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Trends and correlates of the time spent playing videogames in Italian children and adolescents

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Abstract

Background: The use of electronic devices and screen-time behaviours among young people have increased in the last two decades. However, empirical evidence on trends in time spent playing videogames among Italian youths is lacking. The present study examined trends and correlates of the time spent by children and adolescents playing videogames in Italy between 2006 and 2014.

Methods: Data from the cross-sectional Italian Health School-aged Children (2006-2010-2014) study was used. The sample comprised 12,748 children and adolescents (Mage = 13.63, SD = 1.66; 50.2% males, n = 6,398). Ordinal regression models were used to analyse the data and odds ratios were reported.

Results: The time spent playing videogames increased significantly between 2006 and 2014. In particular, children and adolescents who played videogames three hours a day or more consistently increased over time (boys: from 16.6% in 2006 to 25.8% in 2014; girls: from 3.6% in 2006 to 20.8% in 2014). The results of the analyses showed associations between time spent playing videogames and sociodemographic and school characteristics, such as, age, gender, family socio-economic status, physical activity and body mass index, poor school engagement and students' acceptance. Furthermore, bullying episodes, psychological and somatic complaints were associated with the time that children and adolescents spent playing videogames.

Conclusion: From a public health perspective, the results highlight the need to monitor the increasing excessive videogame use among young people in Italy.

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1. Introduction

The use of electronic devices and screen-time behaviours among children and adolescents have increased in the last two decades. Between 2002 and 2010, the time spent watching television decreased while the computer use (both for gaming and non-gaming purposes) increased, as

reported by a cross-national study analysing screen-time behaviours in young people across 30 countries (Bucksch et al., 2016). In particular, for all countries combined, daily computer use increased by around two hours for both boys and girls. Prevalence of daily time of one hour or more spent playing videogames increased from 8.2% in 1999/2000 to 22.4% in 2008/2009 among Chinese children (Gong et al., 2019). Similarly, the daily average time spent on videogames and use of electronic devices increased among Canadian and U.S. adolescents between 2006 and 2017 (Prince et al., 2020; Wang et al., 2019).

In Italy, information on trends in time spent playing videogames among children and adolescents is lacking. Patriarca and colleagues explored videogames use of young people living in the region of Campania in 2007 (Patriarca et al., 2009). 59.6% (n= 588) of participants played videogames with a mean of 1.6 hours per day. The results of the analysis conducted by the authors showed that time spent playing videogames was positively associated with a younger age, male gender, and low parental monitoring.

Previous studies showed that videogames use correlated with both positive and negative aspects. Indeed, it is associated with high intellectual functioning and academic achievement (Kovess-Masfety et al., 2016) and can be used to enhance visuospatial competencies (Milani et al., 2019) as well as to promote emotional intelligence if integrated with a guided and assisted framework (Carissoli & Villani, 2019). On the other hand, adolescent gamers spent less time in other activities such as reading, doing homework, and with parents and friends (Cummings & Vandewater, 2007). Moreover, more time spent playing videogames is related to problematic gaming or Internet Gaming Disorder (Ferraro et al., 2020; Grüsser et al., 2007; Lukavská et al., 2016; Wichstrøm et al., 2019), poorer psychophysical health (Carli et al., 2014; Kaczmarek & Drążkowski, 2014; Mikuška & Vazsonyi, 2018; Wang et al., 2019; Yabe et al., 2018) and physical aggression (Prescott et al., 2018). For example, Przybylski (2014) showed that electronic game engagement (i.e., daily hours of console or computer game engagement) was positively associated with symptoms of internalizing and externalizing problems in a nationally representative sample of UK children and adolescents. At the same time, electronic game engagement was negatively associated with children's psychosocial adjustment in terms of prosocial behavior and life satisfaction. Longitudinal research showed that internet or videogames use over time predicted symptoms of depression and suicidal thoughts at two-year follow-up after controlling for the effect of sociodemographic covariates and symptoms of depression and suicidal thoughts at baseline among young users (Baggio et al., 2016).

Consistent scientific efforts have been made in studying risk factors for excessive and/or problematic gaming as well as problematic gambling and other behavioral addictions during the last decade. The biopsychosocial model posits that multiple causes, including biological/genetic, psychological, familial and sociocultural factors, determine vulnerability to addictive behaviors (Griffiths, 2005). Several factors are associated with excessive and problematic gaming, such as demographic and familial factors, interpersonal relations, social and school functioning, personality, psychiatric comorbidity and physical health conditions (Amendola et al., 2019a, 2019b; Mihara & Higuchi, 2017). Rehbein and Baier (2013) conducted a 5-year longitudinal study in a sample of 406 German children and adolescents. The authors showed that single-parent families, low experienced school well-being and low social integration in class were risk factors for problematic gaming. Yu et al. (2015) pointed out the predictive effects of teacher autonomy support, basic psychological needs satisfaction and school engagement on adolescent problematic gaming at two-year follow-up. Furthermore, low social competence, low self-esteem and loneliness predicted problematic gaming at two-year follow-up (Lemmens et al., 2011). Concomitantly, problematic gaming increased adolescents' feeling of loneliness.

