Why don’t they walk or cycle? Reflections on active home–school transportation among Portuguese adolescents: the role of environmental perceptions

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The way adolescents travel to school can be an important health promotion strategy. The main objective of this research was to identify the relationships between the Portuguese adolescents’ perception of their neighbourhood and their option for active transportation (AT). The Health Behaviour in School-aged Children 2010 questionnaire, was applied to 3,494 adolescents with an average age of 14.93 (DP ± 1.29), 53.6% of whom were female. The associations were studied by applying $\chi^2$ tests and multivariate logistic regression models. In this study, 35% of the sample reported walking or cycling to school. AT to school is associated with age, more frequent in the adolescents aged 16 and older (OR = 1.19, $p < .05$), more frequent in residential areas with good public services (OR = 1.79, $p < .05$), as well as in beautiful neighbourhoods (OR = 1.76, $p < .05$), less frequent in neighbourhoods with nightlife entertainment (OR = 0.73, $p < .05$), and in those characterized by violence and theft (OR = 0.56, $p < .05$) as well as in isolated areas (OR = 0.66, $p < .05$). Finally, it was more frequent when the travel time from home to school was lower (OR = 0.57, $p < .05$).

Conclusion: The results show that the adolescents’ perceptions about some of the characteristics of their neighbourhood environments are associated with their options concerning AT when travelling to school.

Keywords: active transportation; neighbourhood; adolescents; safety; aesthetics; physical activity

Background

In the last 30 years, less and less children and adolescents walk or bike to school (Environmental Protection Agency, 2003). According to Sallis (2006), one of the most important measures aiming to stimulate children and adolescents physical activity (PA) consists in motivating them to walk and cycle, especially from home to school. Some authors even consider active transportation (AT) a missed opportunity to promote PA (Bungum, Lounsbery, Moonie, & Gast, 2009). Also, motorized travel to school accounts for an increasingly large proportion of heavy traffic and is associated with sizable emissions of exhaust and greenhouse gases (Marshall et al., 2010).

An extensive review of the literature (Faulkner, Buliung, Flora, & Fusco, 2009) proves that the youngsters who use AT when travelling to school tend to be more active.

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The decrease in the habits of walking and cycling to school has to be seen in the context of an ecological framework, which takes into account the effects of the physical, social, political and economic environment (Institute of Medicine, 2005). Some of the reasons given to justify this option for not walking or biking to school include: long distances; road traffic safety; danger of criminality and school policies (CDC, 1999). Mota et al. (2007), on the other hand, argue that the girls active travel is negatively influenced by the father’s work hours and education, as well as by the family’s socio-economic level.

The work of Panter, Jones, and van Sluijs (2008) organizes AT behaviour into four major domains of influence: individual factors, those related to the physical environment, external factors outside the most proximal domains of influence and main moderators. These authors suggest that the individual characteristics, the physical environment and the external domains are more likely to condition the youngster’s decision on how to travel to school, whereas the main moderating factors tend to change the strength and form of the association between the different factors and the decision made.

Research on the neighbourhood characteristics and the role they play on the residents’ travel mode choices has increased lately, mainly focusing on groups with limited autonomy, such as children and adolescents (McDonald et al., 2012). Some of these studies have revealed contradictory indicators, especially when adolescents of different ages are compared, because as children develop, they are given more independent mobility and acquire different perceptions of their environment (Ferreira et al., 2007; Giles-Corti, Kelty, Zubrick, & Villanueva, 2009).

Be as it may, some neighbourhood features have been increasingly recognized as having an impact on children and adolescents PA, according to three relevant reviews of the literature on this topic (Davison & Lawson, 2006; Giles-Corti et al., 2009; Wong, Faulkner, & Buliung, 2011). The variables that gather more consensus in there articles are those connected with accessibility and/or proximity to schools and recreational locations (more frequent in the case of female individuals), the existence of pedestrian-friendly facilities, such as controlled sidewalks and crosswalks, the access and proximity to public transports, traffic density, the number of roads to cross, criminality and safety. However, Wong et al. (2011) found conflicting evidence regarding the association between features such as density, land use mix and street connectivity which are strong correlates of AT in adults (Saelens, Sallis, Black, & Chen, 2003). Some of these studies have revealed contradictory indicators, which are not specified in their study, though.

