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# Association between school structure and physical activity in physical education class and school recess

## *Associação entre estrutura da escola com a atividade física na aula de educação física e no recreio*

Arieli Fernandes Dias[1]
Vanilson Batista Lemes[1]
Caroline Brand[1]
Júlio Brugnara Mello[1]
Anelise Reis Gaya[1]
Adroaldo Cezar Araujo Gaya[1]

**Abstract** – The aim of this study was to verify the association between the characteristics of the school structure and the physical activity of students in the physical education class and school recess. This is an association study with quantitative approach. The random sample is composed of 176 schoolchildren (71 boys and 105 girls) from 10 schools of the city of Passo Fundo-RS, Brazil. Physical activity was evaluated with a pedometer, after which the average number of steps in the physical education class and school recess was calculated. The characteristics of the school structure were evaluated by direct observation, with the audit tool in the school. Data were analyzed using descriptive statistics, independent t-test and generalized linear regression. The mean number of steps among boys was higher when compared to girls in the physical education class (t=3.478, p<0.001, d cohen=0.62) and in the school recess (t=2.537, p<0.01; d cohen=0.45). The number of steps in physical education class was not associated with the characteristics of the school structure. In the school recess, an inverse association was found, where boys enrolled in schools with regular quality structure performed on average 208.04 (95%CI=16.44/399.65; p=0.03) steps when compared to boys enrolled in schools with good quality structure. Schools that have bigger and/or better structure do not necessarily influence adolescents in the practice of physical activity in school recess and physical education classes.

**Key words**: Adolescents; Motor activity; Student's health.

**Resumo** – *Objetivou-se verificar a associação entre as características da estrutura da escola e a atividade física dos escolares na aula de educação física e no recreio. Estudo de associação com abordagem quantitativa. A amostra aleatória é composta por 176 escolares (71 meninos e 105 meninas) de 10 escolas estaduais de ensino médio da cidade de Passo Fundo-RS, Brasil. A atividade física foi avaliada com pedômetro, posterior a isso se calculou a média do número de passos na aula de educação física e no recreio. As características da estrutura da escola foram avaliadas por observação direta, com a ferramenta de auditoria na escola. Para análise dos dados utilizou-se estatística descritiva, test t independente e regressão linear generalizada. A média do número de passos entre os meninos foi maior quando comparados às meninas na aula de educação física (t=3,478; p<0,001; d cohen= 0,62) e no recreio (t=2,537; p<0,01; d cohen=0,45). O número de passos da aula de educação física não se associou com as características da estrutura da escola. No recreio, foi encontrada uma associação inversa, onde os meninos que estudavam nas escolas com estruturas de qualidade regular, realizaram em média 208,04 (IC 95%=16,44/399,65; p=0,03) passos a mais quando comparados aos meninos das escolas com estruturas de qualidade boa. As escolas que possuem maiores e/ou melhores estruturas, não necessariamente, influenciam os adolescentes na prática de atividade física no recreio e na aula de educação física.*

**Palavras-chave**: *Adolescentes; Atividade motora; Saúde escolar.*

1 Federal University of Rio Grande do Sul. Graduate Program in Human Movement Sciences. Projeto Esporte Brasil Research Group. Porto Alegre, RS. Brazil.

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## INTRODUCTION

The importance of physical activity (PA) for health and well-being is very widespread today[1]. However, about 80% of adolescents worldwide do not practice sufficient PA for health maintenance[2]. This prevalence is high and worrying; however, it is necessary to recognize that there are many intervening factors for the inclusion of PA as part of the adolescents' lifestyle[3,4]. These influences can be identified through the ecological framework for active lifestyle proposed by Sallis et al.[4], where there is a focus on factors that include the individual, the social environment, the physical environment and public policies. Taking these aspects into account, it does not seem appropriate to blame the individual for his / her more or less active behavior, especially when dealing with adolescents[5].

Sallis et al.[4] stated that the aforementioned factors are the main assumptions to be considered for the development of interventions that favor active behavior. Among these factors, the environment stands out, since it can be determinant for the practice of PA due to the strong relation with daily life[6]. In this context, one of the spaces that make up the adolescents' environment for a large part of their lives is the school, which is also an important place for health promotion and active lifestyle[7-9]. This can be achieved through well-organized physical education classes with active recesses and structures that favor the development of such interventions[10-12].

