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Perceived neighborhood environment and leisure time physical activity among adults from Curitiba, Brazil

Ambiente percebido do bairro e atividade física no lazer em adultos de Curitiba, Brasil

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Abstract – The aim of this study was to analyze the association between perceived neighborhood characteristics and leisure time physical activity (PA) and the moderator effect of gender, age, schooling and time spent working/studying on perceived environment and leisure PA in adults. This is a cross-sectional study conducted with 699 adults (53.1% women), distributed from 32 census tracts selected according to walkability and neighborhood income characteristics in Curitiba. Perceived neighborhood characteristics were assessed using the Brazilian version of the *Neighborhood Environment Walkability Scale-Abbreviated* (A-NEWS). Leisure time PA was evaluated through the long-version IPAQ and walking and moderate to vigorous physical activity (MVPA) were analyzed separately. PA classification considered ≥10 minutes/week and ≥150 minutes/week of walking or MVPA. Associations were tested using a multilevel logistic binary model. After adjusting for potential confounders, aesthetics perception was associated with ≥10 minutes/week of walking. Additionally, access to public places for leisure remained associated with ≥10 minutes/week and ≥150 minutes/week of MVPA. The relationship between perceived access to public spaces, walking and MVPA were stronger in women and younger adults. It is concluded that a better perception of neighborhood aesthetics was associated with the practice of walking and access to public spaces with the practice of MVPA, respectively.

Key words: Adult; Environmental health; Leisure activities; Motor activity.

Resumo – *Objetivou-se analisar a associação entre características percebidas do ambiente do bairro e a prática de atividades físicas (AF) no lazer e verificar o efeito moderador do gênero, faixa etária, escolaridade e tempo no trabalho/escola na relação entre a percepção do ambiente e AF no lazer em adultos. Estudo transversal com 699 adultos (53,1% mulheres), residentes em 32 setores censitários com diferentes características ambientais em Curitiba (walkability e renda). As características percebidas do ambiente do bairro foram avaliadas pela versão em português do Neighborhood Environment Walkability Scale-Abbreviated (A-NEWS). A AF no lazer foi avaliada pelo IPAQ longo e a caminhada foi analisada separadamente da prática de atividades físicas moderadas à vigorosas (AFMV). A classificação da AF no lazer considerou as pessoas que "realizam" ≥10 minutos/semana e ainda aquelas realizam ≥150 minutos/semana de caminhadas ou AFMV. As associações foram testadas com um modelo logístico binário multinível. Após ajuste para as potenciais variáveis de confundimento, observou-se que melhor percepção de estética foi associada a maior chance de adultos caminharem ≥10 minutos/semana no lazer. Além disto, maior percepção de acesso a espaços públicos de lazer foi associado a maior chance dos adultos realizarem ≥10 minutos/semana e ≥150 minutos/semana de AFMV. As associações entre acesso a espaços públicos de lazer com caminhada e AFMV foram mais fortes entre mulheres e adultos mais jovens. Conclui-se que melhor percepção da estética do bairro foi associada à prática da caminhada e o acesso a espaços públicos com a prática de AFMV.*

Palavras-chave: *Adulto; Atividades de lazer; Atividade motora; Saúde ambiental.*

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INTRODUCTION

The construction and maintenance of environments conducive to the practice of physical activity has been recommended by specialists to mitigate the impact of physical inactivity and obesity at global levels[1], especially in low- and middle-income countries such as Brazil, which suffers from the high burden of chronic noncommunicable diseases. These recommendations are based on the premise that environmental interventions are promising to enable greater population coverage and for presenting better outcomes in changing health-related behaviors[2]. Despite the importance attributed to the environmental characteristics, especially to the neighborhood context, there is still inconsistent evidence about which environmental characteristics are determinants of physical activity practice, especially in Brazil, due to its great territorial extension, climate variations, social and economic inequality, among others[3].

