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Modes of commuting to school among 5th and 6th grade schoolchildren

Modos de deslocamento para a escola em crianças do 5º e 6º ano de escolaridade

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Abstract – Active commuting (walking/cycling) is seen as a strategy to promote active behaviors in children's daily school life. This study aimed to analyze the modes of commuting and perceptions of children in relation to the possibility of active commuting to school according to sex. Overall, 101 students (M=11.39/SD=1.22) enrolled in the 5th and 6th grades from two public elementary schools in the state of Maranhão, Brazil, participated in this study. Data were collected through a questionnaire administered to students. The results showed that 21.8% of respondents had active commuting (19.8% on foot / 2% bicycle), without statistically significant differences; however, boys were more predisposed to walking and cycling in relation to girls. As positive justifications, respondents evidenced the 'home-school proximity' and 'fun/pleasure' provided during the journey, and 'distance' and 'traffic / insecurity' as barriers to the possibility of walking or cycling to school.

Key words: Bicycling; Child; Exercise; Healthy lifestyle; Walking.

Resumo – *Vislumbra-se o deslocamento ativo (a pé/bicicleta) como uma estratégia de promoção de comportamentos ativos no cotidiano escolar de crianças. Este estudo objetivou analisar os modos de deslocamento e percepções de crianças em relação à possibilidade do deslocamento ativo para a escola de acordo com o sexo. Participaram 101 alunos ($\overline{xx}$=11,39/DP=1,22) do 5º e 6º ano de escolaridade de duas escolas públicas do estado do Maranhão,Brasil. Os dados foram coletados através de um questionário administrado aos alunos. Os resultados demonstraram que 21,8% dos inquiridos se deslocaram ativamente (19,8% a pé/2% bicicleta), sem diferenças estatisticamente significativas, contudo, os meninos apresentaram maior predisposição à caminhada e utilização da bicicleta em relação às meninas. Como justificativas positivas os inquiridos evidenciaram a 'Proximidade casa-escola' e 'Diversão/prazer' proporcionadas durante o trajeto e, a 'distância' e a 'insegurança trânsito/geral' como barreiras frente a possibilidade em realizar o percurso a pé ou de bicicleta para a escola.*

Palavras-chave: *Atividade física; Caminhada; Ciclismo; Criança; Estilo de vida saudável.*

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INTRODUCTION

Active commuting (walking / cycling) to school has been understood as a strategy to promote active behaviors in the daily lives of children[1], since it can cumulatively collaborate for the fulfillment of international daily levels of physical activity recommendations (60 min)[2].

Studies have evidenced the association between modes of active commuting to school and reduced obesity[3], improved cognitive performance[4], increased cardiovascular fitness[5], increased level of physical activity in children who go to school walking or by bicycle[6] and promotion of autonomy and independent mobility[7].

However, the literature shows different prevalence of active commuting to school in children aged 10-12 years. For example, studies in the United States[8] show prevalence of 20%, Australia[9] 42%, Portugal[10] 23%, Belgium[11] 78% and Spain[12] 50.5%, among others. These differences, even recognizing the existence of methodological peculiarities, suggest that the use of active commuting is relative to the specificities (environmental, intrapersonal, political, etc.) of each context.

In Brazil, although there is little research on this topic in relation to international production[13], different prevalences of active commuting have been found among children of similar ages, such as studies[13,14] conducted in the southern region with levels of 72.4% and 58% respectively, and in the northeastern region[15], with results of 70.4%. In the State of Maranhão, where this study was carried out, a study conducted in São Luís/MA with students from the 2nd to the 9th grades[16] showed approximately 55% of active commuting to school.

In this perspective, there is current evidence of a decline in the active modes of commuting of children to school [17], which can be explained by the influence of several factors (environmental, intrapersonal, political and the perceived home-school route context). Thus, this study aimed to analyze the modes of commuting and perceptions of children enrolled in the 5th and 6th grades of elementary school in relation to the possibility of active commuting to school according to sex.

METHODOLOGICAL PROCEDURES

Study characterization and participants

This is a cross-sectional descriptive study. A total of 101 students from the 5th to 6th grades aged 9-16 years ($\overline{x}$ = 11.39 / SD = 1.122) from two public schools of the municipalities of São Luís and São José de Ribamar, Maranhão, Brazil, were selected by convenience criterion. The majority of participants (85%) were children aged 9-12 years.