In this sense, studies have shown that more structured schools, places for outdoor physical activity, plain and adequate spaces and greater number of multi-sport courts have a positive impact on the sufficiently active behavior of adolescents[13-15]. In this context, Nichol et al.[16] explained this evidence more strongly, emphasizing that students are more active in schools that provide adequate conditions and opportunities for active leisure. In addition, Fein et al.[17] showed that students' perceptions about the quality of school structures can explain 8% of the PA variance in these places.

In Brazil, evidence on this subject is still scarce. Therefore, considering that it is necessary to increase the levels of PA of adolescents and that school structures and facilities can influence the practice of PA, both in the physical education classes and in other moments, the aim of this study was to identify the association between the characteristics of school structure and physical activity of schoolchildren in physical education classes and school recess.

## METHODOLOGICAL PROCEDURES

This is an association study with quantitative approach carried out with schoolchildren from 15 public high schools of Passo Fundo, RS, Brazil, corresponding to approximately 4,599 students (according to the 7th Regional Education Coordination).

The random-type sample was calculated using the G * Power software version 3.1. For sample calculation, effect size of 0.15 (mean effect), signif-

icance level of 0.05 and statistical power of 0.95 were used, considering the level of physical activity as a dependent variable, where the general linear regression models will be worked with approximately five predictors and a 20% increase to cover possible losses and refusals. Based on these criteria, a minimum sample size of 168 adolescents was reached.

The sample selection occurred in two moments. First, the city was divided into five regions (northern, southern, eastern, western and downtown), then, schools were selected from each region. Of the 15 state schools of Passo Fundo, ten were drawn, two per region. In the second moment, a high school class was drawn in each school. The number of schools and classes drawn was determined from the sample calculation, which indicated that a minimum sample size of 168 students was required. It was estimated that 15 to 20 students from each class would be evaluated, so that two schools per region were selected. These criteria were adopted with the purpose of the sample being random and well distributed, characterizing the city.

All high school classes in the selected school participated in the draw. All students of the drawn-out class, within the required age group, were invited to participate in the study. The inclusion criteria were: a) to be enrolled in public high schools of the municipality; B) be within the proposed age group (14-18 years); and, c) to hand back the free and informed consent form signed by parents / guardians and the endorsement indicating the willingness to participate. The following exclusion criteria were used: a) to have some physical and / or cognitive limitation that could compromise the result of some measure; and b) to have suffered some type of injury that prevents him / her from performing physical activities routinely. The study was approved by the Human Ethics Research Committee of the Federal University of Rio Grande do Sul under number 888.090.

PA was evaluated through the number of steps in two moments: in the physical education class and in the school recess. Students used a pedometer (Yamax® Digi-Walker CW 700, Tokyo, Japan) for three consecutive days. In the school recess, the average number of steps of the three days of use was used. In the physical education classes, students used the pedometer during one class, except in schools that offered two weekly periods of PE classes, in this case, it was used in both classes and the average number of steps was used for analysis. The pedometer used in the present study has already been tested and some studies suggest good validity and reliability as a method to objectively evaluate PA[18,19]. To collect data, some procedures were followed: (1) students were informed about the place of use of the pedometer (waist); (2) the equipment was attached using an elastic belt; and (3) the researcher was present at the school in all activity shifts to resolve possible doubts.

The characteristics of the school structure were evaluated through direct observation by a single researcher with the help of the school audit tool[15], which evaluates the characteristics of the school environment related to the practice of PA. The tool is composed of different domains, and the

one used in this study referred to school grounds.

Each structure was evaluated according to functionality, quantity and quality. In this sense, the structures were classified as non functional, quality 1 (regular), quality 2 (good), and quality 3 (excellent). With the help of the school audit tool manual, the general definition for each classification was: (0) non-functional: structure with precarious conditions that cannot be used for intended purpose, or the structure is not complete for the intended function; (1) regular quality: the structure does not have some feature to be used, or it has some wear, damage or lack of maintenance, but the use is not impossible; (2) good quality: the structure has all or almost all the resources to be used, or is preserved and presents good conditions; and (3) excellent quality: the structure has all the features to be used, or it does not present wear or visible damage.

For the analyses of associations, only structures classified as with regular, good and excellent quality were selected. The instrument used provides an individual analysis of the school structures, and to obtain a general quality and quantity analysis, the following criteria were stipulated *a priori*: schools that presented more than 60% of a given quality in a single classification (good, regular or poor) were defined as such. Variable general structure quantity was made through the sum of structures per school, categorized in: 1) one structure; 2) three to four structures; and 3) five and six structures.

