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Original Article (short paper)

Parental education and perception of outdoor playing time for preschoolers

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Abstract — Aim: The objective of this study was to analyze whether or not socioeconomic positions influence outdoor playtime during the week (WK) and on the weekends (WEND). **Methods:** The sample consisted of 485 (girls; n=223) healthy preschoolers, aged from 3 to 6 years, enrolled in kindergartens from the metropolitan area of Porto, Portugal. Physical Activity (PA) was assessed for 7 consecutive days with an accelerometer. The time playing outdoors during the WK or the WEND was reported by parents. Anthropometric data (weight and height) was collected following standardized protocols. Socioeconomic position was assessed by Parental Education (PE), according to the Portuguese education system. **Results:** We found differences in time spent playing outdoors either for the WK or WEND, but not for Total PA (TPA), in both sexes. However, regression analysis showed that after age adjustment, BMI and TPA for both sexes, we only found significant associations between low PE (LPE) and high PE (HPE) groups on WK or WEND. However, we found no statistically significant association for boys on the WK (p=0.06). **Conclusion:** Our findings suggest that socioeconomic position can influence the children's time spent in outdoor activities, especially on the weekends. This may have implications for future interventions with this age group.

Keywords: parental education, outdoor play time; preschoolers, socioeconomic position.

Introduction

Childhood obesity epidemic is already affecting preschoolers. Some behaviors such as increased sedentary time has been described and can have an impact on health indicators, quality of life and the functional autonomy of populations¹. Different national governments have proposed action plans to reduce obesity that include providing safe places for children to be physically active². Recent physical activity (PA) guidelines from the UK, Australia and Canada recommend that preschool children should accumulate at least 3 hours of PA throughout a day.

Playing outdoors is part of the daily life of most preschoolers. These activities have been suggested as a potential childhood obesity preventive effort both for general and individual levels³. Therefore, it is important to identify factors that influence the children's PA in environments where children can be active and engaged in enjoyable and creative types of PA. There is a number of benefits associated with outdoor play, such as improved social skills, vitamin D exposure, as well as the increased levels of PA⁴. A factor that contributes to PA engagement is the socioeconomic position or status (SES). SES is an important determinant of health and well-being because it influences people's attitudes, experiences, and exposure to several health risk factors. In the context of time spent outdoors, SES is a key factor, mainly because of environment matters and parental education, such as the presence of traffic, fear of crime, and perceptions on the small access to facilities for PA are more prevalent in low SES areas, all these being considered factors that influence the parents' decision of letting their children play outside⁵. However, there is

contrary evidence suggesting that children of low SES are more likely to spend time outdoors compared to the ones of high SES⁶.

There are some studies that have assessed the impact of SES on preschoolers. In one of these studies, parental education (PE) negatively contributed to children's daily PA patterns as well as to PA guidelines compliance⁷. On the other hand, a recent systematic review on correlates of PA did not show any significant associations between SES and total PA⁸. However, no studies have assessed whether the time spent outdoors differs in Portuguese preschoolers of different SES. Such analysis is important to develop improved interventions regarding SES and locations where PA take place.

Thus, the objective of this study was to analyze whether or not SES position was associated with outdoor playtime (ODP) during the week (WK) and on the weekends (WEND).

Methods

Participants and setting

Preschool-aged children enrolled in the Preschool Physical Activity, Body Composition and Lifestyle Study (PRESTYLE) SFRH/BD/86538/2012 participated in this study. A sample of children, aged 3–6 years, was recruited from kindergartens located in the metropolitan area of Porto, Portugal. For this analysis, we included preschoolers with seven days of data collection on parental education, height and weight, and Parental Outdoor Time Recall Questions using an accelerometer. The final

sample included 485 preschool-aged children (223 of them being girls). Data were collected between April 2009 and November 2013. A written informed consent was obtained from parents and school supervisors.

Anthropometric assessment

Body mass and height were measured using standard anthropometric methods. Body mass was measured to the nearest 0.1 kg, with participants lightly dressed (underwear and tee-shirt), using a portable digital beam scale (Tanita Inner Scan BC 532). Height was measured to the nearest millimeter in shoeless children standing upright against a Holtain portable stadiometer. The measurements were repeated twice and the average was registered. The Body Mass Index (BMI) was calculated from the body mass (kg) divided by the squared height (m).

