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Perception of the environment and practice of physical activity by adults in a low socioeconomic area

ABSTRACT

OBJECTIVE: To analyze the association between practice of physical activity and the perception of the community environment among adults.

METHODS: A cross-sectional study of 890 adults carried out in Ermelino Matarazzo district in São Paulo, Southeastern Brazil, 2007. The dependent variables were the practice of at least 150 minutes per week in leisure time physical activity and walking for commuting. Independent variables concerned the environment, and adjustment variables were sex, age, education and length of time living in the neighborhood.

RESULTS: Variables associated with leisure time physical activity were: invitation from friends/neighbors, the presence of facilities less than ten minutes walking from the house and the absence of bars within ten minutes walking distance of the house. Public safety was associated with walking for commuting.

CONCLUSIONS: To promote physical activity in areas of low socioeconomic status, it is fundamental to invest in public safety and facilities for physical activity, in addition to promoting social support networks.

DESCRIPTORS: Adult. Motor Activity. Leisure Activities. Socioeconomic Factors. Environment and Public Health. Cross-Sectional Studies.

INTRODUCTION

The physical environment greatly influences the life style of people and their agency to chose healthy habits. The ecological model proposed by Sallis et al[20] showed that the practice of physical activity and the adoption of healthy diets are complex behaviors and that behavior change also depends on the characteristics of the environment. The model proposes levels of influence and interaction between respective aspects, perceptions of the environment and broader aspects such as neighborhood facilities and public policies.

Two reviews found an association between various environmental factors and different types of physical activity.[12,18] The positive association of access to adequate facilities and practice of leisure physical activity was also confirmed by studies that objectively analyzed the environment.[9,15] In addition, adequate access to recreational areas and open public spaces also increases the likelihood of walking at least 150 minutes per week.[5,6,7,11] Yet, these studies were undertaken in high-income countries and the associations described between environment and physical activity may not apply in the Brazilian context.

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The large social inequity in Brazil and other middle-income countries should be considered because it involves the existence of areas with greater vulnerability that many times have few recreational areas, sidewalks or other community attributes that facilitate the practice of physical activity.

Currently, there is scarce evidence about the relationship between environment and physical activity among adult Brazilians, particularly for residents of low socioeconomic areas. Therefore the goal of this study was to analyze the association between physical activity and self-reported community environment among adult residents of a low socioeconomic area.

METHODS

This cross-sectional population study was performed in a district of São Paulo municipality, Southeastern Brazil.

The study was carried out in 2007, in Ermelino Matarazzo district, located in the eastern zone, which is the municipality's most populous region with more than 4 million residents and borders Guarulhos municipality. According to 2009 data from the State Data Analysis Foundation (Fundação SEADE), Ermelino Matarazzo has an area of 8.95 km², 143 census sectors and 115,571 residents, with a population density of approximately 12,900 residents/km².[a] According to 2000 Census data from the Instituto Brasileiro de Geografia e Estatística (IBGE - Brazilian Institute of Geography and Statistics), only 2.3% of the population of Ermelino Matarazzo has a monthly per capita income greater than 10 minimum salaries, in contrast to 12.1% of the population in São Paulo municipality.[b]

The sample consisted of 890 people, aged 18 years or older, living at least six months in Ermelino Matarazzo. Sampling was performed through a three-stage cluster design: census sector selection (random selection of 35 sectors, distributed according to education of the household head), random selection of households from selected sectors and random selection of adults and older adults in the selected household.[23] More details on the sample design have been previously described.[22]

The long version of the International Physical Activity Questionnaire (IPAQ), validated in Brazil, was utilized to evaluate the practice of physical activity in leisure time and as a form of commuting. This instrument was used in epidemiological study with adult representative sample of São Paulo municipality.[3] Comprehensive information about the validation studies and versions of the questionnaire are available on the internet.[c]

To evaluate the environment we used an adapted version of the Neighborhood Environment Walkability Scale (NEWS -- Brazilian version), validated by Malavasi et al.[14] The scale was modified to improve understanding by adult residents of Ermelino Matarazzo. The final adapted version, consisting of 38 questions, was discussed with experts of the environment and physical activity in Brazil. The interclass correlation coefficient was ≥ 0.70 for all scores developed from the individual questions.