Two important aspects that need to be considered in studying videogames use are related to the complexity of new technologies (e.g., their diverse uses and applications) and to its associations with symptoms of other behavioral addictions, especially gambling. The complexity to which reference is made regards the interrelations of new technologies use. Latest generation of mobile phones (i.e., smartphones) allows easy accessibility and usability of internet, videogames and online gambling services. Videogames users may play online or offline. Gamblers may also bet both online and offline. Importantly, some videogames share similar structural and psychological characteristics (e.g., videogame loot boxes) with gambling (Close et al., 2021; King et al., 2015). Drummond et al. (2020) explored associations between symptoms of problem gambling and gaming and monthly expenditure on loot boxes in three samples of adults (from Australia, New Zealand and United States). The authors showed that symptoms of problem gambling and gaming were positively associated and both of them correlated with monthly expenditure on loot boxes. Problematic gamblers and gamers present both similarities and differences in characteristic symptoms and risk factors (Mallorquí-Bagué et al., 2017; Müller et al., 2014; Potenza et al., 2012; Walther et al., 2012), but involvement and/or overinvolvement in one is not a strong predictor of involvement and/or overinvolvement in the other (Sanders & Williams, 2019). According to both correlational and longitudinal research, published studies suggested that despite significant associations, problematic gaming in an unlikely predictor for problem gambling in adolescence (Delfabbro et al., 2009; Vadlin et al., 2018). However,

considering adolescent vulnerability the relationship between gaming and gambling needs to be further investigated (Frisone et al., 2020).

Recently, the Italian Pediatric Society has published its recommendations on the use of media devices among children and adolescents (Bozzola et al., 2018, 2019). The authors recommended no use of media devices in children under two years of age as well as limiting exposure to less than one and two hours per day in children aged 2-5 years and 5-8 years, respectively. Regarding adolescents, they provided advice for parents and clinicians such as improve communication about the use of media devices.

From a public health perspective, researchers need to monitor trends in the use of electronic devices to describe and understand the dynamics of adolescent psychological change over time, as well as providing information about the effectiveness of policies and programs addressing excessive use (Bucksch et al., 2016; Jebb et al., 2015; Király et al., 2018).

1.1 Aims of the study

In light of the above, the present study aims to estimate the prevalence and temporal trend in time spent playing videogames and its correlates among Italian children and adolescents from 2006 to 2014 using data from the Health Behaviour in School-aged Children (HBSC) study. Based on previous studies, it was predicted that the amount of daily time that children and adolescent spent playing videogame increased over time. Moreover, associations between videogame use, gender, age, bullying episodes and psychophysical complaints were expected.

2. Methods

2.1 The HBSC study

The HBSC study is conducted every four years in more than 40 countries and regions across Europe and North America in partnership with the Regional Office for Europe of the World Health Organization. The cross-national study aim is to inform policy and practise to improve the young people lives. Since 2001/02, Italy has been involved in the HBSC study. In Italy, HBSC data collection has been coordinated by a multidisciplinary team of researchers from the Universities of Turin, Siena, and Padua. The questionnaire comprises several questions exploring health behaviours and complaints, school context, family and peer relationships. Data collection is conducted under a multidisciplinary protocol developed (and updated over the years) by the international surveillance group made up of researchers from all the participating countries (Currie et al., 2014; Inchley et al., 2018). Ethical approval for the Italian study protocol was sought from the involved institutions under the lead of Prof. Franco Cavallo (University of

Turin, Principal Investigator for HBSC in Italy) (Lazzeri et al., 2010, 2018; Perasso et al., 2020). An opt-out consent form was used (i.e., parents were asked to explicitly refuse their child's participation) and all data was collected anonymously.

Data from the Italian HBSC 2006, 2010, and 2014, was obtained from the HBSC Data Management Centre (https://www.uib.no/en/hbscdata), that coordinates the work with the international datafile and the trend data, and is the Data Bank for the HBSC study.

2.2. Study sample

Three waves of the Italian HBSC (2005/06, 2009/10, 2013/14) collected data on daily time spent playing videogames (i.e., computer and console games) among 12,860 children and adolescents (age groups: 11-, 13- and 15-year-olds). Specifically, 3,951 students from 349 secondary schools participated in 2006, 4,837 from 285 schools in 2010, and 4,072 from 178 schools in 2014. Probability proportional to size sampling was used to obtain nationally representative samples of students.

Data from 112 participants (0.87% of the total sample) was excluded from the final sample due to the following reasons: lack of data on daily time spent playing videogames (during weekdays) (n= 89), participants responded to less than half of the items used for the purpose of the present study (n= 16), for both of the above reasons (n= 7). Thus, the final sample included 12,748 students (50.2% males, n= 6,398) with a mean age of 13.63 (SD= 1.66). The participants excluded versus the participants included differed in survey wave ($\chi 2$= 6.70, p= .035, Cramer's V= .023), age (F= 6.23, p= .013), gender ($\chi 2$= 9.98, p= .002, Cramer's V= .028), and socioeconomic status (SES) ($\chi 2$= 10.76, p= .005, Cramer's V= .029). More participants from the HBSC 2014 wave (1.1%, standardized residual= 1.3) than from HBSC 2006 wave (0.6%, standardized residual= -1.3) were excluded. The participants excluded (M_{age}= 13.23, SD= 1.78) were also younger than those included (M_{age}= 13.63, SD= 1.66). Finally, more boys (1.1%, standardized residual= 2.2) than girls (0.6%, standardized residual= -2.2) and more participants of low SES (1.3%, standardized residual= 2.6) than those of high SES (0.5%, standardized residual= -1.7) were excluded due to missing data.

2.3 Measures

All of the following measures have been described in detail elsewhere (Currie et al., 2014; Inchley et al., 2018).