Evidence suggests that it would be important to test associations between environmental characteristics and physical activity at the local level, since these associations may be context-specific[4]. Therefore, there is great limitation in considering these aspects in high-income countries as possible environmental correlates for physical activity in Brazil. Moreover, it is believed that part of inconsistencies observed in this relationship may be due to the need to consider the type and volume specificities of physical activity and also the sociodemographic factors of individuals. That is, it is expected that the associations between the characteristics of the neighborhood environment are different among different population subgroups.

Thus, when analyzing population subgroups, one can identify those for which the neighborhood environment may be relevant to the practice of physical activities. A study with Brazilian adults identified that the association between safety perception and leisure time walking tends to be significant only for women and people of high socioeconomic level[5]. In addition, no association was observed between the safety perception in the neighborhood and moderate and vigorous activities and leisure time walking. However, a moderator effect of gender was observed, where perception of walking safety is associated with walking during the day among women, but not among men[5]. In addition, in Brazil, studies that have investigated the characteristics of the neighborhood environment and its relationship with physical activity have not used instruments in their full format[5,6], analyzing only some items of instruments such as A-NEWS[6-8] or even only some specific environment domains[5]. Therefore, the inclusion of all domains and items of the instrument may contribute to broadening the understanding of the relationship between neighborhood environment and physical activity. Thus, this study aimed to analyze the association between perceived characteristics of the neighborhood environment and the practice of leisure time physical activities and also to test the modifying role of sociodemographic variables in this relationship in adults.

METHODOLOGICAL PROCEDURES

This cross-sectional study was conducted through a household survey in adults from Curitiba, Paraná, Brazil, in 2010, which is part of a multicenter study called IPEN - Study - International Physical Activity and the Environment Network Study, conducted in 15 cities of 13 countries with the aim of analyzing the relationship between the characteristics of the built environment and the income of individuals on the practice of physical activity.

In order to select sites and participants, the role of the urban environment in the physical activity of individuals and communities was considered as premise[2]. In this context, environmental characteristics with potential impact on the physical activity performed in the daily movements are operationalized and represented by the term "walkability". To compose the walkability score, four indicators were used: residential density, street connectivity, diversified land use (entropy indicator), and commercial density[9].

The primary sampling units were defined from the walkability characteristics of the census tracts in the city of Curitiba (n = 2,125). For this purpose, information based on the Geographic Information System provided by Institute of Research and Urban Planning of Curitiba was used. Further details on the process of creating indicators can be found in the study of project methods[10].

In addition to the walkability score, the income score created from the average income of those responsible for the households contained in each census tract was considered. After identifying the walkability and income score of all census tracts, 8th and 9th deciles were classified as high walkability and high income, and 2nd and 3rd deciles were classified as low walkability and low income. Sectors without households, composed of one or two blocks and adjacent to sectors with extremely distinct categories of income and walkability (e.g. a high walkability sector located a long side a low walkability sector) were excluded. In all, 16 sectors of high walkability and 16 of low walkability were selected, being eight of low income and eight of high income.

The selection of households considered the minimum sample required (n = 500 individuals) at each site participating in the IPEN-Study. This estimate considers the combined analysis of all study sites to determine variance of physical activity explained by the environment. However, for purposes of analysis only of the city of Curitiba, a total sample of 704 people was adopted. This over-sampling was established to increase the power of analyses when considering only the sample of the city of Curitiba. In each census tract, 22 households were systematically randomized, totaling 176 households per walkability and income stratum. In each household, an adult aged 18-65 years was drawn.

In order to evaluate the level of physical activity, the leisure module of the International Physical Activity Questionnaire (IPAQ) was used, which includes walking, moderate intensity physical activities (e.g. swimming,

moderate cycling, practicing sports) and physical activities of vigorous intensity (e.g. running, speed cycling, gymnastics). This instrument has been widely used in surveys conducted in countries around the world and has been previously translated and validated for use in Brazilian adults[11]. The physical activity measure recorded by the IPAQ is obtained by questioning the number of days and average time per day performed in each activity.

