Obese girls differences in neighbourhood perceptions, screen time and socioeconomic status according to level of physical activity

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Abstract

The purpose of this study was to investigate perceptions of neighbourhood, amount of screen time and socioeconomic status (SES) in active and non-active ‘overweight/obese girls’. The sample comprised 162 girls aged 14.1 ± 1.5 years old. Girls were assigned as active obese (AO) and non-active obese (NAO). Environmental variables, screen time and SES were assessed by questionnaire. No statistically significant differences were found for screen time between AO and NAO groups. Educational status of father ($r = 0.23; P = 0.003$) and mother ($r = 0.18; P = 0.02$) was positively and significantly associated with AO. AO girls reported to more significantly ($P < 0.05$) agree with living in a neighbourhood with several public recreation facilities and that they see people being physically active in neighbourhood. Logistic regression analysis showed that social environment [odds ratio (OR) = 15.06; $P = 0.037$] and recreational facilities domain (OR = 11.16; $P = 0.042$) were associated to likelihood to be more active. Creating social support and providing PA facilities within neighbourhoods, particularly in low SES neighbourhoods, are desirable.

Introduction

Obesity is one of the most common health problems with increasing prevalence worldwide among people of all ages [1]. Obesity during childhood and adolescence is supposed to be an important determinant of whether a subject will become obese as an adult [2]. Furthermore, obesity has been related with major chronic illness as well as several social and psychological problems [3] with economic consequences [4].

The problem of obesity is multifactorial and thought to be a convergence of factors favouring an imbalance between energy consumed and expanded [5]. Complex social and environmental factors contribute to this imbalance, including changing food habits, declining physical activity (PA) and increasingly sedentary lifestyles [6]. With regard to PA, the association found with obesity ranged between small and moderate [7]. Longitudinal studies have documented an age-related decline in total PA during adolescence with girls showing lower PA than boys [8]. Thus, adolescent girls are a particular target for enhancing PA campaigns and strategies because they also experience a steeper decline in activity with age [9]. Previous research identified several psychological, social and physical environmental factors that influence young people’s PA [10], which potentially might affect the obesity level.

For instance, built environment has become a public health research issue. Indeed, one aspect of the environment’s role in obesity that has received recent attention is the way in which neighbourhoods and communities are designed to promote or discourage different kinds of PA [11].
population, Yang et al. [12] reported that the living environment was an important factor regulating PA and particularly sport participation, which in turn might play a key role on weight management/control [13]. Therefore, the development of such knowledge could help to overcome barriers and increase girls’ participation in regular PA.

Another important factor is the socioeconomic status (SES). Higher SES was related to a more ‘activity-friendly’ environment and may have an effect on how the built environment influences body mass index (BMI) [14]. On the other hand, sedentary behaviours such as screen time use have been described as a behavioural marker of sedentary children [10]. While doubts persists with regard the association between screen time and PA [15], a meta-analysis reported that although too small to have substantial clinical relevance, a statistically significant relationship exists between television (TV) viewing and body fatness among children and youth [16]. This is worthy to notice because some studies reported a better tracking of inactivity than activity [17, 18]. For instance, a recent review showed that those considered TV ‘high users’ at young ages are likely to remain high users when older [19].

Although some of those factors have been described before a comprehensive understanding of PA, determinants among obese youth is essential for the identification of appropriate intervention strategies to promote healthy lifestyles. Therefore, the purpose of this study was to investigate perceptions of neighbourhood, amount of screen time and SES in active and non-active ‘overweight/obese’ girls.

### Methods

#### Participants and setting

Eight urban public secondary schools in the North of Portugal participated in this study. The participants of this study were a sub-sample from a cross-sectional research carried out in order to assess relationship between screen time, environmental perceptions, obesity and PA among adolescents. For the purpose of this study, we only used girls. The potential girls’ sample included all students attending each school \((n = 649)\) from the 7th to 12th grades. The questionnaires were distributed and filled out during physical education classes. A response rate of 94% was obtained. Questionnaires were deleted from the analysis if they contained a majority of missing information. For the purpose of this study, only girls who were classified as overweight or obese (BMI \(\geq 25\) kg/m\(^2\)) according to the age-adapted BMI values [20] were considered. Thus, the sample of this study comprised 162 overweight/obese girls aged 14.1 ± 1.5 years old. Informed written consent was obtained from the participants and their parents or guardians before the subjects entered into the study according to Helsinki Declaration.