Videogames use. The time spent playing videogames on weekdays was measured asking to the participants the following question: "About how many hours a day do you usually play games

on a computer or games console (Playstation, Xbox, GameCube etc.) in your free time?". The item slightly changed in HBSC 2014 taking into account the use of other new technological devices to play games ("How many hours a day, in your free time, do you usually spend playing games on a computer, games console, tablet (like iPad), smartphone or other electronic device (not including moving or fitness games)?"). Response options were "none", "about half an hour", "about 1 hour", "about 2 hours", "about 3 hours", "about 4 hours", "about 5 hours", "about 6 hours", "about 7 hours or more".

Sociodemographic characteristics. Age, gender, and socio-economic status (SES) were recorded. SES was calculated using the following four questions on family affluence administered at each of the three survey waves: "Does your family own a car, van or truck?" (0= *none,* 1= *one,* 2= *two or more*), "Do you have your own bedroom for yourself?" (0= *no,* 1= *yes*), "How many computers does your family own?" (0= *none,* 1= *one,* 2= *two or more*), "How many times did you and your family travel out of your country for a holiday/vacation last year?" (0= *not at all,* 1= *once,* 2= *twice or more*). As previously done (Bosakova et al., 2020), the total score was converted to a score ranging from 0 to 1. Subsequently, tertile categories of low (0–0.333), medium (0.334–0.666) and high (0.667–1) socio-economic position have been created.

Family and school characteristics. Communication between parents (i.e., father, mother) and adolescents ("How easy is it for you to talk to the following persons about things that really bother you?") was measured. Those items serve as a valuable measure of relationship quality with parents. Responses were then recoded as 0 (*do not have or see*), 1 (*difficult, very difficult*), and 2 (*easy, very easy*).

Perceived academic achievement was measured asking "In your opinion, what does your class teacher(s) think about your school performance compared to your classmates?". Responses options were recoded as 0 (*below average*), 1 (*average*), 2 (*good, very good*).

One item on school engagement measured participants' emotional and psychological connectedness to school ("How do you feel about school at present?"). Response options were dichotomized and recoded as 0 (*I don't like it at all, I don't like it very much*) and 1 (*I like it a bit, I like it a lot*). Participants were asked to rate students' acceptance ("Other students accept me as I am") on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree". The answer was recoded as 0 (*strongly disagree, disagree*), 1 (*neither agree nor disagree*), and 2 (*agree, strongly agree*). Finally, school demands on participants were measured by a single item on the global feeling of being pressured by the demands of schoolwork ("How pressured do you feel by the

schoolwork you have to do?"). Participants responded on a 4-point Likert scale from 1 (*not at all*) to 4 (*a lot*).

Health behaviours and complaints. Physical activity was examined asking the participants to report how many hours a week they usually exercise in their free time ("Outside school hours: how many hours a week do you usually exercise in your free time so much that you get out of breath or sweat?"). Responses were then dichotomized as 0 (*none*) and 1 (*at least half an hour*). Body mass index was also recorded.

The HBSC symptom checklist of psychosomatic complaints included eight items. The scale is used as a non-clinical measure of subjective health complaints in the last six months and covers eight symptoms: headache, abdominal pain, backache, feeling low, irritability or bad mood, feeling nervous, sleeping difficulties and dizziness. Participants responded on a 5-point Likert scale from 1 (*about every day*) to 4 (*rarely or never*). Total scores of the psychological and somatic dimensions were used. Higher values indicate fewer and less severe complaints.

Bullying episodes during the past two months were examined. Participants were asked to report how often they have been bullied or taken part in bullying another student at school. Responses were dichotomized as 0 (*I have not been bullied/bullied another students*) and 1 (*at least once or twice*).

Health status and life satisfaction. Participants were asked to rate their health ("How healthy do you think you are?") choosing one among four response options (*excellent, good, fair, poor*). Life satisfaction was measured using a one-item scale (from 0= *worst possible life* to 10= *best possible life*).

2.4 Statistical analyses

Descriptive statistics (i.e., frequencies, prevalence, mean, standard deviation) were used to examine the characteristics of the sample. Single and multivariable generalized ordinal logistic regression (based on the use of Likelihood ratio chi-square tests) were used to assess unadjusted (model 1: all factors fitted separately) and adjusted (model 2: all factors fitted jointly) associations between time spent playing videogames and socio-demographic, family and school characteristics and health behaviours. The parallel lines assumption (or proportional odds assumption) was tested using Brant test (Brant, 1990) assuming that the values of the regression coefficient were equal in each category of the dependent variable. If the parallel lines assumption is rejected, an approach that relaxes this assumption is needed (Yu & Park, 2020). The partial proportional odds (PPO) model which allows coefficients that violate the proportional odds assumption to vary across logit equations was used (Fullerton, 2009). Odds Ratios (OR) with

corresponding 95% confidence interval (CI) and *p*-values were reported. Statistical significance was established at $p < 0.05$. All statistical analyses were conducted using SPSS Version 26 and RStudio Version 1.2.5033 packages "brant" and "ordinal".

3. Results

3.1 Time spent playing videogames

Characteristics of the sample by HBSC survey wave are reported in Table 1S (Appendix). Table 1 and Figure 1 show information on time spent playing videogames according to HBSC survey wave and gender. The participants who did not use videogames decreased from 34.8% to 15.9% in the total samples between 2006 and 2014 (Figure 1A). 55% of participants reported a daily time between half an hour and two hours spent playing videogames in 2006. That percentage slightly increased to 60.9% in 2014. The percentage of participants who spent three hours or more per day playing videogames increased from 10.2% in 2006 to 23.3% in 2014.