Physical activity assessment

Daily total PA was measured using an ActiGraph GT1M accelerometer (Pensacola, FL, USA). This device provides information on the intensity of PA; the higher the sum, the higher the intensity¹⁰. Participants wore an accelerometer on the hip for 7 consecutive days (Monday to Sunday) for at least 10 hours, and a minimum of 4 days of valid data was considered valid data for the analysis¹¹. Non-wear time was defined as a period of at least 60 consecutive minutes of zero counts¹². Data reduction, cleaning, and analyses of accelerometer data were performed using commercial software program (*Actilife*® software). For the purposes of this study, only TPA (overall average counts per minute- cpm) were used for statistical analysis.

Outdoor play time (OPT)

Outdoor play time was measured by parental interview. Parents were asked to recall the number of hours that their child has spent playing outside per day in the last month: there was 1 question on how many hours and minutes their child has spent playing outdoors during the week and another one on how many hours they have done it on the weekends. Such a process is appropriate, as this parental recall has shown to corroborate with PA levels of preschoolers according to the accelerometer¹³.

Parental education

The parents' education was used as a measure of socioeconomic status. It has been previously employed in the Portuguese context¹⁴, considering education positively contributes to increases in health-related knowledge¹⁵ and, consequently, a higher capacity to put them into practice¹⁶. For parental education, the highest education level of the mother or father were considered. In mono-parental (single-parent) families, the parental education was based on the children's legal guardian. The parental education was scored according to the Portuguese Educational system; 9 years of education or less - sub secondary

level (scored as 1), 10–12 years of education - secondary level (scored as 2), and more than 12 years of education - higher education (scored as 3). Levels 1, 2, and 3 were considered as low, middle, and high parental education¹⁴.

Statistical analysis

Descriptive data are presented in mean and standard deviation values. All variables were checked for normality using Kolmogorov–Smirnov tests. Comparisons between sexes for all variables were conducted with Chi-square tests and independent t-tests. Differences between parental education groups regarding playing outdoors on the weekdays and weekends and PA were tested using factorial analysis of variance. The Bonferroni test for multiple comparisons was used to check specific differences according to parental education groups. Pearson's correlation and linear regression were used to define parental education groups based on outdoor activities during the week and on the weekends. Multivariate regression was used to analyze the associations between parental education groups (dummy variables) and outdoor activities during the week and on the weekends, according to age, BMI, and TPA. All statistical were performed using a SPSS 20.0 for Windows, and statistical significance was set at <0.05.

Results

Boys had significantly higher average values than girls of outdoor play time during the weekend and TPA ($p < 0.05$, see Table 1). Boys showed to be significantly taller than girls, whereas girls showed a significantly higher BMI. We observed no significant differences between sexes for age, body mass, and outdoor play time during the week or regarding parental education ($p > 0.05$).

Table 1- Characteristics of the participants by gender

Characteristics	Girls	Boys	P	
	(n=223) X±SD	(n=262) X±SD		
Age (years)	4,7±0,9	4,8±0,9	<i>N.S</i>	
Body Mass (Kg)	20,8±4,2	21,2±4,1	<i>N.S</i>	
Height (cm)	109,8±7,2	111,8±7,5	0.002	
BMI ((kg/m ²))	17,2±2,1	16,8±2,0	0.05	
Outdoor play time - weekdays (min/day)	90±71	100±65	<i>N.S</i>	
Outdoor play time - weekend days (min/day)	189±15	211±114	0.031	
Total Physical Activity (cpm)	319±78	365±86	<0.001	
Parental Education (%)	Low	54	52	
	Medium	32	29	<i>N.S</i>
	High	14	19	

Table 2 summarizes the parents' perception on the time spent playing during weekdays and weekend as well as the total PA according to the parental education status. Parents of low PE reported their children spent more time playing outdoors than

children with parents of high PE ($p < 0.05$). The same occurred among girls between low and middle SES. However, there was no difference in TPA regarding parental education status ($p > 0.05$).