Data collection instrument

For data collection, a questionnaire was used[18], addressing aspects related to the modes of commuting to school, perceptions and possible factors

that can influence the options and decisions regarding the possibilities of active commuting to school. The questionnaire contains open and closed questions and is subdivided into six dimensions: 1) Sociobiographic data; 2) Characterization of modes of commuting, home-school distance and time required; 3) Use of bicycle, walking, peers and family; 4) Safety Bike; 5) Health and Autonomy; 6) Environment and Savings.

Procedures and ethical issues

Subsequent to the fulfillment of ethical formalities such as institutional authorizations, approval by pedagogical managers and Free and Informed Consent Form (TCLE) signed by parents / guardians, the questionnaire was administered to students in the classroom context in the presence of the teacher.

The following inclusion criteria were adopted: students enrolled and attending the 5th or 6th grades of elementary school and TCLE signed by parents. Those who did not deliver the signed TCLE and were unable to respond to the questionnaire at the time of application were excluded. This study was developed in accordance with the specific norms that involve research with human beings (CNS Resolution 466/2012) and approved by the Ethics Research Committee of the Federal University of Maranhão (CEP / UFMA) under protocol No. 2.166.038.

Variables

Sociobiographical data were collected from questions inserted in dimension 1 of the questionnaire. To determine the modes of commuting used, students were asked "What is the main means of transport used in your home-school trip?" Answers options were: walking, automobile, bus, van, motorcycle, bicycle and others. Subsequently, responses were dichotomized in: 1) Active commuting (walking / bicycle) and 2) Passive commuting (car, bus, etc.). Participants reported only the main mode of commuting without specifying the direction (going to school / coming back from school), thus discarding multimodal modes of travel such as going by car and walking back home.

The home-school distance was evaluated by specific question and had the following answer options: up to 1km, 1.1 to 3km, 3.1 to 5km, 5.1 to 7km, 7.1 to 10km and 10km or more. Subsequently, answers were grouped for association analysis into 1) Up to 1km; 2) 1.1 to 3km and 3) More than 3km, considering that literature presents distance of 3-3.2km as the distance favorable for active commuting.

In order to describe and analyze factors that could influence modes of commuting, participants were asked about the preferences and possibilities of the active commuting to school and asked to justify their responses that were later categorized as positive and negative.

Data analysis

Data were initially analyzed by descriptive statistics techniques (mean, standard deviation and frequency distribution). Qualitative information obtained from open questions was analyzed from the structuring and sys-

tematization of categories based on the analysis of the Thematic Categorical content[19]. The Chi-square test (χ^2) was used to analyze possible associations among variables. Data were tabulated and analyzed in the Statistical Package for Social Science statistical software (SPSS) V.22 and the statistical significance level was adopted when p-value was lower than 0.05.

RESULTS

The sample of this study was mostly composed of females (53.5%) enrolled in the 6th grade (64.4%). The results did not present statistically significant differences in relation to sex.

Based on the results analyzed (Table 1), it was verified that the percentage of students who actively commuted to school was 21.8%, the majority using the walking mode (19.8%) and only two boys (2.0%) used the bicycle as a mode of commuting to school. The most commonly used means of transport was bus (52.5%), followed by car (20.8%) and walking.

Regarding the school-home distance, 46.5% of students reported to live up to 3km away from the school. The results did not show statistically significant differences between sex and modes of commuting; however, it was observed that boys were more active and users of bicycle as a way of commuting compared to girls.

Table 1. Modes of commuting and home-school distance according to sex (n = 101)

Variables	Male n (%)	Female n (%)	Total n (%)	p
Mode of commuting				
Active	12 (25.5)	10 (18.5)	22 (21.8)	0.394
Passive	35 (74.5)	44 (81.5)	79 (78.2)	
	47 (100.0)	54 (100.0)	101 (100.0)	
Main means of transport in the home-school trip				
Walking	10 (21.3)	10 (18.5)	20 (19.8)	0.426
Bicycle	2 (4.3)	0 (0.0)	2 (2.0)	
Car	10 (21.3)	11 (20.4)	21 (20.8)	
Bus	24 (51.1)	29 (53.7)	53 (52.5)	
Others	1 (2.1)	4 (7.4)	5 (5.0)	
	47 (100.0)	54 (100.0)	101 (100.0)	
Home-school distance				
Up to 1km	6 (12.8)	7 (13.0)	13 (12.9)	0.997
1.1 to 3km	16 (34.0)	18 (33.3)	34 (33.7)	
More than 3km	25 (53.2)	29 (53.7)	54 (53.5)	
	47 (100.0)	54 (100.0)	101 (100.0)	

Note. p= Significance level

Regarding preferences on the modes of commuting to school, the results showed that 75.2% of students reported that they preferred to go using active modes, and the majority of them were more positive in the use of the bicycle (68.3%) to the detriment of the walking mode (6.9%). Although the results did not show significant differences, boys were more

positive to the walking mode and girls more positive to the use of the bicycle as a mode of commuting.

