the implementation of this tool is something they enjoyed because it gives them meaning in their professional and internship development.

Likewise, the participants completely agree that the E-portfolio had a positive impact on the development of their learning, specifically by a good accompaniment from the teacher, and that their feedback was adequate and effective throughout the process of preparing the management project.

TABLE 2 | Codes of the study categories.

Categories	Definition	Codes
Students' learning	Development of the learning through use of E-portfolio and its teaching accompaniment.	SL
Organization and evaluation	Organization and purpose of the evaluation.	OE
Methodology and teacher support	The use of active methodologies in the implementation of E-portfolio as a model to activate a formative evaluation through a teaching accompaniment.	MTS
Creativity and integration	Organization and integration of the information through the use of E-portfolio.	CI

TABLE 3 | Elaboration of propositional units.

Information units	Propositional units
$S25_3OE$ the very kind teacher helped us a lot in our project, even when we needed a meeting, he helped us very quickly and with great disposition.	$S25_{13}OE$ the very kind teacher helped with our project. $S25_{23}OE$ the teacher with great willingness helped us through meetings.

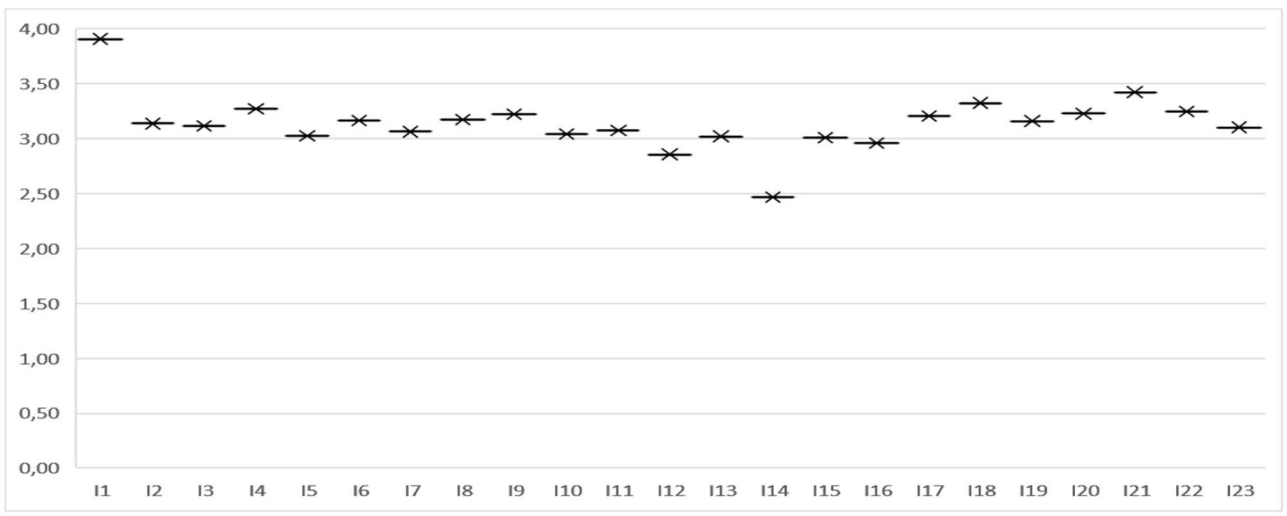

FIGURE 1 | Mean of the student's learning variable.

This finding highlights that students perceive that the E-portfolio, besides promoting autonomous learning, is a good methodology to promote a fair formative evaluation. In short, the average mean value of the students' learning variable is 3.14, which on the Likert scale corresponds to an acceptable internal consistency.

Based on the above-mentioned results, most students declare that the E-portfolio, as a methodology, is effective in successfully carrying out the development of a project (**Table 4**), which is facilitated through permanent and timely feedback from the teacher. On this last point, they declare the following points:

$S1_{12}SL$ The feedback from the teacher allowed our project to improve...

TABLE 4 | Statements in students' learning.

Code	Statements
$S45_{12}SL$	*The E-Portfolio is very useful to create a successful project...*
$S4_{23}SL$	*It is useful to learn how to carry out management projects and to organize yourself as a group...*
$S18_{22}SL$	*It's an opportunity to change so you don't make the same mistakes again...*
$S29_{21}SL$	*The feedback from the teacher allowed our project to improve...*
$S105_{21}SL$	*The E-Portfolio helped us a lot to be able to complete our project...*
$S13_{21}SL$	*The creation of the project through E-Portfolio was very favorable for learning...*
$S100_{21}SL$	*I think the formal evaluation is unnecessary...*
$S9_{21}SL$	*It is favorable to discuss different points of view in the group...*
$S107_{11}SL$	*I really enjoyed working in a group and my colleagues gave their opinion about our work.*

$S43_{11}SL$ The observations and advice given by the teacher generate a constructive approach...

$S12_{13}SL$ It is useful to learn how to carry out management projects and to organize yourself as a group...

In addition, most of the students declare that during the implementation of the E-portfolio, the activities were carried out in an objective time, so that they were completed without many difficulties, emphasizing that everything was carried out step by step through a reflection mediated by the teachers. They issue the following statements:

$S2_{13}SL$ The work done and the tools delivered will be very useful for future projects.

$S17_{13}SL$ Honestly, I thought it was a very good and motivating idea to develop the branch throughout the semester.

Finally, they declare that they value teamwork, particularly for implementing a different method of evaluation, which was different from the traditional ones.

Organization and Evaluation

It is shown in **Figure 2** that the mean of the organization and evaluation variable is 2.9 on the Likert scale, which corresponds to agree, that is, the participants agree that the instructional part of the E-portfolio is clear. However, on the one hand, they perceive that peer-to-peer copying of E-portfolio becomes a problem, while on the other hand, they agree that they had protected time for its development.

The results obtained for the variable organization and evaluation, through the survey applied to students, is consistent

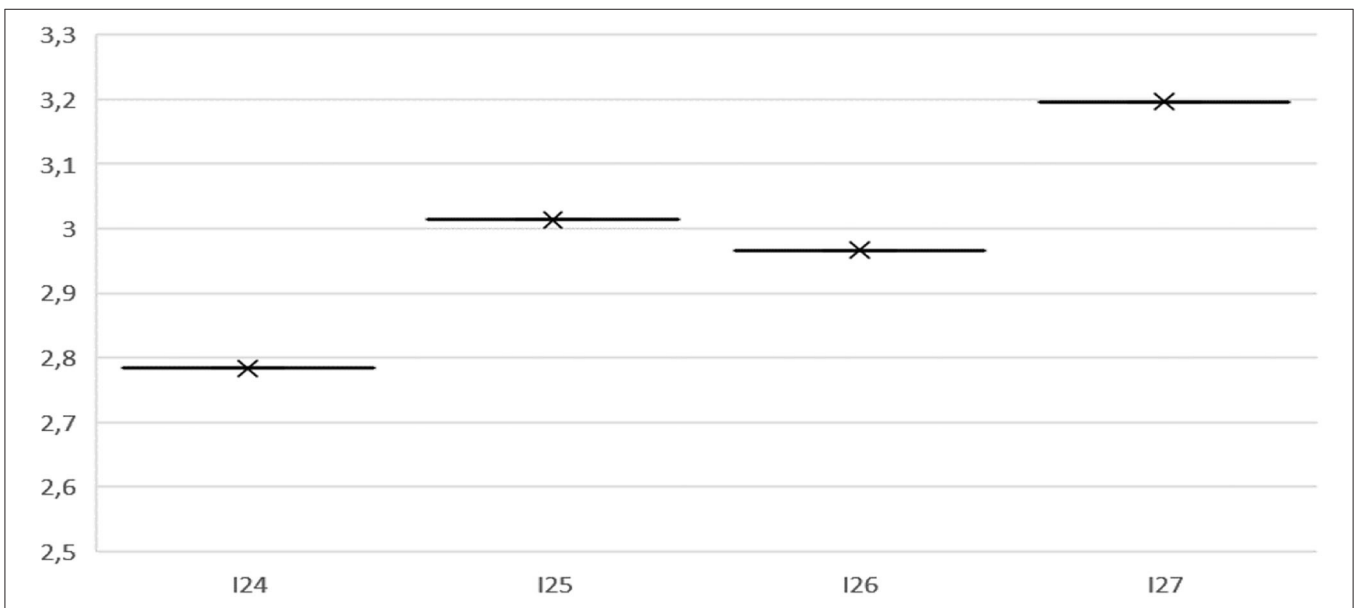

FIGURE 2 | Mean of the variable organization and evaluation.

with the statements made by them (**Table 5**). For example, the majority declares that although there is no individual evaluation, since all the members do not contribute to the collective work, the co-evaluation offered them the opportunity to reflect and integrate the opinions of their peers who were responsible for the development of the projects. Students issue the following statements:

S98$_{32}$OE All aspects of evaluation were very consistent...

S10$_{23}$OE The self-assessment and co-assessment I feel were very efficient...

In addition, students state that teachers were very responsible with the delivery times of feedback and evaluations, giving them enough time to carry out improvements in their projects. In fact, they emphasize that in special cases, the teacher adjusted the time according to the needs and/or characteristics of the students. In this, they declare that:

S48$_{12}$OE The very gentle teacher helped us a lot in our project and its evaluation...

S108$_{11}$OE We needed a meeting and he helped us very quickly and with a lot of disposition...

S21$_{22}$OE The best thing about the evaluation and feedback is that the teacher knew what our work was like as a team...

TABLE 5 | Statements in organization and evaluation.

Codes	Statements
S103$_{11}$OE	*Self-evaluation is very beneficial and process evaluation can show the progress that occurs during the process.*
S19$_{22}$OE	*The student sees the irresponsibility of certain classmates...*
S36$_{13}$OE	*Entire groups disconnect and disappear from the class when progress has to be shown and the teacher does not say anything or does not evaluate in a fairer way.*
S15$_{21}$OE	*Everyone in the group got the same grade, which is unfair to the colleagues who worked the hardest.*
S65$_{31}$OE	*The teacher was always responsible with the evaluation times and with the feedback of the works.*
S34$_{12}$OE	*The teacher adjusted to our times to be able to make corrections.*
S91$_{32}$OE	*Due to the form of evaluation, it became easier to understand the mistakes.*

Methodology and Teacher Support

From **Figure 3**, the perception that students have about their teachers is that they agree that the analysis of the management project is focused on the diagnosis of the community. In line with this, they agree that they act according to their individual characteristics, which motivates them and, therefore, actively participate in the development of their learning with responsibility and progressive autonomy. In addition, they agree that material and technological support is adequate, something that facilitated coordination between the activities of the E-portfolio and the remaining activities of the semester. Finally, it should be noted that the participants in this study agree that they had opportunities to improve those aspects evaluated as deficient in their feedback, and they agree that E-portfolio learning is active. In short, the mean of the variable methodology and teaching support is 3.47 on average, which on the Likert scale corresponds to an acceptable internal consistency.

In addition, the statements made by the students regarding methodology and teaching support (**Table 6**) coincide with what was evidenced in the surveys. For example, most state that teachers were constantly motivating them during the process of

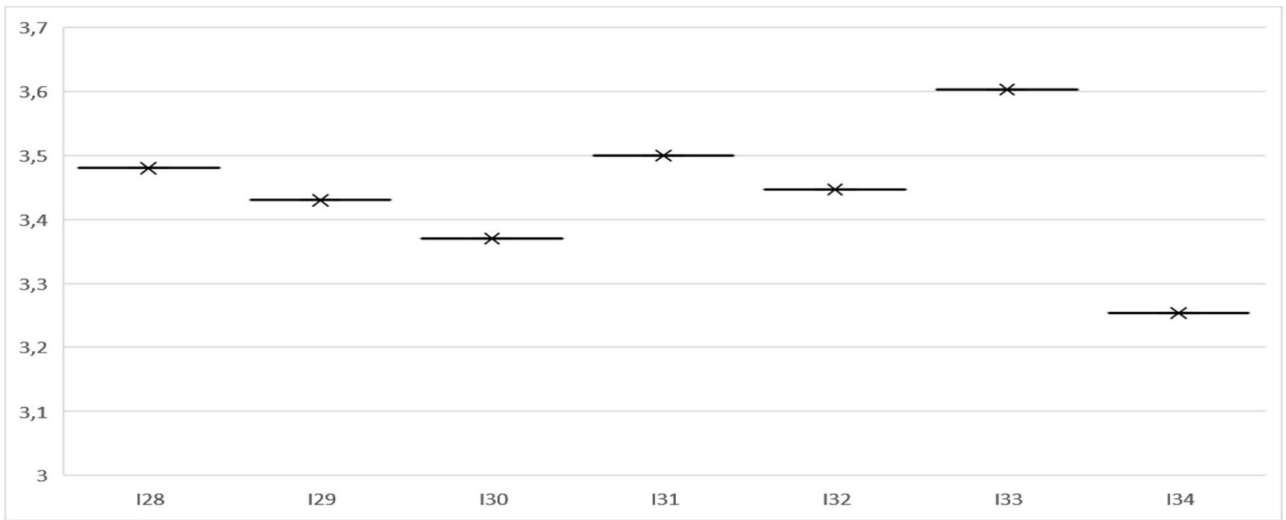

FIGURE 3 | Mean of the variable methodology and teaching support.

their learning, so they had many opportunities to improve all those aspects evaluated as deficient after feedback. On this, they state that:

$S101_{21}MTS$ The teacher took the time to review together with the group every detail of the project...

$S20_{11}MTS$ The great adaptability of the teacher to situations that emerged...

$S50_{13}MTS$ The fact that it was schedules for each group when presenting the doubts was undoubtedly an aspect that motivated me to carry out the work efficiently...

TABLE 6 | Statements in methodology and teaching support.

Codes	Statements
$S70_{22}MTS$	*He always carried out an evaluation in a cordial way and resolved doubts...*
$S54_{11}MTS$	*Always any questions when sending an email or talking to him was immediately...*
$S56_{22}MTS$	*The teachers are committed to the students' projects...*
$S24_{11}MTS$	*The feedback from the teacher is quite complete and helps to improve the project...*
$S92_{11}MTS$	*Thanks to this feedback you can get a more generalized view of what our performance is like...*
$S75_{12}MTS$	*The feedback from our project helped us a lot to improve all the points of our project...*
$S39_{13}MTS$	*Each activity was carried out class by class...*
$S7_{21}MTS$	*The empathy of the teachers regarding the technical unforeseen events that we presented as a group was good...*

Creativity and Integration

The participants surveyed agree that working with E-portfolio does not translate into the mere transcription of the subject but allows them to develop creativity in terms of the different ways of ordering or configuring information in terms of their cognitive processes. They also agree that the implementation of this, as a methodology for the elaboration of a project, allowed them to mobilize and apply previous and new knowledge to real community problems based on epidemiological variables and social, territorial, and ethical aspects. In short, the mean of the creativity and integration variable is 3.21 on average, which on the Likert scale corresponds to an acceptable internal consistency (**Figure 4**).

The main results obtained from the respondents in creativity and integration are consistent with the statements made by most participants (**Table 7**). In this regard, most of them declare that the E-portfolio methodology implemented is far from traditional teaching, since it forces them to review, reflect, and correct each of the activities associated with the projects. In addition, a majority agree that the methodology allowed them

TABLE 7 | Statements on creativity and integration.

Codes	Statements
$S49_{11}CI$	*... a satisfactory method by having the "obligation" to review and correct the previous works obtaining a good result...*
$S53_{21}CI$	*I learned a lot about how and what a project should implement considering aspects that I did not have before...*
$S66_{12}CI$	*The contents learned and the different topics that were imparted should have a solution through the projects...*
$S78_{13}CI$	*The E-Portfolio helped to learn and develop self-criticism skills...*

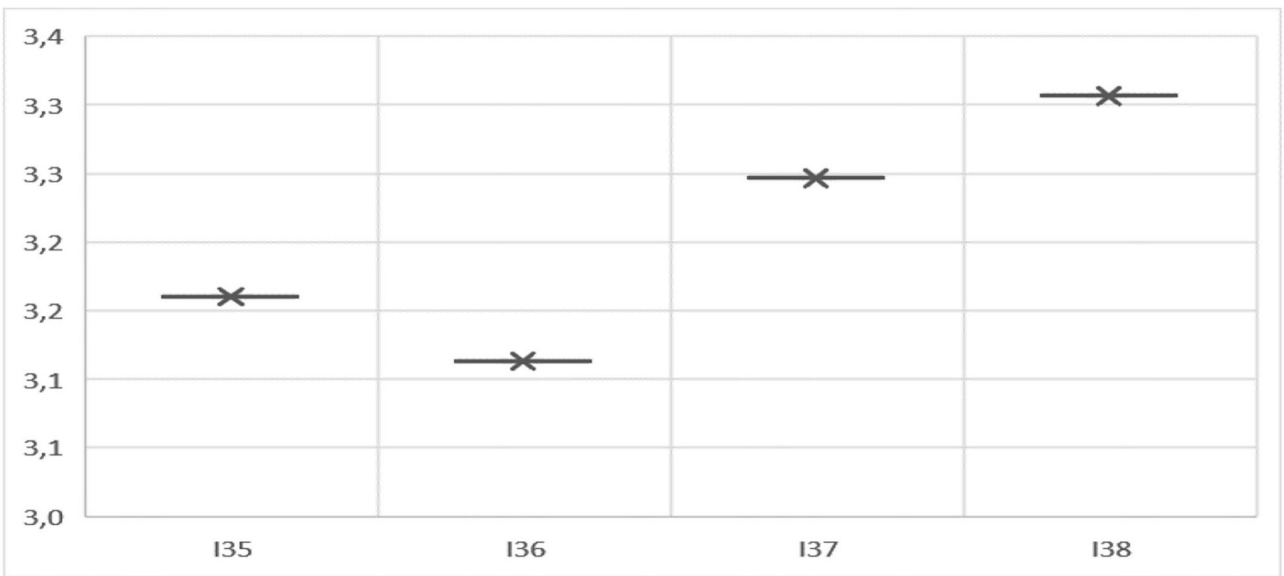

FIGURE 4 | Average of the variable creativity and integration.

to successfully deploy their previous knowledge, thus obtaining effective learning.

DISCUSSION AND CONCLUSION

Students' Learning

Our results show that in the students' learning variable, they present a favorable perception regarding the use of the E-portfolio as an evaluation strategy, results similar to those published by a previous study (Welsh, 2012; Nahadi et al., 2015; Makransky et al., 2019). In this context, through the use of the E-portfolio, students manage to present their way of thinking, enriching it through the exchange of ideas among their peers and professors in charge of the groups (Paulson and Paulson, 1991; Rodríguez and Aguado, 2009). This is consistent with the findings of a previous study (Welsh, 2012), where students value feedback both from their peers and teachers (Revilla-Cuesta et al., 2021). In addition, the decision to offer feedback to small groups of students during the implementation of the E-portfolio caused it to be distributed more evenly throughout the virtual workshops and enabled synchronous meetings with teachers. The E-portfolio had a positive impact on the development of students' learning, because they enjoyed its implementation and believed that it gave them meaning in their professional and internship development. We consider in this context that the use of E-portfolios implies a work methodology on the part of the teacher that allows them to specify the results and learning outcomes, showing a broad pedagogical sense. In addition, we consider introducing E-portfolios in the processes of teaching and learning involved in each of the professional careers, and it is the primary task of universities/institutions, where teachers and trainers are the main promoters.

Organization and Evaluation

The students in this study perceive that the time used for the development of the E-portfolio is adequate. However, students are concerned that the tasks will be copied by their peers. In this sense, we agree with Sarwandi and Wibawa (2022) who state that the use of E-portfolios as a model to promote formative assessment has good scope and potential in integrating knowledge, skills, and attitudes (Makransky et al., 2019). In this regard, in this study, the students have a very positive perception regarding the group evaluation carried out by the teachers in an effective and timely manner (Welsh, 2012). However, it is evident in this study that there was no context of individual evaluation that would allow showing those students who were contributing ideas collectively; this is under the assumption that formative evaluation with permanent and significant feedback increases motivation and participation of students to continue learning. In this context, Nahadi et al. (2015), in a study of the implementation of an E-portfolio for the development of critical thinking skills in university students, showed that the number of tasks is excessive, and the institutions are not used to evaluating them. The variable organization and evaluation received the lowest average scores in the study, noting that, although there is a favorable perception regarding the organization of the model proposed by this experience, it is relevant to reinforce aspects of individual evaluation and monitoring of student's participation in group work.

In brief, we believe that beyond the organization of the evidence of learning through the use of the E-portfolio, the interaction between the student and teacher must be taken into account, so that the evaluation acquires great relevance in the permanent improvement of the learning acquired by the students. To achieve this, a teacher and a student are required to be willing to get involved in the learning process and in the use of the E-portfolio in a teaching and learning situation accompanied by active methodologies and various evaluation instruments (Rodríguez et al., 2013).

Methodology and Teacher Support

The study variable methodology and teaching support received the highest average scores, where the high assessment of the students about the proposed model stands out in the context of the COVID-19 pandemic, where the exhaustion and commitment of the students were strongly supported by teachers (Telyani et al., 2021). On this point, the authors Daumiller et al. (2021) point out that the transition from face-to-face teaching to online teaching necessarily requires teachers to design high-quality teaching material, should know how to virtually communicate content to their students, and how to improve teacher–student and student–teacher interaction (Revilla-Cuesta et al., 2021). Hence, students reflect on the development of their learning in a consistent and adequate manner, such that it gives them a conceptual, procedural, and attitudinal basis to apply in various contexts.

In this study, the perception that the students have about the work developed by the teachers was very positive, showing that they act considering the individual characteristics of their students, which motivates them and develops autonomy in their learning. This coincides with some authors, who point out that before implementing the E-portfolio, the context of the students must be considered (Revilla-Cuesta et al., 2021).

Finally, the perception that students have about the activities of the E-portfolio is that they were constantly presented with opportunities to reflect on those aspects of learning that were wrongly understood, and as we have already mentioned in other variables of the study, this is due to the implementation of a formative evaluation (Nahadi et al., 2015).

Creativity and Integration

The results of this study show that the respondents present an acceptable perception of the use of the E-portfolio in the context of the COVID-19 pandemic, since it allowed them to develop cognitive creativity in terms of the different ways of configuring the information in the E-portfolio and discussing it both with their peers and with the teacher. And in this regard, like Martin Daumiller, we agree that the correct motivations and attitudes in this pandemic would allow students to recognize the challenges in their teaching process as opportunities for improvement.

In brief, the implementation of the E-portfolio for the students of this study meant significant participation in a virtual platform and included the following positive outcomes: a greater awareness of their own learning, an increased sense

of responsibility for their own learning (being the protagonist of the activities that are developed), collaborative construction of knowledge by sharing materials and reflections, a shared and fairer evaluation including external evaluation of the teacher, co-evaluation among peers and self-evaluation, and greater awareness and knowledge about the learning process and its development over time with permanent monitoring and feedback.

We can conclude that despite the COVID-19 pandemic, the E-portfolio model proposed to develop active methodologies and formative evaluation has a positive impact on students' learning.

So, this study suggests that the educational institutions should develop programs to prepare students not only for the workforce but also to face unexpected situations, such as the COVID-19 pandemic, and take advantage of these interventions to highlight teaching practices and improve them considering social, political, technological, and/or cultural changes.

In summary, and as a result of the COVID-19 pandemic, the curricula were unexpectedly more flexible, so this intervention in the subject "Management Project Design in Speech Therapy" suggests that institutions appeal to rethink the disciplines included in a curriculum in terms of the amount of content and its possibilities of being virtualized.

For future research, it is necessary to review the measurement instrument for the incorporation of other questions that delve into aspects of transversal skills and their appropriation through the proposed pedagogical strategies, such as teamwork, information resource management, and ability to self-learning. Likewise, we are aware that within the measures used there are inherent limitations of the quantitative studies, therefore, for future investigations we suggest, for one side, the incorporation of variables that have direct implication in the development of transversal skills and in the other side, associated variables in formative effective evaluation (Nahdi et al., 2021).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Universidad Andrés Bello. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RR, LM-U, and CF-B contributed as supervisor of the study, revised, read, approved the draft, and the submitted version of the manuscript. All authors contributed to the article and approved the submitted version.

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Subjective Well-Being and Schools in South Africa: A Post-COVID-19 Analysis

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From the analysis of the Wave 5 National Income Dynamics Study – Coronavirus Rapid Mobile Survey 2021 dataset, the study conducted in South Africa, we developed a model of analysis based on three dimensions, namely, subjective well-being, material living conditions, and importance attributed to education during the COVID-19 pandemic. A cross-sectional analysis of the data for Gauteng area indicates that the dimension of subjective well-being of families in South Africa—even in relation to the factors such as conditions of deprivation (e.g., hunger)—does not necessarily influence the importance the respondents attach to their children's education, this as reflected in whether or not they send them to school when COVID-19 restrictions allowed for schools to come back to face-to-face teaching. Subjective well-being of parents and guardians is, however, a predictor of concern about their children's education and future. Our working hypothesis is that, although there is little evidence that subjective well-being has a significant association with the respondents' willingness for their children to continue their schooling, there is a significant indirect effect of subjective well-being—which is especially determined by the gender as well as of the living material conditions—and the greater or lesser importance that the respondents attribute to their children's education. Likewise, and in more general terms, subjective well-being is clearly related to gender, with women having the lowest levels of subjective well-being.