Table 2 – Differences in playing outdoor at weekdays and weekends as well as total physical activity according to parental education status

Girls	Low PE (n=120) X±SD	Middle PE (n=72) X±SD	High PE (n=31) X±SD	P
Outdoor play time - weekdays (min/day)	102±74*	80±69**	69±54	0,014
Outdoor play time - weekend (min/day)	208 ±128*	171±89**	151±103	.0,02
Total Physical Activity (cpm)	325±78	323±80	288±67	0.09
Boys	Low PE (n=137) X±SD	Middle PE (n=76) X±SD	High PE (n=49) X±SD	P
Outdoor play time - weekdays (min/day)	108±66*	95±65	85±60*	0,015
Outdoor play time - weekend (min/day)	230±127*	201±89	173±98*	0.009
Total Physical Activity (cpm)	386±92	385±96	367±88	0.31

*Statistical significant differences (LPE vs HPE) ** Statistical significant differences (LPE vs MPE)

Table 3 shows the adjusted coefficients for outdoor playing time during the week and on the weekends as a dependent variable in linear multiple regression analyses according to sex. Girls whose PE was low (LPE) participated in significantly higher outdoor playing time during the week and on the weekends than girls whose PE was higher (HPE). Boys showed a similar result; those with LPE showed significantly higher outdoor playing time during the weekend compared to the ones with HPE. We observed no significant differences between children with high and middle parental education regarding the outdoor playing time during the week and on the weekends.

Table 3– Linear Regressions for Girls and Boys at weekdays and weekends according to parental education status (dummy variables)

Girls	β	t	P
HPE vs. MPE (WK)	0.39	0.38	0,71
HPE vs. LPE (WK)	0,18	2.20	0.03
HPE vs. MPE (WEND)	0.08	0.27	0.42
HPE vs. LPE (WEND)	0.17	2.03	0.04
Boys	β	t	P
HPE vs. MPE (WK)	0.04	0.39	0,70
HPE vs. LPE (WK)	0,13	1.88	0.06
HPE vs. MPE (WEND)	0.13	1.34	0.18
HPE vs. LPE (WEND)	0.19	2.60	0.01

Data adjusted for age* BMI* TPA

HPE – High Parental Education; MPE – Midlle Parental Education; LPE – High Parental Education

Discussion

This study aimed to assess the outdoor playing time of preschoolers during the week and on the weekends and to

determine whether this differed because of parental education as a SES indicator. Childhood obesity remains a significant public health issue and the inverse association between SES and childhood overweight presumably emerges after age 3¹⁷. The increased prevalence of obesity has been attributed to changes in environment that encourage sedentary behaviors and reduced PA. We believe that children might be spending little time playing outdoors and too much time watching television, despite these activities not substituting one another¹⁸ and being apparently unrelated¹⁹. Nonetheless, being outdoors strongly corroborates with children's PA and, therefore, healthy living recommendations should encourage children to play outdoors as much as possible. Children are likely to achieve PA through play, which is important both cognitive and physical development²⁰. This study is the first to assess whether the time spent outdoors differs according to PE (as a SES indicator) in Portuguese preschoolers. This information is key to define better interventions in health and PA and to reduce obesity, considering outdoor environments differ in quantity and quality because of SES²¹.

The results of this study suggested that in general, boys have spent more time playing outdoors than girls, both during WK and WEND. These findings are similar to those previously reported for Australian preschoolers²² as well as for elementary students²³. Although a review of 24 articles on preschool-aged children showed that those who spent more time outdoors were more active than the ones who spent less time outdoors²⁴, in this study, there were no differences in TPA between the sexes. Outdoor playing time is associated with an increase in physical activity⁴, but it only represents one component of TPA. Some evidence suggest that merely providing more unstructured outdoor playing time can be insufficient to increase children's PA²⁵. For example, some children can be physically active when indoors and/or engaged in organized activities, or even during the school period, as well as during transportation²⁶. Thus, it is still not possible to consider outdoor PA as the main reason

for the increases in TPA. Despite this fact, outdoor PA is an important element for TPA and that can undergo environmental intervention. Environments that promote children's higher independent mobility can increase their physical activity levels. Further, children's independent mobility should be considered in research regarding children's play time and physical activity²⁷.

It is worth to highlight that regardless of sex, the parents reported that their children engaged in more outdoor activities on the WEND than during the WK (absolute values). This might be a promising outcome because usually PA decreases on the weekends²⁸. This finding is also interesting considering sex affects PA because usually girls are less active than boys and are at higher risk of inactivity throughout life²². Nonetheless, some evidence suggest that merely providing better structured outdoor playing time can be insufficient to increase children's PA²⁵.