Regarding the statistical treatment to evaluate the sample characteristics and the characteristics of school structures, descriptive statistics was used with absolute and percentage values. PA data were expressed as mean, standard deviation, 95% confidence interval and minimum and maximum values. To verify the differences in the mean values of the number of steps between genders, the independent t-test was used, and the effect size was calculated using the Cohen's d test[20].

The association between school structure and number of steps was verified through generalized linear regression. Variable number of steps was presented continuously, while independent variables (quantity and quality of school structures) were presented categorically, being used the category of greater and better structure as the reference variable. Different models were tested to verify, through the Aikaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC), the most appropriate model. Finally, through the analysis of the regression coefficient, the association of the school structure with the number of steps was calculated. All analyses were performed in the SPSS 22.0 for Windows® software (São Paulo, Brazil), and p values <0.05 were considered statistically significant.

## RESULTS

A total of 176 students (71 boys and 105 girls) aged 14-18 years were evaluated. Of these, 107 presented data on the number of steps in the physical education class and 151 presented data on school recess. Sample losses

occurred due to errors in the recording of pedometers and the absence of students on days of data collection. Table 1 shows the description of the sample characteristics.

**Table 1.** Characteristics of the study participants stratified by sex

| | Male (n=71) n (%) | Female (n=105) n (%) | Total (n=176) n (%) |
|---|---|---|---|
| Age group (years) | | | |
| 14 | 2 (2.8) | 4 (3.8) | 6 (3.4) |
| 15 | 21 (29.6) | 38 (36.2) | 59 (33.5) |
| 16 | 29 (40.8) | 45 (42.9) | 74 (42.0) |
| 17 | 17 (23.9) | 16 (15.2) | 33 (18.8) |
| 18 | 2 (2.8) | 2 (1.9) | 4 (2.3) |
| Region | | | |
| Downtown | 18 (25.4) | 14 (13.3) | 32 (18.2) |
| Northern | 17 (23.9) | 23 (21.9) | 40 (22.7) |
| Southern | 11 (15.5) | 26 (24.8) | 37 (21.0) |
| Eastern | 13 (18.3) | 20 (19.0) | 33 (18.8) |
| Western | 12 (16.9) | 22 (21.0) | 34 (19.3) |

n: absolute sample value; %: proportional sample value.

Table 2 shows the number of steps stratified by sex. The average number of steps among boys was higher when compared to girls, both in physical education class (t = 3,478, p = 0.001, d cohen = 0.62) and school recess (t = 2,537, p = 0, 01; d cohen = 0.45).

**Table 2.** Characteristics related to physical activity in school through the number of steps stratified by sex

| | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | PE class (n=51) | Recess (n=62) | PE class (n=56) | Recess (n=89) | PE class (n=107) | Recess (n=151) |
| Mean | 1903.2* | 583* | 1448.4 | 465.5 | 1665.2 | 513.8 |
| S.D. | 800 | 322.8 | 504.3 | 203 | 697.1 | 264.4 |
| lower 95%CI | 1689.9 | 508.6 | 1315.9 | 422.1 | 1541.4 | 471.4 |
| upper 95%CI | 2121.8 | 663.7 | 1588.9 | 506 | 1798.7 | 558.3 |
| Minimum | 615 | 169.6 | 417 | 82.5 | 417 | 82.5 |
| Maximum | 3563 | 1404 | 2912 | 975.6 | 3563 | 1404 |

PE class = Physical Education class. S.D = standard deviation. lower 95%CI = lower 95% confidence interval. upper 95%CI = upper 95% confidence interval. * = Statistically significant difference between males and females p <0.05 for independent T test.

Table 3 presents the characteristics of structures present for PA practice in school, according to quantity and quality. Differences in relation to the structure for practice of PA among schools are observed, with one school with regular quality structure and another school with six good-quality structures. The results of the association between school structure (quantity and quality) and number of steps are presented in table 4. An inverse association was found between quality of structures with number of steps in the school recess for boys (β = 208, 04, 95% CI = 16.44 / 399.65, p = 0.03).

