

URBAN PARKS WITH ADJACENT BIKE LANES: A FACTOR IN ATTRACTING CYCLIST USERS?

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ABSTRACT: Usually, the research about urban parks, cyclists, and the cycling network are not evaluated together, nor are their interactions, resulting in a need to understand the correlations between these issues related to both urban and environmental design. This study's goals are to better understand the links between urban parks with adjacent bike lanes and cyclists that visit the urban parks in Porto Alegre/RS/Brazil. Intercept surveys were conducted in this study, with questionnaires distributed online and in person to cyclists who frequent any of these locations. The key findings revealed that having bike routes next to parks is a significant component in encouraging cyclists to use them; there are numerous motivations for cyclists to use these areas, with leisure being the most common. As a result of this data, it is conceivable to conclude that urban parks and bicycle infrastructure in the city should be rethought simultaneously, as they are highly associated.

Key-words: Urban parks. Cyclist. Bike lanes.

PARQUES URBANOS COM CICLOVIAS ADJACENTES: UM FATOR DE ATRAÇÃO DE CICLISTAS?

RESUMO: Geralmente, as pesquisas sobre parques urbanos, ciclistas e rede cicloviária não são avaliadas em conjunto, nem suas interações, resultando na necessidade de entender as correlações

entre essas questões relacionadas ao desenho urbano e ambiental. O objetivo deste estudo é conhecer melhor as ligações entre parques urbanos com ciclovias adjacentes e ciclistas que visitam os parques urbanos de Porto Alegre/RS/Brasil. Neste estudo, foram realizadas pesquisas de interceptação, com questionários distribuídos online e pessoalmente para ciclistas que frequentam qualquer um desses locais. São inúmeras as motivações para os ciclistas utilizarem essas áreas, sendo o lazer a mais comum. Como resultado desses dados, é concebível concluir que os parques urbanos e a infraestrutura cicloviária na cidade devem ser repensados simultaneamente, pois estão altamente associados.

Palavras-chave: Parques urbanos. Ciclistas. Ciclovias.

1 INTRODUCTION

In Brazil, there are currently 210.1 million inhabitants, according to IBGE (Brazilian Institute of Geography and Statistics) estimates (2019). Around 57.4% of the population is concentrated in only 5.8% of cities (more than 100,000 inhabitants per city), however, 48 cities with more than 500,000 inhabitants represent 31.7% of the population. Urbanization has accelerated in recent decades and has had detrimental results on the shape of cities, this influences the quality of life of people and the increased consumption of natural resources. The quality of life is present in several areas of study because it contributes to several sectors, such as transportation and security (FERREIRA, 2005).

When considering mobility, the bicycle is becoming increasingly prevalent in urban life; as a result, cyclists have become an important data source for understanding how this mode of transportation is linked to the city, providing information that influences cycling network planning. There is a lack of information about the relations between cyclists and urban parks, and further research is needed; this, can reciprocally affect the planning of bicycle lanes and urban green areas, such as urban parks.

In scientific studies about urban parks, the themes: cyclists and bicycle networks, are not treated together. The studies, about cyclists and the bicycle lanes network focus on aspects such as the bicycle lane infrastructure, the relationship with health, with the decrease in traffic jams, the fact that it is a non-polluting means of transportation and for providing a sustainable urban mobility in cities (COMISSÃO EUROPEIA, 2000; GONDIM, 2006; BOARETO, 2007;

TERAMOTO, 2007; PIRES, 2008; NERI, 2012; TUMLIN, 2012; GEHL, 2013; ARAÚJO, 2014; ITDP, 2015; MOTTA, 2016).

The studies on urban parks typically focus on pedestrian use, not considering them as places frequented by cyclists, they also deal mostly with climatic issues provided by parks (such as temperature reduction), increased quality of life in cities, well-being, health benefits, leisure and social interaction among park users (REIS, 2001; COSTA, 2010; MCCORMACK *et al.*, 2010; SZEREMETA; ZANNIN, 2013; LONDE, 2014; MARTINS; DE SOUSA; ARAÚJO, 2014; SPERANDIO, 2017). With this, there is a need to investigate the themes together in order to have a better understanding of how they are connected.

The city of Porto Alegre - RS, Brazil, was chosen to explore this relationship because it has three urban parks (Farroupilha, Marinha do Brasil, and Moinhos do Vento parks) with contiguous and interconnected bicycle networks, as well as a growing number of bikers. Urban areas, cyclists, and the bicycle network near parks can show how they are related and important in the issue of urban and environmental planning, creating a better knowledge of this theme.

The relevance of this study is in addressing the possible influence of adjacent bikeways as a factor in attracting cyclists to these parks. The cyclists and bicycle networks are related to both: urban and environmental planning of cities. Thus, the investigation can help to promote more quality in the question of how urban parks are seen and planned in relation to cyclists, added to the usual approaches to urban and environmental issues.

The work's objectives were to discover what the relations are between urban parks with adjacent bike lanes and the cyclists who visit them, in order to verify the influence of bike lanes in these places, from the cyclists' point of view and taking into account the reasons that lead them to visit the urban parks, determining the influences of bike lanes in this context, which has not been explored previously in scientific research.

2 LITERATURE REVIEW

2.1 WHAT ARE URBAN PARKS AND WHAT ROLE DO THEY PLAY IN CITIES?

Urban parks can be defined as a green area with leisure, aesthetic and ecological functions, differentiated by its extension (LIMA *et al.*, 1994; NUCCI, 2001; MASCARÓ, 2005).

These, may be included in the concept of green areas, being in the limits of the cities and contribute to the quality of life, environmental balance, exercising different functions for the environment and for the people.

With the growing change in environmental awareness in Brazil and the return of the population's interest in the public life of cities, the use of urban parks has increased (FRIEDRICH, 2007), because of the pursuit of higher quality of life and the enhancement of the urban environment. Green areas have importance mainly in maintaining the environmental quality of cities, because they contribute to the balance between the environment and the modified environment (LOIS; LABAKI, 2001; LIMA; AMORIM, 2006). Recreational places for pedestrians and cyclists are some benefits provided from urban afforestation, as well as reducing air and noise pollution, wind speed, direct insolation, and visual pollution. It also functions as a reference element in spatial organizing, as well as improving living space (such as an urban park) and contributing to people's physical and mental healthcare (GRAHN, 1994; MILANO; DALCIN, 2000).

In concern of the quality of urban life, green areas contribute to social development by promoting well-being, health, social interaction, man's proximity to nature, and the practice of leisure activities, so with the proper infrastructure, people will visit them (ULRICH, 1983; REIS, 2001; LONDE, 2014; COSTA, 2010; MCCORMACK *et al.*, 2010; SZEREMETA; ZANNIN, 2013; MARTINS; DE SOUSA ARAÚJO, 2014; SPERANDIO, 2017). Only green spaces will not increase the quality of urban life; infrastructure must be given to allow people to use them in a variety of ways, resulting in a qualified urban environment.

