

Article

Influence of the Parental Educational Level on Physical Activity in Schoolchildren

Inés M. Muñoz-Galiano ¹, Jonathan D. Connor ², Miguel A. Gómez-Ruano ^{2,3} and Gema Torres-Luque ^{4,*}

¹ Department of Pedagogy, Faculty of Humanities and Education Science, University of Jaén, 23071 Jaén, Spain; imunoz@ujaen.es

² Department of Sport and Exercise Science, James Cook University, Townsville 4811, Australia; jonathan.connor@jcu.edu.au (J.D.C.); miguelangel.gomez.ruano@upm.es (M.A.G.-R.)

³ Department of Social Sciences of Physical Activity, Sports and Leisure, Technical University of Madrid, 28040 Madrid, Spain

⁴ Department of Plastic, Music and Corporal Expression, Faculty of Humanities and Education Science, University of Jaén, 23071 Jaén, Spain

* Correspondence: gtluque@ujaen.es

Received: 3 April 2020; Accepted: 7 May 2020; Published: 11 May 2020



Abstract: The factors influencing physical activity participation in children are varied, although there is evidence that the educational level of parents may be one important factor. The aim of this study is to analyze the influence of parental education on the level of physical activity and the sedentary behavior of their children. The parents of 727 students, separated based on school group (preschool: $n = 179$; primary: $n = 284$; secondary: $n = 230$; high: $n = 34$), were invited to complete a series of questionnaires assessing their educational level (low, intermediate, and high) and their child's level of physical activity and sedentary behavior. Primary school students with high- and intermediate-educated parents were found to engage in significantly more physical activity per week and spent more time engaged in homework than children with lower-educated parents. Secondary school students with higher-educated parents were found to spend significantly less time engaged in sedentary behavior than children with lower- or intermediate-educated parents, and high schoolers with higher-educated parents engaged in less tablet time than children with lower-educated parents. Multiple linear regression demonstrated that greater physical activity was precipitated by certain sedentary behaviors in children with more educated parents, such as total time watching TV (primary school), doing homework (secondary school), and total time using a tablet/similar (high school), which increased total time engaged in physical activity. These findings suggest that more educated parents may implement structured time for their children to engage in a balance of physical activity and sedentary behaviors.

Keywords: children; physical activity; sedentary behavior; family

1. Introduction

The family is considered the fundamental basis for the child's socialization and its first educational context. As an agent of socialization, he develops in each of its members a certain way to function within society. So, its members will investigate what they learned at home with their behavior patterns [1]. Thus, the family is proclaimed as the first group of belonging where the person develops in an integral sense, because it is where children learn and develop knowledge, values, and attitudes that serve to guide their own behavior [2]. There are, therefore, different approaches to child rearing, such as the educational pattern, principles, and values in the family environment [3–5]. For this reason, it is

important to promote an adequate family environment that provides the resources for a good personal and social development of children [6].

In this way, there are several studies that highlight the importance of the family as a health promoting factor [2], and specifically of physical activity [7,8] both in childhood and in adolescence [9]. Thus, it has been shown that quality of life in adulthood can be influenced by the habits adopted in the first years of life [10,11], when the family is the main educational agent.

This fact joins a worrying increase in sedentary behavior worldwide [12–15], together with a decreased physical activity practice [16–19] becoming risk factors for poor health from an early age [16,20–23]. High levels of sedentary lifestyle and the decline in physical activity are considered public health problems [22,24,25], associated with being overweight and obesity [15,26–28], to cardiometabolic risk [29,30], lower cognitive development [31,32], and to the detriment of psychosocial well-being [13,33]. Thus, there are several studies that indicate that the daily recommendations of physical activity are not fulfilled in children [34,35] or adolescents [16,36,37].

The factors that influence participation in physical activity (PA) for young people are varied [38], although there is evidence that the educational level of parents is an aspect to consider [14,39,40]. The relationship between parental education levels and children's physical activity or sedentary behaviors are complex and are predicated upon psychosocial factors such as role modelling, encouragement, and the provision of tangible support. Edwardson and Gorely's [41] systematic review on parental influences and children's physical activity levels highlighted the importance of parental attitudes and encouragement towards developing physically active children. As higher educated parents may better understand the health benefits of physical activity, this is thought to facilitate greater parental encouragement and support of physically active behaviors [42,43]. As parents and children often undergo changes in their relationship as children transition into adolescence, it is unclear whether parental influence on their children's physical activity changes commensurately [44]. Few studies have examined parental education level across different child-age ranges, either via cross-sectional or longitudinal methods. One such study that did examine Spanish children aged 6 to 15 reported that parental education level was positively associated with physical activity [45]. However, their analysis did not report differences between ages, and the analysis of sedentary behavior was limited to television viewing time, which may not provide a complete view of children's physical activity and sedentary behaviors. Clearly, there is a need for further investigation into parental education influences across various child-age stages, and on sedentary behaviors.

It has been observed that when parents have a higher degree of education training, children tend to be more active [39,40] and engage in less sedentary behaviors [14]. This fact has been corroborated for both fathers and mothers [46,47]; interestingly, there are even authors who have shown how the mother's educational level is linked to a higher probability that her children participate in physical-sports activities [48,49]. Conversely, greater sedentary behaviors in children have also been linked with lower educational levels on the part of the parents [50]. Parents with a high educational level tend to better regulate the time their children spend on activities, highlighting a control of internet use, associated with sedentary behavior [51,52].