In order to obtain measures on the environment perception, the abbreviated version of the Neighborhood Environment Walkability Scale (A-NEWS) was used. This instrument assesses the perception of characteristics of the neighborhood environment that may be associated with walking and other types of physical activities such as residential density, land use mix, accessibility to commerce, walking / pedaling structures, street connectivity, aesthetics, safety in relation to traffic and crimes in the neighborhood[12]. A-NEWS presented validity and reliability scores in previous studies and was translated, adapted[13] and previously used in national studies[5,8]. The measure of residential density in the A-NEWS is obtained by means of the perception of the predominant types of residences in the neighborhood and has as options of response a 5-point likert scale that ranges from "none" to "all", with value 1 corresponding to answer option "none" and five as the option "all". For all other questions, the answer options were composed of a 4-point likert scale with "totally disagree", "partly disagree", "partly agree" and "totally agree" options. The mean was computed for each of the sub-scales (domains) in such a way that higher values indicated higher values of the respective domain. Originally, eight domains compose the instrument used in the present study; however, an additional domain was computed in the present study based on the average perception of the proximity of public spaces (parks, squares and cycle paths). This domain was added so that it was possible to identify the perception of access to public structures, since the issues of the "Walking / Bicycling Structures" domain only address issues related to sidewalk quality. A pilot study was conducted prior to data collection in a sample of 67 adults residing in census tracts not drawn for the present study. A-NEWS presented high reproducibility (test-retest with interval of 7-10 days between applications) with the lowest intraclass correlation coefficient of 0.67 (95% CI = 0.47-0.80) and the highest 0.95 (95% CI = 0.92-0.97).

In order to minimize the effect of neighborhood self-selection, 11 questions were used, addressing satisfaction with public transportation, commerce, friends in the neighborhood, walking conditions, leisure options, public spaces for leisure, security, traffic, public services, general satisfaction and if the person would change neighborhood if he could and had options of dichotomous answers (yes and no). Questions had high agreement percentage (> 80%) and suitable Kappa index (0.46-0.80).

The time that people are working and studying outside their home and the time spent in the commuting to these places were evaluated, considering that in these periods people are less likely to perform physical activities in the context of leisure and are less exposed to the neighborhood environ-

ment. The occupation evaluation was carried out through four questions: 1) Do you work? 2) How many days per week do you work? 3) How many hours a day do you work? 4) How much time per day do you spend commuting (going to work + back from work)? The same four questions were applied to identify the time spent going to and coming back from school.

The sociodemographic information obtained was gender, age in years, marital status (single, separated or widowed or married or living with another person), number of children, economic classification based on the Brazilian Economic Classification Criteria, schooling and Body Mass Index (BMI) obtained from self-reported weight and height measures.

To test the study associations, a multilevel logistic model was used to adjust estimates considering the sample design in which adult samples were obtained from 32 census tracts. In order to compare the effects of independent variables on the dependent variable, the A-NEWS domains were continuously included, transformed into a Z-score, thus assuming mean = 0 and standard deviation = 1. The dependent variable was the walking and the practice of leisure time moderate to vigorous physical activities (MVPA) classified according to two different cutoff points. The first classification considered people who performed walking or MVPA for at least 10 minutes / week. The second considered those who reached the current recommendations (≥150 minutes / week) walking or performing MVPA. All analyses were performed in STATA version 12.0 with random intercept without including explanatory variables in the second level. The sample size (n = 699), considering alpha level at 5% and power of 80%, allows detecting effect size greater than 1.25 and 1.37 for the walking outcome (≥10 and ≥150 minutes / week) and 1.26 and 1.29 for MVPA (≥10 and ≥150 minutes / week). Two models were obtained being one crude model and one adjusted model for variables that presented statistically significant association in the crude model ($p < 0.05$). Finally, interaction terms (gender and perceived environment variables, age group and perceived environment variables, schooling and perceived environment variables and time spent in work / study and perceived environment variables) were inserted in the model to test the moderator effect of gender, age group, schooling and time at work / study. For subgroups in which interactions presented a statistically significant coefficient, stratified analyses were performed and the results were presented in the graph format (Figure 1), showing the predicted prevalence values already adjusted for the confounding variables and with A- NEWS scores classified into tertiles.