Participants were also asked if they perceived the possibility of walking or cycling to school and back from school. The results did not present statistically significant differences in relation to sex; however, in general, 54.5% showed positive perception regarding this possibility, with greater emphasis on boys than on girls (Table 2).

Table 2. Preferences and perceptions regarding the active commuting to school according to sex

Variables	Male n (%)	Female n (%)	Total n (%)	p
How would you like to go to school? (n= 101)				
Walking	4 (8.5)	3 (5.6)	7 (6.9)	0.815
Bicycle	31 (66.0)	38 (70.4)	69 (68.3)	
None of the above	12 (25.5)	13 (24.1)	25 (24.8)	
	47 (100.0)	54 (100.0)	101 (100.0)	
Do you think it is possible to do the home-school trip walking or by bicycle? (n= 99)				
Yes	27 (58.7)	27 (50.9)	54 (54.5)	
No	19 (41.3)	26 (49.1)	45 (45.5)	0.440
	46 (100.0)	53 (100.0)	99 (100.0)	

Note. p= Significance level

Table 3 presents the justifications regarding the perception about the possibility of actively commuting to school. The results, for both students who answered positively and those who answered negatively, did not present statistically significant differences in relation to sex.

It was verified that the 'home-school proximity', followed by 'fun / pleasure' on the way, were the most cited aspects to those who positively answered regarding the possibility of commuting to school walking or cycling. Of students who answered in a negative way, the 'long distance', 'Insecurity / general' and 'Insecurity / traffic' were the most cited aspects. Girls showed greater concern about distance and traffic insecurity and boys about general insecurity during the home-school trip.

Table 3. Justifications about the possibility of performing the home-school route by active modes according to sex

Reason of thinking about the possibility of walking or cycling to school (n=89)		Male n (%)	Female n (%)	Total n (%)	p
YES (n=48)	School-home proximity	14 (60.9)	13 (52.0)	27 (56.2)	0.398
	Fun/pleasure	8 (34.8)	8 (32.0)	16 (33.3)	
	Practice of physical activity	0 (0.0)	3 (12.0)	3 (6.3)	
	Other reasons	1 (4.3)	1 (4.3)	2 (4.2)	
		23 (100.0)	25 (100.0)	48 (100.0)	
NO (n=41)	Long distance	6 (33.3)	10 (43.5)	16 (39.0)	0.637
	Insecurity / General	8 (44.4)	6 (26.1)	14 (34.1)	
	Insecurity / Traffic	3 (16.7)	6 (26.1)	9 (22.0)	
	Difficulties along the course	1 (5.6)	1 (4.3)	2 (4.9)	
		18 (100.0)	23 (100.0)	41 (100.0)	

Note. p= Significance level

DISCUSSION

The results showed disparities between how students effectively go to school and how they would like to go to school in their school routine. It has been found that approximately 22% of students go to school in active modes, mostly walking, with only two boys reporting using the bicycle.

Regarding the relationship between modes of commuting and the sex of participants, the results were not significant, and results were similar to another Brazilian study[13]; however, boys were more active in their commuting to school.

These results are in agreement with other studies[5,14], in which boys were more active in commuting to school than girls. On the other hand, two Brazilian studies[15,20] identified greater participation of girls in the use of active modes of commuting to school.

In relation to the percentage of active commuting, our results are in agreement with two studies[1,10] carried out with children in northern Portugal where, respectively, 21% and 23% of students walked to school. However, some studies[14,15] performed in Brazil presented higher results, respectively, 72.4% and 70% of the use of active commuting. Another research[16], carried out in the same region as this one, identified the use of active commuting by 58.4% of children aged 9-16 years.

Regarding modes of commuting, the use of passive modes prevailed, bus followed by car and a very small use of the bicycle. These results converge with literature[17,21], which has evidenced a decline of active modes to the detriment of the growth of the use of passive modes of commuting to school.

Regarding the low use of bicycle, it is noteworthy that most students, when asked how they would like to go to school, chose the bicycle as preferred mode of commuting. The results suggest that students' preferences are not really effective, probably because parents / guardians are the real decision makers of how their students should go to school[21].