It is necessary, therefore, to continue to investigate the influence that parents have not only on the practice of PA by their children, but on the sedentary behaviors they develop. Thus, the objective of this study was to analyze the influence of the educational level of the parents, on the practice of PA and the sedentary behavior of their children, throughout the entire school stage (3 to 17 years).

2. Materials and Methods

2.1. Sample

In total, 727 Spanish students (143.28 ± 23.23 cm; 40.50 ± 17.41 kg; 18.88 ± 4.39 kg/m²) of different educational stages were selected. More concretely, preschool ($n = 179$; 4.08 ± 0.83 years; 107.0 ± 8.97 cm; 18.8 ± 4.14 kg; 16.6 ± 3.19 kg/m²), primary school ($n = 284$; 9.37 ± 1.35 years; 143.2 ± 8.97 cm;

38.9 ± 11.2 kg; 18.7 ± 3.80 kg/m²), secondary school ($n = 230$; 13.1 ± 0.94 years; 143.3 ± 9.22 cm; 54.6 ± 10.7 kg; 20.1 ± 5.07 kg/m²), and high school ($n = 34$; 16.1 ± 0.23 years; 172.1 ± 7.55 cm; 65.7 ± 13.7 kg; 22.0 ± 3.88 kg/m²).

The inclusion criteria to participate in the study were: (a) to be students in infant, primary or secondary education; (b) not have any disease that prevents the practice of physical activity.

Before the start of the study, the educational center was informed, as well as the fathers, mothers and/or guardians of the objectives of the same, presenting a written informed consent to participate in it. This work is approved by the Ethics Committee of the local institution (University of Jaén, Spain (JUN.17/6)).

2.2. Procedures

The instruments used were:

Educational level of parents/guardians

The parents/guardians were asked through a questionnaire for the highest level of education they had, using it as an indicator of their level of education. To do this, he/she was asked about their different levels of studies according to Spanish education. The response options were categorized into three levels: (a) Low level: no graduation, Primary/EGB, Secondary/ESO; (b) Medium level: Vocational Training I, Middle level training cycles, Baccalaureate/BUP/COU, Professional Training II, Higher degree training cycle; and, (c) High level: University degree or technical engineering, degree or higher engineering, Graduate, Master, Doctorate. These three levels used are in accordance with other authors who have previously employed it [14,53].

Physical Activity Practice

Information regarding the practice of physical activity is collected contemplating different possibilities of practice: a) On active displacement: a qualitative question about how to move to the school, 1 = one way (walking, cycling, car, motorcycle, bus) and, 2 = return mode (walking, cycling, car, motorcycle, bus); which in turn included a quantitative question to know the volume in minutes in which the round trip from home to the school is covered (< 10 min, between 10–15 min, between 15–20 min, between 20–30 min, > 30 min), where for the calculation of total PA, only the time used when it was active displacement was selected; b) unstructured PA practice: where the volume in hours/week of PA was asked how to play in the yard, in the park, plaza, etc. where it differed between the volume played during the week and at the weekend; and, c) structured PA practice: where the volume in hours/week in extracurricular activities was contemplated, differentiating between the time spent during the week and at the end of week. Once this information was obtained, the total hours of PA were added, differentiating between two moments: weekdays (Monday to Friday), and weekend (Saturday and Sunday). These questions have been used by different authors to know the practice of physical activity in school age samples [54–56].

Sedentary behavior

Sedentary behavior was determined through the Health Behavior in School-aged Children (HBSC) questionnaire [57]. In the Preschool stage he/she was answered by the parents. The questionnaire consisted of answering six items indicating the number of daily hours spent watching television on weekdays and on weekends; use of a computer, tablet, or similar device on weekdays and weekends, and, time spent on class assignments on weekdays and weekends. Each of the questions included 9 options: 1 = no time, 2 = half an hour, 3 = one hour, 4 = two hours, 5 = three hours, 6 = four hours, 7 = five hours, 8 = six hours, and 9 = seven hours or more. The consistency of the questionnaire is high (Cronbach's alpha = 0.721; 0.745; 0.719 in the three blocks respectively). This questionnaire has been used successfully in previous studies [58,59].

2.3. Statistical Analysis

Firstly, descriptive results were presented as mean and standard deviation. Secondly, the Kruskal–Wallis test was used to test the differences of variables among parents' educational

level (low, intermediate, and high). The Bonferroni's post hoc test was used when necessary to check the pairwise comparisons.

Thirdly, a multiple linear regression was used to estimate the effect of independent variables (total time watching TV, using tablet/similar, doing homework, and the parents' educational level as a dummy variable) on the dependent variable (total time of physical activity). The BMI variable was excluded from the model as it was not statistically significant differentiating educational levels. The Durbin–Watson's test was used to check whether the residuals in the model were independent and to account for collinearity effects. The linear regression model is described in the following equation where β_0 is the intercept, βx represents the effects of the regressors (independent variables), and ϵ_i is the disturbance term.

Total time of PA = $\beta_0 + \beta_1 \times$ Total time watching TV + $\beta_2 \times$ Total time using tablet/similar + $\beta_3 \times$ Total time doing homework + $\beta_4 \times$ Parents educational level + ϵ_i .