RESULTS

The study sample was composed of 699 participants (53.1% women). The final proportion of participants in relation to the number of eligible households (success rate) was 66.4%. Approximately two-thirds of participants had less than 11 years of schooling and had children living at home. When considering leisure time walking, 62.7% of adults reported not walking,

and only 12.6% walked at recommended levels. Regarding the practice of moderate to vigorous physical activity, 68.2% do not perform this activity while 22.8% perform at recommended levels for health (Table 1).

Table 1. Descriptive statistics of the sample characteristics. Curitiba, Paraná, Brazil (n = 699).

Variable	Category	n	%
Gender	Men	328	46.9
	Women	371	53.1
Age Group	18-39	330	47.3
	40-65	367	52.7
Schooling (years)	0-11	433	61.9
	>11	266	38.1
Time spent in school work / school (hours/week)	1st and 2nd tertiles (0-51,5)	463	66.2
	3rd tertile (>51.5)	236	33.8
Children living at home	No	209	30.0
	Yes	487	70.0
Satisfaction with the Neighborhood	Low (1st tertile)	220	31.6
	Intermediate	223	31.9
	High (3rd tertile)	255	36.5
Leisure time walking	0-9 min/week	437	62.7
	10-149 min/week	172	24.7
	≥150 min/week	88	12.6
Leisure time MVPA	0-9 min/week	475	68.2
	10-149 min/week	62	9.0
	≥150 min/week	159	22.8

MVPA: moderate to vigorous physical activity

After adjusting for potential confounding variables, it was observed that people who work and / or study for a long period are less likely (OR = 0.56, 95% CI = 0.40-0.79) of walking 10 or more minutes / week (Table 2). Among perceived environment variables, better esthetics perception was associated with this outcome (OR = 1.23, 95% CI = 1.01-1.50). When considering physical activity volumes at recommended levels, only working and / or studying for a longer period were inversely associated with leisure time walking (OR = 0.49; 95% CI = 0.28-0.86).

In the multivariate model, variables associated with MVPA were the same even considering different cutoff points (MVPA ≥ 10 minutes / week vs. ≥150 minutes / week), although the effect size was slightly higher for physical activities performed at recommended levels. Women were less likely to perform MVPA (Table 3) while higher education was positively associated. The only environmental variable associated with MVPA was access to public recreational spaces, considering both ≥10 minutes / week (OR = 1.46, 95% CI = 1.19-1.80) and ≥150 minutes / week (OR = 1.59, 95% CI = 1.25-2.01).

Of the 152 tested interactions (9 independent variables x 2 dependent variables x 4 moderating variables x 2 cutoff points), 11 were statistically

Table 2. Association between perceived environment domains and leisure time walking in adults. Curitiba, Paraná, Brazil (n = 699).

