Perceived barriers for active commuting to school among adolescents from Curitiba, Brazil.

**Resumo**

O objetivo desse estudo foi analisar associação entre as barreiras percebidas para o deslocamento ativo com a forma de deslocamento para a escola em adolescentes de Curitiba, Brasil. Foram entrevistados 741 adolescentes com idade entre 11 e 18 anos em seis escolas (três públicas e três privadas). A percepção de barreiras para o deslocamento ativo para escola foi avaliado por uma escala com 17 itens. O deslocamento ativo para escola foi considerado quando o adolescente relatou ir/voltar da escola caminhando ou andando de bicicleta. A associação foi testada com a regressão de Poisson com nível de significância de 5%. A prevalência de deslocamento ativo foi de 42,9% (50,0 meninos e 37,2% meninas p<0,001). Para os meninos, a barreira “morar longe da escola” (RP: 0,71; IC95%: 0,60-0,86) foi inversamente associada ao deslocamento ativo. Enquanto, identificar o “percurso como chato” (RP: 1,30; ICI95%:1,04-1,62) e “muito tráfego” (RP: 1,27; IC95%: 1,04-1,56) foram positivamente associadas. Para as meninas, perceber que é “mais fácil ir de carro/ônibus” (RP: 0,70; IC95%: 0,56-0,88) e envolver “muito planejamento” (RP: 0,60; IC95%: 0,42-0,86) foi inversamente associado ao deslocamento ativo. Conclui-se que três barreiras foram associadas com o deslocamento ativo para a escola entres os meninos e duas para as meninas. Os esforços para promover o deslocamento ativo, devem considerar ações específicas a cada gênero. Proporcionando rotas seguras e organizar atividades em grupo podem aumentar o deslocamento ativo para meninas. Encontrar rotas mais rápidas podem aumentar esse comportamento para meninos.

Palavras-Chave: Estruturas de acesso; Adolescente; Atividade motora; Estudos transversais; Brasil

**Abstract**

The aim of this study was to analyze the association between perceived barriers for active commuting to school in the form of displacement of adolescents from Curitiba, Brazil. Interviews were conducted in six schools (three public and three private) with 741 adolescents aged 11 to 18 yrs. The adolescents answered a questionnaire that evaluated perceived barriers with seventeen questions for active commuting to school and one about what is the mode of commuting that usually uses to go to and from school in a typical week. The association was tested by Poisson regression with 5% significance level. The prevalence of active commuting was of 42.9% (50.0 in boys and 37.2% in girls, p<0,001). For boys the barrier "it is too far" (PR: 0.71, CI95%: 0.60- 0.86) was inversely associated with active commuting. While identifying the "route as boring" (PR: 1.30, CI95%: 1.04-1.62) and "too much traffic" (RP: 1.27, CI95%: 1:04 to 1:56) were associated positively. For girls, realize that it is "It’s easier to go by car or bus" (PR: 0.70, CI95%: 0.56-0.88) and involve " it requires too much planning" (PR: 0.60, CI95%: 0.42-0.86) was inversely associated with the active commuting. It is concluded that three barriers were associated with active commuting to school between boys and two for girls. Efforts to promote active commuting, should consider specific actions for the gender. Providing safe routes and organize group activities can increase active commuting for girls. finding faster routes may help increase this behavior among boys.

Keywords: Architectural Accessibility**;** Adolescents; Motor Activity; Cross-Sectional Studies; Brazil

**Introduction**

Active commuting to school is an important strategy to increase physical activity and health in adolescents1,2. In high-income countries as United States, Canada and Belgium the prevalence of active commuting ranges from 50-68%2–4 whereas in Brazil, despite the limited evidence, the prevalence is somehow similar to high-income countries (49-63%)5,6.

Overall, individual correlates of active commuting are also similar across countries5–8. For instance, age, income and the number of perceived barriers are inversely associated with active community in both high and low-to-middle income countries9. However, the evidence on the barriers to active commuting in adolescents is just beginning to emerge and only few studies have been conducted in low and middle-income countries, specifically in the Latin America Region10. In fact, to this date only three studies have been conducted in Latin America11–13 and found that active commuting to school was inversely associated with gender (girls), age (17-19 years old), place of residence (rural), travel time (≥15 minutes), and family income (>R$1,000)5,6.