All the analyses were performed using the IBM SPSS version 22 statistical software (Armonk, NY: IBM Corp) and the significance level was set at (alpha) $\alpha = 05$.

3. Results

The descriptive results for all the studied variables are presented in Table 1 as mean and standard deviation according to the parents' educational level and education stage.

Table 1. Descriptive statistics for each group of students according to the parents' educational level (low, intermediate, or high).

Infantile	Parents' Educational Level					
	Low		Intermediate		High	
	M	SD	M	SD	M	SD
BMI	18.2	3.31	17.2	3.55	16.1	2.88
Total PA time (per week)	4.85	5.76	9.24	8.34	9.92	8.63
Total time watching TV	4.85	3.50	4.68	2.23	4.48	2.56
Total time using tablet/ similar	1.94	1.79	1.47	1.89	1.39	1.48
Total time doing homework	1.32	1.27	2.10	4.02	1.13	1.33
Total sedentary time	8.11	4.20	8.26	4.80	7.00	3.62
	Primary					
BMI	18.8	3.67	18.7	4.18	18.2	3.08
Total PA time (per week)	5.38	6.28	10.34	14.10	10.88	8.30
Total time watching TV	5.42	3.14	4.50	4.09	5.62	3.42
Total time using tablet/ similar	1.33	2.25	2.22	3.12	2.63	3.06
Total time doing homework	2.12	1.90	2.09	1.92	2.50	1.32
Total sedentary time	8.86	4.73	8.82	6.36	10.76	6.28
	Secondary					
BMI	19.8	5.47	20.4	5.79	20.2	2.93
Total PA time (per week)	5.83	6.35	5.90	7.53	8.16	7.60
Total time watching TV	5.07	3.84	3.84	3.03	4.26	3.19
Total time using tablet/ similar	4.51	4.49	5.28	5.13	4.69	3.14
Total time doing homework	4.32	2.95	4.48	3.62	5.88	3.97
Total sedentary time	13.91	8.24	13.60	9.11	14.82	6.58
	High school					
BMI	22.7	4.88	23.5	2.83	20.4	3.01
Total PA time (per week)	3.15	3.18	7.50	6.22	5.23	5.88
Total time watching TV	5.78	2.39	2.98	3.13	2.95	2.53
Total time using tablet/ similar	4.33	3.55	6.03	4.02	4.85	2.94
Total time doing homework	6.54	3.56	5.92	3.39	7.18	2.67
Total sedentary time	16.64	5.88	14.93	4.18	14.97	4.91

The results of Kruskal–Wallis test showed that significant differences were identified for total PA time (lower for low educational level) and total time doing homework (greater for intermediate educational level) at the infantile stage ($p < 0.05$) (Table 2). The primary school students showed significant differences in total PA time per week ($p < 0.001$) with lower values in children with parents of low educational level; total time watching TV ($p < 0.05$) with greater values for intermediate educational level; and total time using tablet/similar ($p = 0.001$) with higher values in children with parents of high educational level. The results for secondary education students showed significant differences in total PA time ($p = 0.044$) with more activity for students with parents of high educational level; and for total time doing homework ($p = 0.012$) with higher values for students with parents of high educational level. Lastly, the high school students showed significant differences in total time watching TV ($p = 0.017$) with higher values for students of parents with low educational level.

Table 2. Results of Kruskal–Wallis test for each variable studied according to the education stages.

Infantile	Df	X ²	p	Pairwise Comparisons
BMI	2	5.779	0.056	
Total PA time (per week)	2	8.149	0.017 *	LvsI; LvsH
Total time watching TV	2	1.229	0.541	
Total time using tablet/ similar	2	2.172	0.338	
Total time doing homework	2	6.192	0.045 *	IvsH
Total sedentary time	2	4.420	0.110	
Primary education				
BMI	2	0.265	0.876	
Total PA time (per week)	2	19.91	<0.001 †	LvsI; LvsH
Total time watching TV	2	6.742	0.034 *	LvsI; IvsH
Total time using tablet/ similar	2	13.65	0.001 †	LvsH
Total time doing homework	2	4.551	0.103	
Total sedentary time	2	3.654	0.161	
Secondary education				
BMI	2	0.304	0.859	
Total PA time (per week)	2	6.255	0.044 *	LvsH
Total time watching TV	2	4.676	0.097	
Total time using tablet/ similar	2	0.711	0.701	
Total time doing homework	2	8.784	0.012 *	LvsH
Total sedentary time	2	1.610	0.447	
High School				
BMI	2	5.839	0.054	
Total PA time (per week)	2	2.080	0.353	
Total time watching TV	2	8.159	0.017 *	LvsI; LvsH
Total time using tablet/ similar	2	0.094	0.608	
Total time doing homework	2	0.984	0.612	
Total sedentary time	2	0.512	0.774	

* $p < 0.05$; † $p < 0.01$; Note: L= low level; I= intermediate level; and H= high level.

The results of the multiple linear regression were available in Table 3. The results were significant for primary, secondary, and high school education level, but it was non-significant for infantile stage. The results for primary school students showed that total time watching TV, and high and intermediate parents' educational level increase the total time of physical activity. The secondary school student's regression showed that total time doing homework increased the total physical activity time; and for high school students the total time using tablet/similar increased the total time of physical activity.

Table 3. Linear regression results for total time of physical activity as dependent variable and the independent variables according to the education stages.