According to Jacobs (2000), the mere presence of a park is insufficient to ensure its own and its surrounds' vitality. According to the author, insolation, spatial delimitation, complexity (variety of uses and people around the park), and centrality are all necessary characteristics for a park to function. As reported by the author, each urban park is a one-of-a-kind case: different areas inspired by the numerous features of the surrounding city. For this reason, this study focuses on three urban parks rather than just one, to determine how these ties with their surroundings evolve and whether this contributes to them becoming more qualified and frequented.

The location of urban green areas and the distance between them, to de Jesus and Braga (2005), has a direct impact on their social, aesthetic, and economic functions. The link with their surroundings is one of the major conditions for the successful performance of urban parks for leisure purposes (CHRISTOPHER; DE PATRONES, 1980); echoing Jacobs' thought (2000). Because urban parks are not isolated areas in the city, they have and maintain connections with their surrounds as well as other networks, such as the bicycle networks studied in this study.

2.2 WHAT PURPOSE DO BICYCLE NETWORKS SERVE IN CITIES, AND HOW SHOULD THEY BE DEFINED?

The definition of a cycling network involves different features, which are thus determined for the use of cyclists and promote the use of bicycles. The proper infrastructure of a cycleway network is essential for its use and operation. Conforming to Siqueira (2017), a good cycling network must meet five key criteria: beauty, safety, linearity, coherence and comfort.

Bicycle use is influenced by a variety of elements, including cultural and climatic factors, relief, urban environment, installed infrastructure, and safety, among others (PUCHER; BUEHLER, 2012). The Ministério das Cidades (2007) identifies five variables that determine bicycle mobility: physical infrastructure quality, environmental quality of routes, continuous infrastructure, ease of storing bicycles, and cycling integration with other modes. To ensure that the cycle network will be used, these considerations must be taken into account throughout its planning and implementation.

The advantages of bicycling constitute a cycle in which social, economic, environmental, safety, and health issues are intertwined and provide tangible effects such as an improvement in the quality of urban life, a reduction in traffic congestion, and an improvement in people's health. In addition to being a popular mode of transportation for pleasure and transit, many people utilize bicycles (COMISSÃO EUROPEIA, 2000; GONDIM, 2006; BOARETO, 2007; TERAMOTO, 2007; PIRES, 2008; NERI, 2012; TUMLIN, 2012; GEHL, 2013; ARAÚJO, 2014; ITDP, 2015; MOTTA, 2016).

Due to the pollution produced, road spaces are becoming less and less suited for vehicle traffic, posing problems for cities and their inhabitants, especially in terms of their health. To

improve people's lives and the quality of life in cities, a paradigm change from one that promotes cars to one that prefers other modes of transportation, including bicycles, is required. The bicycle is a non-polluting mode of transportation that preserves public places without requiring vast parking lots, as well as being accessible to people of all socioeconomic strata (FHWA, 1993; PIRES, 2008). Another positive feature of the bicycle, according to Pires (2008), is the pleasure it provides in displacements, as a mode of transportation and leisure, allowing the cyclist to have a closer relationship with the space around them and promoting social interaction, which can be increased by indicators that reinforce these benefits.

Cycling infrastructures, according to the ITDP (Institute for Transportation and Development Policy) (2015) must be appropriately integrated into the surrounding environment and positioned in attractive areas. Urban parks become gathering areas for a wide range of people. However, because each city has its own qualities and motives, bike planning in each one must be treated differently, although the bicycle always adds to a more human city.

The cycling network can be defined as a collection of factors that make it easier and safer to ride bicycles. It promotes bicycle comfort and confidence on congested streets, creates separation between bikes and motorized transport, boosts cyclist predictability and driver posture, and the ability to traffic on the roadways, according to Guide (2011). The number of kilometers of bicycle infrastructure, however, does not imply that the most important regions or roads are being covered, such as security in conflict zones, attractiveness or utility of displacements. It is critical to emphasize the network's continuity importance (Loboda, 2005).

The elements that make up the bicycle network, according to EMBARQ Brasil (2015), must include:

- Bicycle storage: long-term bicycle parking with plenty of slots and access control;
- Cycle lane: a section of a city road designated solely for the movement of bicycles, delineated by specific signage;
- Bicycle lane: a separate lane for bicycles that is physically separated from other traffic;
- Accessibility: an individual's ability to access a destination within his or her capabilities;
- Bike rack: short-to medium-term bicycle parking in public settings with a limited

number of spots and no access restriction;

- Cycle route: a way that is not physically segregated and can be signposted or not. It represents a good cycling route.

To a healthier city, people's desire to walk or cycle must be increased, and it must become a natural habit (Gehl, 2013). People should feel safe cycling on the cycle paths or visiting urban parks, so it is necessary to invest in the quality of their surroundings.

2.3 THE PORTO ALEGRE CYCLIST'S PROFILE

A survey by Transporte Ativo (Active Transport) between 2017 and 2018 wanted to learn more about cyclists and why they use bicycles as a mode of transportation. It should be noted that this study did not look at urban parks as sites where cyclists congregate; instead, it looked at bike lanes and streets as places where cyclists congregate, and the study was conducted on weekdays. With an emphasis on cyclists who pedal for transportation rather than those who frequently visit urban parks, as revealed in the survey, the results allowed us to estimate the profile of the general cyclist in Porto Alegre until 2018.

The results show that the cyclist who ride a bicycle daily in Porto Alegre, have an income between one and two minimum wages and age range of 25 to 34 years. They claim that they would use more bicycles if there was a bigger and better infrastructure, and daily they face the lack of traffic safety and deal with inadequate infrastructure.

3 METHODOLOGY

An intercept survey was administered, both online and face to face, during which riders were observed while pedaling through the indicated urban parks, paying attention to their paths and duration, as well as their age and gender, perceptions of the difficulty of accessing these spots, and the possibility of switching modes.

3.1 PORTO ALEGRE'S SITUATION AND LOCATION IN RELATION TO URBAN PARKS AND BIKE LANES

The city of Porto Alegre/RS/Brazil (Figure 1) has a population of 1,479,101 people (2018). It has a territorial area of 496,684 km² and is located at the following geographic coordinates: south latitude: -30°01'59" and west longitude: -51°13'48" (Prefeitura Porto Alegre, 2017). Due to the practicality of the research and the placement of urban parks, the study only covered three of the eight mentioned by the Municipality of Porto Alegre/RS (Porto Alegre, 2017). Farroupilha park, Marinha do Brasil park, and Moinhos de Vento park were the urban parks chosen. The Figure 2 depicts the locations of the eight urban parks in Porto Alegre (purple) and the urban parks under consideration for the study (green) in relation to the city's existing bike lanes.