	Leisure time walking (≥10 min./week)				Leisure time walking (≥150 min./week)			
	Crude		Adjusted		Crude		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sociodemographic variables								
Gender (ref=men)	0.87	(0.64-1.19)			0.92	(0.58-1.43)		
Age group (ref=18-39 years)	1.31	(0.96-1.78)			1.67*	(1.05-2.66)	1.44	(0.89-2.32)
Schooling (ref=0-11 years of school)	1.28	(0.93-1.75)			1.27	(0.81-2.02)		
Satisfaction with the neighborhood (ref=1st and 2nd tertiles)	1.39*	(1.01-1.91)	1.13	(0.80-1.60)	1.36	(0.86-2.15)		
Children at home (ref=no)	1.04	(0.74-1.46)			1.02	(0.62-1.68)		
Time at work / school (ref=1st and 2nd tertiles)	0.57*	(0.41-0.80)	0.56*	(0.40-0.79)	0.45*	(0.26-0.79)	0.49*	(0.28-0.86)
Perceived environment variables								
Residential Density	1.16*	(1.00-1.35)	1.08	(0.91-1.28)	1.08	(0.87-1.35)		
Land use mix - Diversity	1.00	(0.86-1.17)			0.99	(0.78-1.24)		
Land use mix - Accessibility	1.05	(0.90-1.23)			1.06	(0.84-1.34)		
Street connectivity	1.00	(0.86-1.16)			0.99	(0.79-1.23)		
Walking / Pedaling Structures	1.21*	(1.04-1.42)	1.01	(0.83-1.24)	1.07	(0.85-1.35)		
Aesthetics	1.32*	(1.13-1.55)	1.23*	(1.01-1.50)	1.27*	(1.01-1.61)	1.28	(0.97-1.70)
Safety in relation to vehicle traffic	1.04	(0.89-1.21)			0.98	(0.78-1.23)		
Safety in relation to crimes	1.04	(0.90-1.22)			1.34*	(1.06-1.69)	1.23	(0.96-1.56)
Access to public spaces	1.19*	(1.02-1.40)	1.07	(0.89-1.27)	1.24	(0.98-1.57)		

OR: Odds Ratio; CI 95%: 95%Confidence Interval; * p <0.05.

Table 3. Association between perceived environment domains and MVPA in leisure time in adults. Curitiba, Paraná, Brazil (n = 699).

	Leisure time MVPA (≥10 min./week)				Leisure time MVPA (≥150 min./week)			
	Crude		Adjusted		Crude		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sociodemographic variables								
Gender (ref=men)	0,47*	(0.34-0.66)	0.54*	(0.38-0.77)	0.41*	(0.28-0.59)	0.49*	(0.33-0.72)
Age group (ref=18-39 years)	0,63*	(0.45-0.87)	0.79	(0.54-1.16)	0.55*	(0.38-0.80)	0.70	(0.46-1.08)
Schooling (ref=0-11 years of school)	2,24*	(1.58-3.17)	1.90*	(1.30-2.78)	2.46*	(1.67-3.61)	2.05*	(1.34-3.12)
Satisfaction with the neighborhood (ref=1st and 2nd tertiles)	1,14	(0.81-1.62)			1.08	(0.73-1.58)		
Children at home (ref=no)	0,58*	(0.40-0.82)	0.92	(0.61-1.40)	0.53*	(0.36-0.78)	0.96	(0.60-1.51)
Time at work / school (ref=1st and 2nd tertiles)	0,99	(0.70-1.40)			0.82	(0.55-1.21)		
Perceived environment variables								
Residential Density	1,41*	(1.21-1.65)	1.12	(0.93-1.37)	1.45*	(1.23-1.70)	1.09	(0.89-1.35)
Land Use Mix - Diversity	1,51*	(1.27-1.81)	1.20	(0.97-1.47)	1.60*	(1.31-1.96)	1.24	(0.98-1.56)
Land Use Mix - Accessibility	1,29*	(1.07-1.54)	1.09	(0.89-1.34)	1.33*	(1.09-1.64)	1.09	(0.87-1.37)
Street connectivity	1,05	(0.89-1.24)			1.15	(0.95-1.39)		
Walking / Pedaling Structures	1,23*	(1.02-1.48)	0.91	(0.74-1.12)	1.29*	(1.05-1.59)	0.91	(0.72-1.15)
Aesthetics	1,13	(0.94-1.36)			1.07	(0.86-1.31)		
Safety in relation to vehicle traffic	0,99	(0.83-1.17)			0.93	(0.77-1.12)		
Safety in relation to crimes	0,96	(0.81-1.13)			1.01	(0.84-1.21)		
Access to public spaces	1,69*	(1.41-2.04)	1.46*	(1.19-1.80)	1.85*	(1.49-2.31)	1.59*	(1.25-2.01)

MVPA: Moderate to Vigorous Physical Activity; OR: Odds Ratio; 95% CI: 95% Confidence Interval; * p <0.05.

significant (p <0.05), of which three presented statistically significant association coefficient (p <0.05) in the analysis of subgroups (stratified analysis). The association between perception of access to public leisure spaces with walking (≥10 minutes / week) and MVPA (≥150 minutes / week) was statistically significant only for women (Figures 1A and 1B, respectively). In addition, it was observed that the association between perception of access to public leisure spaces with MVPA (≥10 minutes / week) is significant only for adults aged 18-39 years (Figure 1C).

