

*Original Article (short paper)*

## Screen time between Portuguese and Brazilian children: a cross-cultural study

Amanda Santos

Sandra Silva-Santos

*Faculdade de Desporto da Universidade do Porto, Porto, Portugal*

Alyne Andaki

Edmar Lacerda Mendes

*Faculdade de Desporto da Universidade do Porto, Porto, Portugal*

*Universidade Federal do Triângulo Mineiro, Uberaba, MG, Brasil*

Susana Vale

*Faculdade de Desporto da Universidade do Porto, Porto, Portugal*

*Instituto Politécnico do Porto, Porto, Portugal*

Jorge Mota

*Faculdade de Desporto da Universidade do Porto, Porto, Portugal*

**Abstract** — **Aims:** To verify differences in screen time (ST) (hours watching TV, using computer and/or video game) and to compare the percentage of meeting ST recommendation between Portuguese and Brazilian children. **Methods:** The sample comprised 369 children aged 9 year-old from Portugal (n=95) and Brazil (n=274). ST average (h/day), physical activity (PA) and socioeconomic status (SES) were estimated by parental-report questionnaire. The Student *t* test or the Mann-Whitney *U* test and binary logistic regression analysis were used to verify differences and associations on ST (<2h/day) between cities. All analyses were stratified by gender and adjusted for age, BMI, PA and SES. **Results:** The prevalence of meet ST recommendation was 66.7% and 55.3% between Portuguese girls and boys and 25.0% and 16.4% between Brazilian girls and boys. Portuguese girls ( $1.58 \pm 0.84$  vs  $3.40 \pm 1.76$  h/day,  $p < 0.05$ ) and boys ( $1.74 \pm 1.18$  vs  $4.20 \pm 2.30$  h/day,  $p < 0.05$ ) had significantly less ST than their Brazilian counterparts. Brazilian girls (OR=7.593;  $p = 0.0001$ ) as well as Brazilian boys (OR=6.564;  $p = 0.0001$ ) were more likely to do not meet ST recommendation, compared with their Portuguese counterparts. **Conclusions:** Portuguese children were approximately seven times more likely to meet ST recommendation than Brazilian children. Differences between countries should be considered in public policy strategies to reduce ST.

Keywords: sedentary lifestyle, cross-cultural comparison, children.

### Introduction

There has been an increased interest in research related to sedentary behavior (SB) and its correlates around the world<sup>1,2</sup>. SB, typically defined as activities that do not increase energy expenditure substantially above the resting level ( $\leq 1.5$  METs) while in a sitting or reclining posture such as sleeping, sitting, lying down, and watching television, and other forms of screen-based entertainment<sup>3</sup>, has been measured by accelerometry as an objective approach and self- or proxy-report questionnaires, as a subjective approach<sup>4</sup>.

Currently, media, from television to the “newmedia”, including cell phones, tablets, and social media, are a dominant force in children’s lives<sup>5</sup>. Therefore, international guidelines recommend that children and adolescents should minimize the time they spend being sedentary each day to reduce health risks. This may be achieved by limiting the amount of total

entertainment screen time (ST) to <1 to no more than 2 h/day, keeping the TV set and internet-connected electronic devices out of the child’s bedroom and break up long periods of sitting as often as possible<sup>5,6</sup>.

A systematic review examining the relationship between ST and health indicators in school-aged children and adolescents suggested that daily TV viewing in excess ( $\geq 2$  hours) was associated with reduced physical and psychosocial health, and that lowering sedentary time leads to reductions in BMI<sup>7</sup>. This was true for all study designs, involving 39 countries, using both direct and indirect measurements, and regardless of participant sample size<sup>7</sup>. An updated publication with data from 71 different countries showed that higher duration of TV viewing and/or ST (e.g., TV, computer, electronic games) was associated with unfavorable health<sup>8</sup>. A gradient was observed across health indicators, indicating that less SB, especially ST, was associated with better health<sup>8</sup>. Further, the overall findings

from a global matrix comparing 15 countries suggested that when SB was high, physical activity (PA) levels are lower, along with a significant global variation in SB<sup>9</sup>, suggesting that international comparisons can illustrate potentially important patterns and trends on SB<sup>9</sup>. The current globalized society, unhealthy behaviors can easily be set up in the person's lifestyle. Therefore, a cross-cultural vision may be particularly useful in understanding differences in lifestyle behaviors, and help to understand how different environments and diverse cultures may impact on ST. It is also worthy to contribute for assist interventions and policy recommendations.