Table 1. Time spent playing videogames according to gender and HBSC survey wave

Variable	Total sample			Male			Female		
	2006 n (%)	2010 n (%)	2014 n (%)	2006 n (%)	2010 n (%)	2014 n (%)	2006 n (%)	2010 n (%)	2014 n (%)
None	1,368 (34.8)	1,198 (25)	640 (15.9)	385 (19.4)	372 (15.5)	236 (11.7)	983 (50.5)	826 (34.5)	404 (20.1)
Half an hour	786 (20)	1,028 (21.5)	869 (21.6)	351 (17.7)	452 (18.9)	337 (16.7)	435 (22.3)	576 (24.1)	532 (26.5)
1 hour	858 (21.8)	1,091 (22.8)	953 (23.7)	546 (27.6)	648 (27.1)	544 (26.9)	312 (16)	443 (18.5)	409 (20.4)
2 hours	518 (13.2)	701 (14.6)	629 (15.6)	370 (18.7)	435 (18.2)	384 (19)	148 (7.6)	266 (11.1)	245 (12.2)
3 hours	209 (5.3)	359 (7.5)	376 (9.3)	174 (8.8)	230 (9.6)	242 (12)	35 (1.8)	129 (5.4)	134 (6.7)
4 hours	70 (1.8)	176 (3.7)	180 (4.5)	57 (2.9)	109 (4.6)	104 (5.1)	13 (0.7)	67 (2.8)	76 (3.8)
5 hours	42 (1.1)	87 (1.8)	140 (3.5)	30 (1.5)	51 (2.1)	64 (3.2)	12 (0.6)	36 (1.5)	76 (3.8)
6 hours	18 (0.5)	57 (1.2)	75 (1.9)	14 (0.7)	37 (1.5)	34 (1.7)	4 (0.2)	20 (0.8)	41 (2)
7 hours or more	60 (1.5)	93 (1.9)	167 (4.1)	54 (2.7)	61 (2.5)	77 (3.8)	6 (0.3)	32 (1.3)	90 (4.5)

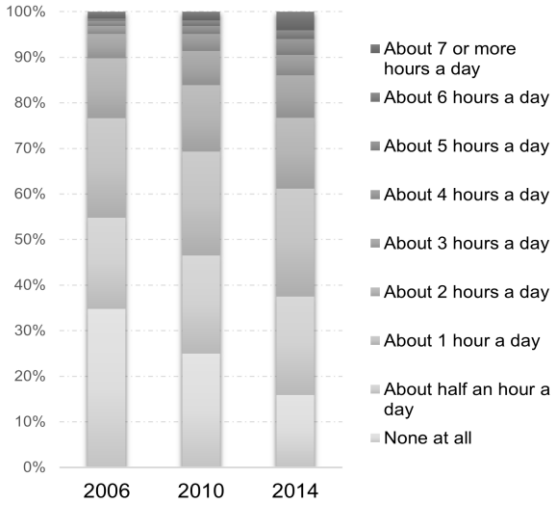
Valid percentage is reported.

Data Sources: Italian Health Behaviour in School-aged Children (HBSC) studies (2006, 2010 and 2014).

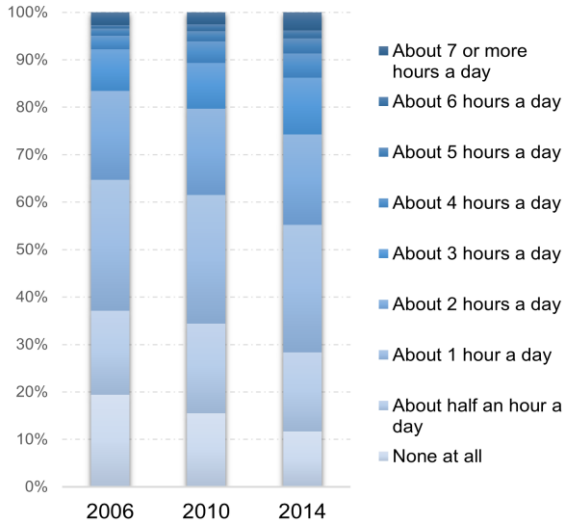
According to gender, the participants of both genders who did not play videogames decreased over time (i.e., from 19.4% in 2006 to 11.7% in 2014 among boys and from 50.5% to 20.1% among girls). The daily time between half an hour and two hours spent playing videogames slightly decreased from 64% in 2006 to 62.6% in 2014 among boys while increased from 45.9% to 59.1% among girls. Finally, the percentage of participants who spent three hours or more per day playing videogames increased from 16.6% in 2006 to 25.8% in 2014 among boys and from 3.6% to 20.8% among girls.