To this date only one study explored correlates perception with active commuting in Brazilian adolescents13 and showed that active commuting was lower among students of private schools, those who spent >20 minutes to commute, and those that spent more time watching TV. The correlates inversely associated with active commuting were long distance, higher crime perception and heavy traffic13.

The evidence on perceived barriers for active commuting among adolescents in Brazil is limited and nearly all the evidence on this subject is from high-income countries2–4,9 . Additionally, the built and social environment characteristics in Brazil, as in other upper-middle income countries, are different when compared from high-income countries (e.g. bicycling infrastructure, traffic congestion, safety from crime)14. Hence, the use of the available evidence to help guide policies and environmental changes to promote active commuting in Brazilian adolescents is prevented by the lack of contextual characteristics. The aim of this study was to analyze the association between perceived barriers for active commuting to school in the form of displacement of adolescents from Curitiba, Brazil.

**Methods**

 **Participants and data collection**

This was a cross-sectional and observational study with adolescents aged from 11 to 18 years old from Curitiba, Brazil. Curitiba is located in the south of the Brazil with approximately 1.8 million inhabitants and it’s classified as a city of moderate to high quality of life as defined by the Human Development Index (HDI)=0.80015. Data was collected between August and November 2012. The research was approved by the Ethics Committee at the Pontifical University Catholic of Paraná (93.644/2012).

The sampling was performed in two stages. First, six schools (three public and three private) were selected by convenience in order to discriminate level of socioeconomic status. Secondly, within each school one-grade classroom was randomly selected until the number of subjects necessary to represent the school was achieved (seven classrooms in each school). All students in the selected classes were considered eligible for this study. Data collection was conducted in each classroom by three researchers. The final sample included 741 adolescents (55.5% girls). The sample power was estimated *a posteriori* for *Poisson* regression analyzes and estimated associations of at least 1.10 and effect of 0.5. According to these estimators sample power was of 0.92.

**Active commuting to school**

The outcome variable was assessed by asking students about the mode of commuting used to go to and from school during a typical week (e.g. walking, bicycling, public and private motorized transportation). All students who reported walking or bicycling to go to and from school were classified as “active commuters”. This question showed adequate test-retest reliability (walking, CCI=0.90; p<0.05; and bicycling, CCI=0.95; p<0.05) and it has been used in similar studies2,7.

**Barriers for active commuting to school**

The explanatory covariate variables were assessed as perceived barriers for active commuting to school and included seventeen questions that emphasized personal, social and environmental barriers (e.g. lack of motivation, company, social support and safety from crime). All items were adapted from existing surveys3,7,9,13,16–19.

he adolescents informed their perception using a four points scale, ranging from 1 (strongly disagree) to 4 (strongly agree) when asked “how difficult is to walk or bike to school?” for the following questions “It’s easier to go by car/bus”, “There are dangerous crossings”, “There is too much traffic”, “ I have too many things to carry”, “It is too far”, “There are too many hills”, “The route is boring”, “I get hot and sweat a lot”, “I don’t like walking or riding a bike”, “It’s not cool to walk or ride a bike to school”, “There are no other teenagers on the way”,” There are dogs on the street”, “Lack of bike lanes”, “I would have to go through unsafe places”, “There is no place to leave a bike safe”, “It involves too much planning”, “The route does not have good lighting”. The responses were categorized into dichotomous variables and the original categories “agree” and strongly agree” were combined and considered “presence of barriers”.

**Sociodemographic and physical activity variables**

Covariates also included the following sociodemographic variables: gender (boy and girl), age (11-14 vs. 15-18 years old), type of school (public vs. private), parent’s schooling (elementary school, higher school, graduate)20 and perceived distance time from home to school (1-10 min.,11-20 min., 21-30 min., and ≥ 31 min). Physical activity practices in leisure time were reported by frequency (days/week) and duration (minute/day) of moderate-to-vigorous physical activity. Adolescents that reported practicing 300 min/wk or more were classified as “active”21.