#### Measures

**Anthropometry**

Stature and body mass were determined by standard anthropometrics methods. Stature was measured to the nearest millimetre in bare or stocking feet with girls standing upright against a Holtain portable stadiometre. Body mass was measured to the nearest 0.10 kg, lightly dressed (underwear and tee shirt) using a portable digital beam scale (Tanita Inner Scan BC 532). The BMI data were estimated from the ratio weight/height\(^2\) (kg/m\(^2\)).

**Assessment of PA**

PA was assessed by a questionnaire previously used with good reliability (intraclass correlation coefficients: 0.92–0.96) [21]. A significant and negative correlation was found between the index of PA and heart rate at rest, serum insulin and skin fold measurements, and assumed as indication of validation of the activity measure [17]. The questionnaire has five questions with four choices: (i) Outside school do you take part in organized sport?, (ii) Outside school do you take part in non-organized sport?, (iii) Outside school, how many times a week do you take part in sport or PA for at least 20 min?, (iv) Outside school hours, how many hours a week do you usually take part in PA so much that you get out of breath or sweat? and (v) Do you take part in competitive sport?
Overall, a maximum of 20 points can be reached. A PA index was obtained, which divided the sample into four different activity categories, according to the total sum of the points: the sedentary group (0–5), low-active group (6–10), moderately active group (11–15) and vigorously active group (16–20). For the analysis, sedentary and low-active groups were collapsed in non-active group, while moderate and vigorous active groups were collapsed into active group.

Screen time: TV watching/computer use
Participants were asked how many hours they usually watched TV and use computer in the week preceding. Respondents were grouped as watching TV and using computer on average <1 h/day, between 2 and 3 h/day and >4 h/day according to an established protocol [22].

Socioeconomic status
Parents were asked about their SES using a questionnaire sent to their home. Response rate was 82% from both parents. Educational level was used in the analysis. Parents’ educational level was based on the Portuguese Educational system: (i) 9 years’ education or less—sub-secondary level, (ii) 10–12 years’ education—secondary level and (iii) higher education. Based on their answers, they were classified into three categories [1 = low (LE), 2 = middle (ME) and 3 = high (HE) level of education, respectively]. Similar procedures have been applied in the Portuguese context [23].

Environmental assessment
A questionnaire using the Environmental Module (Perceived Neighborhood Environments) of the International Physical Activity Prevalence Study was administrated. The questionnaire was designed to be a brief assessment of variables believed to be related to the activity friendliness of neighbourhoods. Neighbourhood environmental variables assessed included (i) access to destination (two questions), (ii) connectivity of the Street Network (one question), (iii) infrastructure for walking and cycling (one question), (iv) neighbourhood safety (two questions), (v) social environment (one question), (vi) aesthetics (one question) and (vii) recreation facilities (one question). These questions were previously used in Portuguese adolescents showing good reliability [24]. A four-point scale assessed each question: strongly disagree, somewhat disagree, somewhat agree and strongly agree. However, for statistical analysis, a dichotomous variable was constructed. Responses to items were collapsed in two categories: (i) ‘somewhat agree’ and ‘strongly agree’ and (ii) ‘strongly disagree’ and ‘somewhat disagree’.

Statistical procedures
For all the analysis, girls were collapsed as obese group and then assigned to one of the two groups [active obese (AO) or non-active obese (NAO)] based on their self-reported level of PA. Differences in physical characteristics were tested by independent t-test. The chi-square ($\chi^2$) was used to determine the differences in SES, screen time and perceived environmental variables between AO and NAO groups. Bivariate associations between variables were investigating using Spearman correlation. The independent association of predictors with BMI and PA (AO versus NAO groups) as dependent variable was examined using logistic regression analysis. The variables entered in the model were selected for variables associating at a $P < 0.05$ in the correlation. The analysis was developed using the SPSS (Statistical Package for the Social Sciences) 14.0 program. The level of significance was set at $P < 0.05$.

Results
No statistically significant differences were found for age, body mass, height and BMI between AO and NAO groups, whereas, as expected, AO group is significantly more active than NAO peers (Table I). Table II shows differences in Perceived Neighbourhood Environments between AO and NAO groups. A significantly ($P \leq 0.05$) greater proportion of AO girls agree compared with NAO counterparts that ‘My neighbourhood has several public
recreation facilities’ and that ‘I see people being physically active in neighbourhood’, which enhanced differences in the domain of social environment and recreation facilities. No other statistically significant differences were found between groups.

Differences in screen time and parental SES according to AO and NAO groups are shown in Table III. No statistically significant differences were seen for screen time between AO and NAO groups. However, differences were found in SES. Girls whose mother \( (P = 0.05) \) and father \( (P = 0.009) \) had lower SES reported to belong significantly more to NAO group than those higher SES.