Keywords: South Africa, COVID-19, school, material conditions, subjective well-being

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INTRODUCTION

The issue of education has been at the center of the national building project in South Africa in the past, during the apartheid, and continues to be the case till now in the democracy. During the apartheid, the Black population was forced into a purposely designed, bad-quality educational system. Known under the disparaging label of Bantu Education, this educational system aimed at reproducing the limited horizons available to Black people who were expected to perform as secondary class citizens in their segregated country (Christie and Collins, 1982). Furthermore, the languages spoken by most of the African population were subsidiary in the teaching and learning environments. Afrikaans was made the official medium of instruction which further disadvantaged and alienated African schoolchildren. It was during the Soweto youth uprising in 1976, when school children rebelled against the obligatory use of the Afrikaans language in the school, a poignant slogan "'go to hell Afrikaans" read in one of the now famous placards held by these school children (Ndlovu, 1998; Bonner, 2004). Images of the brutal repression infringed

on these school children caused widespread concern and helped mobilizing the international opinion against the oppressive system of the apartheid (Bonner, 2004). This was, as some analysts affirm, the beginning of the demise of the apartheid. The Soweto uprising also put at the center the role of education as a mechanism through which the segregationist nature of the apartheid system was reproduced (Ndlovu, 1998). In a democracy, the country's educational system needed to be radically transformed not only to provide not only the formative support and abilities the new generation of "born free" South Africans required but also to provide the intellectual and critical skills the new nation needed.

Nelson Mandela's newly inaugurated democratic government undertook the re-engineering of the educational system to overcome the multiplicity of disparities inherited from the apartheid system. While the transformations introduced by the democratic governments over almost three decades are significant, and their achievements are numerous, there are also many challenges that exist. The gap in educational outcomes and opportunities persist, and the access to resources and infrastructure is deeply unequal. This is still the case with rural and township schools which are schools in large Black population's urban areas that were "grossly underserved and segregated by apartheid" (Ndimande, 2016). Educational inequalities have been reproduced along races, classes, and the urban–rural divide (Ndimande, 2016). With COVID-19, the goals and progress in education have been deeply affected. The measures implemented to respond to the COVID-19 pandemic, such as total and partial lockdowns, and the expected transition into online schooling has impacted on the most vulnerable households and on their children.

Based on the data set of the Wave 5 National Income Dynamics Study – Coronavirus Rapid Mobile Survey (NIDS-CRAM, 2021), this study takes a close look at households in the Gauteng province, the most populated in the country and home to the capital cities of Johannesburg and Pretoria, to explore how has COVID-19 impacted on school children. We focused on this region because it is part of the authors' longer term research area. Gauteng has the highest number of ordinary independent schools (365) in the country and is the most diverse province in the country, in terms of racial groups and income levels. Of the approximately 14.6 million of learners at school in 2019 [Stats SA, 2020—South Africa's General Household Survey (GHS)], the larger percentage attended schools in KwaZulu-Natal (21.8%) and in second place in Gauteng (19.7%). However, the percentages of learners attending the private schools is higher in Gauteng than in any other province with 13.6% of learner attending private schools and only 3.5% of learners in KwaZulu-Natal attending such institutions (Stats SA, 2020—South Africa's GHS). Considering the diversity of Gauteng, we posed questions to the data set relative to the subjective well-being of parents and guardians in homes with school children in this province. While the questions we posed to the survey were not the ones that guided its design, it has allowed for an exploration of hypotheses and potential relations between the variables that we present in this study.

South African Backgrounds

The new democratic government of Nelson Mandela promised socioeconomic justice and integration of the previously segregated and excluded Black population. The new constitution (1996) recognized equality, freedom, and human dignity for all people of South Africa. Affirmative action and the Black Economic Empowerment programs were put in place to revert the socioeconomic and political injustices of the past and undo the historical disadvantages faced by previously excluded groups. A central concern of the democratic governments has been the ending of the legacy of poverty and under-development, intended through the Reconstruction and Development Plan (RDP) of 1994 and in the National Development Plan (NDP) of 2011. However, the country has not succeeded in providing a better life for all, with an economic system that is still largely governed by neoliberal principles. With a Gini coefficient of 63 for 2014/2015 South Africa is one of the most unequal countries in the world (NIDS-CRAM, 2021). A considerable percentage of the population continues to live in poverty. Estimates for 2014/2015 show that 55.5% of the population live in poverty and 18.9% live below the poverty line (World Bank, 2020). Unemployment is persistently high and there is still a lack of access to housing, electricity, and piped water for the poor. Women are the most affected by the country's history of exclusion and discrimination. Women are more impoverished than men; 58.6% are poor as compared to 54.9% for males (Stats SA). Women and girls continue to be victims of gender-based violence, mostly at home. According to the UN Women, in 2018, "13.1% of women aged 15–49 years reported that they had been subject to physical and/or sexual violence by a current or former intimate partner in the previous 12 months" (UN women). The patriarchal order of the society is reproduced through a rigid sexual division of labor in the households. The UN women reported for 2018 that "women and girls aged 10+ spend 15.6% of their time on unpaid care and domestic work, compared to 6.5% spent by men" (UN women). The raising of children is mostly women's responsibility. The recent research has established that 60% of children in South Africa have absent fathers, and more than 40% of South African mothers are a single parent [Human Sciences Research Council (HSRC) and South African Race Relations Institute (SARRI), March 2020].

Despite these failures, many continue to expect the state to deliver on the promise of granting socioeconomic rights to all who remain excluded. South Africa, the rainbow nation, is a diverse society where the inequities of class, race, and gender have deepened with COVID-19.

COVID-19 Situation in South Africa

Faced with the first cases of COVID-19 in South Africa, the government of President Cyril Ramaphosa declared a state of catastrophe and began the total confinement on March 27, 2020. A strict lockdown was implemented to buy time and prepare the health system as well as the general response to what seemed to be an imminent disaster. The closure of all ports of entry put an immediate end to international movements and inter-provincial transport. The prolonged lockdown has

had devastating results for the poorest, for the women, and for the girls. The government's response has been aimed at providing basic subsidies to the poorest and assisting them through an emergency COVID-19 subsidy to face the economic crisis resulting from the loss of jobs. The statistics of the third quarter of 2021 regarding the unemployment revealed the negative effects of the COVID-19 crises, as it reached 34.9%, the highest percentage ever (Stats SA, 2020). If a broad definition of unemployment is considered, one that includes those able to work but not looking for work, the percentage of unemployment then reaches 44%, affecting more than 11 million people. A figure that in the previous decades had reached 20%. The deepening of unemployment has impacted food insecurity. In 2017, 6.8 million South Africans experienced hunger (Stats SA, 2020). COVID-19 related measures such as lockdowns imposed additional burdens on low-income and food-insecure households.

The high level of for domestic, and public, violence. This was demonstrated by the events of July 2021, the eruption of unrest in the provinces of Gauteng and KwaZulu-Natal, two key economic centers of the country in which 354 lives were lost and thousands of businesses were looted and had to close. The unrest is estimated to have cost the country around 50 billion rand ($3.3 billion) in lost production, and put at risk at least 150,000 jobs, according to the South African Homeowners Association. Investigations have revealed that the violence was instigated by dissident groups within the African National Congress, the ruling party, to create fractures in the government.

It has been estimated that the deaths from COVID-19 have been underreported, being 3 times higher than the official numbers, as in March 2022, official figures reported a total of 302,960 deaths (SARMS, 2022) in a country with a population of around 55 million. Just as the likelihood that the excess death due to COVID-19 is underrepresented in the official figures, it can be said there is an invisible effect of the epidemic that will become evident in the post-pandemic period. South Africa has the highest number of people living with AIDS in the world, also the most massive anti-retroviral program, tuberculosis rates are also very high, largely a historical legacy of the precarious working conditions in the gold and diamond mines that enriched the country and made the nation the most industrialized in Africa. Several other chronic diseases have been neglected to respond to COVID-19. Thus, not only the chronic diseases but also the deterioration in mental health, an aspect that will become more visible in the future, and we explored it in our study.

Regarding vaccines, these began to be distributed in March 2021. To date, 18 million people have been fully vaccinated and 21 million have received at least one dose (Sacoronavirus, 2021). The vaccination process, although vaccination has been efficient, has met with significant resistance among people, including through anti-vaccine campaigns on social media. The possibility of establishing the obligatory nature of the vaccine is discussed, something that will have to be pronounced by the constitutional court, putting individual freedom and the protection of health of people as a public good in tension. This is how this COVID-19 crisis in South Africa has further opened the wounds of this country and it is not yet clear which process can strengthen the changes that are necessary.

In a country as unequal as South Africa, education, specifically, has a strategic value in overcoming the structural inequality determined by class, race, and gender (Ndimande, 2016). For the poor, accessing schools means also attaining food security. Through schools, families ensure that the basic needs, such as access to food, are met for their children. The challenge to achieve a more equal society includes the creation of a more inclusive educational system. A system that would embrace the diversity of languages, races, and cultures and simultaneously, is able to redress the gaps between rural–urban divide and create opportunities for the new generations to level the class abyss; hence is the importance of attending to the impact of the pandemic of COVID-19 on education.

In this study, we focus on the subjective well-being of parents and guardians in relation to the return of children to schools amid the COVID-19 pandemic. During the adjusted alert level in place from 1 March 2021 to 30 May 2021, most normal activities resumed including returning to schools. Subjective well-being, we consider, is closely related to the material conditions of households. In our analysis, the explanatory power of gender dimension emerges in relation to both subjective well-being and material conditions of the households. We consider subjective well-being as an intervening dimension in ensuring continuity in the education of children during pandemic and post-pandemic. School continuity, especially, has become complex in South Africa and percentages of out-of-school children have increased with the pandemic. While remote learning programs were designed, only the minority of schools had the necessary infrastructure that would secure access. According to a new report released by Statistics South Africa, "only 11.7% of schools offered remote learning options nationally. Most schools offered rotational options instead of remote learning and the urban–rural divide was prominent, as twice as many individuals were given the option of remote learning in urban areas compared to rural areas" (Stats SA, 2020). The disruptions that resulted from the closures of schools and rotational attendance had as an effect of reduced levels of attendance. As reported by Stats SA (2020), close to 1 million children were out of school; those aged 5–13 years were the largest number of out-of-school children. Country-wise, this age group was the highest in the Western Cape (13.0%), followed by KwaZulu-Natal (9.1%) (Stats SA, 2020). The cause of large percentages of out-of-school children was attributed to the COVID-19 pandemic because "parents/caregivers did not want to expose their children to the virus and subsequently kept them at home" and because most educational facilities closed due to COVID-19 (Stats SA, 2020). The impact of the pandemic might well mean a regression in the progress made over years in equalizing the quality of education and life opportunities for most of the Black population.

THEORETICAL FRAMEWORK: THE IDEA OF SUBJECTIVE WELL-BEING

The task of discussing and understanding the role of subjective well-being within the framework of the analysis of the development of countries, households, and individuals is relevant

because according to the United Nations and its Human Development Programme (2012), it opens the opportunity to rethink progress by placing people at the center of the discussion on the objectives that a society should follow to be considered developed. Thus, addressing the issue of subjective well-being is a way to think about the development beyond mere economic growth, giving public and political relevance to other factors, such as mental and subjective health, security, gender, and trust in institutions, and also recognizing the fact that well-being cannot be separated from the social conditions that affect it.

Subjective well-being has traditionally been understood, from the field of psychology, as one of the relevant dimensions for determining quality of life. Another fundamental dimension is material or objective well-being (Moyano and Ramos, 2007) which, as an indicator, reveals an important information regarding the degree of life satisfaction with both material conditions of existence and influence that the future expectations have on personal happiness. This suggests that the social and relational conditions of existence and their influence on happiness are fundamental to understanding the degree of satisfaction of the population with their living conditions and through this comes the chances of having a physically and mentally healthy life that allows them to carry out life projects.

However, with regard to the discussion on the heuristic and political usefulness of the concept of Subjective Well-being (UNDP, 2012), there is a need to understand the idea of happiness by emphasizing not only its individual aspects but also its social determinants. This is tantamount to admitting that if subjectivity and its well-being are to be installed as an objective of development, it is necessary to give relevance to both, the degree of satisfaction and the expectations that people place on society and its institutions. This highlights the importance of issues that are traditionally outside the discussion on development, such as the concepts of social justice or the subjective feeling regarding the probabilities of success in personal projects *"(...) all subjectivity matters; not only that which refers to people's view of their individual lives, but also to the image they have of society*" (UNDP, 2012, p. 30).

Such has been the problem of positive psychology, a current claim of psychology dedicated to the study of quality of life based on subjective well-being that emphasizes individual psychological characteristics. This is how Diener et al. (1999), relevant authors for the positive psychology, define it: "*(...) subjective well-being is a broad category of phenomena that includes people's emotional responses, domains of satisfaction and global judgments of satisfaction with life*" (p. 277). This does not assign sufficient relevance to social factors and instead emphasizes the influence of individual determinants of well-being such as personality. This is problematic since individual satisfaction and subjective well-being do not only depend on the characteristics of individuals but also on the structural conditions of each society. This implies that through a proper understanding of how subjective well-being affects people's lives, it is possible to develop better policies and to influence the solution of social problems.

More recently, Anand (2016) highlights two good reasons for countries to be interested in measures of well-being constructed from subjective appraisals, which is relevant for the construction of their public policies and the definition of their development goals. Anand (2016) points out that, first, the subjective measure of well-being is important because although the measure of income is an indicator of consumption, it does not fully serve to directly measure the quality of life. Second, he indicates that the values such as the quality of health, education, or gender equality are also an important part of well-being whose value, however, is not reflected in the indicators that have traditionally been used in economics to measure the development of countries. All of which suggests that well-being should be understood as a multi-dimensional phenomenon that is constructed from both subjective and objective factors, and its proper understanding has the potential to significantly affect the trajectory of individuals.

Now, following in this order of ideas, Anand (2016) highlights that, when addressing the subjectivity underlying the idea of subjective well-being, it is important to distinguish between satisfaction or pleasure, and fulfillment. He points out that an important part of subjective well-being can come from activities or responsibilities that are not pleasurable to exercise but are important in that they are directly linked to the possibilities of personal growth, self-acceptance, and the determination of life goals, giving as an example parenthood and the possibility of raising children according to self-determined standards. In this regard, Anand (2016) stresses that a decisive issue is the possibilities open to people to develop their potential, and as an example, it has been observed that gender equality is an important part of women's autonomy and this directly affects social development through children's education.

In the same vein, Anand (2016) indicates that there is a growing body of evidence showing that subjective well-being is connected to and directly affects personal health, people's life expectancy, as well as the likelihood of success in education and in an education system. In support of this claim, Anand (2016) cites a study conducted in Bangladesh, Ecuador, India, Indonesia, Peru, and Uganda in 2006, entitled "Missing in Action: Teacher and Health Worker Absence in Developing Countries," which concludes that the traditional objective indicators such as salary appear to have little impact on professionals' attendance at educational and medical facilities, while the quality of infrastructure and its valuation did directly affect this.

Education and Subjective Well-Being

With regard to the problem of education and its relationship with subjective well-being, UNICEF in collaboration with UNDP published a report in 2014 entitled "The Role of Education in the Formation of Subjective Well-being for Human Development," reviewing the Chilean case, it concludes that the great challenge for education has to do with the possibility of acquiring the necessary tools to develop an autonomous life project. Education is a fundamental way of promoting the subjective well-being of the population from an early stage, but for this to be done properly, schools must not prioritize cognitive training over comprehensive training. In other words, it must be an instance where decision making and the acquisition of competencies for the development of life projects have a relevant place.

In the same vein, the UNICEF and UNDP (2014) highlights that, in the Chilean context, there is a strong criticism of the

education system among students due to the gap between the expectations placed on the system and the assessment of how the school is meeting them. According to the study, students claim that, in addition to the skills that school should provide, which are in crises, and to those competences related to academic training, they demand tools for the development of their own life projects as well as the provision of training that makes students capable of participating and influencing society. This seems to indicate that a school is seen as an instance that should promote subjective well-being not only toward adulthood but also during school education itself. Although the study does not indicate how the school's capacity to promote subjective well-being affects school attendance, it does provide relevant information in this regard, indirectly, by indicating that socio–cultural level is one of the determinants for the assessment of school from a subjective point of view. It indicates that students who are in a position of greater social marginalization tend to appreciate more what happens in the school space in terms of personal development. At the same time, however, students from higher socioeconomic strata, belonging to public schools, recognize that they have learned more in terms of these skills. This suggests that the expectations placed on the school system are also different between social classes and could eventually affect, if not the valuation of the school in particular, the importance or the degree of priority given to education in general. This places additional responsibility on the way in which the school as a social institution constructs the conditions for development.

Society and its institutions do matter, if they are decisive when weighing the degree of satisfaction of individuals with their lives. This means that subjective well-being is an area of work for development that should be at the center of the concerns of any country and its policies. As indicated by the UNDP: "[it is] possible and necessary to address the construction of the social conditions that allow all people to orient themselves toward their personal satisfaction; in other words, that society should use its resources to support people in achieving this objective" (2012, p. 50). It is only in this way that the life in the society enables citizens to recognize themselves and their everyday life in common experience and in public life. This is essential to understand the relationship between personal happiness and social well-being.

Subjective Well-Being in South Africa

The question of subjective well-being and what it means in the context of each society varies according to the social conditions present and cultural particularities. This was indicated by Neff (2007), commenting that the high level of socioeconomic inequality in South Africa, part of the legacy of apartheid, is combined with a particularly relevant factor in the country, which is the origin and ethnicity of the different groups in society, which directly affects the possibility of fostering subjective well-being. As Neff (2007) points out, different ethnic groups in South Africa have different conceptions of what well-being means, and this affects how they assess their situation, even for members of the same racial (but not ethnic) groups, more significantly than the distribution of wealth.

Neff (2007) shows that, contrary to what might be believed, the historically privileged group of English-speaking White population, despite having the highest income concentration in South African society, is not the group with the highest level of subjective well-being. In the face of this fact, Neff suggests two possible hypotheses, not necessarily mutually exclusive. He points out that White people are a group that after the end of apartheid lost some of their legal and juridical protection, which could have affected their perception and optimism regarding the democratic transition, and led to a perception of a lack of security in all areas. Added to this is the possibility, suggested by the evidence, that high income, while helping to achieve high subjective well-being, after a certain point, ceases to have a significant influence on people's perceptions of their situation. This is important because it shows that the relative position of each group directly affects their subjective well-being and the factors that are relevant for the promotion of a feeling of satisfaction and happiness. This is so even beyond socioeconomic indicators that reveal the material situation of each group. All of which puts the subjective development of the population; their psychosocial situation, and the role that institutions can play in helping to improve the level of satisfaction of the population, at the centre of the question.

Another good example of how institutions can directly influence the level of subjective well-being can be observed when analyzing how gender differences can influence the level of subjective well-being of the population. Fisher (2019) recently identified for South Africa that, until 2008, the level of happiness of men and women differed significantly, with men being much happier than women. He was also able to determine that one of the most important variables in determining this, in the case of women at that time, was being in a relationship and feeling satisfied with it. In the case of men, this had a very low influence. However, the relevant issue is that the same study was able to determine that by 2017, these differences between men and women had been significantly reduced, and the fact of being in a relationship had lost a significant part of its importance. Thus, the level of subjective well-being of men had increased moderately compared to 2007, but in the case of women, it had increased considerably.

The case of gender in South Africa, as Fisher (2019) explains, is relevant because it contradicts the global trend, especially in the so-called developed countries, where the level of subjective well-being of women is seen to be declining. It also proves that the policies promoting gender equality help to increase women's level of happiness, while positively, or at least not negatively, influencing men's level of subjective well-being. Likewise, the important differences between one period and another, observable not only at the level of the indicators but also with respect to the variables that are relevant when determining the level of subjective well-being, suggest that the determination of the level of subjective well-being of a population not only varies according to the values through which each group understands their happiness but also the importance of each factor varies over time, according to the position occupied within society. This makes it necessary to observe the particularity of each case, emphasizing the differences between the developed and the underdeveloped countries as well as the influence that the

policies oriented toward the recognition of disadvantaged groups in society have had throughout in the recent history.

In a similar vein to that described above, Blaauw and Pretorius (2012) have identified that in South Africa, and possibly in other countries in the global south with similar problems, there is a great difference from what happens in first world countries, at least when it comes to assessing the subjective well-being of the population and, through that, people's relative happiness and satisfaction. In conditions of material precariousness, insecurity, hunger, and deterioration of life in general, questions such as an individual's high, state of health, and housing, although important, do not explain subjective well-being, as they do, at least in the case of South Africa, first, the cultural and religious influence, and then the territorial location of each group, with all these entail in terms of access to goods. This confirms the need to give different emphasis to the assessment of subjective well-being in different countries, depending on their level of development. Where the basic needs are relatively assured, Blaauw and Pretorius (2012) point out that subjective well-being is more related to individual issues related to appearance, health or access to goods, while in developing countries with significant material deprivation, low levels of security and high levels of inequality, factors such as race, ethnicity, marital status, gender, race, cultural identity, and access to basic services are determinants.

The difference in the assessment of subjective well-being between so-called developed and underdeveloped countries, and between the countries of the global south themselves and their regions, is most clearly evident when material deprivation reaches the extreme of food deprivation, hunger, as shown in our research. Food insecurity is an ongoing problem today and offers much important information about our understanding of subjective well-being. This is shown by Sulemana and James (2019), who study the relationship between food insecurity and indicators of subjective well-being in five sub-Saharan African countries. They conclude, as expected, that subjective well-being declines in countries where lack of access to food remains a problem. However, the same authors also conclude that the influence of food insecurity on subjective well-being is greater where access to food is occasional than when famine is so extreme that there is no assurance that it will be accessible in the near future. Likewise, Sulemana and James (2019) seem to observe that, when the situation reaches the extreme of lack of certainty regarding the possibility of being able to feed oneself the next day, the indicators that were shown to be relevant for the determination of the level of subjective well-being in other circumstances, such as gender, age, or employment status, lose importance. This makes it necessary, as Blaauw and Pretorius (2012) suggested, to consider the issue from a regional and territorial perspective.

However, a particularly relevant indicator, whose importance does not seem to disappear or diminish in the context of famine, at least according to Sulemana and James (2019), is education. Although in the context of food insecurity, unlike in other circumstances, higher levels of education are associated with lower levels of subjective well-being. According to the authors, this is explained by the high expectations placed on access to education, which, however, especially in this extreme situation of famine, is not enough to correct the difficulties and ensure access to food. This situation, however, although contradicting, as the same authors point out, the existing evidence on the relationship between education and subjective well-being, seems to be entirely consistent with the importance of education for people in underdeveloped countries.

This is observable if one considers the case of South Africa, where, as noted above, inequality is extremely deep. According to Neff (2007), in South Africa, the value associated with education is enormous because after the dismantling of apartheid and the installation of a democratic regime, the level of education became an important tool to establish the degree of success and the level of satisfaction of the population. Neff explains that part of the White population that saw its level of subjective well-being decline after the end of apartheid is a population that lost part of its racial privileges and was unable to regain them because its educational level, one of the new mechanisms for determining access to services and goods, was not high enough, and different policies were generated to horizontalize society.

Neff's analysis is consistent with the observations of Blaauw and Pretorius (2012), who indicate that the one variable determining the level of subjective well-being whose importance does not vary significantly across South Africa, is education. According to the authors, the most educated individuals have the highest levels of subjective well-being, and each year of education completed contributes to and impacts the level of satisfaction of individuals. This, once again, highlights the decisive character of education in the question of human development. The importance that its promotion should have in the design of policies that seek to address the lack of satisfaction expressed by disadvantaged groups in society, whether for reasons of ethnicity, gender, race or territory. When the most basic needs are met, education seems to be a consistent way, at least as the evidence indicates, to redress social problems and their impact on people's well-being. Even in an imperfect democracy with multiple problems such as South Africa, the importance of education, at least in terms of how people feel about their situation, is critical.

MATERIALS AND METHODS

The following section will explain the theoretical criteria on which the quantitative methodological work of the research was based. The analysis is composed of two fundamental methodologies, first, descriptive characterization of variables, which is the first approach to the sociodemographic, educational, and subjective well-being context of those living in the territory of Gauteng during the year 2021. Second, we developed two set analyses elaborated after a series of relevance tests, which is defined as a method of interdependence where we seek to group the sample in relation to their behavior in relation to educational variables and perception of subjective well-being. The relationship was then established between these subgroups and material factors grouped from a battery of survey questions. With this, all cases were grouped in the following two categories: Those who had sent their children to school and those who

had not sent their children to school. Then, through a case selection, cases were grouped according to the gender of the respondent and whether they received benefits from institutions during the pandemic. The formation of these four groups is determined by the characterization of each one of them in relation to the factors associated with their perception and behavior regarding subjective well-being and elements associated with children's education.

Sample and Procedure

The questionnaire and material used for our analysis is based on the CRAM mobile survey, which is concerned with the social impact of the coronavirus pandemic in South Africa. This was conducted in May 2021 by telephone and participation was voluntary and consented by the respondents. The main characteristic of this type of statistical study is that it is of the panel type, which focuses on a problem and focuses on the evolution of this phenomenon over a period of time. Coronavirus Rapid Mobile Survey describes information on the same subjects from the beginning of the research until the end of its duration. The sample for this research consists of 473 people selected from households with school-aged children in the Gauteng province. This made up 53% of the total number of respondents in the province. Fifty-seven percent were female, while 43% were male. Gender, together with social and subjective well-being, is included as significant and representative variable in our analysis, and subsequent results that address the research objectives.

Instruments

In the CRAM material used, the variables whose characteristics and nature corresponded to the qualitative order (ordinal and nominal) were generally selected, except for variables such as age, income in the month of March 2021, subsidies and the number of children attending schools before and after March 2021. A bivariate analyses of significance between variables and multivariate statistical analyses were carried out to synthesize the interrelationships observed between the set of variables selected for this study.

Descriptive Analysis

A series of descriptive data emerged from the question related to the state or perception of the mental health of the residents of Gauteng after the appearance of the COVID-19 pandemic that allows us, in the first instance, to describe the subjective state of the respondents, and to understand this in relation to their sociodemographic, educational, and economic factors. It should be noted that only 53.5% of those surveyed in Gauteng have completed their primary school studies. In March 2021, 87.3% of the survey respondents in Gauteng had children attending school. From the beginning of the pandemic, from March 2020 to March 2021, the average number of children attending school only decreased from 1.69 to 1.59 children per household in this province. This percentage is smaller than the above-mentioned dropout rate.