Figure 1. Percentage of response categories of time spent playing videogames according to HBSC survey wave and gender. Note: **a** response categories according to total sample by wave; **b** response categories according to male gender by wave; **c** response categories according to female gender by wave

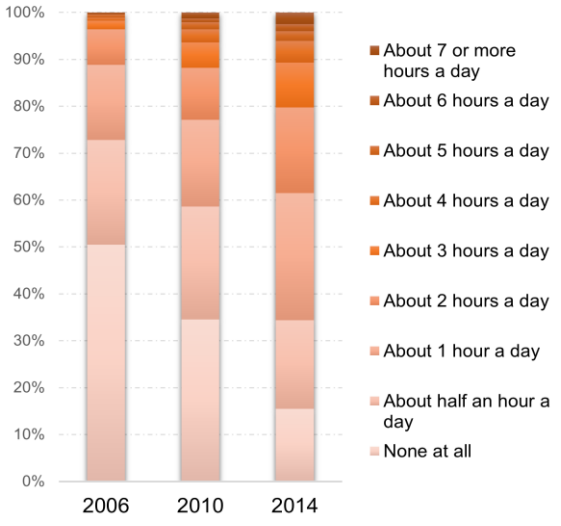
1a



1b



1c



3.2 Proportional ordered logistic model

The results of the unadjusted and adjusted models from proportional ordinal logit regression are shown in Table 2. In the adjusted model, HBSC wave, Age group, Gender, SES, School engagement, Students' acceptance, Body mass index, Somatic and Psychological complaints, Been bullied, Bullied others and Health were significantly associated with the time spent playing videogames. However, Brant test indicated that the adjusted model (model 2) violated the parallel lines assumption ($\chi2= 573.59$, $p< 0.001$). Specifically, the assumption of proportionality across the different categories of time spent playing videogames (cut-offs) was significantly violated for HBSC wave, age group, gender, physical activity and somatic complaints (Table 3). Therefore, as previously planned, an approach that relaxes the parallel lines assumption was chosen.

Table 2. Results of the ordered logit analyses of time spent playing videogames

Variable	Model 1: all fitted separately			Model 2: all fitted jointly		
	Coef. (SE)	OR (95% CI)	*p*-value	Coef. (SE)	OR (95% CI)	*p*-value
HBSC wave (Ref=2014)						
2006	- 0.843 (0.040)	0.43 (0.40, 0.47)	< 0.001	- 0.941 (0.046)	0.39 (0.36, 0.43)	< 0.001
2010	- 0.413 (0.038)	0.65 (0.60, 0.70)	< 0.001	- 0.456 (0.044)	0.63 (0.58, 0.69)	< 0.001
Sociodemographic						
Age group (Ref=15 years)						
11 years	- 0.074 (0.039)	0.93 (0.86, 1.00)	0.060	0.102 (0.049)	1.11 (1.01, 1.22)	0.038
13 years	0.206 (0.039)	1.23 (1.14, 1.33)	< 0.001	0.220 (0.044)	1.25 (1.14, 1.36)	< 0.001
Gender (Ref=Male)						
Female	- 0.937 (0.032)	0.39 (0.37, 0.42)	< 0.001	- 0.939 (0.040)	0.39 (0.36, 0.42)	< 0.001
SES (Ref=High)						
Low	- 0.389 (0.068)	0.68 (0.59, 0.77)	< 0.001	- 0.315 (0.081)	0.73 (0.62, 0.85)	< 0.001
Medium	- 0.050 (0.034)	0.95 (0.89, 1.02)	0.134	- 0.075 (0.039)	0.93 (0.86, 1.00)	0.057
Family and school						
Talk to father (Ref=Easy)						
Do not have or see	- 0.128 (0.089)	0.88 (0.74, 1.05)	0.155	- 0.044 (0.104)	0.96 (0.78, 1.17)	0.672
Difficult	- 0.105 (0.033)	0.90 (0.84, 0.96)	0.002	- 0.014 (0.042)	0.99 (0.91, 1.07)	0.735
Talk to mother (Ref=Easy)						
Do not have or see	0.024 (0.154)	1.02 (0.76, 1.39)	0.874	0.081 (0.183)	1.08 (0.76, 1.55)	0.659
Difficult	0.098 (0.041)	1.10 (1.02, 1.19)	0.016	0.005 (0.050)	1.00 (0.91, 1.11)	0.915
Perceived academic achievement (Ref=Above average)						
Below average	0.397 (0.60)	1.49 (1.32, 1.67)	< 0.001	0.080 (0.074)	1.08 (0.94, 1.25)	0.279
Average	0.222 (0.034)	1.25 (1.17, 1.33)	< 0.001	0.075 (0.040)	1.08 (1.00, 1.17)	0.064
School engagement (Ref=Yes)						
No	0.428 (0.032)	1.53 (1.44, 1.63)	< 0.001	0.262 (0.040)	1.30 (1.20, 1.41)	< 0.001
Students accept me (Ref=Yes)						
No	- 0.099 (0.057)	0.90 (0.81, 1.01)	0.083	- 0.163 (0.070)	0.85 (0.74, 0.97)	0.020
Neutral	- 0.100 (0.044)	0.90 (0.83, 0.99)	0.024	- 0.099 (0.051)	0.91 (0.82, 1.00)	0.055
Pressured by schoolwork (Ref=Not at all)						
A lot	0.200 (0.065)	1.22 (1.08, 1.39)	0.002	- 0.056 (0.079)	0.95 (0.81, 1.10)	0.482
Some	0.246 (0.059)	1.28 (1.14, 1.44)	< 0.001	0.093 (0.071)	1.10 (0.95, 1.26)	0.191
A little	0.122 (0.056)	1.13 (1.01, 1.26)	0.031	0.104 (0.066)	1.11 (0.97, 1.26)	0.116
Health behaviours and complaints						
Physical activity (Ref=Yes)						
No	- 0.208 (0.046)	0.81 (0.74, 0.89)	< 0.001	- 0.047 (0.055)	0.95 (0.86, 1.06)	0.392
Body mass index	0.028 (0.005)	1.03 (1.02, 1.04)	< 0.001	0.019 (0.006)	1.02 (1.01, 1.03)	0.001
Somatic complaints	- 0.013 (0.005)	0.99 (0.98, 0.99)	0.006	- 0.030 (0.006)	0.97 (0.96, 0.98)	< 0.001
Psychological complaints	- 0.021 (0.004)	0.98 (0.97, 0.99)	< 0.001	- 0.027 (0.006)	0.97 (0.96, 0.98)	< 0.001
Been bullied (Ref=No)						
Yes	0.215 (0.043)	1.24 (1.14, 1.35)	< 0.001	0.126 (0.052)	1.13 (1.02, 1.26)	0.016