These urban parks were chosen because they have a surrounding bicycle path and trails/roads that are accessible by bicycles, are accessible on various days and times, have various characteristics such as size and location, and form a connected network between urban parks and cycle paths, allowing for further analysis.

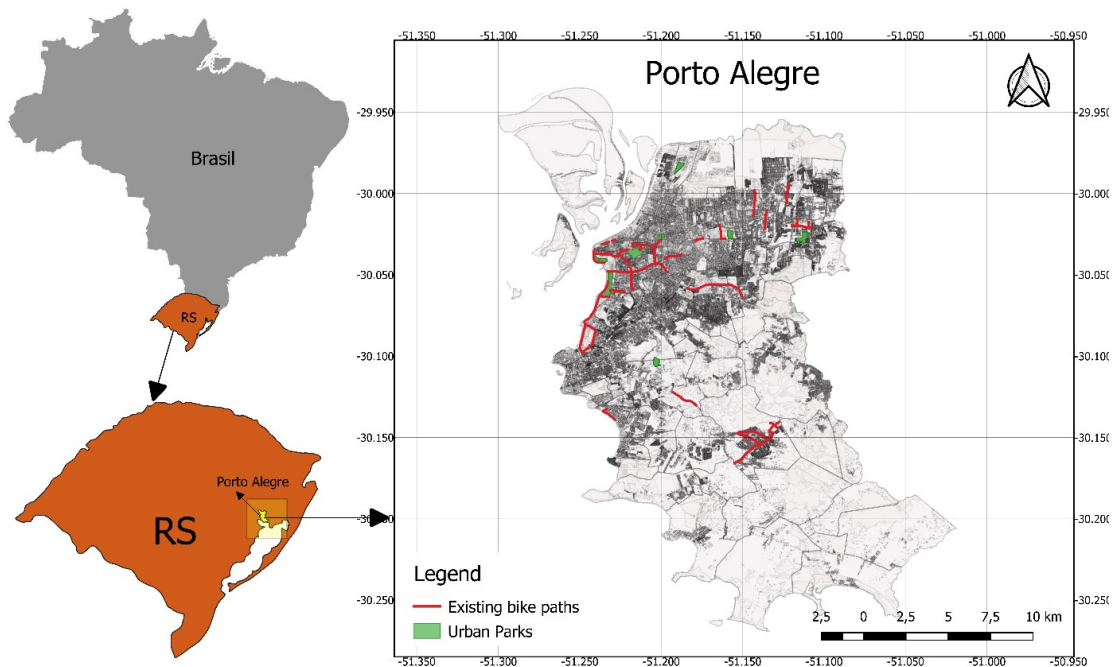


Figure 1: Location map of Porto Alegre/RS/Brazil.
Source: Authors, 2022.

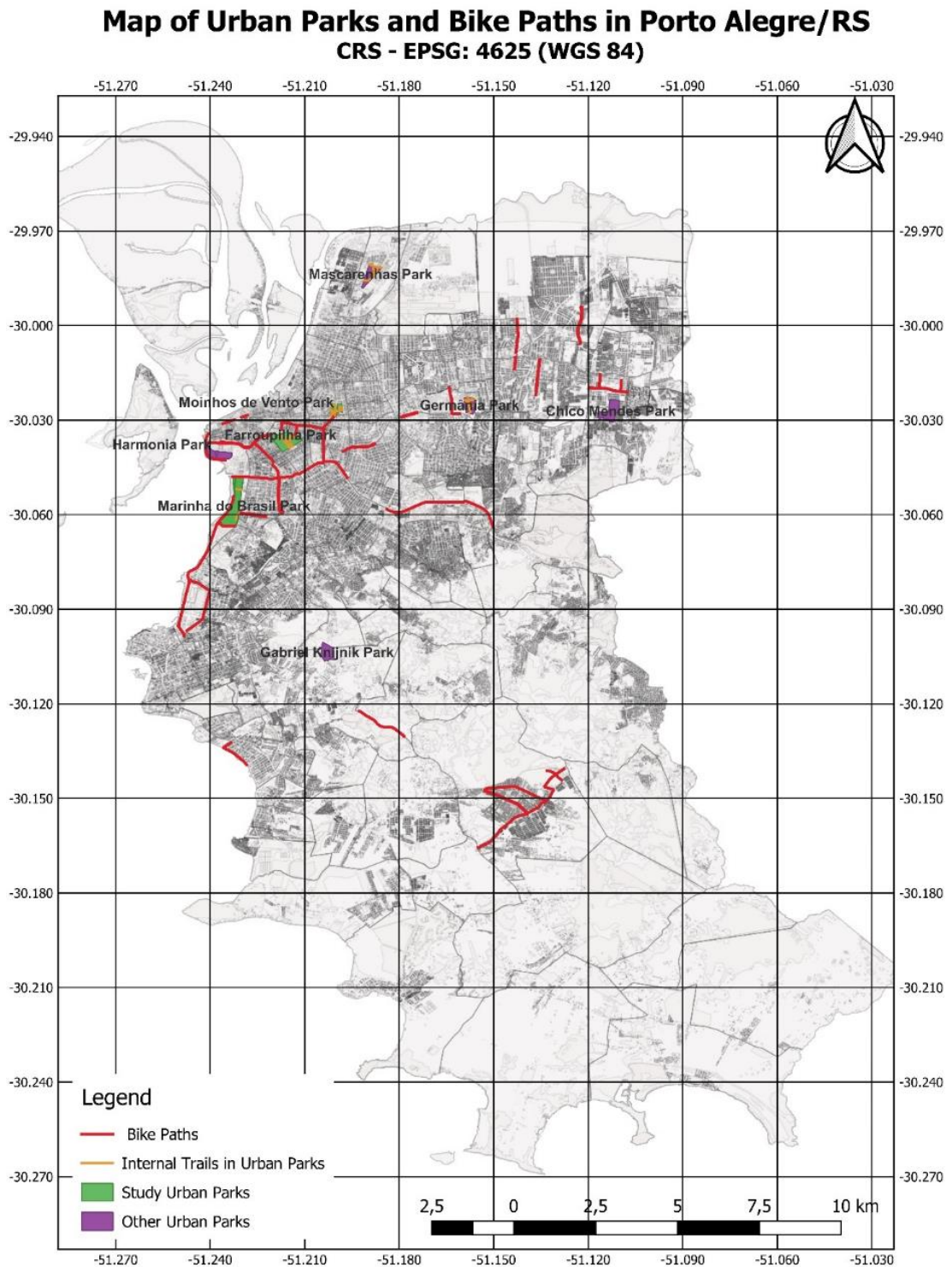


Figure 2: Map of urban parks and bike lanes in Porto Alegre/RS/Brazil.
Source: Authors, 2022.