The dependent variable was the practice of at least 150 minutes per week of walking as commuting or of moderate to vigorous leisure time physical activity. The duration of vigorous physical activities in leisure time was multiplied by two and added to moderate physical activity. The independent variables were all the dichotomous and categorical variables and the self-reported environmental score. The control variables were sex, education, age and length of time residing in household.

Poisson and two regression models were used to evaluate the effect of the independent variables on the practice of physical activity.

Initially, the chi-square was calculated for all environmental variables compared to each dependent variable. Variables with p values < 0.20 underwent bivariate analysis.[8] For the multiple models, variables with $p < 0.05$ were used. Only variables that maintained significance after adjustment for the control variables were included in the final models. In case a dichotomous or categorical variable was included in the final model (for example, feeling safe at night or feeling safe during the day or overall safety score), each of these variables was tested with other environmental variables together with the control variables. We opted for the variable that remained significant after adjusting for the other environmental variables and the control variables.

For data analysis, the sample was weighted according to age group and the sample proportion from the census sector, estimated from the 2000 Census by IBGE.[b] Statistical analysis was performed with SPSS version 15.0 and Stata version 9.1.

The study was approved by the Research Ethics Committee of the Faculdade de Saúde Pública da Universidade de São Paulo (record number 1488 on 4/12/2006).

RESULTS

The majority of the sample was female, less than 60 years old and educated from zero to eight years (Table

[a] Fundação Seade. Informações dos Distritos da Capital. [internet]. [cited 20 Dec 2010] Available: http://www.seade.gov.br/produtos/distritos/imp.php?page=consulta&action=var_list&busca=Densidade+Demogr%E1fica

[b] Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2000. Rio de Janeiro; 2000.

[c] International Physical Activity Questionnaire. [internet] [cited 20 Dec 2010]. Available: http://www.ipaq.ki.se/ipaq.htm

1). These characteristics approximate the population of São Paulo municipality.

In the sample, people were more active in commuting in comparison to leisure time physical activity (Table 2), which may be associated with the low socioeconomic level of the area.

The variables that obtained p values < 0.20 for the practice of at least 150 minutes of leisure physical activity were: amount of recreational areas, clubs, sport courts, social support through invitations from friends and good perception of public safety (Table 3). For walking as commuting, good perception of public safety and safety in commuting were important (Table 4).

Table 1. Study sample, by sociodemographic characteristics. São Paulo, Southeastern Brazil, 2007.

Variables	n	%*
Sex		
Male	368	44.8
Female	522	55.2
Age (years)		
18 to 39	302	52.0
40 to 59	203	35.4
60 or more	385	12.6
Marital status		
Single	253	12.5
Separated, widowed, divorced	180	30.8
Married	457	56.8
Years of education		
0 to 3	242	16.1
4 to 7	300	30.0
8 to 11	252	39.3
12 or more	96	14.6
Skin color		
Not white	401	46.6
White	488	53.4
Length of time residing in household (years)		
Until 1	64	9.4
From 1 to 5	135	18.0
From 5 to 10 years	148	19.3
10 or more years	543	53.2
From 10 to 20 years	134	21.8
Length of time residing in São Paulo (years)		
Until 10	58	9.0
From 10 to 20	134	21.8
20 or more	698	69.2
Total	890	100

* estimated values

After adjustment, the variables associated with leisure physical activity were: invitation from friends/neighbors, proximity of clubs near homes and long distance of bars from homes (Table 5).

In regards to walking as commuting, after adjustment, overall public safety was the only variable associated with this type of physical activity (Table 5).