In Portugal, research on this topic is scarce and does not explain clearly the different variables involved. It is therefore relevant to assess the impact of the variables related to neighbourhood contexts on young people’s decisions concerning AT to and from school. It is hypothesized that the Portuguese adolescents perception of their neighbourhood is associated with their option for AT.

**Methodology**

The present study used data from a research conducted in Portugal, in 2010, within the scope of the Health Behaviour in School-aged Children (HBSC) programme (Currie, Samdal, & Boyce, 2001; Matos et al., 2010). The HBSC is a cross-sectional study that takes place in 44 countries, with the cooperation of the World Health Organization. The ultimate goal is to enhance the knowledge of youth health and well-being, their health behaviours and their social contexts. Based on a questionnaire with the same questions to all participant countries, the study is carried out every four years, making it possible
to compare the indicators between countries and to understand their evolution within each country.

Participants
About 3,494 individuals attending schools in continental Portugal, chosen randomly from a national list organized by region, participated in this study. The class was the unit of analysis chosen. This is a significant sample of 8th and 10th grade students who attend regular education in continental Portugal and, in what gender is concerned, 53.6% (1,872) of the participants were female. The average age was 14.93 (± SD 1.3). As regards the school year, 45.6% attended the 8th grade, and 54.4% the 10th. The number of adolescents who did not respond to the questions under study was very small (less than 3%) and was excluded each time the question was analysed.

Instrument
For each HBSC study, the international questionnaire is designed through collaborative research involving the researchers of the different countries. The questionnaire “Behaviour and Health in School-aged Children” (“Comportamento e Saúde em jovens em idade escolar”), used in this study, was adopted in the international HBSC study in 2010 (Currie et al., 2001).

All the questions followed the format specified in the protocol (Currie et al., 2001), including demographic questions (age, gender, socio-economic status), and questions on: food, hygiene and sleep habits; body image; the practice of PA; spare-time occupations and new technologies; substance use; violence; family and home environment; friendships and peer relations; school and school environment; health and well-being; and sexual behaviour.

This study was subject to a panel of experts from the Consulting Board for the Social Adventure Team (“Equipa Aventura Social”) and had the approval of the Ethics Commission, the National Commission for Data Protection, and the Ministry of Education. The schools also requested the informed consent of parents or legal guardians.

Variables
In order to determine the AT, this study focused on the answers of the questionnaire, which looked into how the adolescents travelled to school. The options kept in this study were walking (33%) and cycling (2%). All the other answers had to do with inactive modes of travel (car – 32.5%, motorcycle – 1% and public transports – 31.5%).

The adolescents’ perception of their residential neighbourhoods was determined by the following yes/no questions: (1) Do the people get on well and talk to one another? (2) Is it safe for children to play outside during the day? (3) Are the people in the area trustworthy? (4) Are there good spare-time facilities? (5) Is there plenty of nightlife entertainment? (6) Are violence and theft frequent? (7) Is it a beautiful area? (8) Is the area too isolated? (9) Are there good public services available (health centre, youth centre, etc.)? The subjects were asked how long it took them to get to school on a normal day, and the answers varied between 1 min and over 31 min.

Demographic variables were also used, more precisely those related to gender and age. The practice of PA (having done PA to the point of accelerating the heart rate and getting short of breath, for at least 60 min a day for ≥5 consecutive days, during the
period of 7 days prior to this study) and overweight and obesity (those who have a body mass index (BMI) of ≥25 kg/m²) were examined as well.

**Statistical analysis**

The SPSS version 16 for Windows (SPSS, Chicago IL, USA) was used. At an initial stage, the descriptive analysis of the variables was conducted, and later, a chi-square test ($\chi^2$) was applied, aiming to determine the main differences in the variables under study. In order to determine relevant differences between variables, the value $\geq 1.9$ of adjusted residual was considered. Then, the analysis focused on the attempt to explain the adolescents’ AT when travelling to school, by resorting to multivariate logistic regression models.

**Results**

The descriptive results of the variables under study are presented in Table 1, which shows that 53.6% of the subjects inquired are female and 52.9% are 16 or older.

