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ORIGINAL ARTICLE

TV in bedroom, outdoor playtime and obesity status among preschool girls

Télévision dans la chambre, activités récréatives en plein air et prévalence de l'obésité chez les filles d'âge préscolaire

J. Mota[a,*], C. Martins[b], S. Silva-Santos[a], A. Santos[a], S. Vale[a,c]

[a] *Research Centre of Physical Activity, Health and Leisure, Faculty of Sport Sciences, University of Porto, 4500 Porto, Portugal*
[b] *Federal University of Paraíba, Brazil*
[c] *Department of Sport Sciences, High School of Education, Polytechnic Institute of Porto, Porto, Portugal*

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Summary
Background. — Time in which children is engaged in screen time such as TV viewing is a serious health problem and might reduce the use of the time for other potential activities such as play outside or being engaged in physical activity. In addition, it was suggested that children's screen time increases with age and patterns begin in preschool years. Therefore, the aim of the present study was to explore the association between obesity status and weight-related room environment (TV at room) and play outside in preschool girls.
Materials and method. — This study included 120 preschool girls (4—6 years old). Data were collected through parents' questionnaire about (yes/no) children have TV in bedroom and the perception of playing outside. Multivariate regression was used to determine the association between BMI and play outside with TV in the bedroom.
Results. — Girls either classified as overweight (OR: 2.6; CI: 1.1—6.0; $P \leq 0.034$) or obese (OR: 4.0; CI: 1.2—13.2; $P \leq 0.02$) were more likely to have TV in room compared to their lean peers. Girls whose parents reported less outdoor play (<P50) were almost twice as much (OR: 1.9) more likely to have TV in bedroom although the this association has been only marginally significant ($P = 0.08$).
Conclusions. — Our data suggested that having TV in bed room is associated with increased level of obesity even in preschool girls as well as showed a marginal association with playing outside.

* Corresponding author. Research Centre in Physical Activity and Health, Faculty of Sports, University of Porto, rua Plácido Domingos, Faculdade de Desporto, 4500 Porto, Portugal.
E-mail address: jmota@fade.up.pt (J. Mota).

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Résumé
Objectif. — Explorer l'association entre le statut de l'obésité, l'environnement matériel (télévision dans la pièce) et les activités physiques de loisir en extérieur chez les filles d'âge préscolaire.
Matériels et méthodes. — Cette étude a permis d'inclure 120 filles d'âge préscolaire (4—6 ans). Les données ont été collectées grâce à un questionnaire transmis et renseigné par les parents ; les questions portaient sur la présence de la télévision dans la chambre des enfants et sur les activités de loisir en extérieur.
Résultats. — Les filles sont classées en surpoids (OR : 2,6 ; IC : 1,1—6,0) ou obèses (OR : 4,0 ; IC : 1,2—13,2) étaient plus susceptibles d'avoir la télévision dans la chambre par rapport à leurs pairs maigres (respectivement $p \leq 0{,}034$ et $p \leq 0{,}02$). Les filles dont les parents ont déclaré moins de jeux en plein air (<P50) étaient presque deux fois plus susceptibles d'avoir la télévision dans la chambre que les filles à la corpulence normale, bien que cette relation n'ait pas atteint le seuil de significativité ($p = 0{,}08$).
Conclusion. — Nos données suggèrent que la présence d'une télévision dans la chambre à coucher est associée à une augmentation du niveau d'obésité même chez les filles d'âge préscolaire, et tendent à montrer une association (bien que de faible importance) avec le fait de jouer en extérieur.

1. Introduction

The prevalence of childhood obesity has been rising during the past decades in many parts of the world [1]. Previous studies have shown a high prevalence of overweight and obesity in Portuguese young children [2] and adolescents [3]. The role played by CRF in obesity seems to be particularly important in girls [4]. Indeed, girls seem to be a key-targeting group in health-related lifestyle promotion due to their low levels of physical activity [5] and CRF [6] compared their male counterparts.

The lack of physical activity is a serious public health problem. The inactivity pandemic causes not only morbidity and premature mortality, but also a major economic burden worldwide [7,8]. One of the main concerns is related to time in which children is engaged in screen time such as TV viewing, consoles and other available screen gadgets [9].

To overcome these influences a couple of determinants were pointed out [10]. Among them, parenthood is one of the major factors during early childhood and childhood. Indeed, parents might influence their children's screen time by their practices (e.g. having rules about watching TV) and by controlling the physical home environment (e.g. placing or not allowing a TV in the child's bedroom) [11,12]. An interesting issue is the permission to children's bedroom TV use because children are more exposed to TV contents without any control or supervision, as well as that might preclude the use of the time for other potential activities such as play outside or being engaged in physical activity [13]. In addition, it was suggested that children's screen time increases with age and patterns of screen time appear to be stable over time [14], beginning in preschool years [15].

A substantial number of studies addressing associations between the social and physical home environment and children's screen time didn't include preschoolers, in which data available are scarce [16]. Although, it was described that high child autonomy is associated with more TV viewing [17] but the results showing having a TV in the child's bedroom on the amount of TV viewing are inconsistent.