Other studies carried out in Brazil also identified low use of bicycle as a mode of commuting to school. An investigation carried out with children and adolescents from the city of Curitiba/PR[22] showed that only 1.7% of students interviewed used the bicycle in their school routine, results that resemble the study carried out in Pelotas/RS[14], which identified the use of the bicycle as a mode of commuting of 6% of students surveyed.

The results showed that the majority of students (54.5%) think that it is possible to carry out the home-school route walking and / or by bicycle. Their justifications clarify the importance of environmental factors in the process of perception, decision and choice by active commuting.

The home-school distance was the most relevant justification presented by both students who showed to be positive and those who showed to be negative about the possibility of going to school through active commuting.

Distance has been understood as one of the most significant factors associated with active commuting, where children who live closer to school are more likely to walk or cycle to school, considerably reducing this pos-

sibility from the distance of 3.2km (2 miles) between home and school[23]. A study[24] with Finnish children found that 97% of children who lived up to 1km from school actively commuted to school (74.4% walking and 22.8% cycling) and among those who lived more than 3 km away, only 2.9 % actively commuted to school.

Another relevant aspect highlighted by participants refers to the perceived environment, especially the safety concerns in the home-school route, whether related to traffic or in general.

Facts related to harassment, assaults, constraints, presence of strangers, among others, during the journey have been understood as aspects that negatively influence active commuting[8]. On the other hand, aspects that provide greater safety perception along the way, such as greater residential / commercial density[25], presence of friends / neighbors who can monitor or follow their children[26], among others, increase the probability of active commuting to school.

It is understood that the safety perceptions of students and their parents / guardians regarding the home-school way may be related to the social context of the environment, city and region where students live. Data from the Brazilian Yearbook of Public Security – 2016[27] showed that in 2015, Brazil registered 58,467 intentional violent deaths and, compared to war situations, registered more victims in five years (279,567) than the War in Syria, which registered 256,124 victims in the period from 2011 to 2015.

Other data regarding violence in Brazil and referenced in this document[27] deserve to be highlighted because they are directly related to the context investigated, in which 50% of Brazilian students and 59% of Maranhão students attend the 9th grade in schools located in risk areas of violence, and 11.5% of them reported to have lost classes due to lack of safety on the home-school route. In Maranhão, this was reported by 10.2% of students.

Concerns about traffic safety during the home-school route were also reported by participants as negative justifications for the possibility of active commuting to school. These results converge with literature, which has emphasized that aspects such as presence of pedestrian lanes and traffic lights[25], measures of traffic intensity and the presence of traffic guards[5], connectivity and density of streets[24], infrastructure for walking and cycling[28], behavior of drivers[29], among others, have been associated as determinant factors to the active commuting of children to school. It is well known that cities and their respective mobility spaces, for the most part, have been structured and restructured for cars at the expense of people, creating a daily dependence on motorized commuting and this has directly influenced the ways children commute to school.

As a study limitation, it was a study based on a convenience sample, using only perceived and transversal measures, which made it impossible to establish causal relationships among variables investigated. However, this study presented relevant and original results in view of the few studies conducted on the subject in the region investigated.

CONCLUSION

The results of this study evidenced low utilization of active modes of commuting to school. Variable sex was not significant; however, boys were more active than girls in commuting to school.

Motorized means were the most used and a very small number of male students declared to use the bicycle to commute to school. These results clarify a disparity between the real and the desired, since most students were interested in cycling to school.

Home-school distance and aspects related to traffic safety were relevant for students when asked about the perception of the possibility of actively carrying out the home-school route. This fact is important for interventions to promote active commuting of children to school. Thus, it is understood that interventions aimed at promoting active commuting and the daily level of physical activities should be structured and implemented at various levels (political, environmental, social, cultural, etc.) with the participation of the main actors involved.

COMPLIANCE WITH ETHICAL STANDARDS

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Ethical approval

Ethical approval was obtained from the local Human Ethics Research Committee – Federal University of Maranhão (No. 2.166.038), and the protocol was written in accordance with the standards set by the Declaration of Helsinki.

Conflict of interest statement

The authors have no conflict of interests to declare.

Author Contributions

Conceived and designed the experiments: BP, SS, WC and APM. Performed the experiments: SS, EO, SB and IS. Analyzed data: SS, AS, APM and BP. Contributed with reagents/materials/analysis tools: SS, BP, AS, APM and WC. Wrote the paper: SS, BP, APM, AS and WC.

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