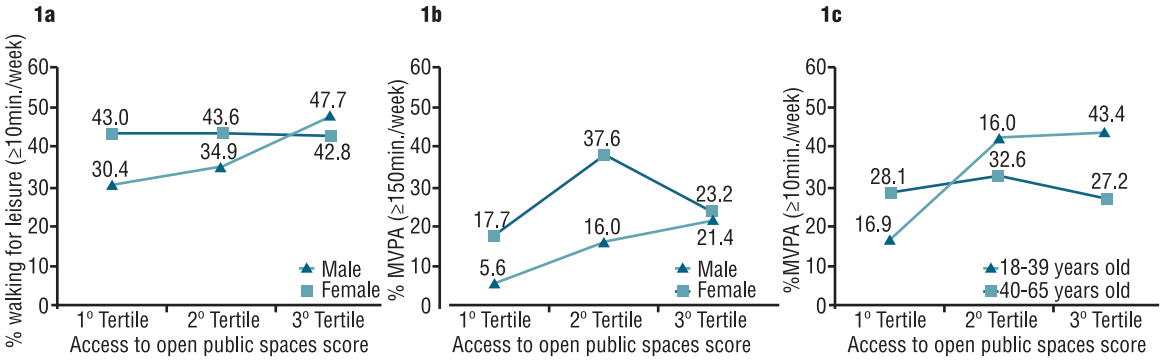

Figure 1. Prevalence of leisure time walking and MVPA according to the score of access to leisure public spaces stratified by gender and age group (Curitiba, PR - 2010, n = 699).

DISCUSSION

The study points out as the main result that the domains of the perceived environment of the neighborhood are differentiated and independently associated with leisure time walking and MVPA in adults. Positive perception of the neighborhood aesthetics was associated with greater chance of walking for at least 10 minutes / week and the perception of access to public spaces was associated with greater chance of performing MVPA regardless of volume (≥10 or ≥150 minutes / week). In addition, the moderating role of sociodemographic variables in the relationship between environmental characteristics and leisure time physical activity was observed, indicating that this association is gender specific and in some cases age group specific.

The practice of leisure time walking has been associated with a favorable environment [14]. Evidence from high-income countries has indicated that sites with better esthetics are associated with higher prevalence of leisure time walking[15], but these findings are still inconsistent when compared to findings of middle- and low-income countries, such as Brazil. For example, studies conducted in Curitiba [16,] São Paulo [17] and Recife[18] found no association between neighborhood aesthetics and leisure time physical activity. Some factors may contribute to explain the lack of association observed in the studies above. Although most of the studies have used A-NEWS items, this measure was not analyzed as a scale with domains composed of several items, but only a few questions, which may limit the evaluation of these characteristics. In addition, these studies used as cutoff point the practice of physical activities in 150 or more minutes per week

and few considered walking separately. Therefore, it is possible that more accurate and sensitive measures are necessary to evaluate characteristics of the neighborhood environment, and that aspects such as aesthetics, for example, may be associated with lower leisure time walking volumes and not necessarily with compliance with recommendations. Results observed in studies carried out in other countries[19] have supported this hypothesis[19,20].

When analyzing the practice of MVPA, the results of this study are similar to those observed in national studies[21,22] and in those conducted in Latin America[23], suggesting that the perception of greater availability of sites to practice physical activity may contribute to higher levels of physical activity. In fact, this is the environmental characteristic that has been most investigated. However, the results are less consistent when the existence or accessibility to public places for the practice of physical activities is considered an important factor in terms of public health and equity. First of all, most studies do not distinguish access to private leisure spaces (clubs, gyms and gymnasiums) and public spaces (squares, parks and hiking trails). In addition, almost all studies analyze only the perception of the environment to obtain this information[23,24], which accentuates problems related to the reverse causality in the findings, since active individuals can perceive more precisely the accessibility to sites for the practice of physical activities[1].