In a population surveillance, 58.2% of the Brazilian children up to 9 year-old and 58.8% of the Brazilian adolescents aged 10-17 year-old spent more than 3h/day watching TV<sup>10</sup>. The Brazilian National School-Based Health Survey (*Pesquisa Nacional de Saúde do Escolar – PeNSE*) showed that 60.0% of adolescents spend  $\geq 2$  h/day watching TV all over the country during weekdays and when asked about the time they were seated in a common weekday not only watching TV but performing other activities such as using the computer, playing video games or doing other sitting activities, 56.1% reported getting more than three hours sitting<sup>11</sup>. In parallel, approximately 60% of Portuguese children aged 11-year-old watched TV for  $\geq 2$ h on weekdays<sup>12</sup>, while 12.2% of children aged between 6-13 year-old spent less than 1.5 hours watching TV and playing video games, either on weekdays or weekends<sup>13</sup>. Thus, we target to contribute in this field of knowledge, pointing out differences between distant countries geographically and culturally that should be considered whereas worldwide studies are recently paying attention on the increased prevalence of ST among children and adolescents<sup>14-16</sup> and it has been reported with negative health outcomes<sup>1, 17-19</sup>. Therefore, this study aimed to verify differences in ST (i.e. hours watching TV, using computer and/or video game) and to compare the percentage of Portuguese and Brazilian children meeting the ST recommendation ( $< 2$  h/day).

## Methods

### Participants

In this school-based cross-sectional study, a convenience sample of 369 out of 1.021 children aged  $9.83 \pm 0.65$  year-old was selected from Matosinhos, Portugal (n=95), and Uberaba, Brazil (n=274). Data from Portugal derived from the longitudinal project named Preschool Physical Activity, Body Composition and Lifestyle Study (PRESTYLE) and it was collected in the fall of 2013 and 2014. Data from Brazil derived from the cross-sectional study named “*Infância Ativa*” and it was collected in the spring of 2011 and 2012. It was scheduled meeting with school principals and it was presented the objectives and measures of the study for their agreement to participate. After informed written consent from parents or guardian consent children were evaluated during school days by trained professionals.

The comparison in the current study was between two different cities from very diverse cultural, social, and environmentally countries. Portuguese data were collected in Matosinhos,

included in the metropolitan area of Porto located in the North region of the country. It has 62,2 km<sup>2</sup> of area, 175.478 inhabitants and 2821 inhabitants/km<sup>2</sup> as demographic density<sup>20</sup>. Portugal's Human Development Index (HDI) value for 2014 was 0.830, which put the country in the very high human development category, positioning it at 43<sup>o</sup> out of 188 countries and territories<sup>21</sup>. Brazilian data were collected in Uberaba located in the South-Eastern region of the country. It has 4533.81 km<sup>2</sup> of area, 295.988 inhabitants and 65.29 inhabitants/km<sup>2</sup> as demographic density<sup>22</sup>. Brazil's HDI value for 2014 was 0.755, in the high human development category and 75<sup>o</sup> position<sup>21</sup>.

### Anthropometry

Body mass was obtained by digital electronic scale with a 150 kg maximum capacity and 100 g accuracy (Plena, modelo ICE, Brazil; Tanita Inner Scan BC 532, Portugal). The height was obtained using a portable stadiometer with a 2 m length and a scale of 0.1 cm (Welmy, Brazil; Holtain, Portugal). The average of two measurements was used for both height and weight. Body mass index (BMI) was calculated by dividing body mass (kg) by square of height (m).

### Socioeconomic status

Parents' education level was used as measure of socioeconomic status<sup>23</sup> based on the Portuguese and Brazilian educational system. The SES was categorized as low (9 years' education or less sub secondary level), middle (10–12 years' education-secondary level) and high education (higher education). The highest level of education from mother or father and the children's principal guardian for mono-parental families were selected.