**Table 3.** Characteristics of structures (quantity and quality) of schools participating in the study

| Structures | Schools | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | Quantity/(Quality) | | | | | | | | | |
| Soccer field | - | - | - | - | - | - | - | 1 (reg) | - | - |
| Dance room | - | - | - | 1 (exc) | - | - | - | - | - | - |
| Indoor soccer court | 1(reg) | - | 2 (reg) | 1(reg) | 1 (good) | - | - | 1 (reg) | 2 (reg) | - |
| Volleyball court | 1(reg) | - | 1 (exc) | 1 (good) | 2 (reg/ good) | - | - | 1 (reg) | 1 (good) | - |
| Multi-sports court | - | 2 (good) | - | 1 (good) | 1 (reg) | - | - | - | - | 1 (good) |
| Gym | - | - | - | - | 1 (good) | - | 1 (good) | - | - | - |
| Outdoor area | 1(reg) | 1 (good) | - | 1 (good) | 1 (good) | 1 (reg) | - | - | 1 (reg) | - |
| Total structures | 3 (reg) | 3 (good) | 3 (reg) | 5 (good) | 6 (good) | 1 (reg) | 1 (good) | 3 (reg) | 4 (reg) | 1 (good) |

Reg = regular quality. Exc = excellent quality.

**Table 4.** Association of school structures (quantity and quality) with number of steps (in physical education, school recess) stratified by sex

| Number of steps in PE class (n=107)* | Male | | | Female | | |
|---|---|---|---|---|---|---|
| Independent variables | β | 95% CI /up † | p | β | 95% CI /up † | p |
| Structure quality | | | | | | |
| 1 structure | -474.27 | -1098.53/149.99 | 0.13 | 255.19 | -114.54/624.94 | 0.17 |
| 3 and 4 structures | -396.6 | -1003.40/210.19 | 0.20 | 166.68 | -247.50/580.88 | 0.43 |
| 5 and 6 structures (reference variable) | | | | | | |
| Structure quality | | | | | | |
| Regular | 487.03 | -51.67/1025.74 | 0.07 | 122.9 | -200.42/446.23 | 0.45 |
| Good (reference variable) | | | | | | |
| Number of steps in Recess (n=151)** | | | | | | |
| Structure quantity | | | | | | |
| 1 structure | 70.04 | -156.80/296.89 | 0.54 | -14.72 | -137.50/108.04 | 0.81 |
| 3 and 4 structures | 20.55 | -200.81/241.91 | 0.85 | 0.25 | -126.09/126.59 | 0.99 |
| 5 and 6 structures (reference variable) | | | | | | |
| Structure quality | | | | | | |
| Regular | 208.04 | 16.44/399.65 | 0.03 | -69.61 | -166.50/27.27 | 0.15 |
| Good (reference variable) | | | | | | |

PE class = Physical Education class; † lower 95%CI = lower 95% confidence interval. upper 95%CI = upper 95% confidence interval; * = Sample number and AIC and BIC information criterion (male n = 51, AIC = 831.02, BIC = 840.68, female n = 56, AIC = 861.36, BIC = 871.49); ** = sample number and AIC and BIC information criterion (male n = 62, AIC = 893,52, BIC = 904,61, female n = 89, AIC = 1204,72, BIC = 1217,16).

## DISCUSSION

In the physical education class and school recess, it was found that the level of PA of boys was higher in relation to girls. In this sense, Scruggs et al.[21] used the same evaluation method in the physical education class and found similar results. In addition, studies that evaluated PA through other methods also showed that boys are more active in both physical education class[7,22,23] and school recess[14,24]. This aspect can be explained by cultural, social and biological aspects that stimulate and favor PA practices favoring boys[25].

Regarding school recess, boys who studied in schools with structures

considered of regular quality performed on average 208 steps more when compared to those from schools with good-quality structures. This result differs from that expected, since schools with better structures should provide higher levels of PA. However, the present study agrees with Nichol et al.[16], who found more active adolescents in schools with gyms considered to be of poor quality in relation to regular ones.

Although it is noteworthy that good structural conditions may induce students to use spaces for practice of PA during school recess, according to the author above, the greater the use of structures, the lower their quality. This can be explained by considering that some of these structures and materials wear out with frequent use, so schools tend to restrain use. In addition, school managers often do not encourage students to practice PA during school recess, denying access to certain places and materials because they are unaware of the benefits. Another hypothesis to be considered is that schools with regular-quality structures may be located in neighborhoods of lower socioeconomic status. This factor may be critical for PA practice among adolescents and it would be important to consider this in future studies addressing this topic.