Bullied others (Ref=No)						
Yes	0.356 (0.039)	1.43 (1.32, 1.54)	< 0.001	0.218 (0.047)	1.24 (1.13, 1.36)	< 0.001
Satisfaction						
Health (Ref=Excellent)						
poor	- 0.541 (0.188)	0.58 (0.40, 0.84)	0.004	- 1.214 (0.238)	0.30 (0.19, 0.47)	< 0.001
fair	- 0.035 (0.062)	0.97 (0.85, 1.09)	0.575	- 0.049 (0.079)	0.95 (0.82, 1.11)	0.532
good	- 0.116 (0.034)	0.89 (0.83, 0.95)	0.001	- 0.062 (0.040)	0.94 (0.87, 1.02)	0.122
Life satisfaction	- 0.015 (0.008)	0.98 (0.97, 1.00)	0.065	0.003 (0.011)	1.00 (0.98, 1.03)	0.780
Sample size		11,204 - 12,748			10,128	

OR: Odds Ratio. 95% CI: 95% confidence interval. Ref: reference category, SES: socio-economic status.

Data Sources: Italian Health Behaviour in School-aged Children (HBSC) studies (2006, 2010 and 2014).

Table 3. Results of the Brant test for parallel lines assumption

Variable	***χ2***	**df**
All	573.59**	126
HBSC wave	68.61**	7
Age group	29.44**	7
Gender	86.01**	7
SES	8.55	7
Talk to father	13.17	7
Talk to mother	5.15	7
Perceived academic achievement	7.54	7
School engagement	8.47	7
Students accept me	6.34	7
Pressured by schoolwork	9.52	7
Physical activity	46.41**	7
Body mass index	9.68	7
Somatic complaints	16.72*	7
Psychological complaints	14.22	7
Been bullied	9.24	7
Bullied others	12.08	7
Health	10.01	7
Life satisfaction	3.48	7

df: degree of freedom, SES: socio-economic status.

* $p< 0.05$

** $p< 0.001$

Data Sources: Italian Health Behaviour in School-aged Children (HBSC) studies (2006, 2010 and 2014).

3.3 Partial proportional odds (PPO) model

A likelihood ratio test was conducted to verify the statistical significance of the PPO model. The log likelihood was - 4'102.7, making the model statistically significant ($\chi2(22)= 8'205.4$, $p< 0.001$) (McFadden $R^2= .19$, Cox and Snell $R^2= .56$, Nagelkerke $R^2= .56$). The results of the PPO model assessing the relationship between variables of interest and time spent playing videogames are reported in Table 4. For the nine categories of the dependent variable, eight regression equations were fitted. Variables that violated the assumption of proportionality

across the different categories of time spent playing videogames have different coefficients across all the eight regression equations while other variables have a single constant coefficient.

The results of the analysis showed that low (OR= 0.73; 95% CI= 0.62-0.85) and medium (OR= 0.93; 95% CI= 0.86-1.00) SES were negatively associated with the time spent playing videogames. Participants of low and medium SES spent less time playing videogames than participants of high SES. Poor school engagement (OR= 1.30; 95% CI= 1.20-1.41), Body mass index (OR= 1.02; 95% CI= 1.01-1.03), bullying episodes during the past two months (Been bullied: OR= 1.14, 95% CI= 1.03-1.26; Bullied others: OR= 1.24, 95% CI= 1.13-1.36) were positively associated with the time spent playing videogames. Furthermore, Psychological complaints (OR= 0.97; 95% CI= 0.96-0.98) and poor Health (OR= 0.32; 95% CI= 0.20-0.51) were negatively associated with the time spent playing videogames. In other words, participants who showed less severe psychological complaints spent less time playing videogames. In addition, participants who reported poor health status played less than those with excellent health status.

Table 4. Partial proportional odds model analysis of time spent playing videogames

Time spent playing videogames level	Variable	Coef. (SE)	*z*-score	*p*-value	OR (95% CI)
All	SES (Ref=High)				
	Low	- 0.319 (0.081)	- 3.933	< 0.001***	0.73 (0.62, 0.85)
	Medium	- 0.078 (0.039)	- 1.979	0.048*	0.93 (0.86, 1.00)
	Talk to father (Ref=Easy)				
	Do not have or see	- 0.042 (0.103)	- 0.411	0.681	0.96 (0.78, 1.17)
	Difficult	- 0.007 (0.042)	- 0.162	0.871	0.99 (0.91, 1.08)
	Talk to mother (Ref=Easy)				
	Do not have or see	0.070 (0.183)	0.384	0.701	1.07 (0.75, 1.54)
	Difficult	- 0.001 (0.050)	- 0.020	0.984	1.00 (0.91, 1.10)
	Perceived academic achievement (Ref=Above average)				
	Below average	0.068 (0.074)	0.921	0.357	1.07 (0.93, 1.24)
	Average	0.078 (0.040)	1.920	0.055	1.08 (1.00, 1.17)
	School engagement (Ref=Yes)				
	No	0.263 (0.040)	6.470	< 0.001***	1.30 (1.20, 1.41)
	Students accept me (Ref=Yes)				
	No	- 0.168 (0.070)	- 2.410	0.016*	0.85 (0.74, 0.97)
	Neutral	- 0.093 (0.051)	- 1.804	0.071	0.91 (0.82, 1.01)
	Pressured by schoolwork (Ref=Not at all)				
	A lot	- 0.014 (0.080)	- 0.181	0.856	0.99 (0.84, 1.15)
	Some	0.125 (0.071)	1.745	0.081	1.13 (0.98, 1.30)
	A little	0.129 (0.067)	1.921	0.055	1.14 (1.00, 1.30)
	Body mass index	0.017 (0.006)	3.088	0.002**	1.02 (1.01, 1.03)
	Psychological complaints	- 0.028 (0.006)	- 4.782	< 0.001***	0.97 (0.96, 0.98)
	Been bullied (Ref=No)				
	Yes	0.131 (0.053)	2.482	0.013*	1.14 (1.03, 1.26)