Almost all children have returned to school, and a number of variables are related to this. A total percentage of 42.7% of people consider themselves to be very concerned about the return of children to their academic activities, and 43.5% of people whose children receive school meals are similarly concerned. By performing Pearson's Chi-squared tests, it was possible to establish that there is a significant incidence in the degree of concern for the return to school closely related to the variable of homes where minors have suffered from hunger in the last 2 weeks. This is due to the fact that the *sig.* 0.005 (i.e., $p < 0.05$) rejects H0 and assumes affirmatively the veracity of H1. Another factor considered is mental health. In relation to the variables associated with the return to school of school students. Among those who have felt depressed almost all the time in the last 2 weeks of March 2021, 58.5% are worried about the children's return to school. The analysis shows that the more depressed they have felt, the higher the percentage of concern about children returning to school. From a gender perspective, those who have worse mental health are in most cases women, since 68.3% of the people who declare to have poor mental health are women, who are presumably caring for minors. All these are composed as elements extracted from the variables of significant relevance in the return to school of most of the children in Gauteng.

Finally, the data and the variables from the survey are relevant to conduct a univariate analysis that allowed to describe the situation in Gauteng in May 2021 (**Table 1**).

First Set Export

Initially, the study aimed at conducting a factor analysis, which according to Cea (2002) consists of a work of reduction of variables to identify the formation of factors that explain most of the variance of a specific number of selected variables. Given the condition of the survey questions and the failed Kaiser, Meyer y Olkin (KMO) test (0.38), the methodological decision was to reverse the work and develop two groups of analysis, to strengthen the statistical analysis. The first step focused on developing niches which were divided between the households that did/did not send children to school at the end of the lockdown in March 2021 after the health crisis caused by COVID-19. This methodological decision strengthened the statistical analyses and provided us with a pattern of behavior for those households with children attending schools.

A decision was made to make a case selection regarding households where children had or had not returned to school by March 2021. For this purpose, statistical tests of the cross-table and ANOVA type were made. This was to see if there was a relevant significance in the variability of the variables of return to school with different variables. This would allow us to make a more complex analysis on the research problem which is linked to subjective well-being. One of the first subsequent steps was to the groups of the households where children had returned to school correspond to 90% of the respondents while only 10% of them had not returned to school.

In this situation, it is important to understand the behavior of both groups. Especially those in which the children did not return to school. In view of this, it can be said that there is a real significant coincidence in the return to school of children and the respondents' concern about the return to school. Indeed, among the total number of respondents who felt very concerned about the return of children to school,

TABLE 1 | Descriptive approach to the situation in Gauteng in May 2021.

Gender (%)	
Men	45.4
Woman	54.6
What type of area are you living in now? (%)	
Traditional area/chiefdom	5.6
Urban area/town	84.8
Farm/rural area	7.8
Number of people resident, including yourself (don't forget babies)	
Average	4.30
In March, which of these was the main household income source? (%)	
Income from employment	52.7
Income from a business	4.8
Government grants	28.2
Money from friends or family	8.1
Household had no income in March	0.6
Pension	5.3
Own elaboration/CRAM survey	
Number of children attending school before school closures in March 2020	
Average	1.69
In the past 2 weeks, how many young people in your household attended school?	
Average	1.58
How worried are you about household learners returning to school? (%)	
Not worried	19.9
A little worried	37.4
Very worried	42.7
In the past 2 weeks, have any household learners received a meal from school? %	
Yes	38.0
No	49.3
Not applicable "No young people at school"	12.7
Own elaboration/CRAM survey	

88% respondents had their children back in the educational system in March 2021. These figures are accompanied and complemented by subsidies that families received or requested during the pandemic, such as Covid's Special Distress Relief Grant, from the government during the pandemic, food and shelter assistance from the government and/or non-governmental organizations. In all of these categories, those who sent children to school have the greatest involvement in applying for and receiving grants.

Then, another point of interest for the study is the perceptions of material precariousness and discomfort in their own perception of their health experienced by the respondents. In relation to material precariousness, we refer to the problems associated with food insecurity in households where children have or have not attended school during the month of March 2021. The data indicate that 82.9% of the people who had children suffering from hunger in their homes sent their children to school, with a justified significance in the results of the significance in the Chi-squared test. To this, we add the variable of income for the month of March 2021, since this as it was established, which is a variable on which the variability of other subjective variables on the perception of one's own well-being depends, such as the following:

- g16_How would you describe your health at present?
- g1_Do you think you are likely to get the coronavirus?
- ga19_Over the last 2 weeks, have you had little interest in doing things?
- ga20_Over the last 2 weeks, have you been feeling down, depressed, or hopeless?

On the other hand, there are conditions and perceptions about one's own health that we also take as relevant variables when talking about people's subjective well-being. Regarding the perceptions of mental health and mood in the last 2 weeks, we can affirm that most of the people who feel unwell in relation to their mental health send their children to school. An example of this is that 93.3% of the people who feel depressed almost every day in the last 2 weeks send their children to school, or that 58.5% of the same total of people felt very worried about the return of school classes. These relationships between mental health and sending children to school continue to be repeated in health variables such as the perception of their current health, where the percentages of children returning to school continue to be higher the worse the perception of their own health.

Second Exploration in the Analysis

Once the descriptive statistical analysis and the first exploration of sets have been carried out, it is convenient to establish the last dimension of analysis. Given that it is not useful to have one group composed of 90% of the sample and another with 10% (those who sent and those who did not send their children to school), we chose a new dimension of analysis corresponding to the variables nested in groups that are segmented according to the descriptive variables relevant for our study. A battery of variables was identified to establish basic elements of subjective well-being. We coded the variables into a single variable, which allowed us to group all people who had received subsidies from any institution as well as those who had not. The rest were kept as they were in the survey to work with them to establish basic descriptive statistics in each of the niches we have identified. The analysis of the selected dimensions allows to establish the main differences between the respondents, also allows to visualise the relation between material condition of the household and subjective well-being as well as the respondents perception of children's education. These dimensions are presented in **Table 2** (Subjective well-being), **Table 3** (Material condition of the household), and **Table 4** (Education).

For the creation of the groups, a new variable was created from a battery of variables present in following questions:

- cg6 – Did you receive any Unemployment Insurance Fund (UIF) benefit in March?
- da6 – Did you apply for the special COVID-19 relief from distress grant?

TABLE 2 | Subjective well-being.

	Men	Women
With subsidies	(+; +) Only 35% of them have the feeling that they will catch COVID; Only 4.8% of them have a poor perception of their current health and 42.9% say they are stable; 66.7% of them say they have not felt a loss of interest in doing things; 71.4% of them say they have not felt depressed at any time in the last 2 weeks	(–; +) 89.1 % of them stated that they have not had underage children in hunger during the last 7 days; 51.1% of them believe they will have COVID; 27.5% of them say they are in reasonable health, while 13.7% of them say they are in poor health; 18% of them say they have not lost interest in doing things during the last 2 weeks; 13.7% of them say they felt depressed every day of the last 2 weeks, while 52.9% did not feel that way on any day; 13.7% of them say they felt depressed every day of the last 2 weeks, while 52.9% of them did not feel that way
Without subsidies	(+; –) 40.6% of them have children who have been hungry during the last 7 days; Only 34.8% of them believe that they will have COVID; 31.5% of them say they are in good health at present and 9.3% of them say they are in bad health; 25.9% of them say they have lost interest in doing things during the last 2 weeks; 59% of them say they have not felt depressed during the last 2 weeks, while 13% of them say they have felt depressed every day	(–; –) 23.3% of them have had hungry children in their homes during the last 7 days; Only 30.8% of them believe they will have COVID; 12.1% of them say they are in poor health at present; 24.1% of them say they have lost interest in doing things during the last two weeks; 8.8% of them say they have felt depressed during the last 2 weeks

TABLE 3 | Material condition of the household.

	Men	Women
With subsidies	(+;+) 92.5% of them have access to drinking water in their homes; 85.7% have access to electricity in their homes; 42.9% of them reported having run out of money for food during the month of March	(–;+) 94.1% have access to drinking water in their homes; The same 94.1% have access to electricity in their homes; 49% of them stated that they ran out of money for food in the month of March 2021
Without subsidies	(+;–) 11.1% of them do not have access to drinking water in their homes; 20.4% of them do not have access to electricity in their homes; 46.3% of them ran out of money for food during the month of March	(–;–) 91.4% of them have access to drinking water in their homes; The same 91.4% have access to electricity in their homes; 56.9% of them stated that they ran out of money for food in the month of March

TABLE 4 | Education.

	Men	Women
With subsidies	(+;+) Less than half of them completed their schooling (42.9%); 9.1% of the children in their homes did not return to school; High % of children feeding in schools (54.5%); 50% of them are really concerned about the return of children to schools	(–;+) 52.9% of these households completed their schooling, but do not have people who have had access to higher education; 10.9% of the households have children who have not returned to school; only 33.3% of the children in these households receive school meals; 65% of these households are very concerned about the return of their children to school
Without subsidies	(+;–) 38.9% of them completed their schooling; 93.8% of the group households have their children back in school; 51.7% of them have their children receiving school meals; Less than half of them were worried about going back to school (48.3%)	(–;–) 55.2% of them stated that they had completed their schooling; 93% of the households had their children back in school; 57.1% of them had their children being fed in school; 61.1% of them were very worried about going back to school

- da8 – Did you personally receive any kind of government grant in March?
- dc1 – During March, did you receive food or shelter from the government?
- dc2 – During March, did you receive food or shelter from any non-governmental organization (NGO)/church?
- dc3 – During March, did you receive food or shelter from the community?

Out this new variable "receiving help from institutions," four groups were formed (**Figure 1**):

- Men with subsidies (+; +) = 29.3%.
- Men without subsidies (+; –) = 11.4%.
- Women with subsidies (–; +) = 31.5%.
- Women without subsidies (–;–) = 27.7%.

In **Table 2**, it can be seen how the group of men presents similar conditions regarding their perceptions of subjective well-being. It is the group "without subsidies" the one that presents a slight decrease in subjective well-being, so it can be inferred a negative impact of the lack of subsidies on wellbeing. In **Table 3**, in the case of the two groups of men shows that the housing conditions of those who do not receive subsidies are worse than those who do. Finally, **Table 4** also shows the percentages of respondents that express concern for the children's return to school are similar and low.

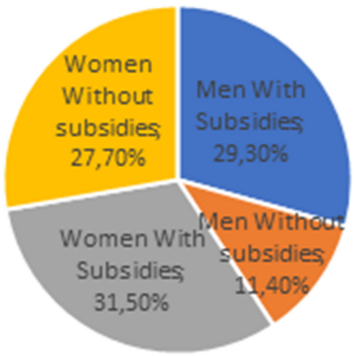

FIGURE 1 | Own elaboration/Wave 5 CRAM survey.

On the other hand, there are two groups of women that are differentiated in the same way as men, i.e. in terms of whether or not they received subsidies from private and public organisations during the pandemic. **Table 2**, shows that women have a higher percentage of concern about Covid infection, hence gender appears to be a key element in understanding the variation in subjective well-being. Women have worst subjective well-being as compared to me, and this percentage is even worst in the group that does not receive subsidies during the time of the pandemic. **Table 3** shows that while female respondents' households have better material conditions than men's respondents, their households have the highest number of people without money for food during the month of March. Finally, **Table 4** shows that women are the most concerned about the return of children to school after the lockdown in South Africa.

Gender Perspective

After observing the behaviour of the gender variable in the analysis (**Tables 2–4**), it is clear that being a woman introduces a greater weight in the perception of subjective well-being. It is because of this, that a methodological decision was made to, a methodological decision was to take gender as an independent variable; its statistical significance is present in the variability of all the other variables used in the study. We conducted an analysis of crosses of variables dependent on gender. The results show that those respondents that have the worst perception of their mental health are in most cases women (68.3%). It was mostly women who were more worried about the children's return to school; hence, there is a relationship where worse mental health is declared, the higher the percentages of concern about the children's return to school.

In a context in which children were out of regular school attendance due to the various regulations associated to COVID-19, the inclusion of variables referring to child care was taken as a relevant factor. After crossing the variable of gender with the variable on who performs childcare tasks, we could see that it is women who perform the role of caregivers in households and it is men who hire the most services for childcare. Finally, the economic condition is also configured as a strong variable with respect to subjective well-being, captured as the income perceived in the month of March. While it is often understood that the more income people have, the better perception they will have with respect to their mental and general health. After analyzing the descriptive data on income by gender, we can also see that women have a much lower average income than men during the month of March.

CONCLUSION

First, we should recall that analysis of the Wave 5 National Income Dynamics Study – Coronavirus Rapid Mobile Survey (NIDS-CRAM, 2021) dataset in South Africa has been conducted in a cross-sectional manner. The survey has been conducted for a different purpose and all our analysis has been conducted on the basis of a comprehensive systematization of secondary data, the NIDS-CRAM (2021) is not a subjective well-being survey. The exploration of the survey has been carried out with an initial hypothesis concerning the relationship between subjective well-being and concern about education, which has been partially corroborated for the case of people who feel concern about education. The lower the subjective well-being, the greater the concern about education. In summary, from a trial-and-error analysis in the construction of our model, we have developed a derivative for which the study was not necessarily designed, but which proves the relevance of the application of our hypotheses and theoretical framework as a prism of observation.

Second, it is important to mention that the vast majority of people in the sample send their children to school after the change in COVID-19 regulations, so it can be said that sending or not sending children to school is not an indicator of distinctions in relation to subjective well-being or material conditions, since 9 out of 10 people send their children to school regardless. However, the proportion of people who did not send their children to school tend to have better material living conditions one could hypothetically infer that they have better conditions to provide educational conditions at home and care, but this hypothesis cannot be corroborated since there is no data in the survey to do so.

Third, and in line with the above, the concern for education and sending children to school do not have a symmetrical relationship. In other words, even if there is not a high concern for education, families still send their children to school. In this sense, the school stands as a security device for families and an institution that provides other elements that do not necessarily have to do with educational aspects, but with subsistence aspects.

Finally, and in relation to subjective well-being, there is a clear line drawn between being a woman and having poorer subjective well-being. This reality is not specific to South Africa or to the data analyzed; there is already an important body of literature (some of which is shown in the theoretical section) which gives an account of this reality. However, it is particularly worrying for the case in question, considering that the variables included in our definition of subjective well-being are related to mental health. Similarly, the material conditions of existence are also worse for Gauteng women. Considering the two variables together

reveals a persistent problem: the precariousness of women's lives regardless of the context or situation of crisis, which worsens with the crisis. In addition, the mental burden of worrying about education falls more heavily on women, who devote more time to child care and are more fearful about the uncertain future in the context of the COVID-19 pandemic.

The limitations of this study is that the analysis only includes the data for Gauteng, while it would have been a more robust analysis had we included all information available in the survey, country wide. This decision was based on the interest of the research team to produce knowledge for Gauteng, an area where they have a specific research focus.

DATA AVAILABILITY STATEMENT

The original contributions presented in this study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

Ethical review and approval were not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the patients/participants or patients/participants legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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Online learning performance and engagement during the COVID-19 pandemic: Application of the dual-continua model of mental health

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The COVID-19 pandemic has led to an abrupt transition from face-to-face learning to online learning, which has also affected the mental health of college students. In this study, we examined the relationship between students' adjustment to online learning and their mental health by using the Dual-Continua Model. The model assumes that mental disorder and mental well-being are related yet distinct factors of mental health. For this purpose, 2,933 college students completed an online survey around the beginning of the Fall semester of 2020 (N = 1,724) and the Spring semester of 2021 (N = 1,209). We assessed participants' mental well-being, mental disorders, and academic distress by means of the online survey. In addition, we incorporated grades and log data accumulated in the Learning Management System (LMS) as objective learning indicators of academic achievement and engagement in online learning. Results revealed that two dimensions of mental health (i.e., mental well-being and mental disorder) were independently associated with all objective and subjective online learning indicators. Specifically, languishing (i.e., low levels of mental well-being) was negatively associated with student engagement derived from LMS log data and academic achievement and was positively associated with self-reported academic distress even after we controlled for the effects of mental disorder. In addition, mental disorder was negatively related to student engagement and academic achievement and was positively related to academic distress even after we controlled for the effects of mental well-being. These results remained notable even when we controlled for the effects of sociodemographic variables. Our findings imply that applying the Dual-Continua Model contributes to a better understanding of the relationship between college students' mental health and their adaptation to online learning. We suggest that it is imperative to

implement university-wide interventions that promote mental well-being and alleviate psychological symptoms for students' successful adjustment to online learning.

KEYWORDS

dual-continua model, mental well-being, mental disorder, online learning, learning management system, student engagement, academic achievement, academic distress

Introduction

The COVID-19 pandemic has affected the entire world, and higher education is not an exception. The virus has unprecedentedly disrupted the educational system at all levels, affecting the lives of students of all ages because of preventive policies, such as on social distancing and lockdown (Raza et al., 2020). Facing the crisis, rapid and complete transitions to online learning have become a requisite not only for educational institutes and instructors but also for the students (Hasan and Bao, 2020). In South Korea, universities have conducted most classes online in following the guideline of the Ministry of Education since April 2020 (Ministry of Education, 2021). These dramatic changes have significantly affected the learning experiences and mental well-being of college students (Ihm et al., 2021).

As the primary focus of higher education shifts from face-to-face learning to online learning, the importance of a Learning Management System (LMS) has increased significantly (Raza et al., 2020). LMS refers to web-based technology or software applications that are intended to facilitate online learning processes (Alias and Zainuddin, 2005). An LMS is generally used to create and deliver learning content, keep track of student participation, and provide a platform for online interactions, such as threaded discussions or video conferences (Lonn et al., 2011; Emelyanova and Voronina, 2014). In an online learning environment based on LMS, diverse aspects of students' learning activities can be automatically recorded in log files, which provide abundant information for analyzing learning processes and patterns of students (Black et al., 2008; Henrie et al., 2018). With the development of learning analytics with machine learning and deep learning techniques, emerging research suggests that LMS log data can be effectively used to predict academic performance (Hu et al., 2014; Costa et al., 2017; Dascalu et al., 2021; Moon et al., 2021; Riestra-González et al., 2021; Zhao et al., 2021); identify students with poor mental health (Heo et al., 2019); and provide academic and psychological interventions (Conijn et al., 2017; Cromley et al., 2020).

In addition, there is a growing interest in analyzing LMS log data to measure student engagement in online learning environments, especially from a behavioral perspective (Umer et al., 2018; Wong and Chong, 2018; Motz et al., 2019; Lu and Cutumisu, 2022). According to the theoretical framework of student engagement proposed by Fredricks et al. (2004), student engagement can be conceptualized in three dimensions: behavioral, cognitive, and emotional. Behavioral engagement refers to students' involvement and persistence in learning activities. Cognitive engagement refers to students' cognitive investment in learning complex ideas or difficult skills. Emotional engagement is defined as emotional reactions toward learning activities, teachers, peers, and academics. Compared to emotional and cognitive engagement, behavioral engagement may be more easily and objectively measured through analyzing LMS activity logs (Wang, 2017). Motz et al. (2019) also showed that LMS log data can be a valid proxy measure of behavioral engagement. Since behavioral engagement is a crucial element for promoting academic achievement and preventing dropouts (Fredricks et al., 2004; Archambault et al., 2009; Wang and Holcombe, 2010; Wang and Eccles, 2012), LMS log data can provide important information in assisting students academically.

Together with the ground-breaking changes in the educational paradigm, the COVID-19 pandemic also affects the mental health in the student population. Deteriorations in students' mental health, such as exacerbated psychological stress, anxiety, and depression, come across as a global phenomenon (for review, see Ihm et al., 2021). Specifically, according to a cross-sectional study conducted during the lockdown, university students in Bangladeshi reported COVID-19-related stress, anxiety, and depression, which had significant associations with psychosocial variables, including perception of physical symptoms, fear of infection, financial uncertainty, and lack of engagements in recreational activities (Khan et al., 2020). Tang et al. (2020) also examined the one-month prevalence of post-traumatic stress disorder (PTSD) and depressive symptoms among Chinese university students after the outbreak of COVID-19, identifying that fear of infection and living in severely affected areas contribute as main risk

factors for development of COVID-19-induced mental health problems. In addition, difficulties in adapting to an unfamiliar online learning environment have been reported to intensify anxiety, depression, and academic distress of college students (Wang et al., 2020; Fawaz and Samaha, 2021; Horita et al., 2021).

The COVID-19 pandemic has not only aggravated mental illness but also reduced mental well-being (Gray et al., 2020; Satici et al., 2020; Copeland et al., 2021). The general population's mental well-being, operationalized by positive affect, level of functioning, and positive relationships, significantly decreased after the prolonged lockdown period compared to the data collected in 2019 before the pandemic (Gray et al., 2020). Satici et al. (2020) found that intolerance of uncertainty during the pandemic predicts a significant decline in mental well-being, serially mediated by rumination and fear of COVID-19. Similarly, research with college student samples revealed that the overall mood, wellness behavior, and happiness of college students significantly decreased after the COVID-19 crisis (Office for National Statistics, 2020; Copeland et al., 2021). Lyons et al. (2020) also emphasized the importance of providing school-level interventions to promote the mental well-being of students because 68% of the medical student sample reported a significant decrease in mental well-being since the onset of the COVID-19 pandemic. Moreover, it has been shown that academic distress caused by a sudden transition to online learning is negatively associated with college students' mental well-being (Barbayannis et al., 2022).

Whereas mental illness and mental well-being are often regarded as being opposite ends of a single bipolar continuum, an alternative model, named the Dual-Continua Model, considers mental illness and mental well-being as separate but correlated unipolar dimensions of mental health (Greenspoon and Saklofske, 2001; Keyes, 2002, 2005, 2007). According to this positive mental-health model, a person with a mental disorder may experience high levels of mental well-being, whereas a person without mental disorders may experience low levels of mental well-being. Ryff and Singer (2003) suggested that positive mental health is closely correlated with resilience, an individual's ability to cope and accomplish growth in the face of life stressors and crisis. Poor mental well-being, on the other hand, serves as a risk factor for mental illness (Keyes et al., 2010; Wood and Joseph, 2010; Iasiello et al., 2019). According to a longitudinal study conducted by Keyes et al. (2010), participants with poor mental well-being were six times more likely to develop mental illness over the 10-year period, than were those who had maintained or improved their well-being at both time points.

Based on the Dual-Continua Model, individuals' mental health status can be categorized by their levels of mental well-being and mental illness (Keyes, 2005; Suldo and Shaffer, 2008). For example, Keyes (2005) classified individuals into five mental-health groups: completely mentally healthy, moderately mentally healthy, pure languishing, pure mental illness, and mental illness and languishing. To elaborate, completely mentally healthy group is characterized by high levels of mental well-being (i.e., flourishing) and the absence of mental illness. Moderately mentally healthy group is characterized by moderate levels of mental well-being combined with the absence of mental illness. Pure languishing group is defined as low level of mental well-being (i.e., languishing) without any mental illness. Pure mental illness group is defined as moderate-to-high levels of mental well-being and the presence of mental illness. Mental illness and languishing group is characterized by the presence of languishing combined with the presence of mental illness. Several studies have identified differences between mental-health groups in psychosocial functioning, educational functioning, and physical health (Keyes, 2005, 2007; Suldo and Shaffer, 2008; Renshaw and Cohen, 2014). For instance, Suldo and Shaffer (2008) reported that adolescents with complete mental health were more adaptive in academic outcomes, social functioning, and physical health than their languishing peers without mental illness were. In addition, among students with high levels of clinical symptoms, students with high levels of mental well-being experienced better physical health, more social support, and fewer social problems than those with low levels of mental well-being did.

Previous research has examined the utility of the Dual-Continua Model in understanding the relationship between mental health and adjustment of college students (Eklund et al., 2010; Keyes et al., 2012; Renshaw and Cohen, 2014; Antaramian, 2015). For example, students with low levels of mental well-being showed less engagement in college experience and poorer academic achievement than did those with high levels of mental well-being, among college students without clinical symptoms (Antaramian, 2015). Understanding the association between online learning and mental health based on the Dual-Continua Model may contribute to contriving interventions and policies for students without mental well-being and for those with mental disorders. The view that the absence of mental illness guarantees mental health may overlook the importance of psychological interventions for students who show poor mental well-being without mental illness. Online learning environments may require greater intrinsic motivation and self-regulation from learners (Klingsieck et al., 2012; Pelikan et al., 2021). Students with low levels of mental well-being may experience more difficulties adapting to the sudden transition to online learning due to the pandemic, considering that poorer mental well-being has been associated with lower intrinsic motivation (Bailey and Phillips, 2016). In addition, increasing number of students experienced declines in their mental well-being because of the prolonged COVID-19 crisis (Grubic et al., 2020; Lyons et al., 2020). Therefore, special attention is also needed for college students with poor mental well-being to adapt to an online learning environment more successfully. However, not enough works have been done on this topic, especially in the current online learning environments triggered

by the pandemic. Although previous research has shown that drastic shifting to online learning is related to poorer mental health of college students (Fawaz and Samaha, 2021; Fruehwirth et al., 2021), to the best of our knowledge, no empirical study has applied the Dual-Continua Model to examine how college students' mental health is related to academic adjustment, including academic engagement, achievement, and distress in online learning environments during the pandemic. Given that two dimensions of mental health is crucial for academic success (Suldo and Shaffer, 2008; Antaramian, 2015), this study may provide useful implications to develop psychological interventions to promote college students' adaptation to the new learning environment caused by the pandemic.

Thus, we aim to examine the utility of the Dual-Continua Model to understand the relationship between students' mental health and their adaptation to online learning environments during the COVID-19 pandemic. Based on Keyes' Dual-Continua Model (Keyes, 2002, 2005), we postulated that two dimensions of mental health (i.e., mental well-being and mental illness) would be independently associated with the adaptation to online learning. We incorporated grades and LMS log data as objective measures of academic achievement and engagement and self-reported academic distress as a subjective measure.