Infantile	B	SE	t	p	95% CI	
					Lower	Upper
Constant	9.220	1.722	5.353	<0.001 †	5.820	12.620
Total time watching TV	−0.189	0.247	−0.767	0.444	−0.677	0.298
Total time using tablet/ similar	0.606	0.384	1.580	0.116	−0.151	1.364
Total time doing homework	0.009	0.249	0.036	0.972	−0.482	0.500
Low Level	−4.642	2.261	−2.053	0.042 *	−9.105	−0.179
High Level	0.695	1.391	0.499	0.618	−2.052	3.441
F			1.699			
Sig			0.137			
R ²			0.05			
Durbin-Watson			1.932			
Primary						
Constant	2.558	1.394	1.835	0.068	−0.186	5.302
Total time watching TV	0.656	0.169	3.887	<0.001 †	0.324	0.988
Total time using tablet/ similar	0.212	0.238	0.890	0.374	−0.257	0.682
Total time doing homework	−0.479	0.348	−1.379	0.169	−1.164	0.205
High Level	5.277	1.789	2.949	0.003 †	1.755	8.799
Intermediate level	5.359	1.313	4.081	<0.001 †	2.774	7.944
F			7.486			
Sig			<0.001			
R ²			0.12			
Durbin-Watson			2.043			
Secondary						
Constant	3.359	1.067	3.150	0.002 †	1.257	5.461
Total time watching TV	0.097	0.150	0.647	0.518	−0.198	0.391
Total time using tablet/ similar	0.101	0.115	0.870	0.385	−0.127	0.328
Total time doing homework	0.353	0.138	2.557	0.011 *	0.081	0.624
High Level	1.845	1.178	1.566	0.119	−0.477	4.166
Intermediate level	0.057	1.097	0.052	0.959	−2.104	2.218
F			3.068			
Sig			0.011			
R ²			0.06			
Durbin-Watson			2.016			
High school						
Constant	0.179	3.171	0.056	0.955	−6.317	6.675
Total time watching TV	0.375	0.323	1.160	0.256	−0.287	1.037
Total time using tablet/ similar	0.579	0.252	2.293	0.030 *	0.062	1.095
Total time doing homework	−0.259	0.268	−0.965	0.343	−0.808	0.291
High Level	3.001	2.087	1.438	0.162	−1.274	7.276
Intermediate level	4.244	2.316	1.833	0.078	−0.500	8.988
F			3.091			
Sig			0.024			
R ²			0.360			
Durbin-Watson			2.037			

* $p < 0.05$; † $p < 0.01$; Note: the variable low level was excluded due to low level of tolerance from the models of primary, secondary, and high school.

4. Discussion

The objective of this study was to analyze the influence of parent's educational level on the PA levels of children throughout their schooling years (3 to 17 years). The results of this study provided evidence that children with low educational level parents engage in low physical activity during early schooling years. Interestingly, for example, the total time watching TV (primary and high

school), doing homework (infantile and secondary school), and total time using tablet/similar (primary school) increased the total time engaged in PA for children with more educated parents. Together, these findings suggest that a parent's educational level is an important factor in children's participation in physical activity and sedentary behavior.

Stronger evidence was found for infant and primary school age children, whereby children with high and intermediate-educated parents engaged in more physical activity than children with lower-educated parents. Parents with greater education levels may be more aware of the numerous health associated benefits of physical activity [60] and have greater knowledge of age appropriate activities [61] which can act as a barrier towards children's engagement in physical activity. One other possible explanation may be that educated parents are more likely to impose scheduled time to participate in physical activity [62], potentially reflecting their own practices [63]. Infantile school children with intermediate educated parents were found to engage in significantly more schoolwork time than children with low or high educated parents. This finding reflects similar work showing that parents' behavior is modeled by children and can influence their behaviors, such as nutritional habits [64,65] and physical activity.

Somewhat counterintuitively, primary school children whose parents had intermediate and high education also engaged in more TV/tablet time than low-educated parents. This may be due to alternative reasons; that is, the associated relationship between parent's education level and socioeconomic status [66], thus reducing the affordability and opportunity to utilize a tablet or similar technology. More investigative research is required in order to understand why these relationships were observed between parent's education levels.

For secondary children, a significant difference was observed in total physical activity time and total homework based on parent's education level. This information is similar to other studies, which have shown that when parents have a higher degree of training, children tend to be more active [39,40]. In addition, there is a greater perception of high education level parents and of the importance of homework for parents who did not attain a high school education [65].

Interestingly, in high school children, no significant difference was observed in total physical activity time based on parent's education level. This finding may be due to the increase in personal autonomy associated with transitioning from childhood into adulthood [61,65]. Other factors may therefore play a greater role in the physical activity behaviors of older children, beyond parental influences [67].

The effect of independent variables such as total time watching TV, using tablet/similar, doing homework, and the parents' educational level on total time engaged in physical activity revealed an intriguing relationship. For infantile and primary school students, it showed that total PA is decreased in low parents' education. One explanation for this finding may be that higher educated parents are more likely to encourage a balanced and reciprocal approach to physical activity and certain sedentary behaviors (e.g., watching tv [68]). In primary school there is a higher total of TV and tablet time for intermediate and high education level. Deslandes and Rousseau [65] previously reported that some parents believe television and tablet technology to have beneficial factors, such as relaxing children. Comparable findings were also found for older children, with secondary school student's regression showing that total time doing homework increased the total physical activity time. Perceived benefits of both physical activity and these sedentary behaviors may reflect the positive relationship reported in this study and others [61,69].