DISCUSSION

This study found that people with a good perception of safety were more likely to be active in commuting. The score for this perception consisted of safety in walking, good street lighting at night of streets around the residence and bicycle riding or physical activity during the day or physical activity at night.

The results were similar to other studies performed in high-income countries.[5,6,10] Giles-Corti & Donovan,[6] in a study with 1,803 Australian adults found that the perception of safe places for walking was associated to the practice of at least 30 minutes per day of walking in commuting (OR = 1.49; 95%CI: 1.14;1.95) or of any type of walking (OR = 1.50; 95%CI: 1.08;2.09). Similar findings were identified in English female adults. Self-reported bad safety was associated with reduced likelihood of any type of walking (OR = 0.53; 95%CI: 0.31;0.88).[5]

A study with 861 adults in three cities of the United States found that after six months of follow up, women reporting low crime index in their neighborhood practiced more minutes of physical activity per week in comparison to other women.[21]

Good self-perception of safety may be associated with the improvement and maintenance of neighborhood facilities. Wood et al[24] argued that adequate

Table 2. Prevalence of physical activity by adults. São Paulo, Southeastern Brazil, 2007.

Practice of physica activity	n	%*
Leisure time physical activity		
Does not practice	621	68.7
Practices between 10 and 149 minutes per week	135	15.4
Practices 150 or more minutes per week	134	16.0
Walking as commuting		
Does not practice	130	14.3
Practices between 10 and 149 minutes per week	438	50.3
Practices 150 or more minutes per week	322	35.4
Total	890	100.0

* estimated values

Table 3. Bivariate regression analysis for the perception of the environment and practice of leisure physical activity. São Paulo, Southeastern Brazil, 2007.

Variable	Bivariate model		
	RR	95% CI	p
Existence of sport courts			0.003*
None		1	
Yes, more than ten minutes walking from residence	1.44	0.91;2.28	
Yes, less than ten minutes walking from residence	1.86	1.24;2.79	
Invitation from friends/ neighbors for the practice			0.004
Does not receive		1	
Receives	1.88	1.23;2.87	
Quartiles for access to leisure areas for practice			0.017*
Lowest access quartile		1	
Third quartile	1.40	0.67;2.95	
Second quartile	1.49	0.65;3.42	
Highest access quartile	2.08	1.07;4.07	
Social support score			0.020*
Poor		1	
Normal	1.59	1.01;2.52	
Good	1.93	1.11;3.35	
Excellent	2.05	0.82;5.14	
Existence of clubs			0.024*
None		1	
Yes, more than 10 minutes walking from residence	1.46	0.72;2.95	
Yes, less than 10 minutes walking from residence	2.05	1.01;4.18	
Quality of sidewalks			0.034*
Poor		1	
Normal	0.68	0.47;1.00	
Good	0.52	0.25;1.09	
Feels safe at night			0.041
No		1	
Yes	1.62	1.02;2.59	
Climate interference for the practice			0.042
Yes		1	
No	1.43	1.01;2.03	
Existence of bars			0.042*
None		1	
Yes, more than 10 minutes walking from residence	0.82	0.19;3.50	
Yes, less than 10 minutes walking from residence	0.50	0.23;1.09	

To be continued

Table 3 continuation

Variable	Bivariate model		
	RR	95% CI	p
Drainage of sidewalks			0.044*
None		1	
Yes, but bad quality	0.69	0.33;1.44	
Yes, but normal quality	0.57	0.24;1.12	
Yes and good quality	0.40	0.15;1.07	
Existence of sidewalks			0.147
Does not have		1	
Yes	0.59	0.28;1.21	
Existence of bakeries			0.152*
None		1	
Yes, more than 10 minutes walking from residence	0.36	0.05;2.32	
Yes, less than 10 minutes walking from residence	1.12	0.11;10.69	
Public safety score			0.242*
Poor		1	
Normal	1.15	0.66;2.01	
Good	0.97	0.50;1.89	
Excellent	1.79	0.87;3.68	
Presence of churches			0.269*
None		1	
Yes, more than 10 minutes walking from residence	0.39	0.14;1.09	
Yes, less than 10 minutes walking from residence	0.79	0.29;2.10	
Existence of small stores			0.410*
None		1	
Yes, more than 10 minutes walking from residence	0.12	0.03;0.51	
Yes, less than 10 minutes walking from residence	0.71	0.26;1.97	
Existence of parks			0.691*
None		1	
Yes, more than 10 minutes walking from residence	0.84	0.52;1.36	
Yes, less than 10 minutes walking from residence	1.84	1.08;3.16	
Overall pollution score			0.843*
Poor		1	
Normal	1.44	0.85;2.46	
Good	0.75	0.41;1.37	
Excellent	1.35	0.66;2.77	