**Data analyses**

Poisson regressions were used to verify the association between perceived barriers and active commuting to school by gender. After crude analysis only variables with p<0.20 were included in the final model. All analyses were performed using STATA 12.0 with significance level of 5%.

**Results**

The final sample included 741 adolescents (55.5% girls) most of them were of 11 to 14 years old (51.0%), enrolled in private schools (60.1%) and had at least one parent with less than undergraduate level of schooling (51.0%). The prevalence of active adolescents in leisure time was 19.7%; and 43.0% reported living at least 30 minutes or more walking to or from school. The prevalence of active commuting was of 42.9% (50.0 in boys and 37.2% in girls, p<0,001) (Table 1).

<<Table 1>>

After adjusted for confounding variables, three barriers remained associated with active commuting to or from school among boys and two among girls. In boys the barrier “it is too far” (PR: 0.71, CI95%: 0.60- 0.86) was inversely associated with active commuting while the barriers “there is too much traffic” (PR: 1.27, CI95%: 1.04-1.56) and “the route is boring” (PR: 1.30, CI95%:1.04-1.62) were positively associated. In girls “It’s easier to go by car or bus” (PR: 0.70, CI95%: 0.56-0.88) and “it requires too much planning” (PR: 0.60, CI95%: 0.42-0.86) were inversely associated with active commuting to school (Table 2).

<<Table 2>>

**Discussion**

The results indicate that only 42.9% (50.0 in boys and 37.2% in girls) of students commute by walk or bike to or from school, with greater frequency among boys (*p*<0.05). The prevalence of active transport was lower than compared to developed countries3,4,22 and to others cities of Brazil13,19,23. Comparison with other studies is undermined due to sample frame and size. The sample used in this study is not representative of adolescents from Curitiba as the design (private vs. public without proportionality) may have led to bias selection. Additionally, contextual factors could also help explaining such inconsistency. For instance, a study performed in South Brazil pointed that the low prevalence of adolescents in active commuting might be linked to work related activities after the school period5.

Among boys reporting to be “too far” was inversely related to active commuting which is consistent with other studies2,5,8. Adolescents who reside on a distance of up to two kilometers from the school usually walk, and those residing up to eight kilometers distant use the bicycle4. Hence, distance remains an important barrier for active commuting in this sample. Two barriers were positively associated with transport to school, “too much traffic” and “the route is boring”. Although interpretation is limited by the study design (reverse causality) it’s possible that a need versus choice model may play a role in the findings. When people have no other mode of transport and walking and bicycling is needed they may report what they see while performing such behavior.

Among girls the barriers “easier to go by car/bus” and “it involves too much planning” were inversely associated with active commuting. Access to car and busses may facilitate getting to school faster and safely, which might help explaining this finding8. Safety has been reported as a barrier for active commuting in girls8 and as Brazil has higher rates of crime and assaults than high-income countries24,25 this may influence one’s decision of using a motorized transport. This also may help explaining “too much planning” been associated with active commuting among girls, as finding a safer route or other means to cope with unsafe environments (e.g. finding company) require more time and resources.

This study has limitation that should be considered. This was cross-sectional design study preventing causal inference. The sample was not representative of the city limiting external validity. Additionally, only a single self-reported question was used to describe active commuting, hence a potential misclassification cannot be excluded as a potential bias.

In conclusion the results of this study have significant contributions. First, this is the first study identifying barriers to active commuting among adolescents in Brazil. Confirm that barrier perception differ between gender. Efforts to promote active commuting should consider gender specific actions. For instance, providing safe routes maps and organizing group activities may help increase active commuting among girls; whereas finding faster routes may help increase this behavior among boys. Additionally, improvement on traffic signage and enforcing existing regulations will help increase safety.