The current study has some limitations that need to be addressed in further research. Firstly, the use of smart devices and tracking systems would improve the quality and quantity of PA information from students. Secondly, the analysis of psychological factors may explain students' characteristics such as the self-regulatory processes or role modeling. Lastly, future studies should increase the sample and age of students to obtain more reliable and generalizable findings.

5. Conclusions

In conclusion, infantile and primary school students with low educated parents were found to have a lower total time of physical activity time than high and intermediate educated parents. Primary school students with high educated parents were found with more tablet time than children with lower- and high-educated parents. Secondary school students with higher-educated parents were found to spend significantly more time engaged in physical activity and homework than children with lower- or intermediate-educated parents. These findings suggest that more educated parents may implement structured time for their children to engage in a balance of PA and sedentary behaviors.

Author Contributions: Conceptualization, I.M.M.-G. and G.T.-L.; data curation, I.M.M.-G.; formal analysis, M.A.G.-R.; investigation, I.M.M.-G. and G.T.-L.; methodology, M.A.G.-R. and G.T.-L.; writing—original draft, I.M.M.-G. and J.D.C.; writing—review & editing, J.D.C., M.A.G.-R., and G.T.-L.; supervision J.D.C., G.T.-L., and M.A.G.-R. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Suárez, P.; Vélez, M. El papel de la familia en el desarrollo social del niño: Una mirada desde la afectividad, la comunicación familiar y estilos de educación parental. *Psicoespacios* **2018**, *12*, 153–172.
2. Ramos, Y.; González, M.A. Un acercamiento a la función educativa de la familia. *Rev. Cuba. Med. Gen. Integr.* **2017**, *33*, 100–114.
3. Perea, R. La familia como contexto para un desarrollo saludable. *Rev. Española Pedagog.* **2006**, año LXIV, 417–428.
4. Kimiecik, J.; Horn, T. Examining the relationship between family context and children's physical activity beliefs: The role of parentig style. *Phychol. Sport Exerc.* **2012**, *13*, 10–18. [[CrossRef](#)]
5. Sanz-Arazuri, E.; Ponce-de-León-Elizondo, A.; Valdemoros-San-Emeterio, M.A. Parental predictors of physical inactivity in Spanich adolescents. *J. Sports Sci. Med.* **2012**, *11*, 95–101.
6. Castillo, E.; Tornero, I.; García, J.A. Relación entre actividad física, alimentación y familia en edad escolar. *Retos* **2018**, *34*, 85–88.
7. Kremer-Sadlik, T.; de Kim, J.L. Lessons form sports: Childrens'socialization to values through family income and parents'education. *Prev. Med.* **2007**, *44*, 410–415.
8. Marques, A.; Martins, J.; Sarmiento, H.; Diniz, J.; Carreiro da Costa, F. Adolescents'physical activity profile according to parental physical activity participation. *J. Hum. Sport Exerc.* **2014**, *9*, 81–90. [[CrossRef](#)]
9. Zaborskis, A.; Zemaitiene, N.; Borup, I.; Kuntsche, E.; Moreno, C. Family joint activities in a cross national perspective. *BMC Public Health* **2007**, *7*, 1–14. [[CrossRef](#)]
10. Jones, R.A.; Hinkley, T.; Okely, A.D.; Salmon, J. Tracking physical activity and sedentary behavior in childhood: A systematic review. *Prev. Med.* **2013**, *44*, 651–658. [[CrossRef](#)]
11. Tammelin, R.; Yang, X.; Leskinen, E.; Kankaanpaa, A.; Hirvensalo, M.; Tammelin, T. Tracking of physical activity from early childhood through youth into adulthood. *Med. Sci. Sports Exerc.* **2014**, *46*, 955–962. [[CrossRef](#)]
12. Arundell, L.; Fletcher, E.; Salmon, J.; Veitch, J.; Hinkley, T.A. Systematic review of the prevalence of sedentary behavior during the after-school period among children aged 5–18 years. *J. Behav. Nutr. Phys. Act.* **2016**, *13*. [[CrossRef](#)] [[PubMed](#)]
13. Arundell, L.; Salomon, J.; Timperio, A. The Relationship between Objectively Measured and Serlf-Reported Sedentary Behaviours and Social Connectedness among Adolescents. *J. Environ. Res. Public Health* **2019**, *16*, 277. [[CrossRef](#)] [[PubMed](#)]
14. Määttä, S.; Kaukonen, R.; Vepsäläinen, H.; Lehto, E.; Ylonen, A.; Ray, C.; Erkkola, M.; Roos, E. The mediation role of the home environment in relation to parental educational level and preschool children's screen time: A cross-sectional study. *BMC Public Health* **2017**, *17*, 688. [[CrossRef](#)] [[PubMed](#)]
15. Noriega, M.J.; Canser, P.; Santamaría, A.; Amigo, M.T.; Guerra, O.; Casuso, I.; Micó, C.; Sobaler, S.; Carrasco, M.; Salcines, R.; et al. Hábitos sedentarios en adolescentes escolarizados en Cantabria. *Retos* **2015**, *27*, 3–7.