*p for trend

Table 4. Bivariate regression analysis of the perception of the environment and practice of walking as commuting. São Paulo, Southeastern Brazil, 2007.

Variable	Bivariate model		
	RR	95% CI	p
Feels safe during the night			0.003
No		1	
Yes	1.10	1.03;1.16	
Public safety score			0.004*
Bad		1	
Normal	1.10	0.96;1.25	
Good	1.12	0.98;1.27	
Excellent	1.18	1.07;1.31	
Safety in commuting			0.023*
Bad		1	
Normal	0.95	0.72;1.25	
Good	0.54	0.38;0.79	
Excellent	0.98	0.65;1.47	
Existence of street markets			0.074*
None		1	
Yes, more than 10 minutes walking from residence	3.91	1.39;10.95	
Yes, less than 10 minutes walking from residence	3.98	1.41;10.68	
Sewage exposed to open air			0.111
Yes in the vacinity of the residence		1	
None in the vacinity of the residence	1.01	0.92;1.08	
Existence of pedestrian crosswalks			0.124
Yes in the vacinity of the residence		1	
Non in the vacinity of the residence	0.93	0.85;1.02	
Presence of public squares			0.134*
None		1	
Yes, more than 10 minutes from residence	1.07	0.93;1.22	
Yes, less than 10 minutes from residence	1.09	0.97;1.23	
Existence of football fields			0.159*
None		1	
Yes, more than 10 minutes walking from residence	0.98	0.90;1.07	
Yes, less than 10 minutes walking from residence	1.04	0.98;1.12	
Owns a dog			0.363
No		1	
Yes	0.96	0.89;1.04	
Existence of small stores			0.512*
None			
Yes, more than 10 minutes walking from residence	2.55	1.10;5.88	
Yes, less than 10 minutes walking from residence	2.18	1.02;4.63	
Existence of gymnasiums			0.592*
None		1	
Yes, more than 10 minutes walking from residence	0.74	0.54;1.02	
Yes, less than 10 minutes walking from residence	0.89	0.70;1.14	

To be continued

Table 4 continuation

*p for trend

maintenance of neighborhoods allows for improved social networks and improved social control, contributing to increased sense of safety among residents.

These results highlight that to promote physical activity it is important to invest in public safety and violence prevention.

The prevalence identified in this study for active people in leisure time was similar to a recent national survey of adults in all the Brazilian capitals.[4] Additionally, the results of this study showed that people invited to practice physical activity are more likely to be active in leisure.

A similar finding was reported in a cross-sectional study of adults (n = 2,205) in the United States,[7] where people with a partner for practicing had increased likelihood of meeting physical activity recommendations (OR = 1.47; 95%CI: 1.15;1.89).

Giles-Corti & Donovan[6] showed that the perception of social support in the neighborhood for walking with a partner was associated with walking for leisure (OR = 1.80; 95%CI: 1.36;2.40) and with walking in general (OR = 1.52: 95%CI: 1.09;2.11). One of the first cross-sectional surveys performed with European adults in Belgium, Finland, Germany, the Netherlands and Spain, found that people with low scores for social support were more likely to be inactive in leisure (OR = 2.15; 95%CI: 1.72;2.68).[23]

Evidence from high-income countries indicates that social support is very important for the practice of physical activity. The results from this study support the above hypothesis and reinforce the importance of investing in environments that stimulate people's

Table 5. Final regression model for perception of the environment and practice of leisure physical activity or walking as commuting. São Paulo, Southeastern Brazil, 2007.