Materials and methods

Participants

We collected data from the Online Mental Health Surveys, which were conducted around the beginning of the Fall semester of 2020 and the Spring semester of 2021 during the COVID-19 pandemic conditions. In addition, grades and LMS log data stored in the university's database were provided by the Office of Digital Information upon the informed consent from participating students. This study was approved by the Institutional Review Board (IRB).

Participants were combined from both time points. We chose the inclusion criteria for data of courses, students, and the LMS log before proceeding with data analyses. Specifically, since we were interested in the association between positive mental health and online learning, we excluded the data from the courses with pass/fail grades or with less than 1 h of study time per week (i.e., 1-credit courses), which were mainly offline-lab lectures. In addition, we included only participants who took at least one course that met our criteria and ended up with 2,933 participants for analysis. Although students were allowed to participate in both time points, and 338 (13.03%) out of 2,595 participants responded twice, for the convenience of analysis, each semester's responses were considered as independent. A final analytic sample consisted of 1,724 college students in 2020 and 1,209 in 2021. Among the sample, 57.65% were female (n = 1,691), and the average age was 21.19 (SD = 2.23, range: 17–35).

Measures

Online learning

Course grades

Grade point average (GPA) is widely used to measure academic achievement and is known as an objective measure with high internal reliability and validity (Richardson et al., 2012). We incorporated grades for each course to generate the indicator of academic performance in online learning. The grade consisted of nine levels: 4.5 (A+), 4.0 (A), 3.5 (B+), 3.0 (B), 2.5 (C+), 2.0 (C), 1.5 (D+), 1 (D), and 0 (F). Since participants took multiple courses per semester (M = 5.09, SD = 1.33, range = 1–9), we calculated the GPAs by averaging the grades that a student received from all courses in a semester (M = 3.88, SD = 0.59, range = 0–4.5).

LMS log data

The LMS log data contain detailed information about the learning activities of students along with the event time. We preprocessed and aggregated the LMS log data to objectively measure the engagement level of college students in online learning. Among the 10 different types of log data in the Blackboard Database, we incorporated only login-attempt and course-access data, which we postulated were most relevant to learning activities. Login-attempt logs were generated whenever a student accessed the LMS. Course-access logs were recorded whenever a student conducted any learning activities, including, but not limited to, opening course materials and notices, watching online content, taking quizzes, uploading assignments, and participating in forum discussions. Since the contents of learning activity differed greatly across courses, we counted only the number of events regardless of the activity types to enable scalability and generalizability of the analyses. In addition, we did not consider the amount of time spent on the LMS in our further analyses, because previous studies have suggested that there were null or weak associations between online learning properties and online time spent (Macfadyen and Dawson, 2010; Heo et al., 2019).

From raw data, we calculated three types of indicators of the engagement level in online learning: *Log-Count*, *Log-Entropy*, and *Access-Ratio*. Log-Count represents how actively a student participated in online learning and was computed by the average number of learning activities a certain student had made per lecture and per semester. Login-attempt was treated like a learning activity for a lecture, in the calculation of Log-Count and the other two indicators that come in below. The log transform of Log-Count was used for analyses because this variable was not normally distributed. Log-Entropy represents the consistency (i.e., the degree of variation) of learning activity

across a semester and was computed by the Shannon entropy (Shannon, 1949): $S = -\sum p_i \log p_i$, where p_i is the relative frequency of learning activities at the ith day of a semester. A higher Log-Entropy means that the distribution of learning activities is relatively uniform throughout a semester, and a lower Log-Entropy shows that the frequency of learning activities is concentrated on specific days (e.g., cramming for midterm and final exams). Last, Access-Rate refers to the steadiness of online learning participation across a semester, regardless of the absolute amount of learning activities. Access-Rate was measured by the proportions of days on which a student conducted a learning activity over the number of total days in a semester. Accordingly, an Access-Rate of 0.8 means that a student participated in online learning activity at least once during 80% of all days in a semester.

Academic distress

To assess academic distress experienced in online learning during the pandemic, we used four items from the Counseling Center Assessment of Psychological Symptoms-34 (CCAPS-34; Locke et al., 2012). The items measure how much academic distress individuals have experienced over the past 2 weeks (e.g., "I am unable to keep up with my schoolwork"). This scale is scored on a 5-point Likert scale ranging from 0 (*not at all like me*) to 4 (*extremely like me*). We used the Korean version of the CCAPS-34 (Kim et al., 2017). The internal consistency of this scale was 0.81.

Mental health

Based on Keyes's Dual-Continua Model (Keyes, 2002, 2005), we measured two dimensions of mental health by means of two self-reported questionnaires: Mental Health Continuum-Short Form (MHC-SF) and Korean Mental Disorder Inventory (K-MDI). The MHC-SF was developed by Keyes (2002) to measure mental well-being and was validated in Korean by Lim et al. (2012). The MHC-SF includes three subscales of emotional well-being (items 1–3; e.g., "During the past month, how often did you feel happy?"), social well-being (items 4–8; e.g., "During the past month, how often did you feel that you had something important to contribute to society?"), and psychological well-being (items 9–14; e.g., "During the past month, how often did you feel that you had experiences that challenged you to grow and become a better person?"). Emotional well-being is related to the presence of positive affect and subjective satisfaction with life (Keyes, 2002). Psychological well-being refers to how well individuals function in their personal lives (e.g., self-acceptance, personal growth, and purpose in life; Ryff, 1989). Social well-being represents an individual's subjective evaluation of social functioning (e.g., social acceptance, social contribution, and social integration; Keyes, 1998). This 14-item scale is scored on a 6-point Likert scale ranging from 0 (*never*) to 5 (*everyday*). Moreover, the MHC-SF employs the diagnostic criteria to classify individuals into three categories: Flourishing (mentally healthy), Moderately mentally healthy, and Languishing (mentally unhealthy) (Keyes et al., 2008). The internal consistency of the MHC-SF was 0.93.

In addition, we used the K-MDI to distinguish the presence or absence of mental disorders. The K-MDI was developed during a national sample survey on the mental health of Koreans (Lim et al., 2010). It consists of 14 items to measure the degree of discomfort caused by various clinical symptoms (e.g., "I often feel depressed or sad") and the degree to which an individual has difficulties in work or relationships because of clinical symptoms. This scale is answered on a 5-point Likert scale, except for the last question, which is answered on a 4-point Likert scale. The internal consistency of the K-MDI was 0.84. It has been validated and widely used to measure the two factors of mental health by using the MHC-SF and the K-MDI (Kim and Ko, 2012; Baek et al., 2019).

Considering the two separate dimensions of mental well-being and disorder, we divided participants into four mental-health groups: (1) *Flourishing and Moderate* (characterized by the presence of mental well-being and the absence of mental illness), (2) *Pure Languishing* (characterized by the absence of both mental well-being and mental illness), (3) *Pure Mental Disorder* (characterized by the presence of both mental well-being and mental illness), and (4) *Mental Disorder and Languishing* (characterized by the presence of mental illness combined with languishing). **Table 1** summarizes the subgroups of mental health, as suggested by the Dual-Continua Model.

Statistical analyses

All statistical analyses of this study were conducted with R (R Core Team, 2021). First of all, sociodemographic differences between four mental-health groups were analyzed using chi-squared tests and the analyses of variance (ANOVA). Additionally, we conducted ANOVA to examine group differences in online learning indicators (i.e., academic distress, GPA, Log-Count, Log-Entropy, and Access-Rate). Later, the relationships between online learning indicators were analyzed using Pearson's correlation. For the main analysis, we then tested the association between two dimensions of mental health and online learning indicators by fitting linear regression models. We examined the hypotheses for online learning using linear mixed-effect models because students were allowed to participate in both time points, and 338 (13.03%) out of 2,595 participants responded twice. To overcome the problem of non-independence of observations, we tested linear mixed-effects models with a random intercept for each student and fixed slopes for mental well-being, mental disorder, and covariates. We used the lmer function in the lme4 package (Bates et al., 2015) to test linear mixed-effects models in this study. In addition, we used the Satterthwaite

approximation for degrees of freedom to conduct significance testing (Kuznetsova et al., 2017).

Results

The descriptive statistics for study variables by mental-health groups are presented in Table 2. The skewed distribution of Log-Count was log-transformed for further statistical analyses. We conducted chi-squared tests and ANOVA to examine the association between mental-health types and sociodemographic factors of participants. We found that the distribution of mental-health groups was significantly, but weakly, associated with sex ($\chi^2 = 13.951$, $p = 0.003$), age [$F(3, 2929) = 8.891$, $p < 0.001$, $\eta^2 = 0.009$], annual household income [$F(3, 2929) = 2.734$, $p < 0.05$, $\eta^2 = 0.003$], and applied credit per semester [$F(3, 2929) = 3.336$, $p < 0.05$, $\eta^2 = 0.003$], not with data collection time point ($\chi^2 = 3.454$, $p = 0.327$) and school year ($\chi^2 = 12.233$, $p = 0.201$). All sociodemographic variables were used as covariates for the main analyses.

In addition, we conducted ANOVA to examine the differences in online learning indicators between four mental health groups. The results showed significant main effects of mental health groups on all five online learning indicators: academic distress [$F(3, 2929) = 267.867$, $p < 0.001$, $\eta^2 = 0.215$], GPA [$F(3, 2929) = 32.987$, $p < 0.001$, $\eta^2 = 0.033$], Log-Count [$F(3, 2929) = 19.785$, $p < 0.001$, $\eta^2 = 0.020$], Log-Entropy [$F(3, 2929) = 21.564$, $p < 0.001$, $\eta^2 = 0.022$], and Access-Rate [$F(3, 2929) = 22.387$, $p < 0.001$, $\eta^2 = 0.022$]. *Post-hoc* analyses with Bonferroni corrections indicated every group showed significant differences in academic distress. Academic distress for each group was shown to be high in order of Mental Disorder and Languishing, Pure Languishing, Pure Mental Disorder, and Flourishing and Moderate ($p < 0.01$). We also found that every group showed significant differences in the GPA. The average GPAs for each group were shown to be high in the order of Flourishing and Moderate, Pure Languishing, Pure Mental Disorder, and Mental Disorder and Languishing ($p < 0.05$). As for the engagement indicators (i.e., Log-Count, Log-Entropy, and Access-Rate), the means of the Flourishing and Moderate group were the highest in all models ($p < 0.01$). Apart from the most adaptive group, the other three mental health groups did not significantly differ in terms of Log-Count. However, participants classified as Pure Languishing group showed higher levels of Log-Entropy ($p < 0.001$) and Access-Rate ($p < 0.05$) than did those classified as Mental Disorder and Languishing group. In addition, Pure Languishing group showed higher levels of Log-Entropy than did Pure Mental Disorder group ($p < 0.05$).

The correlations between online learning variables are presented in Table 3. The Pearson's correlation coefficients

TABLE 1 Diagnostic categories of mental health.

Mental disorder	Mental well-being			
	Languishing		Moderate to flourishing	
No	Pure languishing		Flourishing and moderate	
	MHC-SF	Low level on at least one item (emotional well-being) and low level on six or more items (psychological and social well-being)	MHC-SF	Flourishing: High level on at least one item (emotional well-being) and high level on six or more items (psychological and social well-being) Moderately mentally healthy: Not in a state of flourishing or languishing
	K-MDI	A state that does not meet the criteria for diagnosis of mental disorders in K-MDI	K-MDI	A state that does not meet the criteria for diagnosis of mental disorders in K-MDI
Yes	Mental disorder and languishing		Pure mental disorder	
	MHC-SF	Low level on at least one item (emotional well-being) and low level on six or more items (psychological and social well-being)	MHC-SF	Flourishing: High level on at least one item (emotional well-being) and high level on six or more items (psychological and social well-being) Moderately mentally healthy: Not in a state of flourishing or languishing
	K-MDI	High level on at least one item (discomfort with clinical symptoms) and high level on dysfunction in daily life because of the clinical symptoms	K-MDI	High level on at least one item (discomfort with clinical symptoms) and high level on dysfunction in daily life because of the clinical symptoms

MHC-SF, Mental Health Continuum-Short Form; K-MDI, Korean Mental Disorder Inventory. Participants were divided into four mental-health groups. In the dimension of mental well-being, flourishing and moderately mentally healthy categories were combined as one category [Adapted from Suldo and Shaffer's (2008) study].

showed significant small-to-large correlations among objective online learning indicators (ranging from 0.22 to 0.85). In addition, self-reported academic distress was more significantly correlated with GPA than with other objective online learning indicators (r = -0.25, $p < 0.001$).

We tested our main hypothesis of whether two factors of mental health (i.e., mental well-being and mental illness) would be independently associated with academic adjustment, including academic achievement, engagement, and distress in online learning environments. The summary of results is displayed in Table 4. The results revealed that mental well-being and mental disorder were independently associated with all five subjective and objective online learning indicators after we controlled for the effects of covariates. Specifically, in terms of mental well-being, languishing students showed poorer academic achievement, less engagement in online learning, and greater academic distress than did flourishing and moderately mentally healthy students. Furthermore, this pattern was also found in the dimension of mental disorder. Participants

TABLE 2 Descriptive statistics for study variables by mental-health groups (N = 2,933).

Variable	Flourishing and moderate (n = 2276, 77.60%)		Pure languishing (n = 454, 15.48%)		Pure mental disorder (n = 125, 4.26%)		Mental disorder and languishing (n = 78, 2.66%)	
	% (n)	*Mean (SD)*	% (n)	*Mean (SD)*	% (n)	*Mean (SD)*	% (n)	*Mean (SD)*
Mental well-being[a]		50.48 (11.03)		29.07 (5.29)		45.50 (9.91)		25.47 (5.37)
Mental disorder[b]		21.61 (5.85)		26.36 (6.71)		33.74 (7.69)		40.00 (6.23)
Academic distress		4.34 (3.23)		7.98 (3.56)		6.92 (3.51)		11.59 (3.32)
GPA		3.92 (0.54)		3.83 (0.64)		3.64 (0.69)		3.35 (1.07)
Log-Count[c]		422.97 (199.96)		379.93 (186.99)		356.44 (168.53)		368.02 (179.45)
Log-Entropy		3.52 (0.22)		3.48 (0.25)		3.41 (0.33)		3.36 (0.37)
Access-Rate		0.51 (0.09)		0.49 (0.09)		0.47 (0.10)		0.46 (0.11)
Covariates								
Year—Term								
2020—Fall	77.96		15.78		3.71		2.55	
2021—Spring	77.09		15.05		5.05		2.81	
Sex								
Female (%)	75.58		17.45		4.02		2.96	
Male (%)	80.35		12.80		4.59		2.25	
School Year (%)								
1	81.02		13.09		3.80		2.09	
2	78.48		14.92		3.87		2.73	
3	76.96		15.85		4.26		2.93	
4	73.79		18.17		5.13		2.91	
Age (year; range: 17–35)		21.09 (2.18)		21.38 (2.31)		21.85 (2.42)		21.88 (2.46)
Annual Household Income (range: 1–10)[d]		6.60 (2.85)		6.19 (2.91)		6.38 (3.09)		6.56 (3.10)
Applied Credit		15.01 (3.77)		14.52 (4.08)		14.57 (4.14)		14.18 (4.06)

[a]The mean of all participants for mental well-being was 46.29 (SD = 13.22).
[b]The mean of all participants for mental disorder was 23.35 (SD = 7.26).
[c]The means and standard deviations of Log-Count were calculated with raw data before log transformation.
[d]Annual Household Income is divided equally by 10% based on income, with the lowest income level (lower 10%) as the 1st decile and the highest level (top 10%) as the 10th decile. We treated this variable as continuous.

TABLE 3 Descriptive statistics and correlations between online learning indicators (N = 2,933).

	Academic Distress	GPA	Log-Count	Log-Entropy	Access-Rate
Academic distress	–				
GPA	−0.25	–			
Log-Count	−0.14	0.22	–		
Log-Entropy	−0.12	0.23	0.60	–	
Access-Rate	−0.16	0.24	0.79	0.85	–
M	5.21	3.88	412.02[a]	3.50	0.51
SD	3.72	0.59	197.25[a]	0.24	0.09

GPA, Grade Point Average. All correlations were significant ($p < 0.001$).
[a]The mean and standard deviation of Log-Count were calculated with raw data before log transformation.

with mental illness showed more academic distress, less engagement, and poorer academic achievement than did those without mental illness.

In addition, we explored whether the effects of mental well-being and mental disorder on online learning indicators differ by the time point. As shown in **Figure 1**, in 2020, mental disorder was independently related to all online learning indicators. Mental well-being was significantly associated with academic distress and GPA but was not significantly related to the other three indicators. In 2021, both dimensions of mental health were independently associated with all online learning indicators after we controlled for the effects of covariates, except for the relationship between mental disorder and Log-Count (for detailed statistics, see **Supplementary Tables 1, 2**).

Discussion

Using the Dual-Continua Model (Keyes, 2002, 2005), we examined the effects of mental health on college students' adaptation to online learning environments during the COVID-19 pandemic. We employed GPAs and LMS log data as objective indicators of academic achievement and engagement and used self-reported academic distress as a subjective indicator. In support of our hypothesis, we found that the two dimensions of mental health (i.e., mental well-being and mental disorder) were independently associated with college students' engagement in online learning. Specifically, the two dimensions were significantly associated with how actively and consistently students engaged in online learning activities. Furthermore, each factor of mental health was independently related to academic achievement and self-reported academic distress. These findings remained significant after controlling for the effects of sociodemographic variables.

In terms of mental well-being, we demonstrated that participants classified as flourishing and moderately healthy took part in online classes more actively and consistently and obtained higher GPAs than did those classified as languishing. This is consistent with previous literature that students with higher levels of mental well-being were more likely to show higher engagement in class (Lewis et al., 2011; Montano, 2021) and higher academic achievement (Howell, 2009) than those with lower levels of mental well-being. Our findings highlighted that individuals' mental well-being played an important role in their adaptation to online learning environments during the pandemic. Student well-being is a critical factor for maintaining learning motivation (Yang et al., 2021). Past research has suggested that intrinsic academic motivation may also contribute to successful academic engagement or adaptive learning (Elphinstone and Farrugia, 2016). Given that online contexts require greater self-regulation and intrinsic motivation from the learners (Klingsieck et al., 2012; Pelikan et al., 2021), an abrupt transition to online learning during the pandemic could have obstructed languishing students from adapting to online learning.

We also found that participants with mental illness showed higher levels of academic distress, poorer academic performance, and lower levels of engagement in online learning than did those without mental illness. These findings are in accordance with previous studies that college students with mental disorders were likely to experience difficulties adapting to their campus life and classes (e.g., Salzer, 2012). Moreover, the pandemic led to a dramatic change from face-to-face learning to online learning. Maladjustment to online courses caused by rapid changes in the educational paradigm has been closely related to psychological difficulties, such as anxiety and depression (Fawaz and Samaha, 2021; Fruehwirth et al., 2021).

Our findings that two factors of mental health were independently associated with adjustment to online learning provide additional evidence that mental well-being and mental illness are interrelated but distinct constructs. Consistent with a study conducted by Suldo and Shaffer (2008), we suggest that it is necessary to foster college students' mental well-being because the absence of mental illness is not sufficient for them to successfully adapt to online learning environments. Our data also illustrated that Pure Languishing group (i.e., low levels of mental well-being without any mental illness) showed lower mental well-being and perceived greater academic distress than did Pure Mental Disorder group (i.e., average to high mental well-being and the presence of mental disorder). This may imply that it could be helpful to encourage Pure Languishing group to actively participate in mental well-being promotion programs. Moreover, for students with mental disorders, we propose that it may be important to establish interventions with different strategies depending on their level of mental well-being. For example, interventions focused on alleviating clinical symptoms can be effective for Pure Mental Disorder group. On the other hand, for students in Mental Disorder and Languishing group, it may be important that

TABLE 4 Results of the linear mixed-effect models in predicting online learning indicators (N = 2,933).

	Academic Distress		GPA		Log-Count		Log-Entropy		Access-Rate	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Fixed effects										
Languishing (reference: flourishing and moderately mentally healthy)	0.89***	0.81, 0.97	−0.18***	−0.27, −0.09	−0.14**	−0.23, −0.06	−0.11*	−0.21, −0.02	−0.15**	−0.23, −0.06
Mental Disorder (reference: without mental disorder)	0.72***	0.59, 0.84	−0.48***	−0.62, −0.34	−0.28***	−0.41, −0.15	−0.42***	−0.56, −0.28	−0.33***	−0.46, −0.19
Age	0.07**	0.02, 0.13	−0.19***	−0.25, −0.13	−0.02	−0.07, 0.04	−0.11***	−0.17, −0.05	−0.09**	−0.15, −0.03
School Year [2] (reference: school year [1])	0.02	−0.07, 0.11	0.05	−0.04, 0.15	−0.62***	−0.71, −0.52	−0.27***	−0.37, −0.17	−0.40***	−0.49, -0.30
School Year [3] (reference: school year [1])	−0.02	−0.14, 0.09	0.24***	0.12, 0.37	−0.62***	−0.74, −0.50	−0.10	−0.23, 0.02	−0.36***	−0.48, −0.24
School Year [4] (reference: school year [1])	−0.06	−0.20, 0.07	0.44***	0.29, 0.59	−0.75***	−0.89, −0.60	−0.17*	−0.32, −0.02	−0.47***	−0.62, −0.32
Sex (female; reference: male)	0.25***	0.18, 0.33	0.15***	0.07, 0.23	−0.11**	−0.18, −0.03	−0.20***	−0.29, −0.12	−0.31***	−0.39, −0.23
Annual Household Income	−0.10***	−0.14, −0.07	0.03	−0.00, 0.07	0.02	−0.01, 0.06	−0.01	−0.04, 0.03	0.03	−0.01, 0.06
Applied Credit	−0.01	−0.05, 0.02	0.06***	0.03, 0.10	0.21***	0.17, 0.24	−0.01	−0.04, 0.03	0.03	−0.01, 0.06
Year (2021; reference: 2020)	0.13***	0.07, 0.18	−0.10**	−0.17, −0.04	−0.10**	−0.16, −0.04	0.06	−0.00, 0.13	−0.12***	−0.18, −0.06
Random effects										
σ^2	4.31		0.13		0.07		0.02		0.00	
τ_{00}	6.26		0.21		0.09		0.03		0.00	
ICC	0.59		0.62		0.55		0.55		0.63	

CI, Confidence Interval; σ^2,Within-Person Variance; τ_{00}, Between-Person Variance; ICC, Intraclass Correlation Coefficient. All dependent and independent variables were standardized except for the categorical variables (i.e., two dimensions of mental health, school year, sex, and year).
*$p < 0.05$, **$p < 0.01$,***$p < 0.001$.

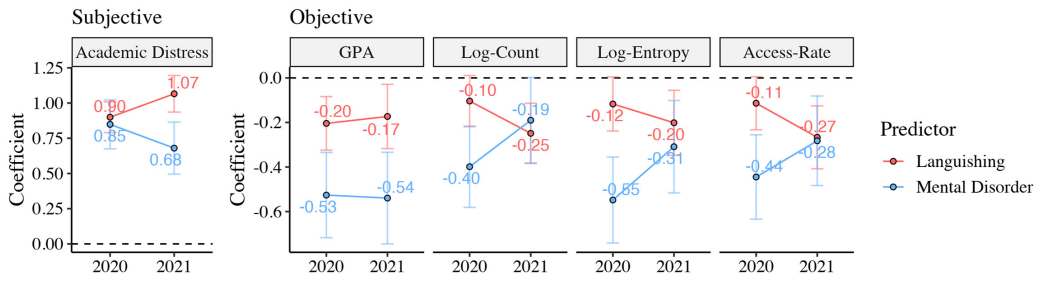

FIGURE 1
The differences in the effects of mental well-being and mental disorder on online learning indicators by the time point. The plot shows the multiple regression coefficients of two dimensions of mental health in predicting online learning indicators (for detailed statistics, see **Supplementary Tables 1, 2**). The error bar represents 95% confidence intervals. Sociodemographic variables were controlled as covariates in the multiple linear regression models. Red lines indicate the effects of languishing (reference: flourishing and moderately mentally healthy) on online learning variables. Blue lines indicate the effects of mental disorder (reference: without mental disorder) on online learning variables.

universities focus not only on reducing their clinical symptoms but also on improving their mental well-being for their academic success. In addition, online learning requires greater intrinsic motivation for students to regulate their learning on their own (Klingsieck et al., 2012; Pelikan et al., 2021). Given that higher mental well-being is related to higher intrinsic motivation (Bailey and Phillips, 2016), psychological interventions that encompass the two factors of mental health can lead to optimal academic functioning. Over the past years, the importance of online learning has increased, and online learning environments are expected to continue after the pandemic. In this situation, our study is of academic

significance in that we identified the utility of the Dual-Continua Model of mental health to understand the relationship between mental health and the adaptation to online learning triggered by the pandemic. Taken together, we propose that it is essential to establish university-level interventions based on positive psychology for their successful adaptation to an online learning environment.

Furthermore, we suggest that the application of LMS log data has notable advantages in measuring student engagement. Since students' learning activities are automatically recorded in log files (Black et al., 2008), an analysis of LMS log data can show how students engage in online learning environments. Student engagement has been mainly measured by participants' perceptions of their engagement in learning activities (Chen et al., 2010; Klobas and McGill, 2010; Junco et al., 2011). Unlike self-reports, which can be affected by social desirability or impression management (Paulhus, 1984), LMS logs can be used to objectively measure students' actual engagement. Motz et al. (2019) suggested that LMS log data can be a useful and valid measure of student engagement by demonstrating that instructors' subjective ratings of engagement were closely associated with student engagement derived from LMS log data. Our data also revealed that the three types of indicators of student engagement (i.e., Log-Count, Log-Entropy, and Access-Rate) were positively correlated with academic performance and negatively with self-reported academic distress. Moreover, we propose a novel approach to extract indicators of student engagement showing students' learning patterns from massive LMS log data. Log-Entropy and Access-Rate represent how consistently students participate in online learning activities. These indicators may help distinguish students who consistently engage in learning activities throughout a semester from those who only engage in learning activities more intensively on specific days (e.g., cramming for exams), among students with high frequencies of activities. As the role and importance of online learning has increased, an analysis of LMS log data can provide meaningful insights into understanding students' adaptation to online learning.