16. Demetriou, Y.; Vondung, C.; Buchsch, J.; Schlund, A.; Schulze, C.; Knapp, G.; Coen, S.; Puil, L.; Phillips, S.; Reimers, A. Interventions on children's and adolescents' physical activity and sedentary behaviour: Protocol for a systematic review from a sex/gender perspective. *Syst. Rev.* **2019**, *8*, 65. [CrossRef]
17. Dumith, S.C.; Hallal, P.C.; Reis, R.S.; Kohl, H.W. Worldwide Prevalence of Physical Inactivity and its Association with Human Development Index in 76 Countries. *Prev. Med.* **2011**, *53*, 24–28. [CrossRef]
18. WHO. World Health Organization recommendations in Physical Activity and Health, Geneva, Suiza. 2010. Available online: http://www.who.int/dietphysicalactivity/factsheet_recommendations/es/index.html (accessed on 20 November 2019).
19. Page, A.; Peeters, G.; Merom, D. Adjustment for physical activity in studies of sedentary behaviour. *Emerg. Themes Epidemiol.* **2015**, *12*, 10. [CrossRef]
20. Cliff, D.P.; Hesketh, K.D.; Vella, S.A.; Hinkley, T.; Tsiros, M.D.; Ridgers, N.D.; Carver, A.; Veitch, J.; Parrish, A.M.; Hardy, L.L.; et al. Objectively measured sedentary behaviour and health and development in children and adolescents: Systematic review and meta-analysis. *Obes. Rev.* **2016**, *17*, 330–344. [CrossRef]
21. Cooper, A.R.; Goodman, A.; Page, A.S.; Sherar, L.B.; Esliger, D.W.; Van Sluijs, E.M.; Ekelund, U. Objectively measured physical activity and sedentary time in youth: The international children's accelerometry database (ICAD). *J. Behav. Nutr. Phys. Act.* **2015**, *12*, 732. [CrossRef]
22. Dumuid, D.; Olds, T.; Lewis, L.; 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*, 736. [CrossRef] [PubMed]
23. Parker, K.E.; Salmon, J.; Brown, H.L.; Villanueva, K.; Timperio, A. Typologies of adolescent activity related health behaviours. *J. Sci. Med. Sport* **2018**, *22*, 319–323. [CrossRef] [PubMed]
24. Bagordo, F.; De Donno, A.; Grassi, T.; Guido, M.; Devoti, G.; Ceretti, E.; Zani, C.; Feretti, D.; Villarini, M.; Moretti, M.; et al. Lifestyles and socio-cultural factors among children aged 6–8 years from five Italian towns: The MAPEC_LIFE study cohort. *BMC Public Health* **2017**, *17*, 1–12. [CrossRef] [PubMed]
25. Cheung, P. Children's after-school physical activity participation in Hong Kong: Does family socioeconomic status matter? *Health Educ. J.* **2017**, *76*, 221–230. [CrossRef]
26. Coombs, N.A.; Stamatakis, E. Associations between objectively assessed and questionnaire-based sedentary behaviour with BMI-defined obesity among general population children and adolescents living in England. *Bmj Open* **2015**, *5*, e007172. [CrossRef]
27. Sousa, G.; Silva, D. Sedentary behavior based on screen time: Prevalence and associated sociodemographic factors in adolescents. *Cien Saúde Colect* **2017**, *22*, 4061–4072. [CrossRef]
28. Thorp, A.A.; Owen, N.; Neuhaus, M.; Dunstan, D.W. Sedentary Behaviors and Subsequent Health Outcomes in Adults: A Systematic Review of Longitudinal Studies, 1996–2011. *Prev. Med.* **2011**, *41*, 207–215. [CrossRef]
29. Väistö, J.; Eloranta, A.M.; Viitasalo, A.; Tompuri, T.; Lintu, N.; Karjalainen, P.; Lampinen, E.-K.; Agren, J.; Laaksonen, D.; Lakka, H.; et al. Physical activity and sedentary behaviour in relation to cardiometabolic risk in children: Cross-sectional findings from the physical activity and nutrition in children (PANIC) study. *J. Behav. Nutr. Phys. Act.* **2014**, *11*, 1–10. [CrossRef]
30. Veijalainen, A.; Tompuri, T.; Haapala, E.A.; Viitasalo, A.; Lintu, N.; Väistö, J.; Lakka, T.A. Associations of cardiorespiratory fitness, physical activity, and adiposity with arterial stiffness in children. *Scand. J. Med. Sci. Sports* **2016**, *26*, 943–950. [CrossRef]
31. Carson, V.; Kuzik, N.; Hunter, S.; Wiebe, S.A.; Spence, J.C.; Friedman, A.; Tremblay, M.S.; Slater, L.G.; Hinkley, T. Systematic review of sedentary behavior and cognitive development in early childhood. *Prev. Med.* **2015**, *78*, 115–122. [CrossRef]
32. Baradaran Mahdavi, S.; Bolourinejad, P.; Heshmat, R.; Motlagh, M.E.; Ziadini, H.; Taheri, M.; Ahadi, Z.; Qoebani, M.; Kelishadi, R. Association of Sedentary Leisure Time with School Performance in Children and Adolescents: The CASPIAN-V Study. *Int. J. Pediatr.* **2019**, *7*, 9557–9566. [CrossRef]
33. Downing, K.; Hinkley, T.; Salmon, J.; Hnatiuk, J.; Hesketh, K. Do the correlates of screen time and sedentary time differ in preschool children? *BMC Public Health* **2017**, *17*, 285. [CrossRef]
34. Basterfield, L.; Jones, A.R.; Parkinson, K.N.; Reilly, J.; Pearce, M.S.; Reilly, J.J.; Adamson, A.J. Physical activity, diet and BMI in children aged 6–8 years: A cross-sectional analysis. *Bmj Open* **2014**, *4*, e005001. [CrossRef] [PubMed]
35. Barbosa, S.C.; De Oliveira, A.R. Physical Activity of Preschool Children: A Review. *Physiother. Rehabil.* **2016**, *1*, 111. [CrossRef]