The most important and interesting finding of this study is regarding PE. We demonstrated differences in OPT both on WK and the WEND but not for TPA, regardless of sex. In addition, regression analysis showed that after age adjustment, BMI, and TPA, we established significant associations for both sexes but only between LPE and HPE groups both for the WK or the WEND. We found no statistical significant association for boys during the WK ($p=0.06$). It is worth mentioning the overall findings for different reasons. First, unlike studies with older children and adolescents, low SES children are less active than their higher SES peers because of the lack of access to equipment and facilities²⁹; HSES children have easier access to structured physical activities and sports paid by their parents³⁰. This may not be relevant for preschoolers as their PA engagement may take place in more informal situations that do not require payment³¹. In addition, usually children of low SES have more unstructured time than those from middle-class households so that they might fill it with outdoor play¹⁸. Although other studies with preschoolers did not detect social inequalities on TPA, as measured by accelerometers³². Regarding playing outdoors²⁰, our outcomes corroborate with those previously reported in similar samples⁷, as is the case of Lithuanian children of LSES and children who lived outside urban centers, who have spent more time in open air activities and less time in sedentary activities (e.g., playing in the computer) when compared to HSES children or urban children³³. These authors also suggested that families of LSES have limited access to computers and other technological tools, which might contribute to more time spent in PA outside. It is possible to mention the case of LSES households, where the parents, usually only mothers, are more likely to be at home during the day, which contributes to higher rates of children's outdoor PA¹⁸. It is also worth mentioning that children's independent mobility is a factor significantly associated with their time spent playing outdoors, considering it depends on several variables including the parent's perception on the neighborhood's safety²⁷. Because of inferior supervised time, low levels of outdoor play in HPE children can be due to the mothers' concerns on the neighborhood's safety and on the safety of the living areas³⁴. Thus, it seems important to have further study on what children can and cannot do when they are outdoors, and to identify the quality of the opportunities for outdoor play³⁵.

We also recognize some limitations of this study. First, the study included preschool children from only one metropolitan area, which makes it difficult for us to generalize these findings and also to infer causal relationships using a cross-sectional design. Despite this fact, cross-sectional studies are useful to describe the risk factor profile of a population and the relationship between different variables. Secondly, PA in preschoolers is especially difficult to measure, and its assessment is even more difficult. Therefore, some of them rely on surrogate measures such as parental reports on outdoor playing time¹³, which, as any recall measure, is prone to error, reducing the likelihood of finding an association between outdoor play time and PE. We could not differ time that children may be spending outdoors by themselves vs. time they are spending outdoors with their parents (or other children). Therefore, we believe that is important to have future studies that better quantify outdoor time, longitudinally analyze the relation between outdoor time and measured PA, and that describe other potential benefits of being outdoors³⁶. Thirdly, we used parental educational level as an indicator of SES; socioeconomic status is a complex and multifactor construct, whose commonest indicators are educational level, income, and occupation. We have previously used PE as an indicator of SES in similar sample⁷. In this study, we used the educational level as main indicator because it reflects not only economic factors, but also general and health-related knowledge that can be more important for health matters than income or occupation²⁰. In addition, it is possible to say that parents with different levels of education spend different amounts of time with their children. For instance, parents with low PE could spend more time with their children compared to parents with high PE. Therefore, their estimative on how much time their children spend playing outdoors could be biased. Despite these limitations, we believe our paper adds to the literature of preschoolers and young children's PA and suggests several public policy implications. The findings highlight that promoting outdoor playing activities might be useful for low SES children who may not have access to organized PA programs or to housing with its own play facilities. However, other support factors such as parental perceptions and behaviors need to be appropriately studied and targeted³⁶. For instance, the study on the strong positive correlation between parental PA and the time they spend outdoors or in play spaces²⁴. There is also merit in better understanding how parental perception of the outdoor environment might encourage children or PA in children from different SES backgrounds.

Conclusion

Our findings suggest that SES influences children's outdoor play activities in a different way. Therefore, the influence of SES should be considered when designing and implementing interventions with preschoolers.

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