3.2 URBAN PARKS AND BIKE PATHS CHARACTERIZATION

Farroupilha park, is a 37.51 hectare park in the Farroupilha district that was established in 1935. In terms of the cycling network, the park has 11 bike racks spread throughout the park; it does not have a dedicated path for bicycles, but it does have trails/roads that illustrate its use, according to data from Google Maps (2018). The current bike lanes that establish direct connections in the park's environs are located on the following roads: Loureiro da Silva St. and General Joo Telles St. (Figure 3).

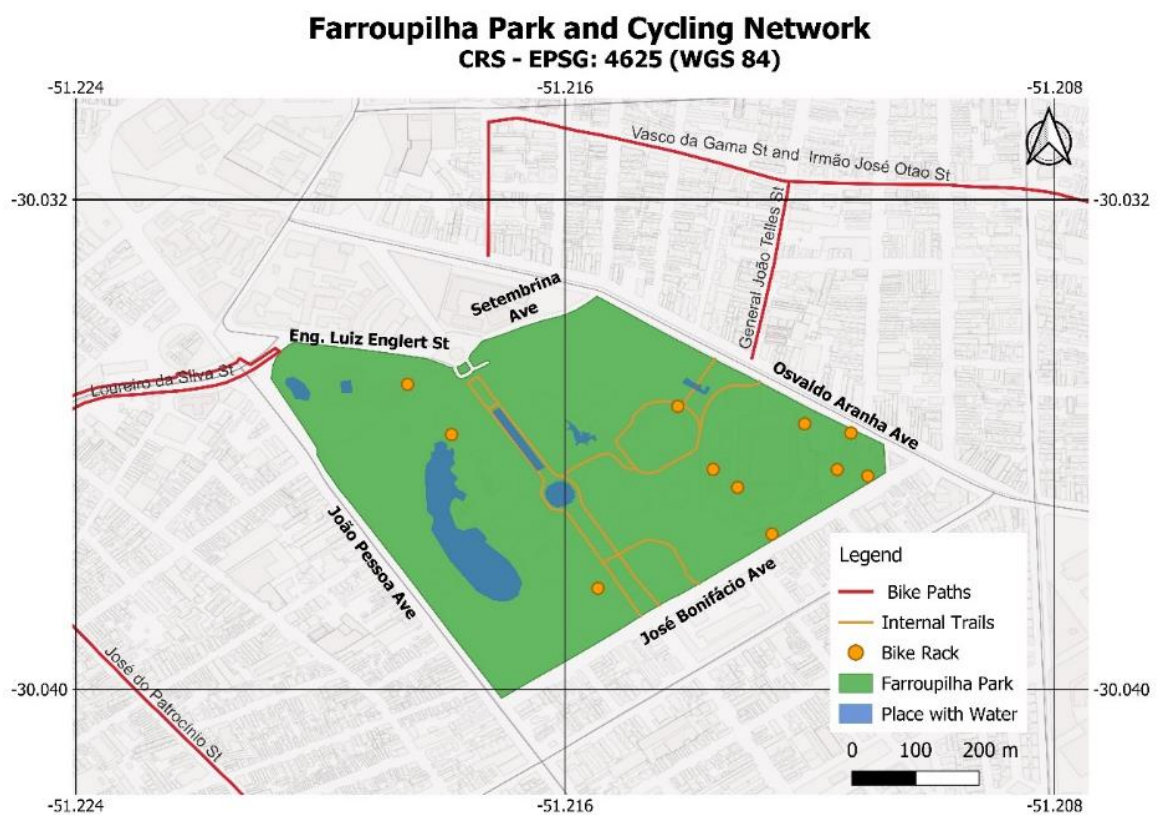


Figure 3: Map of Farroupilha park and cycling network.
Source: Authors, 2022.

The Marinha do Brasil park, which covers 70.70 hectares and is located in the Praia de Belas district, was established in 1978. It is the city's largest urban park and is mostly a sports park. Throughout terms of the cycling network, there are three bike racks at the park's ends, it is the only park with an exclusive path for bicycles, known as a velodrome, and it has trails/roads that illustrate bicycle use in the park, according to data from Google Maps (2018). The existing

bike lanes in the park's immediate vicinity that provide direct links are Ipiranga Ave., Edvaldo Pereira Paiva Ave., Nestor Ludwig St., and Padre Cacique Ave. (Figure 4).



Figure 4: Map of the Marinha do Brasil park and cycling network.
Source: Authors, 2022.

The Moinhos de Vento park, was established in 1972 and covers an area of 11.50 hectares in the Moinhos de Vento district, one of the city's most prestigious areas. Regarding the cycling network, the park does not have a bike rack or a dedicated path for bicycles, but it does

have trails/roads that illustrate its use in the park, according to data from Google Maps (2018), among the selected parks. The one with the least amount of room for riding is the one for the study. There is a bike route in the park's vicinity that links to the park on Mostardeiro St. (Figure 5).