Despite bivariate correlations (data not shown) pointing out a positive and statistically significant association between educational status of both mother \( (r = 0.18; P = 0.02) \) and father \( (r = 0.23; P = 0.003) \), as well as recreational facilities \( (r = 0.26; P = 0.009) \) and social environment \( (r = 0.25; P = 0.01) \) with AO group, logistic regression analysis (Table IV) showed that girls who agreed that ‘My neighbourhood has several public recreation facilities (odds ratio [OR] = 11.16; \( P = 0.042) \)’ and that ‘I see people being physically active in neighbourhood (OR = 15.06; \( P = 0.037) \)’ were likely to be more active (AO group).

**Discussion**

This study addresses the differences in neighbourhood characteristics, screen time use and SES in...
active and non-active overweight/obese girls. This seems to be a timely topic since the adolescent years are thought to be the period during which adult health behaviours, such as dietary and PA patterns, begin to develop [25]. Further, programs targeting youth population at risk for obesity should be developed based on substantiate population obesity data.

While attention is being increasingly turned towards the impact built environment has on PA and dietary habits, little is known about this relationship with obesity and less is known relating differences among AO and NAO girls. Findings from this study showed that recreational facilities (OR = 11.16) and social environment (OR = 15.06) were associated to likelihood to be more active (AO group). These findings agree with the data in youth population showing that environmental characteristics related to both design and recreational facilities can explain part of the variance in PA in youth [26]. The availability of outdoor play spaces, such as parks and playgrounds, may be especially important because the time spent outdoors is strongly correlated to PA [27] and it is associated with a wide range of PA behaviours [28]. Likewise, it is worthy to comment the use of recreational facilities as a setting of formal PA engagement. Indeed, formal activities lead to a more physically active youth, while unstructured activities are likely to be more related to obesity [29]. On the other hand, early-life participation in sports and other types of PA is linked to continued participation in those specific activities during late adolescence [30]. Therefore, the location of home in relation to sport and PA facilities and living environment in general influence PA and sport participation [12].

It was shown that higher SES was related to a more “activity-friendly” environment [14]. Our data showed that girls with mothers and fathers in the lowest educated group were significantly more NAO (P < 0.05) compared with those that reported to be AO. In general, some studies associated higher SES with PA in sense of availability to drive children to and from sports facilities and with more positive attitudes towards the value of PA during leisure time [31] and higher participation in organized sports activities [29]. Furthermore, it was shown, after adjusting for other variables, that vigorous PA was directly related to family income and educational level [32]. Therefore, the lack of free facilities for PA within neighbourhoods might also

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<th>Table III. Differences in SES and screen time among AO and NAO groups at risk of obesity girls</th>
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<th>Table IV. Logistic regression analysis showing estimating results with at risk of obesity groups (AO and NAO) as dependent variable</th>
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<td><strong>Scale composition</strong></td>
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affect the levels of PA in obese girls, which is a noteworthy issue when socioeconomic disadvantages are considered [33]. A potential important message is that at risk of obesity girls belonging to low SES need places to be physically active on regular basis.

PA and sedentary behaviours have been identified as major targets for health promotion strategies in reducing excess weight gain [34]. However, despite screen time as been described as a behavioural marker of sedentary children [10], our data did not show differences between both AO and NAO groups. However, a higher proportion of participants (70%) spent >2 h/day of screen time use, which is higher than the recommended engaging hours per day (=2 h/day) of screen time [35]. These findings are consistent with studies showing that screen time remains consistently high through adolescence period [32, 36].

Strengths of this study include the focus on environmental factors, screen time use and SES in obese girls’ PA. The public health impacts of these findings are potentially substantial. The study is based in Portugal and therefore provides information that can be contrasted with previous studies conducted elsewhere. Nevertheless, limitations of the study should be recognized. The results of this study should be interpreted with the understanding that the data are cross-sectional and thus it may be difficult to assign causality, and prevents causal inferences being drawn. It is worthy to mention that there was no dietary measure or assessment of eating habits. The lack of the variation in these population-based environmental variables and the use of self-reported measures of PA and sedentary behaviours should be noted. Further research is needed using both objective measures of the neighbourhood and PA to help clarify these relationships. Additional data are needed to replicate these findings using longitudinal designs.

Conclusions

Our findings could make an important contribution to knowledge in the field of health education and obesity with regards to promotion of PA among young people. First the data showed that lower SES is associated with less AO girls. Our data also showed that some physical environments characteristics such as social and recreational facilities appear to be associated with PA level, demonstrating a potential broad influence of environmental characteristics on PA among obese girls. Thus, creating social support and providing PA facilities within neighbourhoods, particularly in low SES neighbourhoods, are desirable.

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Conflict of interest statement

None declared.

References


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