	Bullied others (Ref=No)				
	Yes	0.215 (0.047)	4.594	< 0.001***	1.24 (1.13, 1.36)
	Health (Ref=Excellent)				
	poor	- 1.140 (0.238)	- 4.780	< 0.001***	0.32 (0.20, 0.51)
	fair	- 0.054 (0.078)	- 0.695	0.487	0.95 (0.81, 1.10)
	good	- 0.062 (0.040)	1.534	0.125	0.94 (0.87, 1.02)
	Life satisfaction	0.005 (0.011)	0.450	0.652	1.01 (0.98, 1.03)
[1 vs. 2-9]	HBSC wave (Ref=2014)				
	2006	1.163 (0.064)	18.245	0.001***	3.20 (2.82, 3.62)
	2010	0.638 (0.064)	9.906	0.001***	1.89 (1.67, 2.15)
	Age group (Ref=15 years)				
	11 years	- 0.392 (0.063)	- 6.193	0.001***	0.68 (0.60, 0.76)
	13 years	- 0.358 (0.058)	- 6.165	0.001***	0.70 (0.62, 0.78)
	Gender (Ref=Male)				
	Female	1.046 (0.053)	19.715	0.001***	2.85 (2.57, 3.16)
	Physical activity (Ref=Yes)				
	No	0.324 (0.066)	4.923	0.001***	1.38 (1.22, 1.57)
	Somatic complaints	0.010 (0.008)	1.295	0.195	1.01 (0.99, 1.03)
[1,2 vs. 3-9]	HBSC wave (Ref=2014)				
	2006	0.810 (0.053)	15.172	< 0.001***	2.25 (2.02, 2.50)
	2010	0.389 (0.052)	7.524	< 0.001***	1.48 (1.33, 1.63)
	Age group (Ref=15 years)				
	11 years	- 0.110 (0.056)	- 1.956	< 0.001***	0.90 (0.80, 1.00)
	13 years	- 0.254 (0.051)	- 4.973	< 0.001***	0.78 (0.70, 0.86)
	Gender (Ref=Male)				
	Female	1.071 (0.046)	23.273	< 0.001***	2.92 (2.67, 3.19)
	Physical activity (Ref=Yes)				
	No	0.047 (0.061)	0.769	0.441	1.05 (0.93, 1.18)
	Somatic complaints	0.021 (0.007)	2.961	0.003**	1.02 (1.01, 1.04)
[1-3 vs. 4-9]	HBSC wave (Ref=2014)				
	2006	0.782 (0.057)	13.727	< 0.001***	2.19 (1.96, 2.45)
	2010	0.366 (0.052)	6.983	< 0.001***	1.44 (1.3, 1.60)
	Age group (Ref=15 years)				
	11 years	0.125 (0.060)	2.084	0.037*	1.13 (1.01, 1.28)
	13 years	- 0.111 (0.053)	- 2.090	0.036*	0.89 (0.81, 0.99)
	Gender (Ref=Male)				
	Female	0.835 (0.049)	16.931	< 0.001***	2.3 (2.09, 2.54)
	Physical activity (Ref=Yes)				
	No	- 0.125 (0.066)	- 1.836	0.066	0.89 (0.78, 1.01)
	Somatic complaints	0.040 (0.007)	5.439	< 0.001***	1.04 (1.03, 1.06)
[1-4 vs. 5-9]	HBSC wave (Ref=2014)				
	2006	1.036 (0.073)	14.099	< 0.001***	2.82 (2.44, 3.25)
	2010	0.486 (0.062)	7.785	< 0.001***	1.63 (1.44, 1.84)
	Age group (Ref=15 years)				
	11 years	0.180 (0.073)	2.456	0.014*	1.2 (1.04, 1.38)
	13 years	- 0.030 (0.064)	- 0.474	0.635	0.97 (0.86, 1.10)
	Gender (Ref=Male)				
	Female	0.748 (0.060)	12.281	< 0.001***	2.11 (1.87, 2.38)
	Physical activity (Ref=Yes)				
	No	- 0.209 (0.079)	- 2.648	0.008**	0.81 (0.69, 0.95)
	Somatic complaints	0.061 (0.008)	7.195	< 0.001***	1.06 (1.05, 1.08)
[1-5 vs. 6-9]	HBSC wave (Ref=2014)				
	2006	1.202 (0.101)	11.939	< 0.001***	3.33 (2.73, 4.05)
	2010	0.555 (0.078)	7.118	< 0.001***	1.74 (1.50, 2.03)
	Age group (Ref=15 years)				
	11 years	0.069 (0.091)	0.754	0.451	1.07 (0.90, 1.28)
	13 years	- 0.020 (0.081)	- 0.242	0.808	0.98 (0.84, 1.15)
	Gender (Ref=Male)				
	Female	0.485 (0.077)	6.328	< 0.001***	1.62 (1.40, 1.89)
	Physical activity (Ref=Yes)				
	No	- 0.303 (0.096)	- 3.168	0.001**	0.74 (0.61, 0.89)
	Somatic complaints	0.061 (0.010)	5.855	< 0.001***	1.06 (1.04, 1.08)
[1-6 vs. 7-9]	HBSC wave (Ref=2014)				