It is also evidenced that 35.8% of these teenagers report choosing AT when travelling to school, that 70.6% don’t practise PA for 60 min, five or more days a week, and that 17.2% are overweight or obese.

In what concerns their perception of the place where they live, these adolescents reveal a rather favourable opinion, especially when reporting on the relationship between people (89.5%), how safe children are when playing outside (81.8%), and the

| Characteristics                                    | %    | N    |
|----------------------------------------------------|------|------|
| **Gender**                                         |      |      |
| Female                                             | 53.6 | 1872 |
| Male                                               | 46.4 | 1622 |
| **Age**                                            |      |      |
| 13–15                                              | 47.1 | 1588 |
| ≥16                                                 | 52.9 | 1787 |
| **Active transportation**                          |      |      |
| a                                                   | 35.8 | 1251 |
| **Doesn’t practise PA for 60 min/≥5 days a week**  |      |      |
| b                                                   | 70.6 | 2538 |
| **Overweight and obesity**                         |      |      |
| c                                                   | 17.2 | 539  |
| **Neighbourhood features**                         |      |      |
| People get on well                                  | 89.5 | 2953 |
| It is safe for children to play                     | 81.8 | 2699 |
| You can trust people                                | 77   | 2529 |
| Good spare-time facilities                          | 72.6 | 2386 |
| Nightlife entertainment                             | 35.1 | 1156 |
| Violence and theft                                  | 18.2 | 597  |
| Beautiful area                                      | 75.9 | 2488 |
| Isolated area                                       | 24.4 | 800  |
| Good public services                                | 62.9 | 2060 |
| Time spent travelling to school**                   | 45.5 | 1490 |

*usually travel to school on foot or by bicycle.

*did not do PA to the point of accelerating the heart rate and getting short of breath, for at least 60 min a day for ≥5 consecutive days, during the period of 7 days prior to this study.

*teenagers who have a BMI of ≥25 kg/m².

*time spent travelling to school on a normal day >10 min.
fact that they can trust the people (77%). This is also supported by their positive perception of a neighbourhood that: offers good spare-time facilities (72.6%); is a beautiful area (75.9%); and has good public services (62.9%). Not many consider that violence and theft are frequent (18.2%) or that they live in an isolated area (24.4%). Finally, 45.5% of these teenagers say it takes them over 10 min to get to school.

The results of the chi-square test ($\chi^2$) shown in Table 2 determine that there are significant differences regarding AT according to gender: girls are those who use more frequently AT to school.

Table 2. $\chi^2$ Inferential analysis and explanatory logistic regression of the Portuguese adolescents use of AT to school.

| Items studied                                      | NO AT % | AT % | Adjusted OR (AT Ref.) | (95% CL) | $p$-value |
|---------------------------------------------------|---------|------|------------------------|----------|-----------|
| Male (Ref.)                                       | 28.8*   | 17.7*| .880 (.74–1.04)        | .880     |
| Female                                            | 35.4*   | 18.1*|                        |          |
| $\geq$ 16 years old (Ref.)                        | 33.2    | 19.7 | 1.187 (1.06–1.40)      | .042     |
| 13–15 years old                                   | 30.8    | 16.3 |                        |          |
| Does PA for 60 min/$\geq$ 5 days a week (Ref.)    | 16.7    | 10.1 | .997 (.83–1.21)        | .997     |
| Does PA for 60 min/$<$ 5 days a week (Ref.)       | 47.6    | 25.6 |                        |          |
| Overweight and obesity                            | 11      | 6.2  | .728 (.58–0.91)        | .873     |
| Normal                                            | 53.6    | 29.2 |                        |          |
| People get on well – Yes (Ref.)                   | 56.2    | 33.4 | .987 (.74–1.32)        | .927     |
| People get on well – No                          | 6.4     | 4    |                        |          |
| It is safe for children to play – Yes (Ref.)      | 52*     | 29.9*| 1.022 (.82–1.28)       | .852     |
| It is safe for children to play – No              | 10.6*   | 7.5* |                        |          |
| People are trustworthy – Yes (Ref.)               | 49.7*   | 27.2*| 1.213 (.98–1.51)       | .082     |
| People are trustworthy – No                      | 12.8*   | 10.2*|                        |          |
| Good spare-time facilities – Yes (Ref.)           | 45.2    | 27.4 | .955 (.78–1.17)        | .661     |
| Good spare-time facilities – No                  | 17.5    | 9.9  |                        |          |
| Nightlife entertainment – Yes (Ref.)              | 20*     | 15.2*| .734 (.61–.88)         | .001     |
| Nightlife entertainment – No                      | 42.6*   | 22.2*|                        |          |
| Violence and theft – Yes (Ref.)                   | 9.4*    | 8.8* | .562 (.45–.70)         | .000     |
| Violence and theft – No                          | 53.1*   | 28.7*|                        |          |
| Beautiful area – Yes (Ref.)                       | 49.1*   | 26.7*| 1.76 (1.4–2.20)        | .000     |
| Beautiful area – No                              | 13.5*   | 10.6*|                        |          |
| Isolated area – Yes (Ref.)                        | 17.2*   | 7.1* | .659 (.55–.79)         | .000     |
| Isolated area – No                               | 45.3*   | 33.3*|                        |          |
| Good public services – Yes (Ref.)                 | 36.2*   | 26.8*| 1.786 (1.43–2.17)      | .000     |
| Good public services – No                        | 26.3*   | 10.7*|                        |          |
| Time spent travelling to school >10 min$^d$       | 32*     | 13.5*| .565 (.48–.67)         | .000     |
| Time spent travelling to school $\leq$ 10 min$^d$ | 30.4*   | 24.1*|                        |          |