Regarding the number of structures and the relation with the number of steps during school recess, no association was found. On the other hand, in Norway, Haug et al.[14] identified that in schools with higher number of structures, high school students were almost three times more likely to be active during recess than those enrolled in schools with lower number of structures. It is important to note that Norwegian schools provide students with various recess periods throughout the day, averaging 57.8 minutes. Thus, recess time may be the main factor that explains the difference of results in relation to the present study. Additionally, in the child population, the evidence in literature is more consistent, and indicates that the amount of structures directly influences the practice of PA during school recess[26,27].

In physical education class, no significant association was found between school structure and number of steps. The available data addressing this issue is limited, not taking into account the possibility that the structure is an intervening factor in PE classes. This premise is supported by UNESCO[28], which stresses that one of the objectives of physical education is to train an individual to have sufficient ability and autonomy to enjoy school spaces, as well as the importance of safe, accessible and well maintained structures.

When considered in isolation, variable school structure did not present enough forces to explain the behavior of PA in PE classes, since other factors may influence this context. In this perspective, according to Hino et al.[22], the teacher's behavior and the contents worked during PE classes are possibly more determinant factors for the practice of PA. Sallis et al.[29] carried out an intervention with environmental variables (increase in the supply of equipment, directed activities and supervised activities) and policies (context, structure of activities and teacher's behavior) and verified that intervention was effective in increasing PA among boys. Therefore, several

aspects should be considered when analyzing complex behavior such as PA.

Thus, it is considered that the school, students, physical education classes and school recess have different characteristics associated to the practice of PA, such as: age, motivation, equipment supply, quality of structures, access to material and access to sites. Thus, physical education teachers play a relevant role, because it is possible to perceive that even in schools with low-quality structure, when the class is well planned and structured[10,11], there are good levels of PA[7], which does not necessarily depend on environmental and structural aspects.

The aforementioned relationships still need to be investigated in greater depth because this research presents some limitations such as: addressing only one factor related to the environment (school structures), lack of evaluation of the pedagogical structure of physical education classes and lack of evaluation of PA Intensity. In addition, this is a cross-sectional study, which does not allow establishing a cause and effect relationship. On the other hand, the use of objective techniques of the school environment and physical activity is highlighted as a positive aspect.

## CONCLUSION

In conclusion, public schools with larger and / or better structures do not necessarily influence adolescents in the practice of physical education during school recess and physical education classes. Although an inverse association was found between quality of structures and number of steps during school recess, it is evident that having spaces with good structural conditions in schools can favor activities planned by the teacher and consequently increase students' level of PA.

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## REFERENCES

1. Blair SN, Cheng Y, Holder JS. Is physical activity or physical fitness more important in defining health benefits? Med Sci Sport Exer 2001;33(6):379–99.
2. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, et al. Global physical activity levels: Surveillance progress, pitfalls, and prospects. Lancet 2012;380(9838):247–57.
3. Bergmann GG, Pinheiro E, Bergmann M, Torres L, Gaya A. Estilo de vida na infância e adolescencia: repercursões para a educação física escolar. Rev Diálogo 2008;12(1):151–65.
4. Sallis JF, Cervero RB, Ascher W, Henderson KA, Kraft MK, Kerr J. An Ecological Approach To Creating Active Living Communities. Annu Rev Publ Health 2006;27(18):297–322.
5. Who is responsible for adolescent health? [editorial]. Lancet 2004;363(9426):2009.
6. Wang Y, Chau CK, Ng WY, Leung TM. A review on the effects of physical built environment attributes on enhancing walking and cycling activity levels within residential neighborhoods. Cities 2016;50(1):1–15.