### Lifestyle questionnaire

Children' ST and PA were assessed using a parent-reported lifestyle questionnaire. Parents were asked to recall the total average duration their child watched TV, used the computer and used videogames. The questions were made separately for weekdays and weekend days and reunited to analyzes (Cronbach's  $\alpha$ : Brazil = 0,71; Portugal = 0,77). There were seven response categories offered and converted in the corresponding hours: 1 = not at all, 2 = 30 minutes, 3 = 1 hour, 4 = 2 hours, 5 = 3 hours, 6 = 4 hours, 7 =  $>4$  hours. The average time spent per day (h/day) engaged in these sedentary activities was calculated and considered the ST for the analyses. PA was considered as a dichotomous adjustment variable based on positive or negative responses, regarding the children participation in organized sports outside school, classify as active, or not, not active. We assumed that engagement in organized sports is related to higher levels of objectively measured moderate PA, vigorous PA and achieving the recommended levels of MVPA in youth<sup>24</sup>.

### Statistical Analysis

The Kolmogorov Smirnov test was used to verify the normal distribution of variables. Subsequently, Independent Student *t* test or Mann-Whitney *U* test were used to examine differences between cities and gender. Chi-square test evaluated the difference in prevalence between parental education and physical activity between countries. Binary logistic regression analysis was used to evaluate the magnitudes of the associations between ST recommendation and cities. Overall analyses were adjusted for age, BMI, PA and socioeconomic status, within genders. Data analysis was performed using SPSS version 22. The level of significance was set at 0.05.

### Results

The descriptive characteristics of the sample are shown in Table 1. For total sample, the variables of age ( $9.43 \pm 0.45$  vs  $9.97 \pm 0.66$ ;  $p < 0.05$ ), BMI ( $19.07 \pm 3.29$  vs  $18.22 \pm 3.90$ ;  $p < 0.05$ ) and ST ( $1.66 \pm 1.02$  vs  $3.79 \pm 2.08$ ;  $p < 0.05$ ) were significantly different between Portuguese and Brazilian children, respectively. There was no difference in parental education prevalence

Table 1. Descriptive characteristics (mean (standard deviation) or percentage)

	Girls	
	Matosinhos, Portugal (n=48)	Uberaba, Brazil (n=140)
<b>Age (years)</b>	9.40 (0.29)	9.99 (0.67)*
<b>BMI (kg/m<sup>2</sup>)</b>	19.12 (3.41)	18.20 (3.60)
<b>ST (hours/day)</b>	1.58 (0.84)	3.40 (1.76)*
<b>Parental Education (%)</b>		
Low	54.2	47.1
Medium	27.1	39.3
High	18.7	13.6
<b>Physical Activity (%)</b>		
Yes	43.7	12.1
No	56.3	87.9
	Boys	
	Matosinhos, Portugal (n=47)	Uberaba, Brazil (n=134)
<b>Age (years)</b>	9.46 (0.57)	9.94 (0.64)*
<b>BMI (kg/m<sup>2</sup>)</b>	19.02 (3.21)	18.23 (4.21)*
<b>ST (hours/day)</b>	1.74 (1.18)	4.20 (2.30)**/**
<b>Parental Education (%)</b>		
Low	44.7	58.2
Medium	34.0	32.1
High	21.3	9.7
<b>Physical Activity (%)</b>		
Yes	51.1	23.9
No	48.9	76.1

ST: screen time; BMI: body mass index.

\*denote significant difference between cities, within gender ( $p < 0.05$ );

\*\*denote significant difference between gender, within city ( $p < 0.05$ ).

between the two countries ( $\chi^2 = 4.23$ ;  $p = 0.121$ ) and Portuguese children participated in organized sports outside school significantly more than Brazilian children ( $\chi^2 = 32.30$ ;  $p = 0.0001$ ). ST was significantly lower in Portuguese children than Brazilian children, regardless of gender. BMI was significantly higher in Portuguese than Brazilian boys.