The results allow us reinforcing the hypothesis that environmental characteristics associated with physical activity are specific not only to the physical activity domain[25], but also to different types of activities in the same domain (walking vs. MVPA). In the present study, esthetics was associated with walking while the perception of greater access to public spaces was associated with MVPA. However, data suggest that associations are not necessarily specific to the volume of leisure time physical activity. Access to public spaces was associated with greater chance of practicing moderate to vigorous physical activities at both ≥10 minutes / week and ≥150 minutes / week. Neighborhood aesthetics was associated only with walking ≥10 minutes / week. In this way, further studies are necessary so that more robust conclusions about this relationship can be presented.

The hypothesis that the associations between perceived environment characteristics and the practice of physical activities are moderated by individual characteristics[26] was confirmed in the present study. In general, the moderating effect of these variables was more evident in MVPA when compared with leisure time walking. Among the variables selected as potential moderators, gender presented greater consistency in associations. The association between perceived environment characteristics and leisure time physical activity was stronger among women. It is believed that intrapersonal and interpersonal variables may help explain the different associations between men and women. Environmental characteristics can affect physical activity through different mechanisms. For example, a better perception of the availability of leisure spaces was directly associated with MVPA and also indirectly associated through increased self-efficacy[27]. These data indicate that the perception of accessibility to leisure sites can

also promote changes in intrinsic motivational factors that in turn affect levels of physical activity[28]. In general, it has been observed that women have lower self-efficacy, social support and perceive more barriers to physical activity[29], so environmental characteristics could act indirectly in these variables, thus enhancing the effect of the environment perception on the practice of physical activities[4]. Moreover, activities performed by women are not the same as those performed by men [30] and consequently the factors associated with MVPA in each gender may be specific.

Regarding the age group, it was demonstrated that the association between access to public spaces and MVPA was specific for younger adults (18-39 years). One of the possible explanations for this result is the type of physical activity performed by young adults. The practice of MPAV is more prevalent among younger adults (40-65 years) while walking among older adults (table 2 and table 3). Whereas MPAV is often described as sports, activities performed in stations and exercise or running apparatus, such activities require more infrastructure for practice. Such structures are commonly found in public spaces of Curitiba. Therefore, it is possible that these sites are frequented and used for the practice of MVPA. However, the lack of information on the type of activity practiced by participants limits the confirmation of this hypothesis.

This study has some limitations. Firstly, the cross-sectional design of the study does not allow us identifying the meaning of associations observed. In order to minimize the problem of reverse causality, a measure of satisfaction with the neighborhood was included as a control variable in the multivariate analyses. This procedure allows obtaining less inflated effect sizes, but it is not yet possible to determine the true meaning of the associations. In addition, the main confounding variables were included in the analyses. The sampling plan allowed increasing the contrast among environmental characteristics; however, it may have reduced the capacity to extrapolate the findings for the entire population of Curitiba. Furthermore, the final sample size (699 adults) was insufficient to detect associations of small effect magnitude. The measure of physical activity was self-reported, which may increase the chance of overestimation and, therefore, the occurrence of possible non-differential errors. However, comparisons with different outcome levels were performed, thus increasing the comparison with the response gradient. In addition, the measure used allowed specific analyzes for domain and type of physical activity. Finally, although environmental perceptions may present problems to classify exposures, the instrument used is recognized as reliable and allows identifying unique characteristics of the environment, such as aesthetics and safety in the neighborhood, which are not obtained by other methods[11].

Thus, it could be concluded that a better perception of the neighborhood aesthetics was associated to the practice of walking and access to public spaces with the practice of MVPA. These associations were specific to the type of physical activity performed and may be moderated by individual characteristics.

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