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RELATIONSHIP OF THE BUILT ENVIRONMENT WITH PHYSICAL ACTIVITY LEVELS IN MACAPÁ

Marcela Fabiani Silva Dias[1],*, Alisson Vieira Costa[2], Tinale Barbosa Palheta Monteiro[1], Bárbara Luíza Duarte Sales[1], Taynara Camille Guilherme Lima[1], Álvaro Adolfo Duarte Alberto[1,2], Wollner Materko[1,2], Anderson Ferreira dos Santos[3] and Hêule Nilton Santos de Oliveira[1]

[1]Federal University of Amapá, Master's Program in Health Sciences, Macapá, AP, Brazil; [2]Federal University of Amapá, Physical Education Course, Macapá, AP, Brazil;[3]Vale do Acaraú University, Physical Education Course, Macapá, AP, Brazil

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ABSTRACT

The objective of this study was to relate the attributes of the built environment to the levels of physical activity in adults in Macapá, Brazil. A cross-sectional quantitative research was adopted. To collect data on the attributes of the built environment, the Neighborhood Walkability Scale instrument was used, and the International Physical Activity Questionnaire instrument was used to collect the participants' physical activity levels. In the statistical analysis, the Statistical Package for Social Science for Windows program was used, with a significance level of 5% and the Mann-Whitney U significance test. Of the eight attributes of the environment investigated, four showed a significant difference when related to physical activity: proximity to stores, access to services, neighborhood aesthetics and crime.

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INTRODUCTION

The positive effects of physical activity (PA) in various aspects related to the health of the population in general are consolidated in the national and international scientific literature. As well, the literary production is consistent regarding the consequences arising from the lack of it (BOTTCHER, 2019; CARVALHO; PINTO; KNUTH, 2020). Although the positive results of physical activity for people's health are widely publicized, according to Hallal *et al* (2012) about 31% of adults worldwide are physically inactive, and do not reach the mark of 150 minutes/week of physical activity. PA recommended by the World Health Organization (WHO) and this percentage tends to increase with advancing age and in high-income countries. Studies in the health area have investigated the determining factors of human behavior (COLLET *et al*., 2008; CESCHINI; FIGUEIRA JÚNIOR 2007; SEABRA *et al*., 2008), specifically related to decision making for a more active life.

Among the determining factors in the practice of PA, environmental aspects have been the subject of studies, there are international and some national research that tested and proved that there is an association of environmental aspects with the practice of PA (HINO; REIS, FLORINDO 2010; SALVADOR *et al*., 2009). From the above, the guiding question of this study is: what are the attributes of the built environment that influence the practice of physical activity?. Investigating the infrastructure of a city from the perspective of the resident becomes relevant in terms of understanding the extent to which the structural aspects of a city can interfere with people's quality of life, specifically in relation to urban mobility, since planned public structures and wide, can provide the population with greater stimulus for active displacement (on foot, or cycling), a condition of collective interest, given that the more active people are, the fewer problems resulting from physical inactivity will affect them. Based on this, the objective of the study was to relate the attributes of the built

environment to the levels of physical activity of the residents of a neighborhood in the city of Macapá.

MATERIALS AND METHODS

This is a cross-sectional quantitative study: Data collection was carried out in the period between September 2021 and February 2022 with residents of the Congós neighborhood, who were aged between 18 and 59 years, the choice of neighborhood was made for convenience. The collection took place through home visits, complying with all the safety protocols established by the Ministry of Health (MS) (2021) for the COVID-19 pandemic, such as the use of masks, distance of 1.5 meters between the researcher and the participant, and use of gel alcohol. It was adopted as inclusion criteria for participation in the research, subjects who proved the age of majority through an official document with photo, who were residents of the neighborhood and selected streets and who were apparently healthy, without physical or cognitive limitations that made it impossible for them to practice physical activity. Individuals who were present in the residences, but were not residents of the selected neighborhood and streets, did not participate in the study, such as: visitors and housekeepers, as well as those who did not voluntarily agree to participate in the research or did not sign the Free and Informed Consent Form. (ICF). Households that were closed and that there was no person present within the stipulated age group did not participate in the study.

The period before data collection was organized into three moments: 1st moment: the choice of the neighborhood in which the study would be carried out was made for convenience; 2nd moment: a survey was carried out of all the streets/avenues that make up the neighborhood; 3rd moment: a lottery was carried out to select which streets would be part of the sample. In order to survey the streets/avenues that make up the selected neighborhood, a query was made on the official website of the post office, considering that the website provides detailed information about the neighborhoods of the city, as well as the streets, avenues, lanes and public places. The streets/avenues were coded so that each one had a number, in this way it was possible to carry out the electronic drawing of the streets belonging to the selected neighborhood, they were: AvenueTelemaco Mira Martins, AvenueLaudelino Araújo Corrêa and Avenue Ben-HurCorrêa Alves, Avenue Cabo Velho, Avenue Padre ReginaldoBossi and Avenue Padre ÂngeloBiraghi. All residences that were within the neighborhood and streets/avenues selected were eligible to participate in the study. Commercial points, vacant lots, public agencies, churches and hangover areas were excluded.