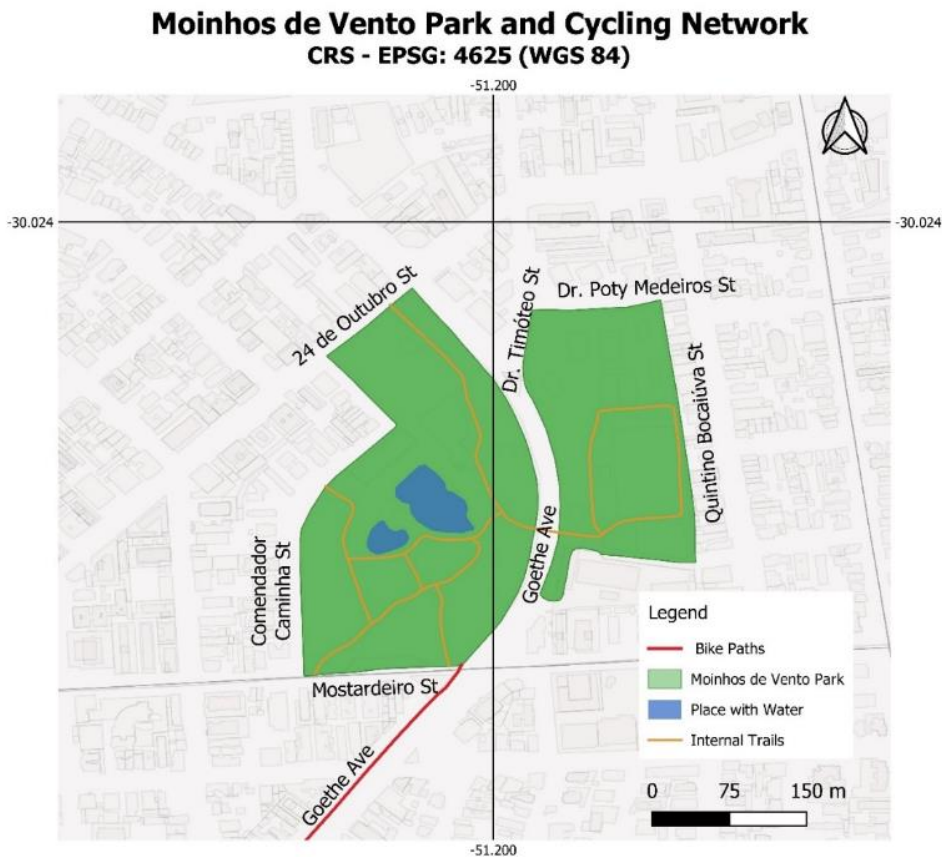


Figure 5: Map of Moinhos de Vento park and cycling network.
Source: Authors, 2022.

The Figure 6 depicts the links between the three urban parks, with letters (A, B, C, D, E, and F) corresponding to the images of bike lanes in Figure 7. The bike path that starts at Osvaldo Aranha Ave. connects to Moinhos de Ventos park (about 1.80 km long) and to Ipiranga Ave., and the bike path that starts at Osvaldo Aranha Ave. connects to Moinhos de Ventos park (roughly 1.80 km long) (Figure 7 - B). The other cycle path (Figure 7 - A) starts at Loureiro Silva Ave. and connects to the Marinha do Brasil park (although there is no marking part of the stretch as a cycle path between Orla and Marinha do Brasil park, it is possible to make this connection; the stretch

is approximately 3.90 km long), and you can choose to go to Ipiranga Ave. via the bike path on José do Patrocínio and Érico Veríssimo Avenues (with an approximate length of 3.30 km). The Farroupilha park, because of its more central location, connects immediately to the other two urban parks, making it a popular cycling destination, a strong attractor effect.

There are three neighboring bike routes in Marinha do Brasil park, one starting at Ipiranga Ave. (Figure 7 – D), another near Nestor Ludwig St. (Figure 7 – E), and the third starting at Padre Cacique Ave. (Figure 7 – F). The park is connected to the Orla do Guaíba bike route by the neighboring bike path and Nestor Ludwig St., with access to the other end of the park via the Orla do Guaíba cycle path, which connects to the Loureiro Silva Ave. cycle path, which connects to Farroupilha park. Another option is to begin on Ipiranga Ave. and carry on to Érico Verssimo Ave., as previously indicated, as well as Farroupilha park and the bike path that begins on Padre Cacique Ave. and leads to José de Alencar St. You can alternatively leave the bike route at Ipiranga Ave. and head straight for Moinhos de Vento park (total length of approximately 4.70 km). Because of its length and linearity, the park has a lot of opportunity for cyclists to explore.

The Moinhos de Vento park has an adjacent bike path, which begins on Mostardeiro St. and leads to Goethe Ave. (Figure 7 - C), which can connect to Farroupilha park, which leads to Av. Ipiranga, which connects to the Marinha do Brasil park, as previously mentioned when describing the other two parks. Due to its configuration and extension, this park is the least appropriate for riding, since it attracts a significant number of people of all ages, making bicycle traffic more unsafe for all park visitors and necessitating more attention.

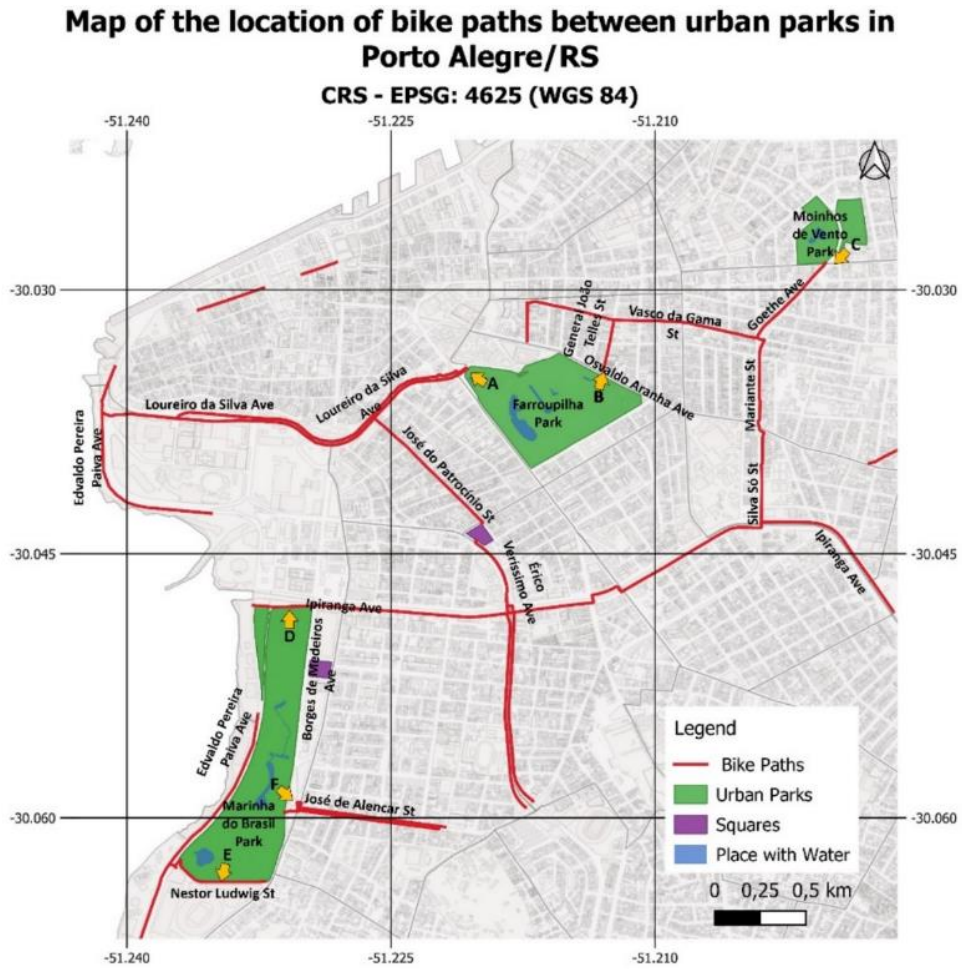


Figure 6: Map of the location of cycle paths between urban parks.
 Source: Authors, 2022.