Parents also play an important role on children's physical activity [18]. Reviews of correlates of PA in youth showed that one of most important variables consistently associated with PA was gender, with studies suggesting a consistent physical activity level decline with increasing age and tend to be lower in girls than boys [5]. Thus, girls seem to be a key-targeting group for enhancing PA levels.

Therefore, the purpose of this study was to explore the association between obesity status, and weight-related room environment (TV at room) and play outside in preschool girls.

2. Materials and method

2.1. Participants and setting

Participants in this study were preschool-aged children enrolled in the Preschool Physical Activity, Body Composition and Lifestyle Study (PRESTYLE). A sample of children aged 4—6 years was recruited from kindergartens located in the metropolitan area of Porto, Portugal. For this analysis, we included girls who:

- aged four to six years in the measurement period;
- presented all the parental information needed, namely the parental outdoor time recall questions as well as the home environment;
- presented the informed written consent from parents and school supervisors.

From a total of 214 possible eligible children, the final sample included 120 preschool girls and their legal guardian, who were evaluated during two weeks, in April 2015.

Study procedures were approved by the Portuguese Foundation for Science and Technology and by the Scientific Board of the Physical Activity and Health doctoral program. A detailed description of this study has been already published elsewhere [19].

2.2. 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 bare or stocking feet with children standing upright against a Holtain portable stadiometer. The measurements were repeated twice and the average was recorded. Body Mass Index (BMI) was calculated as body mass (kg) divided by height (m) squared. For the purpose of this study girls were categorized in normal weight; overweight and obese according the age and gender specific WHO cut-points [20].

2.3. Outdoor playtime (OPT)

Outdoor playtime was measured by parental interview. Parents were asked to recall the number of hours and minutes their child ''typically'' spent playing outdoor each day in the last month. Parents were instructed to consider only the time their children spend in movement outdoor. Such a process is appropriate as this parental recall measure has been shown to correlate with PA levels in preschoolers as measured by accelerometer [21]. For the analysis we used percentile 50 (P50) for assign children to the lower outdoor PA ($P < 50$) group or higher outdoor PA ($P > 50$) group, respectively.

2.4. TV in Bedroom

Parents' questionnaire about children have TV in bedroom was distributed and answers dichotomized in ''yes'' or ''no''.

2.5. Statistical analysis

Descriptive data are presented as means and standard deviation. All variables were checked for normality using Kolmogorov-Smirnov tests. Comparisons between having TV in bedroom groups (yes/no) were conducted with Chi^2 tests and independent *t*-tests. Multivariate regression was used to analyze associations of BMI status and having a TV in bedroom (dummy variables), and playtime during weekdays, adjusted for age, and TPA. All statistical were performed using SPSS 21.0 for Windows, and Statistical significance was set at <0.05.

3. Results

Girls' descriptive characteristics according to presence of TV in bedroom are summarized in Table 1. Approximately 67% of the girls in this sample had a TV in the room where they sleep. While no statistical differences were found for age, girls having TV in bedroom were heavier and were significantly more assigned to obese group than their peers without TV in bedroom.

Besides, parents reported higher levels of outdoor physical activity for those girls whom didn't have TV in bedroom than their counterparts, although this association was only marginally significant (OR = 1.92; IC95%: 0.5—1.10 $P = 0.08$).

Table 2 shows that girls either classified as overweight (OR: 2.6; CI: 1.1—6.0; $P \leq 0.034$) or obese (OR: 4.0; CI: 1.2—13.2; $P \leq 0.02$) were more likely to have TV in room compared to their lean peers.

4. Discussion

This report provides information about the association between obesity status and weight-related room environment (TV in bedroom) as well as to play outside in 120 preschool girls. Our study clearly showed that even in early childhood (preschool) more than half (67%) of our sample had one TV at the room where they sleep. This observed result is in line with data described in a previous report suggesting that more than one third of children less than the age of 6 years have TVs in their bedrooms [22], and is higher than those described in a US national survey with children aged 3 to 6 year olds [23]. Barr-Anderson et al. [24] found a similar prevalence when studying an adolescent sample. These data are noteworthy to highlight once it was suggested that having a TV in the bedroom is a strong predictor of TV use [25], and watching TV has been described as a proxy measure of sedentary time in preschoolers [26], as well as it was associated with more total hours of screen time per day [13,27,28].

Our results still indicated that there were significant differences in the time playing outdoor during the weekdays among children who have and who do not have TV in the bedroom, being favorable for those who do not have. A quasi-experimental study with Hispanic children showed that children without TV in bedroom had greater parental support of physical activity, fact that might explain the longer time playing outdoor for those children's group [29]. Moreover, previous research has shown factors such as parental concerns about neighborhood safety, availability of friends to play with, and access to interesting play areas nearby home to be important influences on children's outdoor free-play [30], which might influence in time playing outdoor during the week and the weekend days.