The binary logistic regression analysis pointed out the relationship between ST and cities, by gender (Table 2). Regarding the ST, the prevalence of meet the recommendation ( $< 2$  h/day) was 66.7% and 55.3% between Portuguese girls and boys and 25.0% and 16.4% between Brazilian girls and boys, respectively. Further, our data also showed that Brazilian girls (OR=7.593;  $p=0.0001$ ) as well as Brazilian boys (OR=6.564;  $p=0.0001$ ) were more likely to do not meet ST recommendation, compared with Portuguese girls and boys, respectively.

Table 2. Association between screen time recommendation and cities, by gender, in children from Matosinhos, Portugal and Uberaba, Brazil

Screen Time*	Cities		p-value	OR	95%CI	
	Matosinhos, PT	Uberaba, BR				
	n (%)	n (%)				
Girls	$< 2$ h/day	32 (66.7)	35 (25.0)	0.0001	7.593	3.20; 18.03
	$\geq 2$ h/day	16 (33.3)	105 (75.0)			
Boys	$< 2$ h/day	26 (55.3)	22 (16.4)	0.0001	6.564	2.80; 15.36
	$\geq 2$ h/day	21 (44.7)	112 (83.6)			

\*Adjusted by age, body mass index, physical activity and socioeconomic status.

### Discussion

This study aimed to verify differences in ST and to compare the percentage of Portuguese and Brazilian children meeting the ST recommendation ( $< 2$  h/day). Our major finding was that Portuguese girls and boys presented significantly lower time spent in ST than Brazilian children. The majority of Portuguese children meet the ST recommendation (61.1%) while the Brazilian children (20.8%) did not. Brazilian girls were 7.4 times more likely to do not meet the ST recommendations than Portuguese girls while Brazilian boys were 6.7 times more likely to do not meet the ST recommendation than Portuguese boys. These data may be important in understanding cultural differences and assist ST recommendation between children from different geographical locations.

Culturally, Brazilian children have only a half-day period at school (morning or afternoon). Given that organization, Brazilian children spent approximately only four hours at schools while the remaining time might easily be spent at home with access to TV, computer and video games. Further, significant differences between SES groups was found for sedentary behavior with higher SES groups spending less time watching TV than low SES groups<sup>25</sup>. Additionally, parental education maybe inversely related with your child ST when considered correlates as presence

of TV in the child's bedroom, eating meals in front of a TV, parental modeling for TV/DVD and parental co-viewing<sup>26</sup>. This scenario contributes for children to stay in front of screens and often without adult supervision even during their leisure time. Rather, the Portuguese educational system provides full-time schools which reduce the time available for ST. Suggesting a potential impact of the time organization and management which lies on social, geographic and cultural environmental factors that should be considered. However, it seems that a single strategy to reduce sedentary behavior measured by accelerometer<sup>27</sup> and ST may be unlikely to be effective across many countries<sup>1</sup>. Guidelines or recommendations are not common in developing countries yet and it seems that public health messages about limiting ST, in particular, may be important as there are changes in lifestyles occurring throughout all over the world<sup>9</sup>. Additionally, in Portuguese schoolchildren, the prevalence of overweight is high<sup>28, 29</sup>, around 30.0%<sup>30-32</sup> and it is among the highest in Europe<sup>31</sup>. However, stabilization seems to have occurred during the last decade<sup>29, 32, 33</sup>. Increased BMI have been observed in the Brazilian population, even in comparison to children from other countries<sup>34</sup>, although there are variations in the prevalence rates of overweight and obesity in the different regions of Brazil, the values identified are high and worrying<sup>35</sup>.

Few international studies involving data from Portugal showed that 45% of girls and 52% of boys aged 11 year-old did not meet the ST recommendation<sup>36</sup> and it was found ST prevalence between 14.5 to 17.5 h/week in children aged 6-8-year-old<sup>37</sup>. The ISCOLE was the only study that compared data from Portugal and Brazil adding interesting findings including Portugal among the countries with high level of sitting time assessed by accelerometer (9.2 h/day) and with ST values below the ISCOLE average (2.3 h/day) while Brazil showed sitting time values below the ISCOLE average (8.3 h/day) and it had the lowest percent of participants meeting the ST guidelines (27.6%)<sup>1</sup>.