36. Guerra, P.H.; Farias, J.C.; Florindo, A.A. Sedentary behavior in Brazilian children and adolescents: A systematic review. *Rev. Saúde Pública* **2016**, *50*, 9. [[CrossRef](#)] [[PubMed](#)]
37. Straatmann, V.S.; Almquist, Y.B.; Oliveira, A.J.; Velga, G.V.; Rostila, M.; Lopes, C.S. Stability and bidirectional relationship between physical activity and sedentary behaviours in Brazilian adolescents: Longitudinal findings from a school cohort study. *PLoS ONE* **2019**, *14*, e0211470. [[CrossRef](#)] [[PubMed](#)]
38. Pelegrín, A.; González, H.; Garcés, E.J. Estilos educativos parentales percibidos en adolescentes, practicantes de actividad física, federados y competidores. *Retos* **2019**, *38*, 92–96.
39. Huppertz, C.; Bartels, M.; De Geus, E.J.C.; Van Beijsterveldt, C.E.M.; Rose, R.J.; Kapiro, J.; Silventoinen, K. The effects of parental education on exercise behavior in childhood and youth: A study in Dutch and Finnish twins. *Scandinavian J. Med. Sci. Sports* **2016**, *27*, 1143–1156. [[CrossRef](#)]
40. Vidal-Conti, J. Identification of physical activity predictors in schoolchildren according to a socio-ecological model using multifactorial analysis. *Cult. Cienc. Y Deporte* **2016**, *11*, 51–59.
41. Edwardson, C.L.; Gorely, T. Parental influences on different types and intensities of physical activity in youth: A systematic review. *Psychol. Sport Exerc.* **2010**, *11*, 522–535. [[CrossRef](#)]
42. Fairclough, S.J.; Boddy, L.M.; Hackett, A.F.; Stratton, G. Associations between children's socioeconomic status, weight status, and sex, with screen-based sedentary behaviours and sport participation. *Int. J. Pediatric Obes.* **2009**, *4*, 299–305. [[CrossRef](#)] [[PubMed](#)]
43. Stenhammar, C.; Sarkadi, A.; Edlund, B. The role of parents' educational background in healthy lifestyle practices and attitudes of their 6-year-old children. *Public Health Nutr.* **2007**, *10*, 1305–1313. [[CrossRef](#)] [[PubMed](#)]
44. Anderssen, N.; Wold, B.; Torsheim, T. Are parental health habits transmitted to their children? An eight year longitudinal study of physical activity in adolescents and their parents. *J. Adolesc.* **2006**, *29*, 513–524. [[CrossRef](#)] [[PubMed](#)]
45. Lasheras, L.; Aznar, S.; Merino, B.; López, E.G. Factors associated with physical activity among Spanish youth through the National Health Survey. *Prev. Med.* **2001**, *32*, 455–464. [[CrossRef](#)] [[PubMed](#)]
46. Kantomaa, M.T.; Tammelin, T.H.; Nayha, S.; Taanila, A.M. Adolescents' physical activity in relation to family income and parents' education. *Prev. Med.* **2007**, *44*, 410–415. [[CrossRef](#)] [[PubMed](#)]
47. Palou, P.; Ponseti, F.; Gili, M.; Borrás, P.; Vidal, J. Profile of athletic habits of pre-adolescents in Mallorca. *Rev. De Psicol. Del Deporte* **2005**, *14*, 225–236.
48. Gordon-Larsen, P.; McMurray, R.; Popkin, B.M. Determinants of adolescent physical activity and inactivity patterns. *Pediatrics* **2000**, *105*, e83. [[CrossRef](#)]
49. Román, B.; Serra, L.L.; Ribas, L.; Pérez-Rodrigo, C.; Aranceta, J. Physical activity in Spanish youth's in free time. *Apunt. Medinina De L'esport* **2006**, *41*, 86–94.
50. Martins, J.; Torres, B.; Cardonso, J.; Costa, A.; Honorio, S. Influence of sociological aspects on the level of physical activity in physical education students. *J. Hum. Sport Exerc.* **2015**, *10*, 815–826. [[CrossRef](#)]
51. Álvarez, M.; Torres, A.; Rodríguez, E.; Padilla, S.; Rodrigo, M.J. Attitudes and parenting dimensions in parents' regulation of internet use by primary and secondary school children. *Comput. Educ.* **2013**, *67*, 69–78. [[CrossRef](#)]
52. Padilla, S.; Rodríguez, E.; Álvarez, M.; Torres, A.; Suárez, A.; Rodrigo, M.J. The influence of the family educational scenario on internet use of primary and secondary school children. *J. Study Educ. Dev.* **2015**, *38*, 402–434. [[CrossRef](#)]
53. Cuervo, C.; Cachón, J.; González, C.; Zagalaz, M.L. Hábitos alimentarios y práctica de actividad física en adolescentes. *J. Sport Health Res.* **2017**, *9*, 75–84.
54. Cancela-Carral, J.M.; Lago-Ballesteros, J.; Ayan-Perez, C.; Mosquera, M.B. Análisis de validez y fiabilidad de tres cuestionarios de autoinforme para valorar la actividad física realizada por adolescentes españoles. *Gac. Sanit.* **2016**, *30*, 333–338. [[CrossRef](#)] [[PubMed](#)]
55. Chillón, P.; Herrador-Colmenero, M.; Migueles, J.; Cabanas-Sánchez, V.; Fernández-Santos, J.; Veiga, O.; Castro-Piñero, J. Convergent validation of a questionnaire to assess the mode and frequency of commuting to and from school. *Scand. J. Public Health* **2017**, *45*, 612–620. [[CrossRef](#)]
56. Muñoz-Galiano, I.; Hernández-García, R.; Torres-Luque, G. Influencia del nivel educativo del progenitor sobre la práctica de actividad física en estudiantes de Educación Infantil. *J. Sport Health Res.* **2019**, *11*, 161–170.