$^a$Usually travel to school on foot or by bicycle.

$^b$Did not do PA to the point of accelerating the heart rate and getting short of breath, for at least 60 min a day for $\geq$5 consecutive days, during the period of 7 days prior to this study.

$^c$Teenagers who have a BMI of $\geq 25$ kg/m$^2$.

$^d$Time spent travelling to school on a normal day $> 10$ min.

Notes: CI indicates the confidence intervals; OR for odds ratio; $R^2_N$: indicates the value of Nagelkerke; $\chi^2_{HL}$ indicates the value of Hosmer and Lemeshow test. $\chi^2$ significant values for $p<.05$; Adjusted residuals $\geq|1.9|$ are considered significant (in bold).
However, no major differences were found for AT depending on age, the practice of PA, and on (BMI, normal vs. overweight/obese).

As regards the perceptions of the neighbourhood, there are relevant differences in several variables. Among the adolescents who choose non-active modes of transportation, 52% find it a safe place for children to play outside, 49.7% say the people are trustworthy, 49.1% believe their neighbourhood is a beautiful place to live, 36.2% think there are good public services available and 32% spend over 10 min on the way to school. In addition, among the youngsters with this travel behaviour, 42.6% say there is no nightlife entertainment, 53.1% consider there isn’t violence or thefts and 45.3% don’t think they live in an isolated area. No differences were found between modes of transportation and the perceptions concerning the existence of good spare-time facilities.

Table 2 also shows the adjusted odds ratio values of the statistical multivariate logistic regression, showing the variables associated with AT. The oldest adolescents are more likely to choose AT (OR = 1.187; \( p < .05 \)). The perception that they live in a beautiful area (OR = 1.76; \( p < .05 \)) and the existence of good public services (OR = 1.786; \( p < .05 \)) also contribute to increase the probability of AT.

There is also evidence that other neighbourhood features influence negatively the probability of these teenagers doing AT, specifically the existence of nightlife entertainment (OR = 0.734, \( p < .05 \)), the perception of violence and theft associated with the area (OR = 0.562, \( p < .05 \)), the awareness of living in an isolated area (OR = 0.659, \( p < .05 \)) and distances from home to school when taking over 10 min (OR = 0.565, \( p < .05 \)).

Discussion

The purpose of this study was to find out the variables that may influence the practice of AT to school among Portuguese adolescents. Keeping in mind the positive impact AT can have on children and adolescents health, by contributing to the increase of PA (Lee, Orenstein, & Richardson, 2008) and the energy spent daily (Slingerland, Borghouts, & Hesselink, 2012), as well as the participation in extra-curricular sports activities (Silva et al., 2010), it is important to understand the implications of demographic and context variables for this behaviour.