Limitations

There are a few limitations of this study that should be noted. First, we used features derived from LMS log data to measure behavioral engagement. However, it may be necessary to consider a holistic approach to measure student engagement. Thus, future studies could comprehend the relationship between two factors of mental health and all three types of engagement (i.e., behavioral, emotional, and cognitive engagement). Second, we did not control for differences in characteristics between online classes or departments. For example, college students who take lectures requiring few assignments or lectures without active discussion in the LMS may use the LMS less frequently regardless of their mental health. Therefore, future research is needed to examine whether the two factors of mental health are independently related to the adaptation to online learning under the same class or departmental conditions. Finally, we assessed participants' mental health using only self-reported measures. Although self-reports have been widely used to measure mental well-being and mental illness (e.g., Keyes et al., 2008), they may be affected by social desirability and self-deception. Further studies can employ clinician assessments to evaluate individuals' mental well-being and mental illness more reliably and classify mental-health types based on the Dual-Continua Model.

Conclusion

Overall, our results provide additional evidence that mental well-being and mental disorder are interrelated yet distinct dimensions of mental health. Using the Dual-Continua Model of mental health, we found that the two dimensions of mental health were independently associated with student engagement, academic achievement, and academic distress in an online learning environment. The effect of each factor of mental health on online learning indicators remained significant even after we controlled for the effects of sociodemographic variables. We suggest that it may be necessary to carry out university-wide interventions to promote mental well-being and alleviate clinical symptoms for college students to adapt to online learning environments more successfully. A remaining issue for future studies is whether the Dual-Continua Model of mental health can be applied to understanding the relationship between mental health and adjustment to online learning in the post-COVID-19 era.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

This study was approved by the Institutional Review Board at Korea University (KUIRB-2021-0070-01 and KUIRB-2021-0126-01). The patients/participants provided their written informed consent to participate in this study.

Author contributions

JK, KM, SL, and YK conceived and designed the study. JK, KM, and SL collected the data. JK and KM performed the data analysis and interpretation under the supervision of YK. JK, KM, JL, and YJ drafted the manuscript. KM and YK provided

critical revisions. All authors read and approved the final version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.932777/full#supplementary-material

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Chilean University Students' Satisfaction With Online Learning During COVID-19 Pandemic: Demonstrating the Two-Layer Methodology

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Student satisfaction is a crucial determinant of success in online education, but studies on satisfaction with virtual classes during the COVID-19 outbreak are still scarce. This research contributes empirical evidence regarding the determinants of overall satisfaction with online classes and academic performance through the domain satisfaction approach. Additionally, we introduce to the psychological literature the two-layer model, a well-known econometric methodology, to estimate the effect of domain satisfaction while controlling the impact of unobserved individual differences. Our analyses are based on a cross-sectional sample of $n = 648$ Chilean university students (53.4% female) surveyed at the end of the first academic semester of 2021, during the lockdown mandated by the Chilean government due to the COVID-19 pandemic. Results show that satisfaction with the support provided by the university, satisfaction with learning, and satisfaction with the perceived quality of the online classes significantly explain the 68% of the variance of satisfaction with the virtual classes experience. Furthermore, satisfaction with academic performance is significantly explained by satisfaction with grades, learning, and the perceived quality of the online classes ($R^2 = .65$). We also explore heterogeneous effects, separating them by gender and geographic area, and find that domains that systematically impact students' satisfaction with online education are satisfaction with grades, learning, and the quality of classes.

Keywords: virtual classes, online learning, COVID-19, student satisfaction, satisfaction domains, two-layer model, Chile

INTRODUCTION

The outbreak of COVID-19, declared a pandemic by the World Health Organization in March 2020 (WHO, 2020), had severe consequences for educational systems worldwide (Sarkar et al., 2021). Because of the higher transmissibility of the virus, many governments worldwide suspended in-person classes in schools and universities to curb the dissemination of the disease and implement online courses (Adedoyin and Soykan, 2020; Dhawan, 2020).

Chile was no exception, and, with varying degrees of success, universities had to adjust quickly to an online environment during the first quarter of 2020. Although some Chilean universities had experience in online learning, the country's higher education system lacked prior experience in virtual classes. Therefore, moving to an online environment represented a considerable challenge, and the difficulties experienced impacted the teaching and learning process for students (Treviño et al., 2022).

By 2021 most Chilean universities had completed almost 2 years of online learning. There were some exceptions during the second semester of that year: some universities had a dual regime, mixing online learning with in-person classes (but with limited capacity per classroom, reaching few students), while other universities ruled that evaluations would be carried out in face-to-face mode (Valenzuela and Rodriguez, 2022).

Online learning represented an enormous challenge for the Chilean university system. On the one hand, many faculty members did not have sufficient mastery of digital tools for the correct transition to an online environment. Consequently, it was necessary to train instructors in digital environments and, at the same time, adapt the curriculum to cover the academic content in this new context (Treviño et al., 2022). On the other hand, many students lived in areas where internet connection quality was limited. This situation led most universities to decide that classes should be recorded and made available to students for viewing at any time (Valenzuela and Rodriguez, 2022).

For university students, the campus shutdown and the unplanned switch to remote learning impacted several aspects of the students' experience in higher education, including satisfaction with online classes (She et al., 2021).

Student satisfaction, defined as students' subjective evaluation of educational experience (Elliott and Shin, 2002; Weerasinghe and Fernando, 2017), is an outcome increasingly important in higher education because of its pivotal role in student success (Guo, 2016).

Indeed, pre-COVID evidence shows that student satisfaction is a crucial determinant of success in online education (Kuo et al., 2014; Alqurashi, 2019; Rabin et al., 2020). A few recent studies during the COVID-19 outbreak suggest the same conclusion (e.g., Gopal et al., 2021; Karadag et al., 2021; Sarkar et al., 2021), but the research in this regard is still scarce. In addition, most studies on student satisfaction conducted in psychology and education rely on multiple regression or Structural Equation Models (SEM) without properly controlling for endogeneity or omitted variables, a central concern in other fields of knowledge (Lütkepohl, 1982; Nakamura and Nakamura, 1998).

Accordingly, this paper aims to disentangle the factors that explain the satisfaction with online learning during the COVID-19 outbreak, among Chilean university students and introduce the two-layer model, an econometric methodology, as a robust tool for analyzing students' satisfaction.

Student Satisfaction With Online Learning During Campus Shutdown

Before the COVID-19 crisis, several studies addressed the determinants of satisfaction with online classes and compared them with in-person learning. For instance, McFarland and Hamilton (2005) explore the differences between students' performance and satisfaction in traditional and online classes. Their results do not show significant differences in the degree of satisfaction with each kind of learning modality.

Other studies focused explicitly on online learning. Lee (2010) provides evidence for Korean and American students regarding online education support service quality, online learning acceptance, and satisfaction. One of its main results is that perceived online support service quality was a significant predictor of online learning acceptance and satisfaction for Korean and American students.

In the same vein, Lu and Chiou (2010), using data for Taiwan, proposed four predictors of e-learning satisfaction: interface friendliness (system quality with learner interface), content richness (information quality with content), perceived flexibility, and perceived community (service quality with personalization and learning community). All four factors had strong predictive power. Moreover, results suggested that a serious consideration of contingent variables (student job status and learning styles) is crucial for improving e-learning system satisfaction.

Furthermore, Schubert-Irastorza and Fabry (2011), investigates the factors that produce dissatisfaction in students of online academic programs. Study results suggested that negative student evaluations are most strongly influenced by lack of organization, lack of clarity, and insufficient feedback. Research by Kuo et al. (2013) and Kirmizi (2015) highlight that previous experience with technological tools and student readiness are relevant predictors of satisfaction with online education.

Other researchers addressed students' satisfaction with Massive Open Online Courses (MOOCs). For example, Hew et al. (2020) reports that course instructor, content, assessment, and schedule are significant predictors of student satisfaction with the course.

Although the above studies and others conducted before the COVID-19 pandemic assist in the understanding of the factors influencing student satisfaction, their results cannot necessarily be applied in a generalized fashion to online classes during the campus shutdown due to the COVID-19 outbreak.

The fundamental difference between online classes pre- and post-COVID-19 is that before the pandemic students could choose online courses and programs, and universities were able to prepare them carefully. In other words, classes were likely better designed, instructors were better trained, and students were more intrinsically motivated to take online courses (Costa et al., 2021; Treviño et al., 2022; Valenzuela and Rodriguez, 2022). In contrast, the suspension of in-person classes due to the pandemic and the consequent switch to online learning was an unplanned, forced life event (Costa et al., 2021; Muthuprasad et al., 2021; Selvaraj et al., 2021).

For that reason, it is relevant to study the determinants of satisfaction with online courses triggered by COVID-induced lockdowns.

There are some recent studies aimed to address this issue. For instance, Gopal et al. (2021), using data from 574 Indian management students, found that the most important predictors of students' satisfaction were the perceived quality of instructor, course design, instructor's feedback, and student's expectation.

Meanwhile, Karadag et al. (2021), using comprehensive data from nearly 15,000 students enrolled in 30 Turkish universities, report that universities with higher distance education capacities got higher satisfaction scores from their students.

In the Latin–American context, Jiménez-Bucarey et al. (2021) presents evidence regarding the satisfaction of Chilean medical students with the digital transformation process that was experienced due to the COVID-19 pandemic. Student satisfaction was measured across three dimensions: teacher quality, technical service quality and service quality. Using a structural equation model, the authors found that it is very important to improve the quality of technical service provided, in terms of teacher training, and the use of teaching strategies that promote student participation.

A Two-Layer Approach to Student Satisfaction

A robust and helpful approach to assess the determinants of student satisfaction comes from the so-called aggregation approach, used in the happiness economics literature to investigate the determinants of subjective wellbeing (Rojas, 2006; Easterlin and Sawangfa, 2007; Kant et al., 2014; Loewe et al., 2014; Mahmud and Sawada, 2018; Montero and Miranda, 2020).

The rationale of the aggregation approach is to assume that the subjective wellbeing of the individual is the result of the satisfaction obtained in each of the domains that are relevant to their life (for example, work, family life, and health status, among others). Rojas (2006) uses an aggregation approach to analyze the determinants of life satisfaction in Mexico, where he showed that satisfaction in the personal, economic, health, work and family spheres were determinants of satisfaction with life. In a similar study using data for the United States, Easterlin and Sawangfa (2007) show that people's satisfaction with their finances, their health, their work, and their family life were important to explain their life satisfaction.

Applying the same rationale to the satisfaction with online learning, the model to be estimated is:

$$s_i = f\left(D_1, D_2, \ldots, D_k\right) + u_i \tag{1}$$

where s_i corresponds to overall satisfaction with online classes, D_1, D_2,..., D_k correspond to satisfaction in each relevant domains for online classes experience, and u_i is a well-behaved stochastic shock.

Note that the above formulation is equivalent to the well-known multiple regression or path analytic models in which global satisfaction is the dependent variable, satisfaction with domains of online experience are independent variables, and u_i is typically known as an error term or unexplained variance. Indeed, the aggregation approach is the mechanism underlying the regression and SEM methods used in most studies on the determinants of satisfaction with online classes, reviewed in the preceding section.

An often-overlooked problem with the aggregation approach (and, therefore, with regression and SEM methods) is that non-modeled individual differences can bias parameter estimation. For example, people of different ages, gender, or ethnic groups might evaluate satisfaction with online classes differently. Even latent individual differences (e.g., personality traits) could also influence the results. For example, more agreeable people may assess the quality of service more benevolently, or more conscientious students may be more critical of the perceived quality of a class.

To overcome this problem, Van Praag et al. (2003) propose an improvement to the aggregation approach that they call the "two-layer model." The first layer of the model establishes that overall satisfaction (for the purposes of this article this correspond to satisfaction with online learning) is the result of the satisfaction obtained in different domains, *plus* a variable z controlling for unobserved individual differences (e.g., personality traits). The second layer establishes that a set of exogenous variables determines each domain; then, from this layer, it is possible to create a proxy variable ($\hat{z}$) of the unobserved individual differences that predispose students to make specific satisfaction judgments.

Therefore, the benefit of this approach is that it allows the consideration of the unobservable variables that affect overall satisfaction, controlling the omitted variables bias that can arise when unobserved individual differences are not included. Notice that Van Praag et al. (2003), drawing from econometric literature, initially claim that z represents "*personality traits.*" However, we propose using the phrase "*unobserved individual differences*" instead because it better captures the underlying meaning of the proxy variable ($\hat{z}$) and is more consistent with the psychological and behavioral sciences literature.

More formally, the first layer of the model is given by:

$$s_i = f\left(D_{1i}, D_{2i}, \ldots, D_{ki}, z_i\right) + u_i \tag{2}$$

where z is an unobservable variable that affects the subjective wellbeing.

For the second layer of the model, we assume that satisfaction in each domain depends on the objective situation of the individual (summarized by a vector of characteristics, X) and on their dispositional traits (z). Thus, traits are not observable and codetermine both s and D_i (with $j = 1, 2, \ldots, J$). Therefore, for each (J) domain satisfaction (D_i):

$$D_{ji} = h\left(X_{ji}, z_i\right) + \epsilon_i \tag{3}$$

Remember that if equation (2) is estimated without controlling for unobserved individual differences (z), the estimates of the parameter for each domain satisfaction (D) will be biased and inconsistent.

Since, by definition, a measure of unobserved individual differences is not available in surveys, Van Praag et al. (2003) suggest constructing a proxy variable for z. That is the key ingredient of the two-layer method. The estimation of a proxy variable for z follows a three steps procedure.

First, we estimate equation (3) for each of the domains ("J" in total), obviously not including z, by ordinary least squares regression (OLS). In more familiar terms, we run an OLS regression for each domain, using domain satisfaction as

the dependent variable and a set of characteristics, X, as predictors. Those Xs can be manifest individual differences, such as gender, age, socioeconomic status, etc.

Then, in the second step, we calculate the residuals of each estimated equation. Remember that regression residuals are simply the arithmetic difference between observed values and those predicted by the regression model. In this context, the OLS residuals represent estimates of the contribution of z to each domain.

Third, we extract the first principal component of the covariance matrix among those residuals. We use this first component as an instrumental variable representing the proportion of z common to all the domains.

This proxy variable ($\hat{z}$, since it is a proxy of z) is added as an additional regressor to equation (2), which allows us to assume that the error term (u_i) will not be correlated with the variables that represent the domains (D_k), and therefore, the parameter estimates will be consistent.

For the purposes of this research the variable s corresponds to the satisfaction of university students with online learning. On the other hand, the domains considered are the following: (1) satisfaction with the support provided by the university, (2) satisfaction with the dedication and interest of the professors, (3) satisfaction with the technological platform used by the university for virtual classes, (4) satisfaction with the quality of pedagogical material, (5) Satisfaction with the relationship with classmates, (6) satisfaction with the relationship with instructors, (7) satisfaction with grades obtained, (8) satisfaction with the level of learning achieved, and (9) satisfaction with the quality of online classes. Therefore, for this case $J = 9$.

MATERIALS AND METHODS

Participants and Procedure

This study is part of a larger investigation aimed at understanding the explanatory factors of the college experience of Business and Accounting students. Consequently, we recruited undergraduate Business and Accounting students only *via* poster advertisements and mailing lists across three medium-size Chilean universities (Universidad Diego Portales, Universidad Autónoma de Chile, Universidad Nacional Andrés Bello) that offer these professional programs. The three universities have campuses in the capital of the country (Metropolitan area), and two of them also have campuses in other regions of Chile. An *a priori* power analysis with STATA 17 (StataCorp, 2021) revealed that a sample size of $n = 635$ participants was necessary to detect an R^2 even as small as 2% with sufficient statistical power ($1 - \beta = 0.80$).

The students were invited to participate voluntarily and anonymously in an online survey on satisfaction with distance education during the COVID-19 lockdown. We did not offer them payment for participation.

The questionnaire was applied through the Qualtrics platform, at the end of the first academic semester of 2021 during the lockdown mandated by the Chilean government due to the COVID-19 pandemic.

As usual in this kind of study, the first screen of the online questionnaire presented a description of the research and an informed consent form, designed to confirm that the participant has been given all relevant information about the study and their role within it. They were also told that they could withdraw from the study at any time without consequence. Participants had to agree with the consent form before proceeding to the actual questions.

With the recruitment strategy described above, we completed a final sample of n = 648 participants after 1 month. The final sample includes 364 women (53.4%) and 302 men (46.6%) from the three universities (UDP = 42.75%; UA = 34.41%; UNAB = 22.84%), enrolled in business (74.23%) and accounting (25.77%). Most participants study and live in the Metropolitan area (79.48%), and they have an average age of 22.59 years (SD = 4.33).

The data that support the findings of this study are openly available in the Open Science Framework [OSF] at: https://osf.io/vytn8/?view_only=c6969b9501e24bec8ac9caf33127fa31.

Measures

Each participant was asked to fill out an online questionnaire divided into two sections. The first section included questions regarding socio-demographic variables, required for estimating the first layer of method of Van Praag et al. (2003) method: university, undergraduate program (Business or Accounting), years in college ("*number of years that have passed since you entered college*"), geographical zone of residence (metropolitan area or other regions), age and gender.

Based on the studies mentioned early on satisfaction with online classes and drawing from desk-based reviews of student satisfaction surveys, the second section of our questionnaire comprised several questions to assess overall and domain satisfaction with remote classes.

To measure students' overall satisfaction, we asked for academic satisfaction with online classes ("*what is your overall level of satisfaction with the virtual classes experience so far?*") and current academic performance ("*What is your level of satisfaction with your current academic performance?*"). Both questions used a percentual response scale, ranging from 0 to 100, anchored from 0 = "*not satisfied at all*" to 100 = "*very satisfied.*"

For assessing satisfaction with specific domains of the virtual classes experience, we asked the respondents to rate their satisfaction with (1) the *support provided by the university*, (2) the *dedication and interest exhibited by the instructors*, (3) the *user-friendliness of technological platform used by the university for online classes*, (4) the *quality of pedagogical material (class notes, videos and slides)*, (5) the *relationship with classmates*, (6) the *relationship with instructors*, (7) the *grades obtained so far*, (8) the *level of learning achieved*, and with (9) the *quality of online classes sessions so far*. We also use a percentual scale for these questions, bounded from 0 = "*not satisfied at all*" to 100 = "*very satisfied.*"

On the type of questions used, we acknowledge that single-item scales do not have a good reputation among psychology researchers, and the discipline's tradition is to prefer multi-item scales (Allen et al., 2022). Because in traditional measurement theory the items are supposed to represent a random selection

from the hypothetical domain of indicators of the construct (Nunnally and Bernstein, 1994), multi-item scales could capture the whole complexity of any construct better than single-item scales. A related limitation is a lack of a measure of internal consistency reliability.

On the other hand, some authors consider the assertion that one *must* use multi-item measures as an urban legend (Boyd et al., 2005), and some others go even further, standing out that single-item scales have several advantages over multi-item measures, in terms of cognitive burden and readability (i.e., Matthews et al., 2022).

Our view is more aligned with a recent editorial in the *European Journal of Psychological Assessment*: although multi-item scales are undoubtedly superior, single-item scales are not automatically inferior to multi-item measures, and they are acceptable when constructs are unidimensional, clearly defined, and narrow in scope (Allen et al., 2022, p 3). Furthermore, multi-item scales are preferred, and evidence is needed to support using a single-item scale to measure a particular construct. In the specific case of the measurement of satisfaction with (any domain), past research support that single-item scales deliver comparable results to multi-item measures (e.g., Nagy, 2002; Dolbier et al., 2005; Cheung and Lucas, 2014; Mark et al., 2014; Montero and Rau, 2015, 2016; Jovanović, 2016; Sears et al., 2017; Fülöp et al., 2020; Jovanović and Lazić, 2020; Gempp and González-Carrasco, 2021). Several of these studies also report adequate test–retest coefficients for single-item measures.

To be clear, we are not claiming that single-item measures are better than or preferable to multi-item measures. We argue that, for measuring satisfaction, empirical evidence shows that single-item scales are equally valid and reliable as multi-item measures. Of course, this might not be the case in other research areas and for different types of constructs. The use of single-item scales is a matter that should always be based on the best available evidence.

Finally, since the discussion of the limitations and scope of single-item measures is beyond the scope of this paper, we recommend the editorial by Allen et al. (2022) and the references therein for a detailed review.

RESULTS

Table 1 presents the descriptive statistics of the sample in terms of subjective wellbeing. The first two columns show the average satisfaction with virtual classes and with academic performance. Then, the next nine columns show the average satisfaction with each of the nine domains already defined. Note that the scale for all the satisfaction measures ranges from 0 to 100.

In **Table 1**, it is possible to see that satisfaction with virtual classes is M = 64.35 points (SD = 27.97), which could be considered as a middle evaluation. Men make a lower evaluation (M = 62.51, SD = 29.19) than women (M = 66.48, SD = 26.53), and the difference is significant ($t = -1.81$, df = 646, $p = 0.03$, $d = 0.14$). On the other hand, there is no statistically significant difference between the mean level of satisfaction of students from Metropolitan and other regions ($t = 0.25$, df = 646, $p = 0.60$, $d = 0.02$).

The average satisfaction with academic performance is M = 65.3 points (SD = 26.96), that is, an assessment equivalent to the previous dimension. Again, males have a worst perception (M = 63.66, SD = 27.73) than females (M = 67.95, SD = 26.16), although the difference is barely significant ($t = -1.59$, df = 646, $p = 0.05$, $d = 0.12$). As in the case of satisfaction with virtual classes, there are no significant differences in satisfaction with academic performance between students from the Metropolitan and other regions ($t = 0.08$, df = 646, $p = 0.53$, $d = 0.008$).

Regarding the satisfaction with specific aspects of the online learning experience, the domain best evaluated is D3, the satisfaction with the technological platform used by the university for virtual classes (M = 75.35, SD = 23.81). On the other side, the worst evaluated aspect is D_5, the satisfaction with the relationship with classmates (M = 57.78, SD = 31.08). This general pattern is also observed for men, although in the case of women, the less satisfactory domain is D_1, the support provided by the university.

Regarding the Van Praag et al. (2003) two-layer method, **Table 2** presents results of the first layer. Remember that the first layer involves estimating equation (2) by ordinary least squares (OLS) for each of the nine domains. The following controls have been incorporated for each of the domains: dummy for gender (1 = women; 0 = men), age, years in college ("*number of years that have passed since you entered college*"), dummy for undergraduate program (1 = business; 0 = accounting), dummy for geographical zone (1 = metropolitan area; 0 = other regions), and dummies by university (two dummy variables were included since the students in the sample come from three universities).

As previously explained, the OLS residuals are constructed from these estimates, and thus the common variance to all of them is extracted by principal components analysis. The first principal component constitutes a proxy for the variable *z*, which is then incorporated as an additional regressor when estimating equation (1).

Thus, **Table 3** shows the results for the second layer, for two kinds of outcomes. For satisfaction with virtual classes and satisfaction with current academic performance, we presented the estimates by OLS of equation (1), controlling for the variable z as a regressor.

Regarding the satisfaction with virtual classes, it is worth highlighting the excellent adjustment that the model presents, evidenced by a 68% of explained variance. Considering the domains, satisfaction with the support provided by the university, satisfaction with learning, and satisfaction with the quality of online classes are the strongest determinants of overall satisfaction with virtual classes. Satisfaction with the technological platform used by the university also has a positive effect, but only at a significance level of 10%. Finally, it is possible to appreciate that the variable *z*, which controls the impact of unobserved individual differences, does not have a statistically significant effect.

Table 3 also shows the estimation of satisfaction with academic performance. Results reveal that the domains that positively and

TABLE 1 | Descriptive statistics.

	s_1	s_2	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9
All	64.35	65.30	57.99	70.35	75.35	70.53	57.78	60.51	68.51	61.80	65.27
(n = 648)	(27.97)	(26.96)	(28.99)	(24.23)	(23.81)	(24.32)	(31.08)	(29.58)	(23.85)	(27.65)	(25.94)
Men	62.51	63.66	58.63	69.69	75.55	69.09	56.49	57.57	68.30	60.67	62.90
(n = 302)	(29.19)	(27.73)	(29.29)	(24.43)	(23.51)	(24.51)	(30.78)	(29.51)	(24.68)	(28.30)	(26.47)
Women	66.48	67.05	57.66	71.55	75.89	71.96	59.29	63.34	69.23	63.34	68.04
(n = 346)	(26.53)	(26.16)	(28.79)	(23.70)	(23.31)	(23.88)	(31.06)	(29.34)	(22.59)	(26.70)	(24.78)
Metropolitan area = 1	64.21	65.25	57.43	69.78	75.82	70.65	57.79	59.88	68.71	61.46	65.13
(n = 515)	(27.63)	(26.82)	(29.19)	(24.19)	(24.12)	(24.20)	(31.02)	(29.40)	(23.55)	(27.42)	(25.95)
Metropolitan area = 0	64.88	65.47	60.17	72.57	73.51	70.06	57.74	62.91	67.76	63.14	65.79
(n = 133)	(29.32)	(27.60)	(28.24)	(24.33)	(22.56)	(24.86)	(31.44)	(30.23)	(25.02)	(28.59)	(26.02)

(s_1) Satisfaction with virtual classes; (s_2) Satisfaction with current academic performance; (D_1) satisfaction with the support provided by the university, (D_2) satisfaction with the dedication and interest of the professors, (D_3) satisfaction with the technological platform used by the university for online classes, (D_4) satisfaction with the quality of pedagogical material, (D_5) Satisfaction with the relationship with classmates, (D_6) Satisfaction with the relationship with instructors, (D_7) satisfaction with grades obtained, (D_8) satisfaction with the level of learning achieved, and (D_9) satisfaction with the quality of online classes. Estimates include dummy variables by university. All the measures range from 0 to 100. Standard deviations are in parenthesis.