The lower values of ST and high prevalence of meet the ST recommendation in Portuguese children can be found in other studies with Portuguese samples, such as data from Portuguese Prevalence Study of Obesity in Childhood, with 1.517 children aged 7-10 year-old, found around only 28% of boys and 26% of girls watched  $\geq 2$  h of TV<sup>38</sup>, while data from Braga, North of Portugal, in children aged 8-10 year-old showed 1.4 h/day ST<sup>39, 40</sup>. However, higher values of ST in Portuguese youngsters were also described approaching our Brazilian outcomes. For instance, data from urban and rural communities in the Portuguese Midlands comprising 100 boys and 115 girls aged 13-14 year-old found  $3.34 \pm 1.79$  h/day and  $2.63 \pm 1.39$  h/day of ST, respectively<sup>41</sup>.

Recently, a systematic review described the methodological characteristics and assessed variables associated with SB among Brazilian children and adolescents and identified a great number of cross-sectional studies around the country<sup>42</sup>. Besides a global matrix comparing 15 countries suggest that SB in general are better in low-income countries<sup>9</sup>, we found high ST values (Girls:  $3.36 \pm 1.83$ ; Boys:  $4.2 \pm 2.28$  h/day;  $p < 0.05$ ) and prevalence of ST  $\geq 2$  h/day (Girls: 81.0%; Boys: 76.4%). Despite that, our data seems to be in accordance with recent studies. For instance, data from 879 adolescents aged 14-19 year-old from São José, Santa

Catarina, showed that they spent  $6.5 \pm 4.9$  hours (85.4%  $\geq 2$  h/day) in front of TV, computer and videogame,  $7.0 \pm 4.9$  h (90.3%  $\geq 2$  h/day) among boys and  $5.9 \pm 4.8$  h (81.2%  $\geq 2$  h/day) among girls<sup>43</sup>. Data from 515 boys and 716 girls aged 14-17 year-old from Londrina, Paraná, found that most adolescents (93.8% of boys and 87.2% of girls) spent  $\geq 2$  h/day in ST<sup>44</sup>. Data from the 1993 Pelotas birth cohort study showed that the frequency of adolescents that did not accomplished the ST recommendation was 75% (median 4.5 h/day), 80.2% (median 5.5 h/day) and 77.4% (median 4.5 h/day) at 11, 15 and 18 year-old, respectively. Those values were very similar between boys (75.6%, 82.3% and 78.8% at 11, 15 and 18) and girls (74.5%, 78.3% and 76% at 11, 15 and 18)<sup>45</sup>.

In addition to these figure, the ST can happen in different ways in their assessments. A representative sample of 8,610 Portuguese adolescents aged 11-17 year-old, from three different cohorts in 2002, 2006, and 2010 found that for the two screen-based media assessed there was a trend reversal. Time spent watching TV/video/DVD decreased significantly from 2002 to 2010 for boys and girls. Conversely, time spent on the computer increased significantly over the years for boys and girls<sup>46</sup>. In Brazil, a comparative analysis of two cross-sectional surveys including 5.028 and 6.529 students in 2001 and 2011, aged 15-19 year-old from Santa Catarina state found a decrease in TV watching after a decade and this appears to be compensated by the increased time spent in computer/video game use, either in boys or girls<sup>47</sup>. Therefore, children may behave differently according to the different screens/devices and we must take this into account.

Our study has some limitations that should be mentioned. The cross-sectional design provides associations but not causal relationships. The sample contains information of only one city of each country, so the results here should be interpreted with caution and attention to generalizations. Measures of ST and PA relied on parent-report and were possibly biased. Unfortunately, there are not yet, self-report or proxy-report sedentary behavior questionnaires for children and adolescents available that are both valid and reliable<sup>48</sup>. Besides that, we did not evaluate the use of new media such as handheld videogames, cell phones and music devices that recently has contributed to increased screen time<sup>49</sup>.