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| **TABLE 1 -** Descriptive characteristics of participants by gender. Curitiba-PR, 2012 (n=741). |
|  | Boys(n=330) | Girls (n=411) | P | All(n=741) |
| n | % | N | % | n | % |
| Age |  |  |  |  |  |  |  |
| 11-14 yrs old | 162 | 42.5 | 219 | 57.5 | 0.256 | 381 | 51.4 |
| 15-18 yrs old | 168 | 46.7 | 192 | 53.3 |  | 360 | 48.6 |
|  |  |  |  |  |  |  |  |
| Type of school |  |  |  |  |  |  |  |
| Public | 139 | 47.0 | 157 | 53.0 | 0.279 | 296 | 39.9 |
| Private | 191 | 42.9 | 254 | 57.1 |  | 445 | 60.1 |
|  |  |  |  |  |  |  |  |
| Schooling of a parent/responsible |  |  |  |  |  |  |  |
| Up to elementary school | 12 | 37.5 | 20 | 62.5 | 0.206 | 32 | 4.3 |
| High school | 142 | 42.9 | 189 | 57.1 |  | 331 | 44.7 |
| Undergraduate | 176 | 46.6 | 202 | 53.4 |  | 378 | 51.0 |
|  |  |  |  |  |  |  |  |
| Physical activity in leisure-time |  |  |  |  |  |  |
| < 300 min/wk | 240 | 40.3 | 355 | 59.7 | <0.001 | 595 | 80.3 |
| ≥ 300 min/wk | 90 | 61.6 | 56 | 38.4 |  | 146 | 19.7 |
|  |  |  |  |  |  |  |  |
| Perceived distance walking to school |  |  |  |  |  |  |
|  ≤ 10 min | 76 | 48.7 | 80 | 51.3 | 0.486 | 156 | 21.1 |
| 11-20 min | 68 | 48.2 | 73 | 51.8 |  | 141 | 19.0 |
| 21-30 min | 46 | 35.6 | 82 | 64.1 |  | 128 | 17.3 |
| ≥ 31 min | 140 | 44.3 | 176 | 55.7 |  | 316 | 42.6 |
|  |  |  |  |  |  |  |  |
| Active commuting to school\* |  |  |  |  |  |  |
| No | 165 | 50.0 | 258 | 62.8 | <0.001 | 423 | 57.1 |
| Yes | 165 | 50.0 | 153 | 37.2 |  | 318 | 42.9 |