7. Moreira RB, Nina GLD, Gaya AR, Nina PLD, Lemos AT, Gaya A. Níveis de atividade física em diferentes modalidades esportivas: Um programa não convencional de educação física escolar. Pensar Prát 2016;19(4):814–27.
8. Nina GLD, Moreira RB, Moura MM, Nina PLD, Carneiro C. Educação Física Escolar: uma proposta inovadora. Ciênc Conhecimento 2010;7(1):1–11.
9. Elliot E, Erwin H, Hall T, Heidorn B. Comprehensive School Physical Activity Programs: Helping All Students Achieve 60 Minutes of Physical Activity Each Day. J Phys Educ Recreation Dance 2013;84(9):9–15.
10. Lonsdale C, Rosenkranz RR, Peralta LR, Bennie A, Fahey P, Lubans DR. A systematic review and meta-analysis of interventions designed to increase moderate-to-vigorous physical activity in school physical education lessons. Prev Med 2013;56(2):152–61.
11. Wood C, Hall K. Physical education or playtime: which is more effective at promoting physical activity in primary school children? BMC 2015;8(1):8–12.
12. Tenório MCM, Tassitano RM, Lima MC. Conhecendo o ambiente escolar para as aulas de Educação Física: existe diferença entre as escolas? Rev Bras Ativi Fis Saude 2012;17(4):307–13.
13. Haug E, Torsheim T, Samdal O. Physical environmental characteristics and individual interests as correlates of physical activity in Norwegian secondary schools: The health behaviour in school-aged children study. Int J Behav Nutr Phys Act 2008;5(47):1-10.
14. Haug E, Torsheim T, Sallis JF, Samdal O. The characteristics of the outdoor school environment associated with physical activity. Health Educ Res 2010;25(2):248–56.
15. Jones NR, Jones A, Van-Sluijs EMF, Panter J, Harrison F, Griffin SJ. School environments and physical activity: The development and testing of an audit tool. Health Place 2010;16(5):776–83.
16. Nichol ME, Pickett W, Janssen I. Associations between school recreational environments and physical activity. J Sch Health 2009;79(6):247–54.
17. Fein AJ, Plotnikoff RC, Wild TC, Spence JC. Perceived environment and physical activity in youth. Int J Behav Med 2004;11(3):135–42.
18. Oliveira MM, Maia J. Avaliação da actividade física em contextos epidemiológicos. Uma revisão da validade e fiabilidade do acelerómetro Tritrac – R3D, do pedometro Yamax Digi-Walker e do questionário de Baecke. Rev Port Cien Desp 2001;1(3):73–88.
19. Schneider PL, Crouter SE, Lukajic O, Bassett DRJ. Accuracy and reliability of 10 pedometers for measuring steps over a 400-m walk. Med Sci Sports Exerc 2003;35(10):1779–84.
20. Cohen J. Statistical power analysis for behavioral sciences. Acad Press 1977;357–410.
21. Scruggs PW, Mungen JD, Oh Y. Quantifying Moderate to Vigorous Physical Activity in High School Physical Education: A Pedometer Steps/Minute Standard. Meas Phys Educ Exerc Sci 2010;14(2):104–15.
22. Hino AAF, Reis RS, Añez CRR. Observação Dos Níveis De Atividade Física, Contexto Das Aulas E Comportamento Do Professor Em Aulas De Educação Física Do Ensino Médio Da Rede Pública. Rev Bras Ativi Fis Saude 2010;1(1):21–30.
23. Santos SFC, Tribess S, Soares A, Ferraz M. Determinação da carga de trabalho decorrente de aulas de educação física escolar. Cinergis 2013;14(1):38–44.
24. Ickes MJ, Erwin H, Beighle A. Systematic review of recess interventions to increase physical activity. J Phys Act Health 2013;10(6):910–26.
25. Gonçalves H, Hallal PC, Amorim TC, Araújo CLP, Menezes AMB. Fatores socioculturais e nível de atividade física no início da adolescência. Rev Panam Salud Publ 2007;22(4):246–53.
26. Ridgers ND, Salmon J, Parrish AM, Stanley RM, Okely AD. Physical activity during school recess: A systematic review. Am J Prev Med 2012;43(3):320–8.

27. Escalante Y, García-Hermoso A, Backx K, Saavedra JM. Playground Designs to Increase Physical Activity Levels During School Recess : A Systematic Review. Health Educ Behav 2014;41(2):138-44..
28. Diretrizes em educação física de qualidade (EFQ) para gestores de políticas. Brasília:UNESCO, 2015; Available from: <http://unesdoc.unesco.org/images/0023/002319/231963por.pdf> [2017 fev 07].
29. Sallis JF, McKenzie TL, Conway TL, Elder JP, Prochaska JJ, Brown M, et al. Environmental interventions for eating and physical activity: A randomized controlled trial in middle schools. Am J Prev Med 2003;24(3):209–17.

**CORRESPONDING AUTHOR**

Arieli Fernandes Dias
Universidade Federal do Rio Grande do Sul-UFRGS. Programa de Pós Graduação em Ciências do Movimento Humano.
Rua Felizardo, 750, Jardim Botânico, 90690-200, Porto Alegre, Brasil.
E-mail: ariieli_dias@hotmail.com