The instrument used to assess the perception of the built environment was the Neighborhood Walkability Scale. It consists of eight items that deal with the different aspects and variables of walkability in a city, such as: residential density, proximity to shops, access to services, street connectivity, places to walk/cycle, neighborhood aesthetics, safety in the traffic and crime. The PA level was evaluated through the short version of the International Physical Activity Questionnaire, this instrument involves questions such as sedentary behavior, walking, moderate and vigorous physical activities and classifies the participants in: sufficiently active and insufficiently active, considering the activities performed in the last 7 days. This research was submitted and approved by the Research Ethics Committee of the Federal University of Amapá, under opinion nº 4,855,835, according to resolution 510 of 2016 of the Ministry of Health of Brazil, given that the study participants were human beings (BRAZIL, 2016). The data were tabulated and organized using Microsoftware Excel 2016. The Kolmogorov-Smirnov test was performed to analyze the normality of the data, the significance test (Mann-Whitney U) was applied for the inferential comparison between the variables not parameters and the chi-square test to identify whether there is influence of any variable. A significance level of 5% was used. The composition of the results was given by the statistical software Statistical Package for Social Science for Windows version 26 in the performance of the descriptive analysis

(frequency, mean and standard deviation). For the sample calculation, the form for finite samples was used. For a population of 18,636, at an error of 5%, and a confidence level of 95%, a minimum sample size of 377 individuals would be expected. Due to the COVID-19 pandemic, the analyzed sample consisted of 216 individuals, raising the sampling error to 6.63% with a significance level of 95%. Acceptable error for health studies.

RESULTS

The sample of this study consisted of 216 participants who live in the Congós neighborhood, located in the south of the city of Macapá.
The result of the sociodemographic data represented in table 01, indicated that there was a prevalence of females in the sample composition (72.7%) and a predominance of people aged over 39 years (63.0%), with a mean age of 41.91 and standard deviation of 13.88. As for the classification of physical activitylevels represented in table 02, the participants were grouped into two distinct groups: sufficiently active and insufficiently active. It is noted that most participants (69.9%) are classified as "insufficiently active", that is, they do not reach the recommended minimum of 150 minutes/week of physical activity. Among the eight domains related to the perception of the environment that make up NEIGHBORHOOD WALKABILITY SCALE -A, significant differences were found in four, as shown in table 03. The domains proximity to stores (P<0.001), access to services (P<0.001), neighborhood aesthetics (P<0.001) and crime (P<0.001) were significant when related to the physical activity levels of the participants.

DISCUSSION

The results of the aforementioned study indicated that there is a significant relationship between the levels of physical activity of residents of the Congo neighborhood with four of the eight attributes of the built environment investigated in this research: proximity to stores, access to services, neighborhood aesthetics and crime. In relation to the domains "proximity to stores" and "access to services", it was evidenced that people who perceive living closer to gyms, fairs, clothing stores, beauty salons, school, work, leisure areas, among others, have more likely to be sufficiently active compared to those who perceive stores further away from their homes. Reinforcing this result, Hino *et al* (2017) conducted a survey with 699 adults in Curitiba/Paraná and found that the perception of access to services was associated with a greater chance of performing physical activity regardless of volume (≥10 or ≥150 minutes/week). In a study by Sallis*et al* (2009), who conducted a survey in 11 countries, including Brazil. The authors showed that the perception of greater access to commercial areas, bus stops, streets with sidewalks, places to cycle and free public spaces is associated with greater physical activity practice. In a survey carried out by Hallal *et al* (2010) through a telephone survey with 2,046 people from Pernambuco aged 16 years or older, they found a significant association between the presence of sidewalks and access to leisure equipment and the prevalence ofphysical activity.

Results similar to these were also found in other studies (GOMEZ *et al*., 2010; PARRA *et al*., 2010; HINO *et al*., 2011; SILVA *et al*., 2017; BORCHARDT, PAULITSCH and DUMITH, 2019; FLORINDO *et al*., 2017 and 2019). As for the "neighborhood aesthetics" domain, although the results have been low both for people who are sufficiently active (average 2.21) and for people who are insufficiently active (average 1.64), which indicates that both perceive that their neighborhood does not is aesthetically satisfactory, evidence was found that people who perceive that the surroundings of their neighborhood have attractive views, natural landscapes and the presence of trees are more physically active than those who perceive the opposite. A positive perception of neighborhood aesthetics was also associated with a greater chance of walking for at least 10 minutes per week in a study by Hino *et al* (2017).

Table 01. Sociodemographic Characterization

	N (%)	IC-95%[1]	Média(IC-95%)[2]	Dp
		Sociodemographic Profile		
Age Group			41,91(40,05-43,77)	13,88
18-38 years old	80(37,0)	(30,8-43,6)		
39-59 years old	136(63,0)	(56,4-69,2)		
Sex				
Male	59(27,3)	(21,7-33,5)		
Female	157(72,7)	(66,5-78,3)		

Source: Author [1]Confidence Interval for theproportion [2]Confidence Interval for themean Dp- Standard Deviation

Table 02. Classification of physical activity levels through the INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE.