In this study, it was verified that only 35.8% of the adolescents say they walk or cycle to school, when compared with the 59.3% evidenced by D’Haese, De Meester, De Bourdeaudhuij, Deforche & Cardon (2011).

As is referred in various studies (Frank, Kerr, Chapman, & Sallis, 2007), this active behaviour is reported more often by older students. According to Panter et al. (2008), age is an important moderator of adolescents AT, since the older ones may have less personal safety concerns, due to greater autonomy and less dependence on parents. On the other hand, parental views on the neighbourhood characteristics significantly influence the youngsters’ decisions about PA and AT (Carson, Kuhle, Spence, & Veugelers, 2010), and denote the important role educators play in determining the exposure to facilitating factors of PA (Gustafson & Rhodes, 2006).

This research found that, when the adolescents characterize the residential area as beautiful and offering good public services, they appear to have more probabilities of using AT. The relevance of matters related to the neighbourhood aesthetics is not consensual, in what concerns the youth population (De Meester, Van Dyck, De Bourdeaudhuij, Deforche, & Cardon, 2013) if compared with that of adults (Giles-Corti et al., 2013). However, Mota, Almeida, Santos, and Ribeiro (2005) consider that the young people who are more active are associated with greater satisfaction with the...
aesthetics of their neighbourhood, the accessibility to shops and facilities, and the social environment. On the contrary, relating safety and criminality to PA is complex, considering the diversity of crimes, time and context, as well as the emotional response and coping strategies, which can produce different effects in practice. (Ding et al., 2013).

In the present study, it became evident that issues concerning safety, mainly those involving the perception of violence and theft, the existence of nightlife entertainment (often associated with the disturbance of public order), and the isolation of the residential area affect the adolescents’ choices related to AT. Factors that influence the perception of safety have been identified by other researchers as particularly relevant to the practice of the adolescents’ AT and PA (Leslie, Kremer, Toumbourou, & Williams, 2010).

The data connected with the neighbourhood isolation, justified by longer distances, which take over 10 min to travel, shows that this variable is negatively linked to the use of AT. This conclusion coincides with the findings of several studies (De Meester et al., 2013; Wong et al., 2011), according to which this is one of the most relevant factors influencing children and adolescents modes of transportation to school (Panter, Jones, van Sluijs, & Griffin, 2010).

One of the limitations of this study has to do with the fact that the questions used did not address the characterization of AT, which may have caused interpretation problems to the subjects inquired. Another restraint involves the variables related to neighbourhood features, always conditioned by a high degree of subjectivity.

Conclusion

As a conclusion, this study shows that, among Portuguese adolescents, the probability of choosing AT increases with age, with their positive perception concerning the aesthetics of the area and the existence of good public services, and decreases with the perception of violence and theft, the existence of nightlife entertainment, the isolation of the residential neighbourhood and the time spent on the way to school.

AT can be an important strategy to increase the practice of the adolescents informal PA and become a catalyst of experiences that foster structured learning aiming at a healthy lifestyle. It is therefore urgent to understand the factors that promote and facilitate AT, in order to define a set of strategies, adequate to individual contexts, which may encourage the young to choose AT as the preferential mode of transportation.

The main findings of this study are: Despite girls being pointed out as less active than boys in most studies, they more frequently use active home–school transportation; AT decreases when environmental features such as lack of safety are perceived. On the contrary, AT is more frequent when the environment is perceived as more pleasant.

The results of this study reinforce the importance of local authorities taking some action on the safety and aesthetic features of the neighbourhoods, after these evidences that this can be a cheap way to promote PA in adolescents, especially in girls. As well as promoting the health benefits of AT, interventions could emphasize the low cost of these transport modes compared with driving, and how beneficial sustainable transport is by reducing pollution and dependence on fossil fuels (Bauman et al., 2008) and promoting social interaction (Carver et al., 2011).

Living in high-density contexts may present several challenges for families with children, and it’s very important to know and understand parental perceptions about active transport and safety of the route to school.
Finally, additional efforts may be needed to raise awareness about existing programmes and interventions aiming to promote AT, involving schools, communities and the parents.

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