57. Ministry of Health, Social Policy and Equality of Spanish Government. *Adolescent Development and Health in Spain. Summary of the Health Behavior in School Aged Children Study (HBSC-2006)*; Paseo del Prado Publication Center: Madrid, España, 2006.
58. Booth, M.L.; Okely, A.D.; Chey, T.; Bauman, A. The reliability and validity of the physical activity questions in the WHO health behaviour in schoolchildren (HBSC) survey: A population study. *Br. J. Sports Med.* **2001**, *35*, 263–267. [[CrossRef](#)]
59. Grao-Cruces, A.; Nuviala, A.; Fernández-Martínez, A.; Martínez-López, E. Relationship of physical activity and sedentarism with tobacco and alcohol consumption, and Mediterranean diet in Spanish teenagers. *Nutr. Hosp.* **2015**, *31*, 1693–1700. [[CrossRef](#)]
60. Gray, C.; Gibbons, R.; Larouche, R.; Hansen, E.B.; Bienenstock, A.; Brussoni, M.; Chabot, G.; Herrington, S.; Janssen, I.; Pickett, W.; et al. What is the relationship between outdoor time and physical activity, sedentary behaviour, and physical fitness in children? A systematic review. *J. Environ. Res. Public Health* **2015**, *12*, 6455–6474. [[CrossRef](#)]
61. Hesketh, K.D.; Hinkley, T.; Campbell, K.J. Children's physical activity and screen time: Qualitative comparison of views of parents of infants and preschool children. *J. Behav. Nutr. Phys. Act.* **2012**, *9*, 152. [[CrossRef](#)]
62. Davis-Kean, P.E. The Influence of Parent Education and Family Income on Child Achievement: The Indirect Role of Parental Expectations and the Home Environment. *J. Fam. Psychol.* **2005**, *19*, 294–304. [[CrossRef](#)]
63. Mitchell, J.; Skouteris, H.; McCabe, M.; Ricciardelli, L.A.; Milgrom, J.; Baur, L.A.; Fuller-Tyszkiewicz, M.; Dwyer, G. Physical activity in young children: A systematic review of parental influences. *Early Child Dev. Care* **2012**, *182*, 1411–1437. [[CrossRef](#)]
64. Vereecken, C.A.; Keukelier, E.; Maes, L. Influence of mother's educational level on food parenting practices and food habits of young children. *Appetite* **2004**, *43*, 93–103. [[CrossRef](#)] [[PubMed](#)]
65. Deslandes, R.; Rousseau, M. Long-term students' management strategies and parental involvement in homework at the elementary level. *Int. J. Parents Educ.* **2008**, *2*, 13–24.
66. Lampinen, E.K.; Eloranta, A.M.; Haapala, E.A.; Lindi, V.; Väistö, J.; Lintu, N.; Karjalainen, P.; Kukkonen-Harjula, K.; Laaksonen, D.; Lakka, T.A. Physical activity, sedentary behaviour, and socioeconomic status among Finnish girls and boys aged 6–8 years. *Eur. J. Sport Sci.* **2017**, *17*, 462–472. [[CrossRef](#)] [[PubMed](#)]
67. Ball, K.; Cleland, V.J.; Timperio, A.F.; Salmon, J.; Crawford, D.A. Socioeconomic position and children's physical activity and sedentary behaviors: Longitudinal findings from the CLAN study. *J. Phys. Act. Health* **2009**, *6*, 289–298. [[CrossRef](#)] [[PubMed](#)]
68. Tandon, P.S.; Zhou, C.; Sallis, J.F.; Cain, K.L.; Frank, L.D.; Saelens, B.E. Home environment relationships with children's physical activity, sedentary time, and screen time by socioeconomic status. *J. Behav. Nutr. Phys. Act.* **2012**, *9*, 88. [[CrossRef](#)]
69. Keith, T.Z.; Reimers, T.M.; Fehrmann, P.G.; Pottebaum, S.M.; Aubey, L.W. Parental involvement, homework, and TV time: Direct and indirect effects on high school achievement. *J. Educ. Psychol.* **1986**, *78*, 373. [[CrossRef](#)]