Variable	Final multivariate model[a]		
	RR	95% CI	p
Leisure physical activity			
Existence of clubs			0.010*
None		1	
Yes, more than 10 minutes from residence	1.26	0.63;2.51	
Yes, less than 10 minutes from residence	2.26	1.33;3.85	
Existence of bars			0.004*
None		1	
Yes, more than 10 minutes walking from residence	1.21	0.30;4.85	
Yes, less than 10 minutes walking from residence	0.48	0.26;0.91	
Receiving invitation from friends/neighbors			0.023
No		1	
Yes	1.59	1.07;2.38	
Walking as commuting			
Public safety score			0.003*
Bad		1	
Normal	1.11	0.98;1.26	
Good	1.13	0.99;1.28	
Excellent	1.19	1.07;1.33	

[a] Model adjusted for sex, age, education and length of residence in household
*p for trend

surroundings to encourage the creation of social networks important to the practice of physical activity.

Proximity between clubs and the home was positively associated with leisure physical activity. Nonetheless, the presence of bars was inversely associated with practice. Other studies were not identified to support the finding that bars close to homes are inversely associated with the practice of leisure physical activity.

Although bars are important places for social interaction, patrons may have unhealthy habits such as excessive alcohol consumption, tobacco use and consumption of high energy density food with low nutritional value. In addition, the chance of serious violence acts is higher in these locations, especially in the periphery of São Paulo city, and it is possible that proximity to these establishments is related to degraded environments.

In regards to clubs, it is well established in high-income countries that the presence of leisure and recreation facilities is positively associated with the practice of leisure physical activity.[2,6,9,13,15,19] Clubs were the only specific recreational facilities associated to leisure physical activity in this study. In Ermelino Matarazzo district there were eight facilities in 2007, all public. This finding is even more relevant when considering other issues such as the formation of social networks, in which clubs play an important role.

In Brazil, analysis of data from more than 54 thousand adults interviewed by the Vigitel System showed that the existence of adequate locations close to residences was associated with the practice of at least 150 minutes per week of leisure physical activity.[4]

Adequate access to recreational areas and open public spaces is not only associated with leisure physical activity but also increases the likelihood of walking at least 150 minutes.[5,6,7,11]

These data show the importance of leisure and recreational areas in urban planning, since these facilities contribute to leisure physical activity and also walking as commuting.

As limitation, cross-sectional studies are unable to establish causality. The evaluation of self-reported environment in relation to practice of physical activity may suffer from this problem, since without temporality it is not possible to establish if an adequate environment is the cause of physical activity. In addition, the perception of environment relies on current knowledge of the neighborhood. This limitation may have been minimized since the analysis considered length of time living in the current home.

Another problem that may have influenced the results is related to the notion of proximity. It was defined as locations people could reach within ten minutes walking

from their home, equal to approximately 800 meters. Distances from 400 meters to 1,500 meters (from five to 15 minutes walking) are significantly associated with the practice of walking for commuting.[16] Nonetheless, it is not known if the people interviewed share this notion of time and distance.

A modified scale, based on the NEWS version validated in Brazil, was used to establish data validity and the true relationship with the contextual data of the environment.[14] Although the contextual indicators are associated and follow the same direction of relationship as indicators previously found to be related to physical activity,[17] a recent study found low agreement between objectively measured data and self-reported data.[1] Therefore, it is possible that the objective and perceived variables capture different aspects of the environment, which would explain the low agreement.

In summary, these results show that the practice of physical activity is a complex phenomenon, requiring interdisciplinary strategies for understanding and promotion, which can be found in the 2006 National Policy for Health Promotion.

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