\*walk or bike

|  |
| --- |
| **TABLE 2 -** Association between perceived barriers and active commuting to school in adolescents from Curitiba-PR, 2012 (n=741). |
| Barriers | Presence | Boys |  | Girls\* |
| N | % | PR | CI95% | n | % | PR | CI95% |
| It’s easier to go by car/bus | No | 62 | 73.8 | 1 |  | 55 | 69.6 | 1 |  |
|  | Yes | 103 | 41.9 | 0.80 | 0.58-1.11 | 98 | 29.5 | **0.70** | **0.56-0.88** |
|  |  |  |  |  |  |  |  |  |  |
| There are dangerous crossings | No | 64 | 54.2 | 1 |  | 56 | 50.9 | 1 |  |
|  | Yes | 101 | 47.5 | 1.08 | 0.83-1.40 | 97 | 32.2 | 1.00 | 0.77-1.29 |
|  |  |  |  |  |  |  |  |  |  |
| There is too much traffic | No | 73 | 57.0 | 1 |  | 53 | 46.9 | 1 |  |
|  | Yes | 92 | 45.5 | **1.27** | **1.04-1.56** | 100 | 33.6 | 1.23 | 0.82-1.84 |
|  |  |  |  |  |  |  |  |  |  |
| I have too many things to carry | No | 88 | 57.1 | 1 |  | 59 | 48.8 | 1 |  |
|  | Yes | 77 | 43.8 | 0.99 | 0.83-1.18 | 94 | 32.4 | 1.04 | 0.92-1.18 |
|  |  |  |  |  |  |  |  |  |  |
| It is too far | No | 109 | 70.3 | 1 |  | 101 | 56.7 | 1 |  |
|  | Yes | 56 | 32.0 | **0.71** | **0.60-0.86** | 52 | 22.3 | 0.86 | 0.61-1.18 |
|  |  |  |  |  |  |  |  |  |  |
| There are too many hills | No | 94 | 58.0 | 1 |  | 81 | 44.0 | 1 |  |
|  | Yes | 71 | 42.3 | 0.88 | 0.71-1.08 | 72 | 31.7 | 0.99 | 0.65-1.49 |
|  |  |  |  |  |  |  |  |  |  |
| The route is boring | No | 85 | 50.0 | 1 |  | 76 | 42.9 | 1 |  |
|  | Yes | 80 | 50.0 | **1.30** | **1.04-1.62** | 77 | 32.9 | 1.16 | 0.88-1.52 |
|  |  |  |  |  |  |  |  |  |  |
| I get hot and sweat a lot | No | 93 | 54.7 | 1 |  | 93 | 48.2 | 1 |  |
|  | Yes | 72 | 45.0 | 1.02 | 0.81-1.29 | 60 | 27.5 | 0.91 | 0.70-1.20 |
|  |  |  |  |  |  |  |  |  |  |
|  I don’t like walking or riding a bike  | No | 121 | 54.3 | 1 |  | 96 | 46.2 | 1 |  |
|  | Yes | 44 | 41.1 | 0.87 | 0.63-1.20 | 57 | 28.1 | 0.79 | 0.48-1.30 |
|  |  |  |  |  |  |  |  |  |  |
| It’s not cool to walk or ride a bike to school | No | 121 | 54.8 | 1 |  | 94 | 41.2 | 1 |  |
|  | Yes | 44 | 40.4 | 0.95 | 0.71-1.28 | 59 | 32.2 | 1.23 | 0.73-2.04 |
|  |  |  |  |  |  |  |  |  |  |
| There are no other teenagers on the way | No | 113 | 52.3 | 1 |  | 102 | 40.8 | 1 |  |
|  | Yes | 52 | 45.6 | 1.06 | 0.91-1.24 | 51 | 31.7 | 0.96 | 0.80-1.17 |
|  |  |  |  |  |  |  |  |  |  |
| There are dogs on the street | No | 119 | 53.1 | 1 |  | 105 | 40.1 | 1 |  |
|  | Yes | 46 | 43.4 | 0.93 | 0.67-1.31 | 48 | 32.2 | 1.06 | 0.87-1.30 |
|  |  |  |  |  |  |  |  |  |  |
| Lack of bike lanes | No | 122 | 51.9 | 1 |  | 99 | 38.1 | 1 |  |
|  | Yes | 43 | 45.3 | 0.97 | 0.75-1.27 | 54 | 35.8 | 0.95 | 0.76-1.21 |
|  |  |  |  |  |  |  |  |  |  |
| I would have to go through unsafe places | No | 132 | 54.3 | 1 |  | 118 | 45.4 | 1 |  |
|  | Yes | 33 | 37.9 | 1.02 | 0.92-1.26 | 35 | 23.2 | 0.78 | 0.31-1.91 |
|  |  |  |  |  |  |  |  |  |  |
| There is no place to leave a bike safe | No | 118 | 52.7 | 1 |  | 114 | 37.0 | 1 |  |
|  | Yes | 47 | 44.3 | 0.90 | 0.72-1.10 | 39 | 37.9 | 1.06 | 0.90-1.23 |
|  |  |  |  |  |  |  |  |  |  |
| It involves too much planning | No | 140 | 54.3 | 1 |  | 132 | 44.9 | 1 |  |
|  | Yes | 25 | 34.7 | 0.90 | 0.60-1.34 | 21 | 17.9 | **0.60** | **0.42-0.86** |
|  |  |  |  |  |  |  |  |  |  |
| The route does not have good lighting | No | 133 | 50.8 | 1 |  | 119 | 38.1 | 1 |  |
|  | Yes | 32 | 47.1 | 0.98 | 0.69-1.40 | 34 | 34.3 | 1.00 | 0.70-1.40 |
| PR: prevalence ratio; CI95%: interval with 95% of confidence; adjusted for covariables presenting p <0.20. \*adjusted for variables with p value <0.20 in crude analysis: age, leisure time, perceived distance walking to school, schooling of a parent/responsible and others barriers: It’s easier to go by car/bus, I have too many things to carry, It is too far, I get hot and sweat a lot, I don’t like walking or riding a bike, There are no other teenagers on the way, There are dogs on the street, It involves too much planning. |

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