Figure 7: Photos of bike paths adjacent to urban parks.

Source: Authors, 2022.

The parks have one thing in common: they all have nearby bike lanes, are in conveniently accessible areas, and are surrounded by major city roadways. The Farroupilha park, being the most central, is the best situated of the three; all three offer bike-sharing systems in or near the park. The three urban parks do not have suitable infrastructure for bicycles, as they were not designed with cyclists in mind. After the parks were built, modifications were made, such as the installation of bike racks and adjacent cycle routes, but there was no cycle path infrastructure inside the parks.

3.3 DATA COLLECTION PROCEDURES FOR THE BIKE NETWORK AND URBAN PARKS

The information used to create the maps was gathered in a variety of methodologies and from many sources. The data was compiled and treated using the QGIS program in version 3.0. The sources, formats, and data used in the study are listed in Table 1:

Table 1 – Summary of sources, formats and use of data

Source	Format	Use of Data
Google Maps	.jpg	Visualization of implemented bike paths, trails inside the parks, streets and avenues names
My Maps	.kmz	Routes of existing bike paths, urban parks and trails inside the parks
Bike de boa	.csv	Data related to bike racks
Map of EPTC (Public Transport and Circulation Company)	.jpg	Visualization of installed bike paths
Strava	.jpg	Field survey, visualization and confirmation of implemented bike paths. Bike paths comprising the street and avenues: Ipiranga Ave, Edvaldo Pereira Paiva Ave, Diário de Notícias Ave, Padre Cacique Ave and Loureiro da Silva St;
IBGE	.shp	Data from the territorial limits of Brasil, Rio Grande do Sul and Porto Alegre
City Hall website Porto Alegre	.shp	Boundary data and urban parks of Porto Alegre
Observa Poa	.shp	Data on the division of neighborhoods and limit of Porto Alegre
Open Street Maps	API Overpass	Data related to the road network, blocks, lots and buildings

Source: Authors, 2022.

These data were then entered into the QGIS software after they were collected. Thus, the layers in QGIS were first separated into bike racks, parks, bike pathways, park trails, and the Porto Alegre boundaries, and then intersections were constructed between these layers for data superposition, which permits the grouping of different types of objects, in numerous layers. Enabling the visualization of all objects, which allows for a more accurate analysis of the data,

and finally, the placement of labels with the names of urban parks and their nearby streets, as well as the paths where the bike paths are located.

The final product was a set of maps with information superimposed on them, allowing for the analysis of data integrated with georeferenced data and assisting in the identification of spatial clipping and its presentation.

3.4 THE CONSTRUCTION OF THE QUESTIONNAIRES

The following questions were developed based on the determination of which relationships wanted to be uncovered, which was based on the literature supplied and the author's perception:

- Cyclist Profile: gender and age group (only one option as a response);
- Cyclists' Bicycle-related preferences and aspects in the urban park: areas where cyclists feel safer when cycling and places where cyclists feel less safe when cycling (possibility of more than one answer);
- Cyclists and their relationships with the urban park: evaluation of the general infrastructure for cycling in the three urban parks, evaluation of the three urban parks' safety, reasons for using and not using the bicycle in the urban park; (only one alternative as an answer regarding the evaluation and safety, and the possibility of more than one alternative as an answer regarding the reasons to use or not use it);
- Cyclists and their relationships with cycle paths near urban parks: the presence of a nearby cycle path effects the cyclist's trip to urban parks if cyclists utilize the nearby cycle pathways to access the urban parks of the study and evaluation of the cycle paths near urban parks (only one alternative answer).

3.5 HOW THE QUESTIONNAIRES WERE APPLIED

Questionnaires were used as part of the research. The questionnaires were given to cyclists who frequented the study's urban parks and had closed questions. They were given out in person and online.

Three days of collection were planned for each urban park considered for the study when using printed questionnaires. These days were Friday, Saturday, and Sunday, for the purpose of obtaining more people's assistance in filling out the questionnaires, and because there are more cyclists in urban parks on weekends. Previous visits to the parks were made on different days, a higher cyclists concentration was observed on weekends. During the month of October 2018, the questionnaires were used for three weeks in a row.

The application of the questionnaires was based on the observation of who was riding bicycles around the park's perimeter. Initially, all cyclists, even those riding a bicycle, were approached, but they did not stop to answer the questionnaire; therefore, another criterion was used, and only cyclists who were at rest were contacted.

The online surveys had the same questions as the paper questionnaires, but the arrangement of the questions had been changed to accommodate the respondent who would not be in the park at the time of the survey. A brief presentation of the research and of the author was added, the purpose was also inserted, with a small term of consent at the end, to disclose the answers. In addition, a little explanation of the functioning of the questionnaire and presenting the three areas of study, each one would only choose one of the three to later answer the questions regarding. The questionnaires were created using Google Forms and distributed mainly through social media posts on Instagram and Facebook (on sites and groups relating to bikers, urban parks, and the city of research interest).

3.6 HOW QUESTIONS ARE PROCESSED

The SPSS (Statistical Package for the Social Sciences) and Excel were used to analyze the questions. To count frequencies and run statistical tests, SPSS software was utilized. "The

frequencies reflect the distribution of data in relation to the categories considered in the variable," Lay and Reis (2005) write. Frequencies do not need to be accompanied by other statistical tests, according to the authors, because these might be utilized to show crucial features of the interaction between users and space. The choice of SPSS was based on the simplicity with which the analyses could be exported to Excel software, allowing for easier data grouping and table construction.

To demonstrate the results, Pearson's chi-square tests (χ^2) were done between pairs of pertinent questions, which were:

- Is the presence of a nearby bike path a factor in your decision to visit a park? Do you ride your bike to the park using the nearby bike paths?

- Which location(s) do you consider the safest to ride a bicycle? Which location(s) make you feel the most unsafe to ride a bicycle?

- How would you rank the park's overall cycling facilities (pavement, bike racks, etc.)? How would you rank the park's security?

- What motivates you to ride your bike in the park? What are your reasons for not riding your bike in the park?

When the test values were equal to or less than 0.05 (P value), the test values were considered significant, indicating that there was an association between the questions. These values correspond with what was said by the authors Lay and Reis (2005).

4 RESULTS ANALYSIS AND DISCUSSION

In total, 304 cyclists responded to the survey, with 114 responding in person (Moinhos de Ventos park (52), Farroupilha park (50), Marinha do Brasil park (12), and 190 responding online, about: Farroupilha park (126), Marinha do Brasil park (52) and Moinhos de Ventos park (12). The table 02 shows the results obtained.