TABLE 2 | Two-layer method, first layer: predictors of domain satisfaction.

Variable	Domain satisfaction								
	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9
Women = 1	−1.789	1.059	1.197	2.309	2.358	4.414*	0.544	1.939	4.697**
(n = 346)	(2.296)	(1.923)	(1.880)	(1.923)	(2.485)	(2.355)	(1.875)	(2.175)	(2.027)
Age	0.670**	0.447*	0.396*	0.106	0.431	0.549*	0.647***	0.902***	0.444*
	(0.302)	(0.238)	(0.222)	(0.246)	(0.319)	(0.295)	(0.199)	(0.224)	(0.255)
Years in college	−3.605***	−1.306**	−0.532	−2.139***	−1.083	−1.184	−0.817	−1.976***	−2.091***
	(0.756)	(0.621)	(0.591)	(0.642)	(0.771)	(0.740)	(0.587)	(0.685)	(0.658)
Business program = 1	−1.311	−4.386*	−3.148	−1.708	−4.800	−3.711	−1.594	−4.125	−4.584*
(n = 481)	(2.748)	(2.335)	(2.180)	(2.288)	(2.991)	(2.877)	(2.369)	(2.713)	(2.474)
Metropolitan area = 1	−2.847	−1.028	0.417	1.744	1.267	0.715	2.925	2.437	2.047
(n = 515)	(3.191)	(2.722)	(2.572)	(2.730)	(3.511)	(3.307)	(2.677)	(3.135)	(2.910)
Constant	56.60***	68.10***	72.22***	72.46***	53.14***	51.42***	57.18***	51.82***	63.44***
	(7.597)	(6.152)	(5.936)	(6.510)	(8.286)	(7.600)	(5.794)	(6.417)	(6.484)
N	648	648	648	648	648	648	648	648	648
R squared	0.040	0.020	0.023	0.026	0.010	0.029	0.019	0.040	0.034

**10% significance level.*
***5% significance level.*
****1% significance level.*
The domains are as follows: (D_1) satisfaction with the support provided by the university, (D_2) satisfaction with the dedication and interest of the professors, (D_3) satisfaction with the technological platform used by the university for online classes, (D_4) satisfaction with the quality of pedagogical material, (D_5) Satisfaction with the relationship with classmates, (D_6) Satisfaction with the relationship with instructors, (D_7) satisfaction with grades obtained, (D_8) satisfaction with the level of learning achieved, and (D_9) satisfaction with the quality of online classes. Estimates include dummy variables by university. Standard errors are in parenthesis.

significantly (at 5%) affect satisfaction with academic performance are satisfaction with grades, satisfaction with learning, and satisfaction with the quality of online classes. Satisfaction with the support provided by the university is no longer relevant, and what matters is satisfaction with grades (which was not relevant to evaluate the experience with virtual classes).

Next, we explored the existence of heterogeneous effects, for which separate estimates were carried out by gender and geographical area. Results are presented in **Tables 4, 5**.

In **Table 4**, results show that, for men, two domains influenced overall satisfaction with virtual classes: satisfaction with learning and satisfaction with the perceived quality of online classes. Satisfaction with the platform used by the university also has a positive impact, but significant only at 10%. In contrast, for women, satisfaction with the support provided by the university is a significant predictor.

Regarding satisfaction with current academic performance, **Table 4** also shows that satisfaction with grades and with

TABLE 3 | Two-layer method, second layer: subjective wellbeing of students, controlling for z.

Variables	Satisfaction with virtual classes	Satisfaction with current academic performance
Satisfaction with the support provided by the university	0.0985*** (0.034)	−0.0179 (0.038)
Satisfaction with the dedication and interest of the instructors	−0.0468 (0.052)	−0.0846 (0.062)
Satisfaction with the technological platform used by the university for online classes	0.0833* (0.048)	0.0351 (0.043)
Satisfaction with the quality of pedagogical material	−0.00727 (0.055)	−0.0371 (0.058)
Satisfaction with the relationship with classmates	0.0194 (0.038)	−0.0122 (0.038)
Satisfaction with the relationship with instructors	0.00911 (0.047)	0.0495 (0.052)
Satisfaction with grades obtained	−0.00223 (0.051)	0.514*** (0.051)
Satisfaction with the level of learning achieved	0.460*** (0.058)	0.308*** (0.064)
Satisfaction with the quality of online classes	0.393*** (0.060)	0.191*** (0.066)
z	−0.401 (1.563)	−0.174 (1.834)
Constant	0.559 (11.75)	3.182 (12.74)
N	648	648
R squared	0.677	0.648

*10% significance level.
***1% significance level.
Standard errors are in parenthesis.

learning have a positive and statistically significant effect (at 5%) for men. The same occurs in the case of women, but satisfaction with the quality of the online classes is also added.

The estimates of the two-layer model, separated by geographical area, are presented in **Table 5**. For students in the Metropolitan area campuses, satisfaction with the support provided by the university, with the technological platform, with perceived learning and with the quality of online classes, are the most relevant determinants of overall satisfaction with virtual classes. On the other hand, for students from other regions, the determinants are the same except for the platform used by the university, which does not have a statistically significant impact.

For the satisfaction with current academic performance, the most relevant predictor among students from the Metropolitan area are grades, learning, and class quality. For students outside the Metropolitan area, the domains that explain satisfaction with current academic performance are grades and learning.

TABLE 4 | Two-layer method: estimates separated by gender.

Variables	Men ($n = 302$)		Women ($n = 346$)	
	Satisfaction with virtual classes	Satisfaction with current academic performance	Satisfaction with virtual classes	Satisfaction with current academic performance
Satisfaction with the support provided by the university	0.0507 (0.047)	−0.0705 (0.053)	0.165*** (0.049)	0.0616 (0.053)
Satisfaction with the dedication and interest of the instructors	−0.0630 (0.073)	−0.0168 (0.080)	−0.0195 (0.076)	−0.149* (0.086)
Satisfaction with the technological platform used by the university for online classes	0.132* (0.079)	0.0674 (0.076)	0.0579 (0.063)	0.0168 (0.052)
Satisfaction with the quality of pedagogical material	−0.0492 (0.070)	−0.0366 (0.083)	0.0134 (0.089)	−0.0496 (0.080)
Satisfaction with the relationship with classmates	−0.0182 (0.056)	−0.0224 (0.054)	0.0636 (0.051)	0.0222 (0.055)
Satisfaction with the relationship with instructors	0.0241 (0.073)	0.0329 (0.071)	0.00250 (0.064)	0.0552 (0.074)
Satisfaction with grades obtained	0.0315 (0.076)	0.474*** (0.076)	−0.0344 (0.075)	0.555*** (0.072)
Satisfaction with the level of learning achieved	0.484*** (0.080)	0.300*** (0.087)	0.460*** (0.086)	0.337*** (0.092)
Satisfaction with the quality of online classes	0.258*** (0.090)	0.0941 (0.098)	0.498*** (0.083)	0.285*** (0.087)
z	1.960 (2.457)	1.814 (2.210)	−3.025 (2.349)	−2.612 (2.811)
Constant	9.492 (18.68)	9.493 (16.96)	−11.18 (17.50)	−7.159 (18.23)
N	302	302	346	346
R squared	0.738	0.705	0.631	0.610

*10% significance level.
***1% significance level.
Standard errors are in parenthesis.

DISCUSSION

Table 6 summarizes results of the estimates. The symbol "✓" denotes that the effect is statistically significant.

First, we can highlight that only five of the nine domains have a positive and statistically significant effect, either on virtual classes satisfaction or on current academic performance.

TABLE 5 | Two-layer method: estimates separated by geographical area.

	Metropolitan area = 1 (n = 515)		Metropolitan area = 0 (n = 133)	
Variables	**Satisfaction with virtual classes**	**Satisfaction with current academic performance**	**Satisfaction with virtual classes**	**Satisfaction with current academic performance**
Satisfaction with the support provided by the university	0.101**	−0.00995	0.123*	−0.0176
	(0.039)	(0.045)	(0.067)	(0.082)
Satisfaction with the dedication and interest of the instructors	−0.0130	−0.0624	−0.129	−0.159
	(0.061)	(0.071)	(0.121)	(0.131)
Satisfaction with the technological platform used by the university for online classes	0.114**	0.0657	0.00623	−0.0341
	(0.054)	(0.048)	(0.106)	(0.096)
Satisfaction with the quality of pedagogical material	−0.00934	−0.0484	0.0427	0.0692
	(0.059)	(0.069)	(0.157)	(0.131)
Satisfaction with the relationship with classmates	0.00937	−0.00279	0.0868	−0.0525
	(0.042)	(0.044)	(0.091)	(0.087)
Satisfaction with the relationship with instructors	0.00718	0.0436	0.0508	0.124
	(0.053)	(0.060)	(0.095)	(0.111)
Satisfaction with grades obtained	0.0469	0.551***	−0.0978	0.443***
	(0.058)	(0.057)	(0.100)	(0.123)
Satisfaction with the level of learning achieved	0.451***	0.314***	0.497***	0.315**
	(0.065)	(0.073)	(0.116)	(0.145)
Satisfaction with the quality of online classes	0.409***	0.212***	0.394**	0.162
	(0.063)	(0.072)	(0.163)	(0.173)
z	−1.250	−1.301	−0.625	0.984
	(1.870)	(2.351)	(2.464)	(2.341)
Constant	−7.266	−4.880	4.611	10.08
	(14.27)	(15.84)	(16.59)	(14.53)
N	515	515	133	133
R squared	0.684	0.641	0.673	0.687

*10% significance level.
**5% significance level.
***1% significance level.
Standard errors are in parenthesis.

Indeed, the domains that systematically have a positive impact on students' satisfaction are satisfaction with grades (this domain is only relevant to explain satisfaction with current academic performance), satisfaction with learning, and satisfaction with the quality of online classes (these last two domains are relevant to explain both dimensions evaluated). On the other hand, there are two domains that only in certain cases present a statistically significant effect: satisfaction with the support provided by the university, and satisfaction with the technological platform used by the university.

A special mention is deserved by what happened with the (negative) effect that satisfaction with the dedication and interest of instructors has on satisfaction with the academic performance of female students. It is a result that can have multiple interpretations, but it certainly attracts attention. This result means that the more satisfied the female students are with the dedication and interest of the professors, the less satisfied they are with their current academic performance. We can hypothesize that instructors' interest does not necessarily translate into higher performance, which damages the expectations of female students.

On the other hand, some domains are irrelevant when explaining satisfaction with overall online learning or current academic performance: satisfaction with the quality of the pedagogical material, satisfaction with the relationship with classmates, and satisfaction with the relationship they have with the instructors.

Another aspect systematically revealed by the estimates is that the variables associated with unobserved individual differences (variable z) do not have a significant effect in explaining the subjective wellbeing of students, with very specific exceptions.

Results should guide higher education institutions regarding which are the aspects that should be reinforced to improve the subjective evaluation that students make of online learning. Here it is possible to identify two variables. First, satisfaction with learning. Thus, the universities must guarantee that in the context of an online environment learning takes place on the part of the students. This is a challenge, because in this context the students interact less among themselves and with the instructor, and in fact, in general, they do not turn on their cameras.

The second variable is related with satisfaction with the quality of the online classes. To promote the quality of the classes, a permanent policy of support for instructors must be in place. Observing the instructor's class will also be helpful in providing feedback. It is very necessary for instructors to be trained in the use of information and communication technologies since it will allow them to access various resources to improve the quality of their online classes.

Our findings should be viewed with caution. The estimates were carried out with a sample of students from three universities in Chile; therefore, the results of the study cannot be generalized to other samples. In this sense, it would be convenient to gather information from different countries, thus more fully understanding the determinants of satisfaction with the virtual academic experience of young people. We should also remember that we use single-item measures, whose limitations have already been discussed in section Measures.

It would be interesting for a possible future line of research to establish the effect that the academic performance of peers

TABLE 6 | Satisfaction with online classes and with academic performance: summary.

	All		Men		Women		Metropolitan area = 1		Metropolitan area = 0	
Satisfaction with:	**(a)**	**(b)**	**(a)**	**(b)**	**(a)**	**(b)**	**(a)**	**(b)**	**(a)**	**(b)**
The support provided by the university	✓				✓		✓			
The dedication and interest of the instructors						✓				
The technological platform used by the university for online classes	✓		✓				✓			
The quality of pedagogical material										
Relationship with classmates										
Relationship with instructors										
Grades obtained		✓		✓		✓		✓		✓
The level of learning achieved	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The quality of online classes	✓	✓	✓		✓	✓	✓	✓	✓	

(a) Dependent variable: satisfaction with virtual classes. (b) Dependent variable: satisfaction with current academic performance. (✓) the domain is statistically significant in at least one of the models.

has on the subjective wellbeing associated with the online experience of young people. This is because it is widely documented that subjective wellbeing (satisfaction with life, for example) depends not only on one's own monetary income but also on the monetary income of the group with which the individual is compared, the reference group (Ferrer-i-Carbonell, 2005; Card et al., 2012; Montero and Rau, 2015, 2016; Montero and Vásquez, 2015; Montero and Miranda, 2020). A similar phenomenon could occur in the context of learning, where the result of a peer affects one's own subjective wellbeing.

CONCLUSION

To conclude, we have investigated how online education has been perceived by undergraduate students in Chilean Universities. We have implemented an econometric method to control the effect that unobserved individual differences play in regard to students' subjective evaluations. Results show, on one hand, that satisfaction with the support provided by the university, satisfaction with learning, and satisfaction with the quality of the online classes, are the most relevant domains to explain satisfaction with the virtual classes experience. On the other hand, satisfaction with academic performance is affected the most by domains such as satisfaction with grades, satisfaction with learning, and satisfaction with the quality of the online classes. In order to evaluate the existence of heterogeneous effects, estimates are provided, separating them by gender, and by geographic area. In this context, the domains that systematically have a positive impact on the subjective wellbeing of students are satisfaction with grades, satisfaction with learning, and satisfaction with the quality of classes.

Due to the relevance that online and hybrid education have attained, a trend that will continue growing even after the pandemic has come to an end, universities must understand how to deliver the best educational experience, particularly to those students belonging to the most vulnerable groups of society which present more difficulties accessing computers and Wi-Fi connections, something that would make the gap between the haves and the have-nots even wider. Our investigation has helped to cast light on some aspects related to this discussion and to provide insights to improve students' online educational experience.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the Open Science Framework [OSF] at: https://osf.io/vytn8/?view_only=c6969b9501e24bec8ac9caf33127fa31.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Teachers' emotional exhaustion before and during the COVID-19 pandemic: Neither emotional exertion nor vacation feeling

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Purpose: In this paper, we use latent change models to examine the changes in in-service teachers' emotional exhaustion before and during the COVID-19 pandemic. As a result of the pandemic, teachers are confronted with challenging tasks, which can lead to stress and burnout. Resultingly, teachers' stress experiences have been examined in different studies. However, often the *change* in those experiences remains unclear. Against this background, we investigate longitudinally how the emotional exhaustion of a cohort of German teachers changes. In addition, we examine whether gender, age, teaching degree studied, or the amount of time spent in distance learning affected the change during the pandemic.

Methods: We surveyed German veteran teachers (N=382) about their emotional exhaustion at three measurement points. The first two surveys were before the COVID-19 pandemic (t_1: winter 2016/2017; t_2: spring: 2019), and the third measurement point was after the first lockdown Germany in summer 2020 (t_3). To answer the research questions, we used neighbor-change models.

Results: Emotional exhaustion increased between the first two measurement points (t_1, t_2) but decreased in the following period (t_2, t_3). The changes in the two periods did not differ significantly from each other. Neither gender, age, nor the teaching profession studied influenced the change in emotional exhaustion. The hours spent in distance learning were also not a significant predictor.

Conclusion: In summary, the COVID-19 pandemic does not appear to be associated with higher emotional exhaustion across the veteran teachers. However, there are some teachers whose emotional exhaustion rises to high levels. Those teachers deserve special attention.

KEYWORDS

Coronavirus disease, emotional exhaustion, in-service-teachers, latent-change, longitudinal study, teacher stress

Introduction

Since the beginning of 2020, the COVID-19 pandemic has had multiple impacts on all aspects of daily life. The educational sector has also been extensively affected by the restrictions associated with the pandemic. All around the world, schools were closed – also in Germany. The associated challenges represented an additional stressor for teachers (Rabaglietti et al., 2021; Weißenfels et al., 2022). Within a short time, they had to convert their lessons to digital formats (König et al., 2020; Lorenz et al., 2020). Following the lockdown, many teachers practiced a mixture consisting of face-to-face instruction at school and homeschooling (Klapproth et al., 2020). At the same time, many felt insecure about digital teaching (Hansen et al., 2020).

Various studies have already captured the perspective of children and parents on the COVID-19 pandemic (e.g., Adams et al., 2021; Bussières et al., 2021; Simm et al., 2021). However, despite teachers' central role, investigations have less frequently focused on their experiences. This paper addresses the exhaustion of teachers in Germany. In contrast to previous studies, however, the change in emotional exhaustion is examined longitudinally. The first two measurement points were in winter 2016/2017 and spring 2019 – before the COVID-19 pandemic. A third measurement point was during the pandemic in summer 2020.

The study had three purposes. *First*, it investigated whether emotional exhaustion increased or decreased over time. *Second*, it examined whether emotional exhaustion changed differently during the COVID-19 pandemic, in comparison to before the pandemic. *Third*, we tested the influence of gender, age, and teaching degree on the change in emotional exhaustion.

Emotional exhaustion

Emotional exhaustion represents the central dimension of burnout and describes a feeling of being emotionally overextended and depleted of one's resources. It manifests as a lack of energy (Maslach et al., 2001) and develops individually differently – depending on person and environment (Lazarus and Folkman, 1984). Thus, depending on their own internal and external resources, different individuals may evaluate the same situation quite differently. While one person views a situation as a challenge that can be mastered, another person might perceive an imbalance of demands and resources and consequently experience the same situation as a threat (e.g., Antonovsky, 1987; Bakker and Demerouti, 2008). Although evaluation is individual, new and unpredictable situations with low subjective controllability are thought to intensify the experience of stress (Lazarus and Folkman, 1984). Consequences are the experience of emotional exhaustion and, in the long term, burnout (Maslach et al., 2001).

To date, some studies provide information on how teachers' stress and burnout change throughout their professional lives. Generally, occupational stress seems to be a largely stable construct as far as the mean value is concerned (Hultell, 2011). In other words, emotional exhaustion scarcely increases or decreases across all participants in a sample. Even over 16 years, teachers' experienced job strain does not vary significantly on average (Bleck et al., 2019). However, changes in emotional exhaustion are evident for beginning teachers (Hultell et al., 2013; Dicke et al., 2016) and during teacher induction (in German *Referendariat*; Dicke et al., 2015; Voss and Kunter, 2020). Although the effect sizes are small, emotional exhaustion increases at the beginning of teacher induction time and decreases with growing teaching experience throughout the traineeship (Voss and Kunter, 2020). A frequently mentioned explanation for the increase at the beginning is the wide range of new tasks and that teachers are responsible for their lessons and student learning for the first time (e.g., Dicke et al., 2015).

Emotional exhaustion during the COVID-19 pandemic

The situation during the COVID-19 pandemic is associated with unpredictability and low controllability for everyone, especially for teachers. In this respect, the experience of emotional exhaustion could increase, comparable to the career entry experiences. In interviews, teachers in England were asked about their feeling about the COVID-19 pandemic and described uncertainty about the future as a central theme (Kim and Asbury, 2020; Kim et al., 2022). Argentine teachers stated in a survey that uncertainty about the consequences of the COVID-19 pandemic was the greatest stressor for them (Vargas Rubilar and Oros, 2021). Teachers in Germany have also reported feelings of uncertainty (Hansen et al., 2020). At the same time, demands and resources for coping with everyday professional life are changing (Hilger et al., 2021). Even if occupational demands and resources were in balance before the COVID-19 pandemic, resources might no longer be sufficient to cope with the lockdown requirements and the associated homeschooling (Weißenfels et al., 2022). Against this background, it is also plausible to assume that teachers' emotional exhaustion increases during the pandemic.

Whether in the United Kingdom, Italy, Vietnam, or Germany, the perceived workload of teachers in many places around the world has increased due to COVID-19 (e.g., Giovannella et al., 2020; Hansen et al., 2020; See et al., 2020; Vu et al., 2020). The heavier workload arises, among other things, from the additional organizational and communication requirements, and from initial familiarization issues with digital media (forsa, 2020). This perceived workload could also be associated with increased emotional exhaustion. Results from Canada suggest that teachers are having higher levels of stress and emotional exhaustion during the COVID-19 pandemic (Sokal et al., 2020b). The values were above the theoretical mean. Teachers from the United States, Spain, and Finland also reported high levels of stress, burnout, and negative emotions (Ozamiz-Etxebarria et al., 2021; Pöysä et al., 2021; Chang et al., 2022). However, a study of German teachers found a decrease in workload and fatigue after the first lockdown (Hilger et al., 2021). Filipino teachers' mental health appears to

have been little affected by the COVID-19 pandemic (Rabacal et al., 2020). While one-third of teachers have low levels of perceived stress, only one in 10 Filipino teachers surveyed in August 2020 reported high levels of stress (Oducado et al., 2021). A study in Israel found that teachers reported experiencing more burnout than before the COVID-19 pandemic (Gutentag and Asterhan, 2022). Teachers in the United Kingdom also showed high levels of well-being, although around half of the survey respondents experienced online teaching as stressful (See et al., 2020).

Prior studies in German-speaking countries have also focused on stress and occupational strain among teachers during the COVID-19 pandemic. Results of the school barometer (Huber and Helm, 2020) indicate that around 40% of school staff felt very stressed 2 weeks after the beginning of the first lockdown in March 2020. A representative survey of 310 teachers conducted in April 2020 shows that most teachers were coping well with the new situation (Eickelmann and Drossel, 2020). However, teachers' perceived stress during the pandemic varied greatly: On the one hand, around one-third reported feeling less stressed than usual. These were mainly teachers who did *not* provide digital services during school closures. On the other hand, one-third of the respondents felt more stress than usual – regardless of their gender or age. One in six teachers felt overwhelmed by the new situation during the pandemic (Eickelmann and Drossel, 2020).

Using a sample of teachers from the German federal state Thuringia ($N = 1.263$), Dreer and Kracke (2021) show that their participants' job satisfaction during the lockdown in April 2020 was high and that the teachers felt moderately stressed. Hansen et al. (2020) also summarize that the teachers they surveyed show a high occupational satisfaction – despite the pandemic. Nevertheless, at the same time, the authors point out that one in four teachers show symptoms of burnout. In the survey conducted by Lorenz et al. (2020) in April and May 2020, the teachers also described both positive and negative emotions. The teachers' perceived occupational stress was at a medium level. However, a higher level was reported by the female teachers in the sample and by teachers who did not feel sufficiently supported by the school management. In another cross-sectional study with teachers of different school types in Germany, the respondents reported a medium or high level of stress: They sometimes or often felt nervous or strained during the 4 weeks prior to taking part in the survey (Klapproth et al., 2020). The perceived stress was greater among female teachers than among male teachers and also greater among high-track secondary school teachers compared to those in other types of schools. In addition, the study showed a correlation between the experienced stress and the time spent daily on distance learning.

The mentioned studies indicate that, during the COVID-19 pandemic, German teachers are experiencing challenges associated with increased emotional exhaustion (see also Eickelmann and Drossel, 2020; Klapproth et al., 2020). However, the studies did not take into account the emotional exhaustion pre-pandemic, making the reported values difficult to interpret. Furthermore, most studies only focused on the *state* of stress and exhaustion but did not survey any *change*. There are a few exceptions to this restriction. In a qualitative study, 24 teachers were interviewed at various times during the COVID-19 pandemic (Kim et al., 2022). The authors conclude that mental health and well-being appear to decline during the period. Lindner et al. (2021) found a decrease in job satisfaction among Austrian teachers until the first lockdown. During this period, female teachers' job satisfaction declined more than the satisfaction of male teachers. However, job satisfaction before the pandemic was only examined retrospectively during the COVID-19 pandemic.

In the following, we report the results of quantitative studies that analyzed changes in well-being and stress before and during the COVID-19 pandemic. A study with Chilean teachers showed a significant decrease in life satisfaction from pre-pandemic to summer 2020 (Lizana et al., 2021). Pellerone (2021) questioned teachers from Italy about their feelings of burnout. Her findings indicate that teachers rated their personal performance as a dimension of burnout significantly lower during the pandemic compared to an earlier survey. The general level of burnout was significantly higher, although there were no significant changes in emotional exhaustion and depersonalization. A recent study from Germany by Weißenfels et al. (2022) examined the changes in burnout and self-efficacy based on data from 92 teachers. The first survey was conducted in fall 2019, with the second survey starting in May 2020. Using latent change models, the authors show that, while lack of accomplishment and depersonalization increased significantly, emotional exhaustion did not. Sokal et al. (2020a) surveyed Canadian teachers at two measurement points *during* the pandemic – in April 2020 and June 2020. Over the investigation period during the pandemic, both teachers' emotional exhaustion and depersonalization increased.

Unfortunately, the studies that have investigated change in emotional exhaustion did not have the data to compare the change before and during the pandemic. Thus, this longitudinal survey depicting and comparing long-term changes – before and during the COVID-19 pandemic – can provide data about essential to interpreting findings related to teachers' emotional exhaustion.