## Conclusions

Portuguese children were approximately seven times more likely to meet the ST recommendations than Brazilian children. Difference between countries should be considered in public policy strategies to reduce ST. More research is needed to confirm and expand this data.

## References

1. LeBlanc AG, Katzmarzyk PT, Barreira TV, Broyles ST, Chaput JP, Church TS, et al. Correlates of Total Sedentary Time and Screen Time in 9-11 Year-Old Children around the World: The

- International Study of Childhood Obesity, Lifestyle and the Environment. *PloS one*. 2015;10(6):e0129622.
2. Atkin AJ, Sharp SJ, Corder K, van Sluijs EM, International Children's Accelerometry Database C. Prevalence and correlates of screen time in youth: an international perspective. *Am. J. Prev. Med.* 2014;47(6):803-7.
  3. Pate RR, O'Neill JR, Lobelo F. The evolving definition of "sedentary". *Exerc Sport Sci Rev.* 2008;36(4):173-8.
  4. Atkin AJ, Gorely T, Clemes SA, Yates T, Edwardson C, Brage S, et al. Methods of Measurement in epidemiology: sedentary Behaviour. *Int J Epidemiol.* 2012;41(5):1460-71.
  5. Children, Adolescents, and the Media. *Pediatrics.* 2013;132(5):958-61.
  6. Tremblay MS, Leblanc AG, Janssen I, Kho ME, Hicks A, Murumets K, et al. Canadian sedentary behaviour guidelines for children and youth. *Appl Physiol Nutr Metab.* 2011;36(1):59-64; 5-71.
  7. Tremblay MS, LeBlanc AG, Kho ME, Saunders TJ, Larouche R, Colley RC, et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *Int J Behav Nutr Phys Act.* 2011;8:98.
  8. Carson V, Hunter S, Kuzik N, Gray CE, Poitras VJ, Chaput J-P, et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth: an update. *Appl Physiol Nutr Metab.* 2016;41(6 (Suppl. 3)):S240-S65.
  9. Tremblay MS, Gray CE, Akinroye KK, Harrington DM, Katzmarzyk PT, Lambert EV, et al. Physical activity of children: A global matrix of grades comparing 15 countries. *J Phys Act Health.* 2014;11(Suppl 1):113-25.
  10. PNAD. Pesquisa Nacional por Amostra de Domicílios: Um panorama da saúde no Brasil. Acesso e utilização de serviços, condições de saúde e fatores de risco e proteção à saúde 2008: Instituto Brasileiro de Geografia e Estatística Rio de Janeiro; 2010.
  11. Pesquisa nacional de saúde do escolar: 2015. Rio de Janeiro. 2016.
  12. Currie C. Social determinants of health and well-being among young people: Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey 2012.
  13. Vasques C, Mota M, Correia T, Lopes V. Prevalence of overweight/obesity and its association with sedentary behavior in children. *Rev Port Cardiol.* 2012;31(12):783-8.
  14. Santaliestra-Pasias AM, Mouratidou T, Verbestel V, Bammann K, Molnar D, Sieri S, et al. Physical activity and sedentary behaviour in European children: the IDEFICS study. *Public Health Nutr.* 2014;17(10):2295-306.
  15. Rey-López JP, Vicente-Rodriguez G, Ortega FB, Ruiz JR, Martinez-Gómez D, De Henauw S, et al. Sedentary patterns and media availability in European adolescents: The HELENA study. *Preventive Medicine.* 2010;51(1):50-5.
  16. Bucksch J, Sigmundova D, Hamrik Z, Troped PJ, Melkevik O, Ahluwalia N, et al. International Trends in Adolescent Screen-Time Behaviors From 2002 to 2010. *J Adolesc Health.* 2016;58(4):417-25.
  17. Stamatakis E, Coombs N, Jago R, Gama A, Mourao I, Nogueira H, et al. Associations between indicators of screen time and adiposity indices in Portuguese children. *Prev Med.* 2013;56(5):299-303.