The most prevalent gender in Farroupilha, Marinha do Brasil and Moinhos de Vento parks was male, aged between 18 and 30 years old and between 31 and 45 years old in Farroupilha and Moinhos de Vento parks and in Marinha do Brasil park between 31 and 30 years

old. 45 years and between 46 and 60 years. Comparing with the profile of the general cyclist in Porto Alegre presented by Transporte Ativo (2019), the age group differed from that of cyclists who frequent urban parks (higher) than that found in the aforementioned survey (25 to 34 years).

Table 2 – Results of the questions applied in the three urban parks of the study

Variables		Number of Respondents in Percentage and Absolute Amount						
		Farroupilha park		Marinha do Brasil park		Moinhos de Vento park		
Gender and age group	Male	Under 17 years old	-	-	1,60%	1	6,10%	4
		Between 18 and 30 years old	23,30%	41	12,50%	8	26,20%	17
		Between 31 and 45 years old	20,50%	36	25,00%	16	21,50%	14
		Between 46 and 60 years old	10,80%	19	25,00%	16	15,40%	9
		Over 60 years	6,30%	11	4,70%	3	3,10%	2
	Female	Under 17 years old	0,60%	1	-	-	-	-
		Between 18 and 30 years old	16,50%	29	14,00%	9	12,30%	8
		Between 31 and 45 years old	16,50%	29	9,40%	6	12,30%	8
		Between 46 and 60 years old	5,10%	9	7,80%	5	3,10%	2
		Over 60 years	0,60%	1	-	-	-	-
Places where cyclists feel safest	Bike Path	76,70%	135	82,81%	53	76,56%	49	
	Park	53,40%	94	29,68%	19	56,25%	36	
	Street	15,34%	27	12,50%	8	9,37%	6	
	Sidewalk	13,63%	24	15,62%	10	28,12%	18	
	Others	3,40%	6	3,12%	2	4,68%	3	
Places where cyclists feel most insecure	Bike Path	5,68%	10	3,12%	2	7,81%	5	
	Park	4,54%	8	9,37%	6	4,68%	3	
	Street	85,22%	150	71,87%	46	84,37%	54	
	Sidewalk	20,45%	36	32,81%	21	18,75%	12	
	Others	6,81%	12	-	-	4,68%	3	

(continued on next page)

Table 2 (continued).

Variables		Number of Respondents in Percentage and Absolute Amount					
		Farroupilha park		Marinha do Brasil park		Moinhos de Vento park	
Assessment of the general infrastructure of the three urban parks for cycling	Great	-	-	3,80%	3	-	-
	Good	10,30%	18	19,20%	12	8,30%	5
	Regular	50,80%	89	38,50%	25	41,70%	27
	Bad	28,60%	51	26,90%	17	25,00%	16

General security assessment of the three urban parks	Very bad	10,30%	18	11,50%	7	25,00%	16
	Great	1,60%	3	1,90%	1	8,30%	5
	Good	5,60%	10	11,50%	7	25,00%	16
	Regular	37,30%	66	26,90%	17	25,00%	16
	Bad	38,90%	68	36,50%	23	33,30%	22
Reasons to use the bike in the urban park	Very bad	16,70%	29	23,10%	16	8,30%	5
	Tour/Leisure	73,29%	129	73,43%	47	78,12%	50
	Tourism	6,81%	12	4,68%	3	15,62%	10
	Welfare	69,88%	123	48,43%	31	46,87%	30
	Transport/Passage	59,09%	104	32,81%	21	29,68%	19
	Health/Exercise	59,65%	105	85,93%	55	65,62%	42
	Others	3,97%	7	4,68%	3	3,12	2
	Lack of maintenance of the adjacent bike path	14,77%	26	15,62%	10	9,37%	6
	Discomfort when ride a bike	8,52%	15	4,68%	3	3,12%	2
	Reasons for not using the bike in the urban park	Bad weather conditions	35,79%	63	32,81%	21	20,31%
Rugged topography		14,20%	25	12,50%	8	23,43%	15
Lack of cycling infrastructure		30,11%	53	23,43%	15	29,68%	19
Lack of bike rack		24,43%	43	15,62%	10	15,62%	10
Lack of security		58,52%	103	60,93%	39	39,06%	25
Others		13,06%	23	3,12%	2	12,50%	8
Assessment of bike paths near the study parks	Great	-	-	3,80%	2	-	-
	Good	11,10%	19	23,10%	15	25,00%	16
	Regular	41,30%	73	42,30%	27	25,00%	16
	Bad	35,70%	63	21,20%	14	25,00%	16
	Very bad	11,90%	21	9,60%	6	25,00%	16
Cyclists use the nearby bike paths to reach the study parks	Yes	73,00%	128	82,70%	53	75,00%	48
	No	27,00%	48	17,30%	11	25,00%	16
The existence of a nearby bike path influences the cyclist's trip to the urban parks	Yes	62,70%	110	76,90%	49	83,30%	53
	No	37,30%	66	23,10%	15	16,70%	11

Source: Authors, 2022

The bike path was the most frequently indicated as the safest place for cyclists to ride a bicycle in the three urban parks, followed by the urban parks. While the street was listed as the least safe place, the sidewalk was cited as the second least safe place, owing to conflicts with people and the fact that it is not an authorized place to ride a bicycle. These findings are consistent with those provided by Guide (2011), who found that a bike lane improves cyclist safety and comfort by creating a barrier between bicycles and motorized vehicles. One more

possible reason is that the attractive scenery of the parks makes cycling more attractive and they can cycle through the parks to avoid traffic, potential injuries, and waiting for traffic lights (ZHAO; LI, 2017). Suggesting that the creation of more green areas and trees in the streets, encourage more people to use bicycles.

The general infrastructure for cycling (includes paving, cycling trails and bicycle racks) in the three urban parks was rated as regular, whereas the general infrastructure for cycling in the Moinhos de Vento park was rated as good by the same percentage of riders. In Farroupilha and Marinha do Brasil parks, negative assessments (poor and extremely terrible) were cited in a higher percentage than positive ones (excellent and wonderful), indicating that most cyclists rated negatively. Well, good infrastructure in green regions influences people's presence (ULRICH, 1983; REIS, 2001; LONDE, 2014; COSTA, 2010; MCCORMACK, 2010; SZEREMETA; ZANNIN, 2013; MARTINS; DE SOUSA ARAÚJO, 2014; SPERANDIO, 2017), hence these sites, according to the evaluations done, require development.