Research questions

Up to now, only a few studies describe the change in teachers' emotional exhaustion during the COVID-19 pandemic. Exceptions are the described studies conducted by Sokal et al. (2020a), Lizana et al. (2021), Pellerone (2021), and Weißenfels et al. (2022). Despite their longitudinal design, it is unclear how the change in emotional exhaustion during the pandemic differs from the change before the pandemic. The first research question of the paper arises from this lack of corresponding studies:

> *Research question 1:* Has teachers' emotional exhaustion changed differently in times of the COVID-19 pandemic in comparison to before the pandemic?

The challenges for teachers associated with the pandemic are often emphasized. These challenges may be linked to a higher workload and increased emotional exhaustion. However, previous studies also show that the experience of teachers varies greatly: While some teachers report increased stress, a similarly high proportion of teachers report experiencing less stress than before the pandemic (Eickelmann and Drossel, 2020). Due to the inconsistent findings, we do not formulate a hypothesis about the change in emotional exhaustion. Instead, the aim is to test whether the emotional exhaustion that changed between spring 2019 and summer 2020 (during the COVID-19 pandemic) was similar to the change between the two measurement points before the COVID-19 pandemic.

In a second step, to learn more about the change in emotional exhaustion during the COVID-19 pandemic, we examine the regression of stress change on gender, age, and teaching profession studied. In addition, we investigate if the time spent in distance learning predicts the change of emotional exhaustion during the pandemic.

> *Research question 2*: Do gender, age, the teaching profession studied, and the amount of time spent in distance learning predict the interindividual change in emotional exhaustion?

We developed two hypotheses related to this research question. Some research findings on *gender* suggest that female teachers experience higher occupational stress and emotional exhaustion than male teachers (Klapproth et al., 2020; Lorenz et al., 2020; Lindner et al., 2021; Oducado et al., 2021; Ozamiz-Etxebarria et al., 2021). In contrast, Eickelmann and Drossel (2020) report that the experience of occupational stress varies among teachers regardless of their gender. The relation between *age* and the experience of stress has been less frequently studied. Previous research suggests no association between the two characteristics (Eickelmann and Drossel, 2020; Oducado et al., 2021). A correlation between age and stress was found only in the retrospective study by Jakubowski and Sitko-Dominik (2021). In the study conducted by Weißenfels et al. (2022), the change in emotional exhaustion was independent of teachers' gender and work experience.

While Lorenz et al. (2020) found that the *type of school* also does not affect the perceived occupational stress, the results from Klapproth et al. (2020) suggest that teachers at high-track secondary schools are more stressed than teachers at other types of schools. However, the present sample does not include participants who have studied teaching for high-track secondary schools. Therefore, a hypothesis is only formulated for gender while investigating the influence of age and teaching degree in an exploratory manner.

> *Hypothesis a*: Emotional exhaustion increases significantly more among female teachers than among male teachers.

The change to digital teaching is associated with numerous challenges for many teachers and became a particular stressor during the pandemic. In this respect, we assume that digital teaching has a higher potential for emotional exhaustion than other teaching practices more similar to conventional lessons. On the other hand, if teachers do not conduct digital lessons during school closures, the workload should also be reduced. Thus, it is not surprising that Eickelmann and Drossel (2020) found that teachers who did not provide digital resources felt less stressed. Furthermore, the extent to which they teach digitally seemed to influence the emotional experience. Teachers who spent more hours a day on distance learning reported higher occupational stress (Klapproth et al., 2020). In this respect, we formulate the following assumption for the interrelation between the amount of time spent in distance learning and the change in emotional exhaustion:

> *Hypothesis b*: The more hours teachers spent on distance learning per week, the higher the increase in emotional exhaustion during the COVID-19 pandemic.

Materials and methods

The data are part of the longitudinal project *professional paths* (in German *Wege im Beruf*; Lipowsky, 2003; Bleck et al., 2019). The project focuses on former students of Universities of Education in the German federal state Baden-Württemberg who completed their teacher education program between 1995 and 1997. Besides teachers, the sample also comprises graduates working outside the teaching profession. From 1999 to now, they were assessed 12 times on their professional situation and their professional experiences. Thus, the project has been running for over 20 years. Over time, the content focus has evolved and changed. As a result, not all constructs have been measured at all time points. However, some constructs like occupational stress were included in all surveys.

This paper focuses on the teachers in the sample and uses the data from three survey dates. We examined the change in emotional exhaustion starting from winter 2016/2017 (t_1) through spring 2019 (t_2). These time points are thus *before* the start of the COVID-19 pandemic. The third assessment point was in summer 2020 (t_3) and therefore was conducted *during* the pandemic. Data was collected using an online questionnaire.

Sample

The total sample consists of 977 graduates who participated in the first two surveys in 1999 and 2001. The following analyses include all participants from whom data are available for at least one of the three measurement points ($N = 505$). Participants working outside the teaching profession at one of the three measurement points were excluded from the analyses ($N = 123$). Accordingly, 382 teachers remain in the sample. At the last

measurement point in summer 2020, the participants were on average 51 years old ($M = 50.53$, $SD = 2.92$) and had worked for about 20 years in the teaching profession ($M = 20.04$, $SD = 3.24$). Accordingly, this is a group of veteran teachers.

They taught mainly in grades 5–9 (52.1%) or 1–4 (46.9%). They have studied primary and low-track secondary school teaching (*Grund- & Hauptschullehramt*, 61.8%) or middle-track secondary school teaching (*Realschullehramt*, 38.2%). The average teaching load was around 21 h ($M = 20.53$, $SD = 6.06$) with a real working time of around 31 h per week ($M = 30.86$, $SD = 12.91$).

The final sample participants ($N = 382$) do not differ from the rest of the original sample (non-participants: $N = 595$) either in the teaching profession studied ($\chi^2(1) = 1.52$, $p = 0.218$), in gender ($\chi^2(1) = 1.21$, $p = 0.271$) or in year of birth ($t(934.81) = -1.87$, $p = 0.062$). There are also no differences between participants and non-participants in occupational stress at the first measurement point in the project (2001; $t(707) = -0.86$, $p = 0.392$) or at the last time of measurement before 2016 (t_1), which was in 2012 ($t(390) = -0.28$, $p = 0.783$).

As participants without complete data are also considered in the longitudinal analysis, data are missing at particular measurement points. The percentage of missing values is 20.2% at t_1 in winter 2016/2017 and 15.7% at t_2 in spring 2019. At t_3, the survey during the COVID-19 pandemic, 23.8% of the data are missing. Since there are also missing values for some variables, the proportion of missing values is up to 28.0% per measurement. To handle the missing data, we performed multiple imputation using the package mice (van Buuren and Groothuis-Oudshoorn, 2011) in R 3.6.2. We generated 20 imputed data sets that are included for the analyses.

Measures

We used a German adaption (Enzmann and Kleiber, 1989) of the Maslach Burnout Inventory (Maslach et al., 1996) to assess emotional exhaustion at three measurement points. Participants were asked: "We are interested in how you experience your employment. Please rate the extent to which the following statements apply to you." The four items (e.g., "I often feel exhausted at work") have a Likert format ranging from 1 *does not apply at all* to 7 *applies completely*.

First, we tested the measurement invariance of the instrument at three measurement points. Strict measurement invariance is considered a prerequisite for testing differences in means (van de Schoot et al., 2012). Table 1 shows the fit indices of the models with different degrees of measurement invariance. In the models, correlations of the residuals of the same items at different measurement times were allowed (correlated uniqueness; Marsh and Hau, 1996). The model of *configural invariance* (without restrictions) shows a good model fit. The model fit remains stable even when equating the factor loadings in the *metric invariance* model (ΔCFI < 0.01, ΔRMSEA < 0.015; Cheung and Rensvold, 2002). Equating the intercepts in the *scalar invariance* model leads to a decrease in model fit, but the differences remain below the cut-offs (ΔCFI < 0.01, ΔRMSEA < 0.015; Cheung and Rensvold, 2002). Therefore, the instrument has the necessary level of strict measurement invariance over time.

We had already asked about gender (1 *female*, 2 *male*), birth year, and the teaching profession studied (1 *primary and low-track secondary school teaching*, 2 *middle-track secondary school teaching*) at an earlier measurement point in the project. How many hours per week the teachers spent on distance learning was determined at t_3 with the question: "On average, how many lessons per week have you conducted distance learning since mid-March?" On average, the teachers held around 10 lessons per week digitally ($M = 9.97$, $SD = 7.14$).

Analyses

To investigate our research questions, we specified latent change models in Mplus 7. Latent change models capture changes dynamically and directly in structural equation models (McArdle, 2009). Latent difference variables were modeled, representing interindividual differences in the change in emotional exhaustion on a latent level. The mean and variance of the latent difference score can be tested for significance, and predictor variables can be included in the models (Steyer et al., 1997; McArdle, 2009). The model fit was assessed using the fit indices commonly used for structural equation models. Thus, to avoid misinterpretation, we used different fit indices – χ^2 as well as CFI, TLI, and RMSEA – to estimate the model fit. χ^2 depends on sample size and leads to significant values in larger samples (Chen, 2007). Therefore, we consider χ^2 concerning the degrees of freedom. Both CFI and TLI have proven useful for assessing the model fit and should be $\geq$0.90 for an acceptable fit. Values $\geq$0.95 suggest a good fit to the data (Hu and Bentler, 1999; Brown, 2006). For RMSEA, values $\leq$0.08 suggest an acceptable fit, and values <0.05 indicate a good fit (Brown, 2006).

To answer *research question 1*, we specified a neighbor-change model based on the strict measurement invariance model. The model contains the differences between the first and second measurement time point (t_1, t_2) and between the second and third

TABLE 1 Series of CFA models investigating measurement invariance of emotional exhaustion.

	χ^2/df	$p(\chi^2)$	CFI	TLI	RMSEA	AIC
Configural invariance	2.07	<0.001	0.973	0.954	0.053	15,463.03
Metric invariance	1.96	<0.001	0.972	0.959	0.050	15,554.35
Scalar invariance	2.04	<0.001	0.965	0.955	0.052	15,473.01

measurement time point (t_2, t_3). To test whether the changes differ significantly, the intercepts of the latent difference variables were set equal in the next step. A Chi-square test was used to check whether the restricted model fits significantly worse than the model without restrictions. To answer *research question 2*, we included additional covariates in the model to predict the baseline value and the two latent difference scores.

Results

Changes in emotional exhaustion

With *research question 1*, we investigate how emotional exhaustion has changed before and during the COVID-19 pandemic. Are the changes similar or significantly different? To answer the question, we specify a neighbor-change model ($\chi^2/df = 1.91$, $p(\chi^2) < 0.001$; CFI = 0.97, TLI = 0.96, RMSEA = 0.05, AIC = 15,468). The latent baseline score of emotional exhaustion is below the theoretical mean ($M = 2.83$; Table 2). Consequently, at the first measurement point (t_1, winter 2016/2017), the teachers felt emotionally exhausted to a relatively low degree. The latent difference between this first and the second measurement point in spring 2019 (t_2–t_1) is positive and significant ($M = 0.12$, $SE = 0.06$, $p = 0.041$). This result indicates that emotional exhaustion increased significantly in the sample between the two measurement points *before* the COVID-19 pandemic. Given that the variance of the latent difference score is also significant ($\sigma = 0.68$, $SE = 0.11$, $p < 0.001$), emotional exhaustion varies substantially between the teachers.

The latent difference between the second and third measurement time points (t_3–t_2) reveals the change in emotional exhaustion from spring 2019 to summer 2020. The intercept of the latent difference is negative ($M = -0.05$, $SE = 0.06$). Across all teachers in the sample, emotional exhaustion decreased slightly over about 1 year, including the beginning of the COVID-19 pandemic. However, the difference score and thus the change in emotional exhaustion is not significant ($p = 0.367$). Once again, the variance of the latent difference score indicates individual differences in the change in emotional exhaustion ($\sigma = 0.54$, $SE = 0.09$, $p < 0.001$).

While emotional exhaustion increased significantly in the period *before* the COVID-19 pandemic (from t_1 to t_2), emotional exhaustion does not change significantly in the following period, including the beginning of the pandemic (from t_2 to t_3). However, if we equate the intercepts of the latent difference scores, the Chi-square difference test yields no significant difference compared to the model with freely estimated parameters (baseline model: $\chi^2(59) = 112.79$, $p < 0.001$; restricted model: $\chi^2(60) = 115.83$, $p < 0.001$; $\Delta\chi^2 = 3.04$, $\Delta df = 1$, $p = 0.081$). Therefore, the change in emotional exhaustion is comparable over both periods.

The change in emotional exhaustion between the first two measurement points (t_2–t_1) is significantly negatively related to the baseline score at t_1 ($r = -0.36$, $p < 0.001$). Those teachers with high emotional exhaustion at the first measurement point tended to experience a decrease in emotional exhaustion up to the second measurement point. In contrast, the change between the second and third measurement point is not significantly related to the latent baseline score ($r = -0.15$, $p = 0.066$).

TABLE 2 Means and variances of the latent variables.

	Means (M)	Variances (σ)
Latent baseline score (t_1)	2.83 ($SE = 0.06$), $p < 0.001$	1.91 ($SE = 0.16$), $p < 0.001$
Latent difference (t_2–t_1)	0.12 ($SE = 0.06$), $p = 0.041$	0.68 ($SE = 0.11$), $p < 0.001$
Latent difference (t_3–t_2)	−0.05 ($SE = 0.06$), $p = 0.367$	0.54 ($SE = 0.09$), $p < 0.001$

Predictors of emotional exhaustion

In the next step, gender, year of birth, and teaching profession studied were simultaneously included as predictors for the baseline value of emotional exhaustion and the latent differences. The hours teachers spent in distance learning each week are modeled only as a predictor of the change in emotional exhaustion from t_2 to t_3, as it is a feature of the pandemic. Table 3 reports the standardized regression coefficients of the model ($\chi^2/df = 1.52$, $p(\chi^2) < 0.001$; CFI = 0.97, TLI = 0.96, RMSEA = 0.04, AIC = 15,478).

The baseline level of emotional exhaustion in winter 2016/2017 was slightly higher among female teachers than among male teachers, but the difference is not significant ($\beta = -0.07$, $p = 0.296$), nor is the subsequent change in emotional exhaustion predicted by gender (t_2–t_1: $\beta = 0.07$, $p = 0.338$; t_3–t_2: $\beta = -0.02$, $p = 0.802$). *Hypothesis a*, that emotional exhaustion increases to a greater extent in female teachers than male teachers during the COVID-19 pandemic, must be rejected.

We also tested the influence of the year of birth and the teaching profession. However, neither of the variables shows a significant influence on the baseline value of emotional exhaustion (see Table 3). Furthermore, the latent differences (t_2–t_1, t_3–t_2) are not explained by either of the two variables. The experience of emotional exhaustion at the first measurement point and the change between the subsequent measurement points are therefore independent of birth year and teaching profession studied.

Finally, we examined the influence of the time teachers spent on distance learning each week on the change in emotional exhaustion between spring 2019 and summer 2020. We assumed that emotional exhaustion increased to a greater extent when teachers spent more hours on distance learning (*hypothesis b*). However, the result suggests that this hypothesis must also be rejected ($\beta = 0.06$, $p = 0.382$).

Discussion

The COVID-19 pandemic and its consequences are omnipresent. Besides the economic consequences, the consequences in the field of education are receiving much attention. Homeschooling is not only challenging for students

TABLE 3 Prediction of the baseline score and the latent differences in the neighbor-change model.

	Latent baseline score		Latent difference (t_2–t_1)		Latent difference (t_3–t_2)	
	β (*SE*)	*p*	β (*SE*)	*p*	β (*SE*)	*p*
Gender[1]	−0.07 (0.06)	0.296	0.07 (0.07)	0.338	−0.02 (0.09)	0.802
Year of birth	−0.02 (0.06)	0.758	0.00 (0.08)	0.956	−0.05 (0.10)	0.608
Teaching profession studied[2]	−0.06 (0.06)	0.314	0.03 (0.08)	0.731	−0.06 (0.09)	0.468
Distance learning	–		–		0.06 (0.07)	0.382

[1]One female, two male.
[2]One primary and low-track secondary school teaching, two middle-track secondary school teaching.

and parents; the teachers' work has also been affected by the pandemic-related changes in schools. In this respect, educational research is focusing on teachers' experience of stress and emotional exhaustion during the pandemic. However, there is a lack of longitudinal research on the change in teachers' emotional exhaustion. In addition to existing studies, in this paper, we compared the change in emotional exhaustion before the COVID-19 pandemic with the change during the pandemic.

Summary

Research question 1 focused on the change in emotional exhaustion. From winter 2016/2017 to spring 2019 – throughout around 2 years even before the COVID-19 pandemic – the emotional exhaustion of the teachers surveyed increased significantly. From spring 2019 to summer 2020, which includes the start of the pandemic and the first lockdown, however, emotional exhaustion decreased slightly, albeit not significantly.

The situation of teachers caused by the COVID-19 pandemic is characterized by novelty and unpredictability. Therefore, the situation could increase the experience of stress and emotional exhaustion. In line with these theoretical assumptions, evidence was found in a sample of Canadian teachers that teachers' emotional exhaustion increased from April to June 2020 (Sokal et al., 2020a). On the other hand, there are also results showing that emotional exhaustion has not necessarily increased due to the COVID-19 pandemic. Pellerone (2021) and also Weißenfels et al. (2022) found no evidence of a significant increase in emotional exhaustion among teachers. This insignificant finding also seems to apply to the present sample. It is plausible that the emotional exhaustion of some teachers increases while the emotional exhaustion of other teachers decreases. As a result, no significant change emerges on average. Some teachers reported noticeably extra loads in earlier studies, while a similarly high proportion reported experiencing less stress (Eickelmann and Drossel, 2020). An indicator for such individual differences in change is the variance of the latent difference in our study, which is significantly different from zero ($\sigma = 0.54$, $SE = 0.09$, $p < 0.001$).

An open question is how these differences in the changes can be explained (*research question 2*). For this purpose, we included socio-demographic data such as gender, year of birth, and the teaching profession studied in the model. Contrary to expectations, gender had no significant effect on emotional exhaustion at the first measurement point (winter 2016/2017). Similarly, the subsequent change up to the second measurement point and the change between the second and third measurement points were unrelated to gender. Subsequently, we rejected *hypothesis a*. As a result, emotional exhaustion in the study sample – similar to Weißenfels et al. (2022) – is independent of teacher gender. Nonetheless, in the literature, gender differences in stress experience are widely reported (e.g., Purvanova and Muros, 2010; Innstrand et al., 2011; Fernet et al., 2012; Skaalvik and Skaalvik, 2016), even during the COVID-19 pandemic (e.g., Klapproth et al., 2020; Lorenz et al., 2020; Oducado et al., 2021). Neither age nor teaching profession studied are significant predictors of emotional exhaustion or its change.

Hypothesis b tested whether emotional exhaustion during the pandemic increases with the number of hours teachers spent on distance learning. For example, Eickelmann and Drossel (2020) showed that the experience of stress is higher among teachers with distance learning. More hours in distance learning are also associated with a higher stress experience (Klapproth et al., 2020). However, the change in emotional exhaustion in the present study cannot be explained by the extent of distance learning. This lack of a relationship between the two factors could be related to the time of the survey in the summer of 2020; teachers no longer only taught distance learning but also taught in the classroom. On the other hand, it is conceivable that a high distance learning level only causes stress under certain conditions. A high level of stress could arise if, at the same time, the amount of face-to-face teaching is high or if the teachers believe their competencies for implementing distance learning are low.

Limitations

When interpreting the results, special attention should be paid to the date of the third *measurement point* during the COVID-19 pandemic. The data collection took place from the end of July 2020 to late October 2020. Pandemic-related restrictions were lower during this phase than during the spring 2020 lockdown. In addition, the summer holidays were during this period. Previous

research suggests positive effects of vacations on well-being and dimensions of burnout. However, these effects fade out within a few days or weeks after the vacation (de Bloom et al., 2009). This *vacation effect* is also evident among teachers (e.g., Kühnel and Sonnentag, 2011; Kellmann and Heidari, 2020; Horan et al., 2021). Interviews with teachers indicate that recovery from vacations is lower for middle-aged and older teachers than for younger ones (Skaalvik and Skaalvik, 2015). Although we surveyed a sample of veteran teachers, it seems conceivable that the emotional exhaustion was even higher a few weeks earlier. However, there was no difference in emotional exhaustion between teachers who participated in the survey during holidays ($M = 3.17$, $SD = 1.29$, $N = 132$) and teachers who participated outside of holidays at the third measurement point ($M = 3.06$, $SD = 1.45$, $N = 138$, $t(268) = -0.67$, $p = 0.502$). Additionally, we could not find a significant correlation between the date of survey participation – measured by the week after the start of the survey – and emotional exhaustion at t_3 ($r = 0.06$, $p = 0.356$).

A positive aspect is that the more extended study periods of one to 2 years make it possible to compare changes before and during the COVID-19 pandemic. Nevertheless, it would also be interesting to compare changes during the pandemic within shorter periods. It is conceivable, for example, that emotional exhaustion increased at the beginning of the lockdown and decreased afterward. However, this cannot be stated based on our data. Further, it should be noted that the time between the first and second measurement point (t_1: winter 2016/2017; t_2: spring 2019) is about 2 years, which is about twice as long as the period between the second and third measurement point (t_3: summer 2020). The primary reason for this is that we conducted the third survey *ad hoc* in order to be able to capture the teachers' experience during the pandemic.

Moreover, unique features of the *sample* must be taken into account. The sample consists of veteran teachers from three consecutive cohorts. In this respect, the sample is relatively homogeneous regarding age and professional experience and is not representative of all teachers in Germany. Even if the conducted dropout analysis (see section Sample) did not indicate, selection bias might have occurred over the long term of the project.

In particular, the differences between various types of schools cannot be represented. Since the teachers completed their first state examination at German Universities of Education in the federal state Baden-Württemberg, the sample does not include graduates for high-track secondary schools. However, the emotional exhaustion of high-track secondary teachers could differ from primary and lower- and middle-track secondary school teachers. According to the findings from Klapproth et al. (2020) high-track secondary teachers felt more stressed than other teachers during the COVID-19 pandemic.

Finally, it should be noted that we used a general version of the Maslach Burnout Inventory (Maslach et al., 1996) to assess emotional exhaustion. The Educator Survey of the Maslach Burnout Inventory (MBI-ES) specifically measures teacher burnout. Although the Educator Survey is more appropriate for the sample of teachers, we used the general version because all participants – including the graduates working outside the teaching profession – were asked about their emotional exhaustion.

Implications

For research, the study findings raise two central questions. First, the question arises of how emotional exhaustion will continue as the COVID-19 pandemic progresses. Will it decrease as the situation for teachers normalizes, or will it increase? In the study by Sokal et al. (2020a) with Canadian teachers, both emotional exhaustion and depersonalization of teachers increased from April to June 2020. Jakubowski and Sitko-Dominik (2021) also reported increased mental health problems in a sample of Polish teachers. However, the change between the beginning of the COVID-19 pandemic and the winter of 2020/2021 was not significant. Regardless of general trends regarding an increase or decrease in emotional exhaustion, it is crucial to identify those teachers whose emotional exhaustion increases significantly. The consequence can be impairments in motivation or subjective or objective health (Hakanen et al., 2006). Furthermore, the quality of (digital) teaching and students' learning can also suffer (Klusmann et al., 2008b, 2016).

Additionally, the question arises as to which characteristics can explain the individual change in emotional exhaustion. In the present study, neither gender, nor age, nor teaching profession studied, nor amount of distance learning significantly predicted the latent differences in emotional exhaustion. In addition to occupational demands, occupational and personal resources are also relevant in experiencing situations (Bakker and Demerouti, 2008; Sokal et al., 2020b). For *occupational demands*, time management, dealing with technology, and working with parents are significant predictors of emotional exhaustion during the pandemic (Sokal et al., 2020b). In lockdown times, *private demands*, such as caring for children in homeschooling and family-work conflicts, could also be highly important (Hilger et al., 2021; Gutentag and Asterhan, 2022; Kim et al., 2022). As a limitation, it should be noted that the same requirements do not necessarily have to be associated with the same experiences (Lazarus and Folkman, 1984).

Many studies have identified *social support* as an essential resource (e.g., Bakker and Demerouti, 2008; Voss and Kunter, 2020). Several studies show that support from school leadership, colleagues, and family and friends, is linked to lower emotional exhaustion (e.g., Klusmann et al., 2008a; Skaalvik and Skaalvik, 2016; Wolgast and Fischer, 2017; Voss and Kunter, 2020). During the pandemic, social support – from school leadership, colleagues, or in the private environment – is also considered highly relevant (Sokal et al., 2020b; Jakubowski and Sitko-Dominik, 2021; Kim et al., 2022). For example, teachers who experience their school leadership as autonomy-supportive report less burnout and emotional exhaustion (Collie, 2021; Chang et al., 2022). Further

research should examine which type of social support is helpful for teachers during the COVID-19 pandemic. It is conceivable that, similar to teacher induction time, teachers' instrumental support is especially beneficial (Voss and Kunter, 2020). Accordingly, the exchange of materials and literature seems to be of greater relevance in how prospective teachers experience emotional exhaustion than is the emotional support of peers. Similarly, during the pandemic, teachers could benefit from an exchange of teaching materials and content on methods and tools within the teaching staff.

Finally, *personal resources* are theoretically also crucial in the experience of emotional exhaustion. In this respect, self-efficacy as a resource is associated with the change in emotional exhaustion (e.g., Dicke et al., 2015). Studies also examine the extent to which teachers' knowledge can protect them from burnout (Lauermann and König, 2016). It seems reasonable, that under the current circumstances of the COVID-19 pandemic, technical knowledge and its application in the classroom (*TPACK*; Mishra and Koehler, 2006) are important in how emotional exhaustion is experienced. For example, Gutentag and Asterhan (2022) found a negative correlation between online teaching proficiency and burnout. Another study shows that the emotional exhaustion of teachers who have participated in a 14-week training on stress management, emotional intelligence, and the use of digital media develops more favorably compared to that of a control group (Pozo-Rico et al., 2020). Thus, teacher training seems to be a resource to protect against emotional exhaustion. Despite the findings of Pozo-Rico et al. (2020), however, it is unclear whether emotional exhaustion is reduced by stress management, emotional intelligence, digital media, or a combination of all three. In the study by Weißenfels et al. (2022), the change in emotional exhaustion is independent of self-efficacy for using digital media and attitudes toward e-Learning.