  18. Stamatakis E, Coombs N, Jago R, Gama A, Mourao I, Nogueira H, et al. Type-specific screen time associations with cardiovascular risk markers in children. *Am. J. Prev. Med.* 2013;44(5):481-8.
  19. Dutra GF, Kaufmann CC, Pretto AD, Albernaz EP. Television viewing habits and their influence on physical activity and childhood overweight. *J Pediatr (Rio J).* 2015;91(4):346-51.
  20. INE. Censos 2011 Portugal: Instituto Nacional de Estatística; 2011 [Available from: [http://censos.ine.pt/xportal/xmain?xpid=CENSOS&xpgid=censos2011\\_apresentacao](http://censos.ine.pt/xportal/xmain?xpid=CENSOS&xpgid=censos2011_apresentacao)].
  21. UNDP. Human Development Index (HDI): United Nations Development Programme; 2014 [Available from: <http://hdr.undp.org/en/content/human-development-index-hdi>].
  22. IBGE. Censo Demográfico 2010: Instituto Brasileiro de Geografia e Estatística; 2010 [Available from: <http://www.ibge.gov.br/home/default.php>].
  23. Francisco R, Espinoza P, Gonzalez ML, Penelo E, Mora M, Roses R, et al. Body dissatisfaction and disordered eating among Portuguese and Spanish adolescents: The role of individual characteristics and internalisation of sociocultural ideals. *J Adolesc.* 2015;41:7-16.
  24. Marques A, Ekelund U, Sardinha LB. Associations between organized sports participation and objectively measured physical activity, sedentary time and weight status in youth. *Journal of science and medicine in sport / SMA.* 2016;19(2):154-7.
  25. Drenowatz C, Eisenmann JC, Pfeiffer KA, Welk G, Heelan K, Gentile D, et al. Influence of socio-economic status on habitual physical activity and sedentary behavior in 8 – to 11-year old children. *BMC Public Health.* 2010;10(1):214.
  26. Gebremariam MK, Altenburg TM, Lakerveld J, Andersen LF, Stronks K, Chinapaw MJ, et al. Associations between socioeconomic position and correlates of sedentary behaviour among youth: a systematic review. *Obesity Reviews.* 2015;16(11):988-1000.
  27. Sedentary Behaviour Research N. Letter to the Editor: Standardized use of the terms "sedentary" and "sedentary behaviours". *Appl Physiol Nutr Metab.* 2012;37(3):540-2.
  28. Pedrosa C, Correia F, Seabra D, Oliveira BM, Simoes-Pereira C, Vaz-de-Almeida MD. Prevalence of overweight and obesity among 7-9-year-old children in Aveiro, Portugal: comparison between IOTF and CDC references. *Public Health Nutr.* 2011;14(1):14-9.
  29. Wijnhoven TM, van Raaij JM, Spinelli A, Starc G, Hassapidou M, Spiroski I, et al. WHO European Childhood Obesity Surveillance Initiative: body mass index and level of overweight among 6-9-year-old children from school year 2007/2008 to school year 2009/2010. *BMC Public Health.* 2014;14:806.
  30. Santos R, Moreira C, Ruiz JR, Vale S, Soares-Miranda L, Moreira P, et al. Reference curves for BMI, waist circumference and waist-to-height ratio for Azorean adolescents (Portugal). *Public Health Nutr.* 2012;15(1):13-9.
  31. Padez C, Fernandes T, Mourão I, Moreira P, Rosado V. Prevalence of overweight and obesity in 7-9-year-old Portuguese children: trends in body mass index from 1970-2002. 2004.
  32. Gomes TN, Katzmarzyk PT, dos Santos FK, Souza M, Pereira S, Maia JA. Overweight and obesity in Portuguese children: prevalence and correlates. *Int J Environ Res Public Health.* 2014;11(11):11398-417.