More cyclists rated the Farroupilha and Moinhos de Vento parks as fair in terms of overall safety (considered as the perception of being protected from risks, dangers or losses). while the Marinha do Brasil park was rated as poor. In contrast to positive assessments, negative evaluations (very bad and terrible) obtained larger percentages in the Farroupilha and Marinha do Brasil parks (good and excellent). Safety is a factor that affects one's quality of life (FERREIRA, 2005), therefore based on the responses, it appears that safety needs to be improved, particularly in the two parks mentioned, where the negative feedback was more pronounced.

When it comes to the reasons why bicycles visit the parks, the top reason claimed by cyclists from Moinhos de Vento and Farroupilha parks is for walking/leisure, which is the second reason mentioned in the research conducted by Transporte Ativo and LABMOB- UFRGS (2019). While the primary motivation for the cyclists of Marinha do Brasil park was health/exercise, the health advantages created are numerous, as several authors have shown (COMISSÃO EUROPEIA, 2000; GONDIM, 2006; BOARETO, 2007; TERAMOTO, 2007; TUMLIN, 2007; PIRES, 2008; NERI, 2012; GEHL, 2013; ARAÚJO, 2014; ITDP, 2015; MOTTA, 2016).

There is a variety of reasons why cyclists choose not to ride through city parks. The main reason given by cyclists in the three urban parks was a lack of safety. The answer to this issue is related to the above-mentioned security evaluation of the park, in which security

assessments were conducted on a regular basis, emphasizing the necessity of security in urban parks. The main reason offered by cyclists for not riding in an urban park accords with that given by Pucher et al. (1999), who mention safety as a justification for cycling.

In the three urban parks, the evaluation of cycling paths adjacent to the respondents' parks was rated as regular in a higher percentage of cases. Negative (poor and very terrible) assessments received higher percentages than favorable ones (good and great). These findings demonstrate that, in the opinion of cyclists, the bike paths around the parks need to be improved.

The presence of local bike pathways has an impact on how cyclists travel to the three urban parks analyzed, demonstrating the relevance of having bike paths in these areas. Furthermore, the majority of cyclists in the three urban parks reported that they use the nearby bike routes to go to the park. The benefit of having bike pathways is obvious, since it allows more cyclists to use their bikes and commute securely to these locations (PUCHER *et al.*, 1999; MINISTÉRIO DAS CIDADES, 2007).

Table 3 shows the pairs of questions and the urban parks, along with the P values for the variables that showed relationships. There were correlations between all the pairings of questions. The first set of questions, whether the presence of a nearby bike path influences going to a park and whether the nearby bike paths are used to reach the park, indicates that people who answered affirmatively in one question also answered affirmatively in the other, indicating that whoever answered that the bike path influences going to a park also uses it to get to the park.

The second set of questions focused on where they felt most and least safe when riding their bikes. The correlation revealed that the places cited as safer in one question had the lowest percentages in the question of the least safe places, and vice versa. For example, a bicycle lane had a higher percentage of safer in one question and the lowest percentage in the inverse question, which agrees with another issue, emphasizing as a place that provides cycling safety.

The third set of questions, which included the park's bicycle infrastructure and safety, had a lower correlation in Moinhos de Vento park, than in the other two parks studied. The fourth and last set of questions, which concern the reasons for riding and not riding a bicycle in the park, reveal that the reasons for riding and not riding a bicycle in the park were similar.

Table 3 – Set of variables in which Pearson's Chi-square tests were performed and the presentation of the p-value of those that showed correlations.

Set of Variables	Farroupilha park	Marinha do Brasil park	Moinhos de Vento park
If the existence of a nearby bike path influences going to a park vs. The nearby bike paths are used to reach the park.	0	0,001	0,001
In which place(s) do you feel safest to ride a bike vs. In which place(s) do you feel least safe to ride a bicycle.	0	0	0
Assessment of the general infrastructure of this park for cycling vs. Safety assessment of this park.	0	0	0,006
The reasons for using the bicycle in the park vs. The reasons for not using the bicycle in the park.	0	0	0

Source: Authors, 2022.

It was feasible to illustrate how the correlations have relationships or not in the different parks by verifying the correlations. The results indicated that the correlations occur in higher or lower numbers depending on each park, but they do exist.

5 CONCLUSION

Understanding the relationships between urban parks with adjacent cycle paths and the cyclists, who frequent them, was accomplished in several ways. In addition to including the profile of the cyclist who frequents the urban park, as well as the preferences and aspects related to the bicycle of the cyclists who frequent them. Also, the cyclists and their interaction with the urban park, as well as cyclists and their relationship with bike trails near the urban park was considered. The one of the authors' familiarity with cyclists and awareness of which concerns should be explored in the study were aided by the fact that she is a cyclist.

The profile of a cyclist who frequents an urban park was drawn, and it differs from profiles of cyclists who ride their bikes in other places, such as streets (as compared to the 2019 Cyclist Profile survey). In comparison to the research indicated above, the male gender

predominates in urban parks, and the statistics on income and age group rise in the consideration of cyclists exclusively in these settings.

Cycle paths have been shown to have an impact, and cyclists actually use them to get to an urban park, highlighting the importance of these infrastructures for commuting. Even though cyclists rate them as regular, this shows that, despite their widespread use, they can be improved (with maintenance). The major reason to visit a park is to enjoy the ride/leisure and to improve one's health/exercise, while the main reason not to visit a park is the lack of safety; if cyclists feel unsafe, they avoid coming there.

The bike lane is where riders feel safest, while the street is where cyclists feel least safe, because the bike lane improves commuting safety. According to all the data reviewed and presented, the general infrastructure of urban parks for cycling can be regarded regular, and the general safety of the parks can be deemed regular and inadequate. As a result, the three urban parks' security and infrastructure can be upgraded.

In the current scenario of climate change, the supremacy of motorized transport, and the search for quality of life, the themes of bicycle, cyclists, cycling networks, and urban parks are very important. All of these are related to urban and environmental planning, and this research provides a way to explore different themes that can be studied together.

With the work presented, it was possible to start a better understanding of the reality of urban parks and nearby bike routes for cyclists in Porto Alegre, based on their impressions and in-person surveys, in order to direct efforts to develop these areas and encourage more cyclists to utilize them. Urban parks are frequently the first stop for new cyclists, who begin riding initially for recreation, but soon realize the benefits of this form of transportation and begin to use it in their everyday lives, and cycling infrastructure is critical in ensuring cyclist safety. As a result, greater investment in cycling infrastructure is required in general, as the use of bicycles in the city will increase as the number of cycle pathways increases.

In this case studied - urban parks, cyclists and the cycling network - it is possible to survey the important issues for cyclists who frequent these areas, that are not addressed by others researches. With the determination of the relationships found in the investigation, it is possible to demonstrate the importance of thinking about urban parks as also being used by cyclists and not only by pedestrians, and that cyclists do not simply cycle only on the streets and on bike lanes.

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