The main result shows that having a TV in one's bedroom is associated with reduced playing time and high risk of obesity in preschooler girls. Our data pointed out that girls having TV in bedroom were almost three times more likely to be classified as being overweight (OR = 2.6) and four times more likely to be classified as obese (OR = 4.0) than their peers without TV in bed room. Therefore, our findings reinforced some previous outcomes suggesting an association between home environments, such as having TV

Table 1 Characteristics of the participants.

Characteristics	Girls ($n = 120$)		P
	No (43)	Yes (77)	
	X ± SD	X ± SD	
Age (years)	6.9 ± 0.9	6.9 ± 0.4	*N.S*
Body Mass (Kg)	23,9 ± 3.6	26.6 ± 5.2	**0.004**
Height (cm)	120.1 ± 5.3	121,3 ± 5.5	*N.S*
BMI (kg/m²)	16.5 ± 1.6	17,9 ± 2.6	**0.000**
Outdoor play time — weekdays (min/day)	99.9 ± 88.1	67.8 ± 60.6	**0.02**
Outdoor play time — weekend days (min/day)	169.6 ± 126.2	167.9 ± 113.1	*N.S*
BMI (%)			χ^2
Normal weight	79.1	59.7	**0.009**
Overweight	20.9	22.1	
Obese	0.0	18.2	

BMI: Body Mass Index. All analyses were adjusted for age, BMI, and total physical activity. Bold figures indicate significant *P*-values.

Table 2 Multivariate analysis showing estimating results with BMI status as independent variable and having a TV in bedroom (Yes vs. No) as dependent variables.

BMI	TV in bedroom		
	OR (95% CI)	β	*P*-value
Normal weight	1		1
Overweight	2.55 (1.08—6.02)	0.93	**0.034**
Obese	3.97 (1.19—13.2)	1.38	**0.025**

BMI: Body Mass Index. All analyses were adjusted for age, BMI, and total physical activity. Bold figures indicate significant *P*-values.

in bedroom, and the likelihood to be obese [22,31], even in preschoolers [29,32,16].

Parental control appears to be increasingly relevant in providing guidance on sedentary or screen time and PA or active play [33]. In fact, in families with rules about screen time, children were less likely to watch TV for more than 2 hrs/day [34]. Further, it is well known that parents at young ages played an important role either as model [35] or leading children toward the establishment of positive healthy behaviors impacting in their life style [36].

Moreover, the home environment has been suggested to play an important role on the physical activity and sedentary behaviors in youth [37]. In young children, data are more scarce but a recent study pointed out that 5-year-old children with a TV or computer or game console in their bedroom were more likely to watch TV for more than the recommended 2 hrs/day [24]. Further, recent report showed additive effects of too much TV and too little sleep with elevated odds of obesity among 3-year-old children [38] as well as decreased scores on measures of psychosocial health and cognitive development [39]. Although our study does not specifically address the time spent in front of the screen, it is known that in older children, having a television in the bedroom is associated with a longer screen time, in addition to increasing the chances of obesity [40].

Several studies suggested a physical activity level decline with increasing age and tend to be lower in girls than boys [5]. Our data showed that those girls whose parents reported that they are less often playing outside (>P50), were almost twice as much (data not shown) classified as having TV in bedroom, although the association was only marginally significant (OR = 1.92; IC95%: 0.5—1.10 $P = 0.08$). Despite the no statistical significant association our data might be important to notice from public health perspective, as well as from the developmental standpoint. In this case one may hypothesize that girls who have TV in bedroom may find digital/screen distractions that limit their availability to play outside, which may indicate lower levels of PA. Indeed, several studies suggested outdoors PA as an indicator of higher levels of MVPA and overall PA in older girls [41,42]. Furthermore, at this age groups play outside is important as mean to build-up motor skills acquisition [43], and it was shown that the level of gross motor coordination during childhood was associated with PA participation and sedentary behavior in adulthood [44]. Thus, our study highlights the need towards the development of familiar actions that could help to overcome barriers and increase girls' participation in regular physical activity. Our results might have some importance from a preventive point of view because one might assume the utility of early intervention strategies to limit TV, discourage parents from putting TVs in their children's bedrooms, or removing the TVs if they are already there [27]. In addition, our findings also highlighted the need towards the development of familiar actions that could help to overcome barriers and increase girls' participation in regular physical activity. Despite the interesting and valuable outcomes several limitations should be considered when interpreting our study. First, our sample size was small, composed only

by girls, and our results may not be generalizable to other minority groups. Second, it is possible that we excluded other reasons that might be important in these associations like neighborhood safety, and combined qualitative and quantitative methods to explore potential confounders. Limitations also include the use of outdoor playtime as a proxy for physical activity, and the omission of indoor activities or outdoor play at school. Further research, which examines environmental conditions and individual behaviors concurrently, is needed to promote the implementation of effective policies to reduce obesity risk in preschool children.

Therefore, our data suggested that having TV in bedroom is associated with increased level of obesity even in preschool girls as well as showed a marginal association with playing outside. These outcomes highlight a possible health negative impact of having a TV in bedroom, even at preschool ages.

Disclosure of interest

The authors declare that they have no competing interest.

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