33. Martin L, Oepen J, Reinehr T, Wabitsch M, Claussnitzer G, Waldeck E, et al. Ethnicity and cardiovascular risk factors: evaluation of 40,921 normal-weight, overweight or obese children and adolescents living in Central Europe. *Int J Obes (Lond)*. 2015;39(1):45-51.
34. Filho VC, Lopes Ada S, Fagundes RR, de Campos W. [Anthropometric indices among schoolchildren from a municipality in Southern Brazil: a descriptive analysis using the LMS method]. *Rev Paul Pediatr: orgao oficial da Sociedade de Pediatria de Sao Paulo*. 2014;32(4):333-41.
35. Niehues JR, Gonzales AI, Lemos RR, Bezerra PP, Haas P. Prevalence of overweight and obesity in children and adolescents from the age range of 2 to 19 years old in Brazil. *Int J Pediatr*. 2014;2014:583207.
36. Inchley J, Currie D, Young T, Samdal O, Torsheim T, Augustson L, et al. Growing up unequal: gender and socioeconomic differences in young people's health and well-being. Copenhagen: WHO Regional Office for Europe 2016.
37. Mantziki K, Vassilopoulos A, Radulian G, Borys JM, Du Plessis H, Gregorio MJ, et al. Inequities in energy-balance related behaviours and family environmental determinants in European children: baseline results of the prospective EPHE evaluation study. *BMC Public Health*. 2015;15:1203.
38. Jago R, Stamatakis E, Gama A, Carvalhal IM, Nogueira H, Rosado V, et al. Parent and child screen-viewing time and home media environment. *Am J Prev Med*. 2012;43(2):150-8.
39. Silva C, Fassnacht DB, Ali K, Goncalves S, Conceicao E, Vaz A, et al. Promoting health behaviour in Portuguese children via Short Message Service: The efficacy of a text-messaging programme. *J Health Psychol*. 2015;20(6):806-15.
40. Fassnacht DB, Ali K, Silva C, Goncalves S, Machado PP. Use of text messaging services to promote health behaviors in children. *J Nutr Educ Behav*. 2015;47(1):75-80.
41. Machado-Rodrigues AM, Coelho ESMJ, Mota J, Padez C, Martins RA, Cumming SP, et al. Urban-rural contrasts in fitness, physical activity, and sedentary behaviour in adolescents. *Health Promot Int*. 2014;29(1):118-29.
42. Guerra PH, Farias Junior JC, Florindo AA. Sedentary behavior in Brazilian children and adolescents: a systematic review. *Rev Saude Publica*. 2016;50:9.
43. Goncalves EC, Silva DA. [Factors associated with low levels of aerobic fitness among adolescents]. *Rev Paul Pediatr: orgao oficial da Sociedade de Pediatria de Sao Paulo*. 2016;34(2):141-7.
44. Christofaro DG, De Andrade SM, Mesas AE, Fernandes RA, Farias Junior JC. Higher screen time is associated with overweight, poor dietary habits and physical inactivity in Brazilian adolescents, mainly among girls. *Eur J Sport Sci*. 2016;16(4):498-506.
45. Bergmann GG, Bertoldi AD, Mielke GI, Camargo AL, Matijasevich A, Hallal PC. [Physical activity, screen time, and use of medicines among adolescents: the 1993 Pelotas (Brazil) birth cohort study]. *Cad Saude Publica*. 2016;32(4):e00011715.
46. Marques A, Gaspar De Matos M. Trends and correlates of overweight and obesity among adolescents from 2002 to 2010: a three-cohort study based on a representative sample of Portuguese adolescents. *Am J Hum Biol*. 2014;26(6):844-9.
47. Lopes AS, Silva KS, Barbosa Filho VC, Bezerra J, de Oliveira ES, Nahas MV. Trends in screen time on week and weekend days in a representative sample of Southern Brazil students. *J Public Health (Oxf)*. 2014;36(4):608-14.
48. Hidding LM, Altenburg TM, Mookink LB, Terwee CB, Chinapaw MJM. Systematic Review of Childhood Sedentary Behavior Questionnaires: What do We Know and What is Next? *Sports Med*. 2016:1-23.
49. Dumuid D, Olds TS, Lewis LK, Maher C. Does home equipment contribute to socioeconomic gradients in Australian children's physical activity, sedentary time and screen time? *BMC Public Health*. 2016;16(1):736.

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#### Corresponding author

Amanda Santos. 65 St. Professor Mendes Correia 2<sup>nd</sup> left. Porto, Portugal.  
Email: amanda637@hotmail.com

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