	N (%)	IC-95%[1]	Média(IC-95%)[2]	Dp
		International Physical Activity Questionnaire – IPAQ		
IPAQ-PhysicalActivityLevels				
Insufficientlyactive	151(69,9)	(63,6-75,7)		
Active enough	65(30,1)	(24,3-36,4)		

Source: Author; [1]Confidence Interval for theproportion; [2]Confidence Interval for themean; Dp- Standard Deviation

Table 03. Analysis of comparison between the classification of physical activity levels established by the IPAQ and the NEIGHBORHOOD WALKABILITY SCALE instrument scores

	IPAQ-PhysicalActivityLevels		
	Insufficientlyactive	Active enough	
NEIGHBORHOOD WALKABILITY SCALE	Média±Dp	Média±Dp	P-valor
Residential Density	200,44±14,66	201,05±13,39	0,691
Proximity to stores	4,06±0,36	3,52±0,45	<0,001
Access to services	3,16±0,43	3,71±0,43	<0,001
Street connectivity	2,60±0,79	2,83±0,82	0,057
Walking/bikingplaces	1,96±0,42	2,05±0,47	0,261
Neighborhood Aesthetics	1,64±0,52	2,21±0,66	<0,001
Traffic Safety	3,15±0,66	2,99±0,69	0,102
Crime	3,55±0,51	3,12±0,76	<0,001

Fonte: Autor [1]Teste U de Mann Whitney, ao nível de 5%.

Data similar to those found in this study were also observed by Owen *et al* (2004), who provide evidence that places with better aesthetics are directly associated with the prevalence of physical activity through active displacement. This study provides evidence that people who perceive less risk in terms of safety when walking during the day or night are more physically active (average 3.12) compared to those who perceive the opposite. Despite the fact that the results related to crime are considered high for all participants. The association between safety and physical activity prevalence was also found by Kretschmer and Dumith (2020) in a survey carried out in Rio Grande do Sul, with 1,290 adults and elderly people. In another study, Bennett *et al* (2007) used a pedometer to analyze physical activity levels in adults and found that women who reported feeling unsafe in their neighborhoods had 1,107 fewer steps/day than those who reported feeling unsafe in their neighborhoods safe.

Still on the perception of security, Florindo *et al.* (2011), in a survey carried out in São Paulo, with 890 adults, found that the positive perception of security is related to the greater displacement of people. Regarding the domains "Residential Density", "Street Connectivity", "Places to walk and ride a bicycle", and "Traffic Safety", it was not possible to identify a significant relationship with the residents' physical activity levels. However, this relationship was significant in another study carried out with 213 elderly people in Santa Catarina, by Balbé *et al* (2018). Such a discrepancy may be due to the specifics of the environmental context, or due to other factors, as the authors themselves state, that physical activity involves complex behaviors that suffer interference from perception, but also from other factors such as food, neighborhood structure, policies public and socioeconomic level. The relationship between physical activity and socioeconomic level was not the object of study in this research. This aspect can interfere with people'sphysical activity levels. As was found by Sugiyama *et al.* (2015), who showed that residents of areas of lower socioeconomic status are more likely to be insufficiently active.

Sallis *et al.* (2009) claim that the existence of appropriate facilities for the practice of physical activity favors a greater opportunity to carry out this activity, but does not determine the increases in people'sphysical activity levels. This study has some limitations. Data collection was carried out in only one neighborhood in the city of Macapá and during a pandemic period, which made it impossible to build a more robust sample. Furthermore, the two instruments used for data collection (Neighborhood Walkability Scale -A And International Physical Activity Questionnaire) are self-declared and entirely subjective. Therefore, the results vary according to the participant's knowledge of their neighborhood. Therefore, the results regarding proximity to stores, access to services, and other items may vary from individual to individual. It is suggested that studies with this theme be applied with the use of more objective instruments, such as the collection of environmental data carried out through geoprocessed data, and for the analysis of physical activity levels, the use of accelerometer, not used in this study due to the high financial cost.

CONCLUSION

The objectives of this study were fulfilled and the research brings fundamental data to the scientific field in the area of health, since this is the first study in the northern region of Brazil that addresses aspects of the environment as determinants in the practice of physical activity. Of the built environment attributes that can interfere with the population's physical activity levels, evidence was found that the perception of proximity to stores, access to services, neighborhood aesthetics and crime significantly interfere with the participants' physical activity levels. Participants who had a better perception of proximity to stores, access to services and neighborhood aesthetics were more physically active. While the participants who reported high crime rates in the vicinity of their residence were insufficiently active.

This study brings insights and contributions about some environmental factors that can stimulate the practice of physical activity by the population, as well as raises the discussion for the creation of public health policies that expand and improve the structural conditions of the city in relation to spaces conducive to the active commuting incentive.

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