This study examined the change in emotional exhaustion before and during the COVID-19 pandemic using latent change models. The results show that emotional exhaustion increased significantly over the 2 years *before* the pandemic. However, emotional exhaustion slightly decreased in the following year, including the beginning of the pandemic and the first lockdown. Consequently, coping with the situation during the COVID-19 pandemic was *not* an emotional exertion for the sample of veteran teachers. However, it should be noted that there are substantial differences between teachers, and some of them do report increased emotional exhaustion. Those teachers deserve special attention to avoid burnout and health problems in the long term.

Data availability statement

The datasets presented in this article are not readily available because the project is not yet completed. The data will be used for further publications and final theses. Requests to access the datasets should be directed to VB (victoria.bleck@uni-kassel.de).

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

FL supervised the project and reviewed the manuscript critically. FL and VB designed and administered the surveys. VB drafted the manuscript and performed the calculations. Both authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Psychometric properties of the Collective Efficacy Scale Short-Form in Chilean teachers

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Background: The Collective Efficacy Scale Short-Form (CES-SF) is a short and reliable instrument that assesses collective efficacy in schools at a group level. Previous research has shown a two-factor structure considering the perception of the group competence about their teaching capabilities and task analysis that refers to the opportunities inherent to a specific task. However, there is no conclusive evidence that collective efficacy corresponds to a two-factor model or single-factor structure.

Methods: A cross-sectional research was conducted on a 693 sample of teachers (M_{age} = 39.4; SD = 11.8) from schools in the 16 regions of Chile. They were assessed using the CES-SF, Personal Well-being Index, Social Well-Being Scale, and satisfaction with the school. Exploratory and confirmatory factor analyses were used to assess the construct validity of the CES-SF.

Results: The CES-SF showed mixed results about its construct validity. Best fit has been found to retain two new factors (opportunities and challenges for collective efficacy) with eight items each, yielding a McDonald's ω of 0.803. Convergent validity was also established.

Conclusion: The psychometric results suggest that a two-factor structure for the CES-SF is a valid and reliable measure for this construct for Chilean teachers. However, collective efficacy might not strongly relate to subjective wellbeing but to school-context variables.

KEYWORDS

teachers, collective efficacy, well-being, school context, factor analysis

Introduction

Collective efficacy refers to the shared belief within a group structure about their standard abilities related to the organization and execution of courses of action (Gurcay et al., 2009), thus extending the theory of efficacy from the individual level to the group organizational level (Bandura, 1986). The development of personal efficacy depends not only on individual assets but also on the social and institutional resources with which

individuals come into contact (Reyes-Rodríguez et al., 2021). Belief in the capabilities of a group to organize and execute the courses of action required to achieve a goal is an essential organizational property because it facilitates goal attainment (Salloum, 2021). Thus, collective efficacy is the shared beliefs of group members about whether they can work together to achieve the goal of a specific task (Sun and Lin, 2022).

Collective efficacy has been correlated with various organizational outcomes, such as job satisfaction and burnout (Yurt, 2022), organizational belongingness, organizational commitment, and job wellbeing (Awuor et al., 2022; Gómez-Leal et al., 2022; Sánchez-Rosas et al., 2022). A recent systematic review found various personal, structural, group, process, and organizational factors (Butel and Braun, 2019). Individual factors include willingness or commitment to collaborate, understanding the benefits of teamwork, and the combination of particular skills, knowledge, and experience in teamwork. The most important structural factors are related to issues of time, continuity of personnel, physical proximity, and formalization/regulation of professional interaction. Group and process characteristics (i.e., the specific aspects of a particular team and its work together) had the most facilitators, including team size, supportive atmosphere, transformational leadership and flexibility, task emphasis, and interdependence (Vangrieken et al., 2015). Given the above, it is essential to have a measure of collective efficacy for teachers that allow addressing the construct in a specific way due to the different variables related to it to maximize the benefits of a school's functioning.

Collective efficacy in teachers

Collaboration among teachers has long been highly valued for its significant benefits, including increased motivation, job satisfaction, self-efficacy, and collective efficacy and its role in teacher professional development and school improvement (Swafford and Anderson, 2020; Bükki and Fehérvári, 2021).

From the education perspective, Gurcay et al. (2009) reported that students, teachers, and school administrators develop common beliefs that can be studied in terms of self-efficacy and act according to them. Collective teacher self-efficacy refers to the perceptions that a group of teachers in a school has about their ability to work together to generate a positive effect on their students (Goddard et al., 2000).

Studies have found that teacher collaboration can significantly foster professional learning and improve student achievement (Bolam et al., 2005; Goddard et al., 2015; Reeves et al., 2017). Thus, teachers' collective efficacy predicts student success (Deltour et al., 2021), as outcomes are more effective when leading individuals in a community to embrace collectively valued goals rather than forcing them to do so (Peraza-Balderrama et al., 2021).

In educational settings, teachers' perceptions of collective efficacy refer to a personal judgment of their colleagues' abilities to perform instructional practices that support academic and psychosocial adjustment in school (Goddard et al., 2004) and in the collective ability of faculty members to positively affect student learning outcomes (Goddard et al., 2015).

Collective efficacy measurement

After Gibson and Dembo's (1984) teaching efficacy scale, designed to measure individual teaching efficacy, Goddard et al. (2000) created the Collective Efficacy Scale (CES). This scale considers a model with two dimensions of collective efficacy, namely, "group competence" and "task analysis," reflecting perceptions of the group competence (GC) judged to the task. The CES is a 21-item scale that measures teachers' collective efficacy based on the assumption that previous studies had considered measuring at the individual level (i.e., see Shamir et al., 2000; Ellemers et al., 2013), ignoring the effects of group membership (Goddard, 2002). This scale attempts to address this challenge by developing items that consider the judgment of the collective about the whole faculty ("Teachers in this school have what it takes to get the children to learn" instead of "I have what it takes to get my students to learn"). Later, Goddard (2002) tested a short form for the CES, considering 12 items more balanced than its 21-item version.

Other measures have been developed based on Goddard's research. The Collective Teacher Efficacy Scale (EC-CTES; Donohoo et al., 2020) addresses advanced teacher influence, goal consensus, knowledge of others' work, cohesive staff, leadership responsiveness, and Effective Systems of Intervention. Collective Teacher Self-Efficacy Scale (Sánchez-Rosas et al., 2021) is a self-report instrument that measures beliefs about the capabilities of the teaching team. Specifically, it was designed to assess, using 45 items, six dimensions of collective teacher self-efficacy: self-efficacy for decision-making (8 items), self-efficacy for teaching (8 items), self-efficacy for coexistence (7 items), self-efficacy for family involvement (7 items), self-efficacy for community involvement (7 items), and self-efficacy for positive school climate (8 items).

The present study

There is no consensus about measuring collective efficacy in schools considering one or several related factors. This study aimed to test the factor structure of collective efficacy that applies to teachers in Chilean schools. The chosen measure is the 12-item Collective Efficacy Scale Short-Form (CES-SF) developed by Goddard (2002), which is a short and widely used in different cultures measure for collective efficacy (Goddard et al., 2004; Baleghizadeh and Goldouz, 2016). We

hypothesized that (1) the CES-SF might retain its two-factor structure and (2) there will be a positive relationship between the validated measure of CES-SF and scales of subjective wellbeing, satisfaction with the school, and social wellbeing at school.

Materials and methods

Participants

This study used a probabilistic and stratified sample of schools in the different urban zones of the 16 regions of Chile in 2018. The sampling framework was the 2017 National School Enrollment Registry from the Chilean Ministry of Education. There were 693 teachers, and the mean age was 39.4 years (*SD* = 11.8). Most of the teachers were from public schools (44.8%) and subsidized schools (42.4%), followed by private ones (11.1%) and another administrative dependency (1.8%). According to the National School Vulnerability Index (IVE-SINAE, known as the school vulnerability percentage, which corresponds to the percentage of students in a situation of social vulnerability), 50% of the schools catered to students with low SES, 25.4% with medium SES and 24.6% with high SES.

Measures and instruments

Collective Efficacy Scale Short-Form (Goddard, 2002). Based on its original 21-item version, this scale included 12 items rated on a 6-point scale (1 = "strongly disagree"; 6 = "strongly agree"). Different items reflected two dimensions, namely, GC and task analysis (TA), each with six items, and both positively and negatively worded items appeared.

Criterion variables

Personal Wellbeing Inventory for Adults (PWI-A) was originally developed by The International Wellbeing Group (2013) and adapted for the Chilean context by Oyanedel et al. (2015). This scale measures subjective wellbeing considering seven dimensions of satisfaction (one for each item) and two additional items related to religion or spirituality (Wills, 2009; Żemojtel-Piotrowska et al., 2017) and overall life satisfaction (Campbell et al., 1976). This 9-item scale is rated on a 11-point scale (0 = "Completely dissatisfied"; 10 = "Completely satisfied"). For this sample, the internal consistency for the full scale was ω = 0.900.

Satisfaction with school is a 6-item scale created to evaluate different aspects of satisfaction with the school as an institution. It also asks about the relationships between various educational community members, whether they would recommend this school to others, and whether they like it. The internal consistency for the 6-item scale was ω = 0.893.

Social wellbeing at school scale (SWS) is a scale created by Keyes (1998) and adapted to school context and teachers by Bilbao et al. (in press) that assesses five dimensions of social wellbeing, contextualizing their evaluation of their school as a context-based experience of school as a society. The adapted version of 22 items had a 5-point rating scale (1 = "completely disagree"; 5 = "completely agree"). The internal consistency for the full scale was ω = 0.851.

Procedure and ethical considerations

This study is part of a larger investigation carried out by the Research Center for Inclusive Education of the *Pontificia Universidad Católica de Valparaíso*, Chile, where different scales were applied to students, teachers, parents, and management teams in order to characterize educational trajectories. However, for this particular research, we worked only with data from teachers.

Participation in this study was supported by the signature of the researcher and participant of the letter of consent following the regulations of the Ethics Committee of Pontificia Universidad Católica de Valparaíso, Chile, following de Declaration of Helsinki. All participants signed informed consent forms. All questionnaires were administered in the schools where participants worked. This research was approved by the Ethics Committee of Pontificia Universidad Católica de Valparaíso, Chile under the code BIOEPUCV-H 427-2021.

Statistical analysis

First, negatively worded items were reversed before the calculation of later analyses. A descriptive and correlation analysis was used for the items of the CTES-SF. Later, two types of factor analyses were performed: first, to explore how the items related to each other (exploratory factor analysis, EFA), and second, to confirm its theoretical structure and other obtained for this sample by EFA (confirmatory factor analysis, CFA). The reliability of the CES-SF was evaluated using McDonald's omega (ω), considering acceptably reliable coefficient values greater than 0.90 (McDonald, 1999).

The EFA used the robust factor analysis with Diagonally Weighted Least Squares (DWLS), polychoric correlation matrices, and promin rotation (Lorenzo-Seva and Ferrando, 2019). The parallel analysis test was used to determine the most appropriate number of dimensions (Timmerman and Lorenzo-Seva, 2011) and the closeness to unidimensionality assessment (Ferrando and Lorenzo-Seva, 2018) with the convergence of three indices, namely, UniCo, ECV, and MIREAL, to determine its unidimensional structure.

TABLE 1 Descriptive statistics and correlation matrix for Collective Efficacy Scale Short-Form (CES-SF) (n = 693).

	1	2	3	4	5	6	7	8	9	10	11	12
Item 1	–											
Item 2	0.52***	–										
Item 3 (r)	0.26***	0.46***	–									
Item 4 (r)	0.29***	0.35***	0.49***	–								
Item 5	0.53***	0.43***	0.25***	0.32***	–							
Item 6	0.09*	0.37***	0.16***	0.07	0.22***	–						
Item 7	0.06	0.15***	0.03	−0.07	0.05	0.51***	–					
Item 8 (r)	0.15***	0.09*	0.20***	0.23***	0.16***	0.18***	0.17***	–				
Item 9 (r)	0.29***	0.46***	0.48***	0.51***	0.30***	0.20***	−0.04	0.20***	–			
Item 10	0.36***	0.48***	0.23***	0.24***	0.44***	0.33***	0.23***	0.09*	0.24***	–		
Item 11 (r)	0.11**	0.20***	0.31***	0.28***	0.17***	0.07	−0.11**	0.16***	0.36***	0.09*	–	
Item 12 (r)	0.14***	0.15***	0.21***	0.16***	0.19***	0.17***	0.10*	0.24***	0.21***	0.08*	0.37***	–
M	4.93	4.88	4.61	4.88	5.20	3.48	2.85	3.79	4.74	4.65	5.06	4.67
SD	0.97	1.05	1.31	1.29	1.02	1.36	1.47	1.32	1.30	1.16	1.17	1.50

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. (r), reversed item.

Confirmatory factor analysis was performed using robust weighted least square mean and variance adjusted (WLSMV), considering the ordinal nature of the response rating scale. The models evaluated in the confirmatory analysis were those theoretically proposed by Goddard (2002) and later those produced by EFA. The evaluation of the different models was performed considering other goodness-of-fit indices (GFIs): the comparative fit index (CFI with appropriate values ≥0.90; the standardized root mean square residual (SRMR); and the root means square error of approximation (RMSEA), with a confidence interval of 90%, both with adequate values <0.08 (Hu and Bentler, 1999).

Finally, the convergent validity of the most appropriate model was evaluated using correlation analyses between CES-SF and PWI-A, satisfaction with school, and SWS scales. Correlations were expected to be positive moderately or strongly related between the different measures.

All the analyses were performed using Factor version 12.01.02 (Ferrando and Lorenzo-Seva, 2017) and MPlus version 8.7 Base Program and Combination Add-On (Muthén and Muthén, 1998–2007).

Results

Descriptive analysis

To characterize the items of the CES-SF for teachers and the relationships between them, descriptive statistics – including mean and standardized deviations – and the correlation matrix are summarized in Table 1. Most of the items show positive and significant correlations among themselves.

Exploratory factor analysis and reliability estimates

Exploratory factor analysis was used for item reduction as well as to understand the underlying factor structure (Table 2). The analysis was shown to be excellent for the overall sample, with a KMO of 0.814 and a statistically significant Bartlett's test of sphericity ($p < 0.001$). The highest reported communality was reported for item 2 (0.954) and the lowest for item 7 (0.276). Results do not suggest a unidimensional structure (UniCo = 0.864; ECV = 0.754; MIREAL = 0.246). Then, the two-factor solution showed that items 6 and 7 configure a second factor. All items were strongly loaded on their respective factors, except for items 8, 11, and 12. The three-factor solution showed that items 6 and 7 loaded into a different factor, and item 8 loaded poorly to its factor. These three solutions suggest the removal of items 6, 7, and 8 for the final factor structure.

Confirmatory factor analyses

Confirmatory factor analysis was used to confirm the different solutions obtained from the EFA analysis (Table 3). The assumption of a global collective efficacy (one-factor models, Models 1 and 2 in Table 3) was compared with its multidimensional structure (two-factor models, Models 3–8 in Table 3), considering the prior removal of items 6, 7, and 8. One-factor models (Models 1 and 2) and two-factor models (Models 3 and 4), both theoretically proposed, showed poor fit to the data, even adding two error covariances for each model. Then, the two-factor proposed model, based on the three-factor solution in Table 2, showed a better fit removing item 12 that

TABLE 2 Factor loadings of exploratory factor analysis with the one, two, and three factor solutions (n = 693).

		One-factor solution	Two-factor solution		Three-factor solution		
	Theoretical factors	λ F1	λ F1	λ F2	λ F1	λ F2	λ F3
Item 1	Group competence	0.644	0.637	–	0.899	–	–
Item 2	Group competence	0.796	0.769	–	0.744	–	–
Item 3 (r)	Group competence	0.691	0.714	–	–	–	0.583
Item 4 (r)	Group competence	0.692	0.732	–	–	–	0.587
Item 5	Group competence	0.725	0.714	–	0.808	–	–
Item 6	Task analysis	0.407	0.325	0.609	–	0.685	–
Item 7	Task analysis	0.201	–	0.726	–	0.751	–
Item 8 (r)	Task analysis	0.324	0.318	–	–	–	0.383
Item 9 (r)	Group competence	0.729	0.758	–	–	–	0.613
Item 10	Task analysis	0.636	0.596	0.316	0.704	–	–
Item 11 (r)	Task analysis	0.460	0.492	–	–	–	0.768
Item 12 (r)	Task analysis	0.399	0.401	–	–	–	0.595
McDonald's ω		0.767	0.783	–	0.769	–	0.710

Loadings lower than absolute 0.300 were omitted.

TABLE 3 Goodness-of-fit indices of alternative confirmatory factor analysis (CFA) models.

Model	χ^2 (df)	CFI	RMSEA [LCI, UCI]	SRMR	Model description
1	698.889*** (27)	0.894	0.189 [0.177, 0.202]	0.063	One-factor model, w/o items 6, 7, 8
2	442.661*** (25)	0.934	0.155 [0.143, 0.168]	0.047	One-factor model, w/o items 6, 7, 8 + 2 error covariances (i11↔i12; i1↔i5)
3	696.865*** (26)	0.894	0.193 [0.181, 0.205]	0.063	Two correlated factors theoretical model, w/o i6, i7, i8
4	439.693*** (24)	0.934	0.158 [0.145, 0.171]	0.046	Two correlated factors theoretical model, w/o i6, i7, i8 + 2 error covariances (i11↔i12; i1↔i5)
5	299.474*** (26)	0.957	0.123 [0.111, 0.136]	0.041	Two-factor proposed model (Table 2) w/o i6, i7, i8
6	149.617*** (25)	0.980	0.085 [0.072, 0.098]	0.025	Two-factor proposed model (Table 2) w/o i6, i7, i8 + 1 error covariance (i11↔i12)
7	159.482*** (19)	0.977	0.103 [0.089, 0.118]	0.026	Two-factor proposed model w/o i6, i7, i8, i12
8	109.117*** (18)	0.985	0.085 [0.070, 0.101]	0.022	Two-factor proposed model w/o i6, i7, i8, i12 + 1 error covariance (i1↔i5)

***$p < 0.001$. GC, group competence; TA, task analysis.

showed the lower factor loadings and adding one covariance between items 1 and 5 errors.

Model 8 (Figure 1), with eight items (ω = 0.803), presented the best fit to the data where Factor 1 (ω = 0.769) represents opportunities and conditions for collective efficacy and Factor 2 is related to challenges for collective efficacy (ω = 0.745).

These two new definitions for the found factors arise from the association of items, where factor one involves elements that teacher controls. In contrast, the second factor focuses on features that teachers need to overcome to be effective.

Construct validity

The external construct validity was tested by implementing correlations with other tests that were theoretically correlated with collective efficacy. A correlation analysis was performed on each scale to test the CES-SF's construct validity for the teachers' sample (Table 4). The results showed that the CES-SF is related positively to other criterion variables: it yielded a statistically significant but weak correlation with the PWI-A (subjective wellbeing) but higher with satisfaction with the school (r = 0.518, $p < 0.001$) and social wellbeing at school (r = 0.564, $p < 0.001$). In

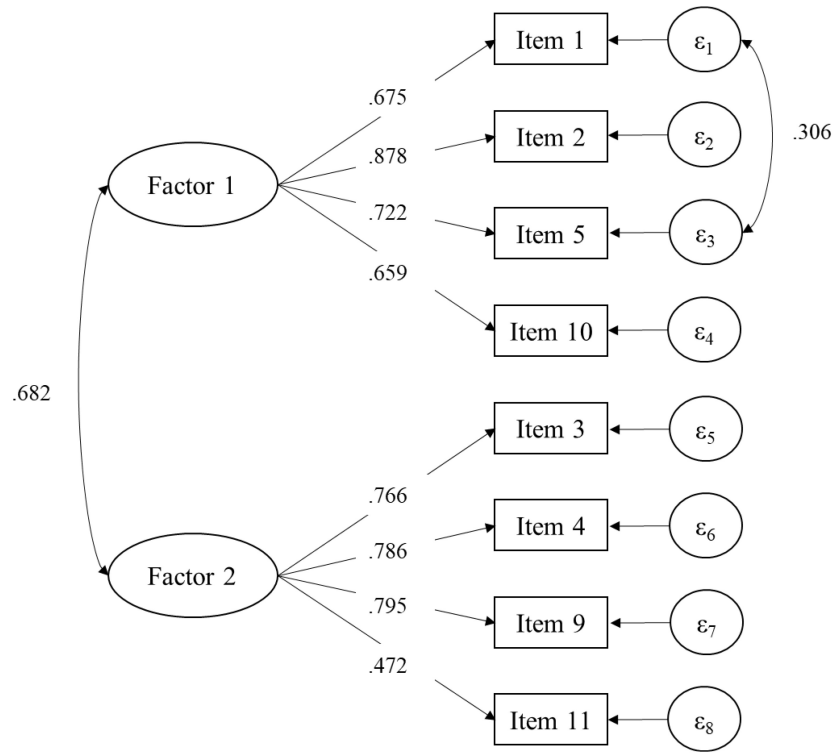

FIGURE 1
Factorial loadings of the Model 8 in **Table 3** (*n* = 693).

TABLE 4 Correlations between CES-SF and comparison variables.

	CES-SF		
	F1 Opportunities	**F2 Challenges**	**Total score**
CES-SF			
Factor 1: opportunities	–		
Factor 2: challenges	0.237***	–	
Total score	0.815***	0.756***	–
PWI-A	0.316***	0.299***	0.391***
Satisfaction with the school	0.500***	0.275***	0.501***
Social wellbeing at school	0.484***	0.361***	0.541***

***$p < 0.001$.

both cases, the opportunities dimension was strongly correlated with each criterion variable and the challenges factor.

Discussion

This study aimed to test the factor structure of the CES by Goddard (2002) among Chilean teachers. The analysis revealed that this instrument might have a two-factor structure in the Chilean teachers' sample, considering some modifications concerning its original composition, better than a unidimensional factor structure. First, when the EFA was performed, one, two, and three-factor solutions could not be configured like the original factors of the scale. Items 6, 7, 8, and 12 loaded poorly to their respective factors. We hypothesized that the poor performance of these items is because they refer to factors external to the community (Lauder et al., 2003), being beyond the faculty's responsibility, and perhaps not part of collective efficacy itself.

Collective efficacy beliefs are essential factors in predicting psychological (Roos et al., 2013) and subjective wellbeing (Salanova et al., 2003). Results also showed that it is correlated to satisfaction with the school and social wellbeing at school, which are important school-context-related variables (López et al., 2021).

This tool can assess collective efficacy among teachers in the school context as a reliable and valid instrument. Although few studies validate the scale (Sánchez-Rosas et al., 2021) and others create a new scale based on it (Donohoo et al., 2020; Kapat et al., 2022), there is no consensus on its dimensionality. Also is shorter than the previous version, which is especially important in school contexts where there is less time to participate in studies.

As projections of this study, it would be advisable to have a larger sample to verify its invariance in different groups of interest, such as the type of school, educational level, and the school's capabilities to guide its change processes and promote student learning. Bifactor analysis would be essential to determine the specific contribution of each item to a specific and a general factor, with variables to explain these differences. One of the limitations of this study has been to have a sample that does not allow us to distinguish between groups that are comparable and that have characteristics that can influence the obtaining of different factorial solutions.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

This research was approved by the Ethics Committee of Pontificia Universidad Católica de Valparaíso, Chile under the code BIOEPUCV-H 427-2021. The patients/participants provided their written informed consent to participate in this study.

Author contributions

CH conceptualized this study and chose the theoretical framework and measures. CH and JT-V designed the general study and the methods to be implemented. JT-V wrote several sections of the initial draft, carried out the analysis, and interpreted results. JM-L contributed to the literature review. All authors listed have made a substantial, direct, and intellectual contributions to this study, reviewed and drafted sections of the initial draft, interpreted the results, wrote, read, and revised the final manuscript, and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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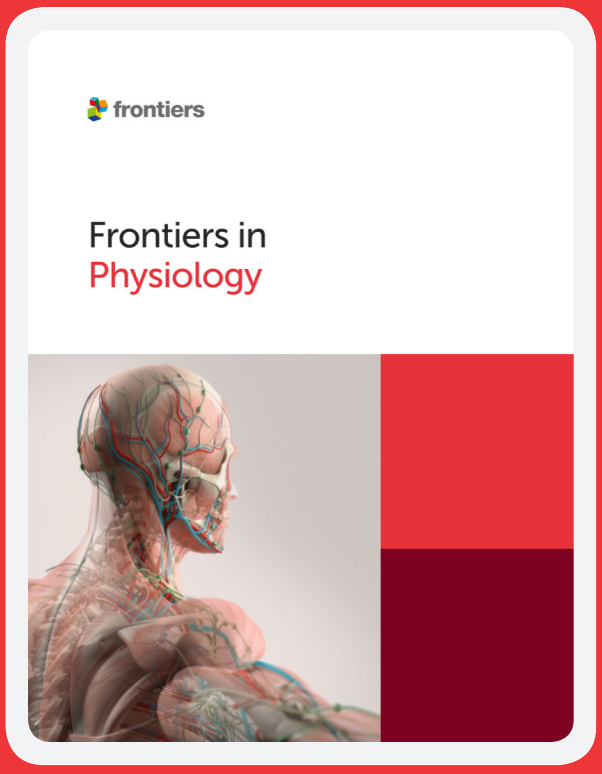

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