	2006	1.182 (0.122)	9.657	< 0.001***	3.26 (2.56, 4.14)
	2010	0.725 (0.098)	7.415	< 0.001***	2.07 (1.71, 2.50)
	Age group (Ref=15 years)				
	11 years	0.112 (0.115)	0.977	0.328	1.12 (0.89, 1.40)
	13 years	- 0.087 (0.099)	- 0.878	0.380	0.92 (0.75, 1.11)
	Gender (Ref=Male)				
	Female	0.382 (0.094)	4.039	< 0.001***	1.46 (1.22, 1.76)
	Physical activity (Ref=Yes)				
	No	- 0.324 (0.113)	- 2.856	0.004**	0.72 (0.58, 0.90)
	Somatic complaints	0.078 (0.012)	6.295	< 0.001***	1.08 (1.05, 1.11)
[1-7 vs. 8,9]	HBSC wave (Ref=2014)				
	2006	1.123 (0.157)	7.149	< 0.001***	3.07 (2.26, 4.18)
	2010	0.636 (0.121)	5.230	< 0.001***	1.89 (1.49, 2.40)
	Age group (Ref=15 years)				
	11 years	- 0.013 (0.141)	- 0.095	0.924	0.99 (0.75, 1.30)
	13 years	- 0.080 (0.126)	- 0.638	0.523	0.92 (0.72, 1.18)
	Gender (Ref=Male)				
	Female	0.457 (0.116)	3.927	< 0.001***	1.58 (1.26, 1.99)
	Physical activity (Ref=Yes)				
	No	- 0.420 (0.139)	- 3.023	0.002**	0.66 (0.50, 0.86)
	Somatic complaints	0.095 (0.015)	6.336	< 0.001***	1.10 (1.07, 1.13)
[1-8 vs. 9]	HBSC wave (Ref=2014)				
	2006	1.050 (0.185)	5.658	< 0.001***	2.86 (1.99, 4.11)
	2010	0.727 (0.151)	4.824	< 0.001***	2.07 (1.54, 2.78)
	Age group (Ref=15 years)				
	11 years	0.015 (0.174)	0.084	0.932	1.01 (0.72, 1.43)
	13 years	- 0.153 (0.153)	- 0.999	0.317	0.86 (0.64, 1.16)
	Gender (Ref=Male)				
	Female	0.524 (0.142)	3.679	< 0.001***	1.69 (1.28, 2.23)
	Physical activity (Ref=Yes)				
	No	- 0.522 (0.165)	- 3.163	0.002**	0.59 (0.43, 0.82)
	Somatic complaints	0.105 (0.017)	6.036	< 0.001***	1.11 (1.07, 1.15)

Since the coefficients for SES, Talk to father, Talk to mother, Perceived academic achievement, School engagement, Students accept me, Pressured by schoolwork, Body mass index, Psychological complaints, Been bullied, Bullied others, Health and Life satisfaction effects were constant, they were not repeated at each comparison between levels of time spent playing videogames.
Coefficients of the variables effects that were not constant predicted the low level of each comparison between levels of time spent playing videogames.
Levels of time spent playing videogames: 1 = *none*; 2 = *about half an hour*; 3 = *about 1 hour*; 4 = *about 2 hours*; 5 = *about 3 hours*; 6 = *about 4 hours*; 7 = *about 5 hours*; 8 = *about 6 hours*; 9 = *about 7 hours or more*.
OR: Odds Ratio, SES: socio-economic status, 95% CI: 95% confidence interval, Ref: reference category. N= 10'128.
* $p< 0.05$; ** $p< 0.01$; *** $p< 0.001$.
Data Sources: Italian Health Behaviour in School-aged Children (HBSC) studies (2006, 2010 and 2014).

In comparing levels of time spent playing videogames, HBSC survey waves (2006, 2010) were significantly and positively associated with each low level of the comparison. Coefficients of effect were slightly lower when comparing levels 1-2, 1-3 and 1-4 with the others. In other words, survey waves 2006 and 2010 were more strongly associated with not spending time playing videogames and with low levels of time spent playing videogames compared with other high levels.

Age groups were significantly and negatively associated with levels 1, 1-2 and 1-3 (except for age group 11 years) when compared with the others. This means that participants in age group 11 and 13 years spent some time playing videogames compared to no or very low use. However,

comparing the time spent playing videogames levels 1-3 (*none - about one hour*) and 1-4 (*none - about two hours*) with the other levels, the age group 11 years was positively associated with low levels of time spent playing videogames (participants who were 11 years old spent less time using videogames). After that, the effect of age group in comparing high levels of time spent playing videogames became non-significant.

Female gender positively correlated with each low level of the dependent variable across the different comparisons. Specifically, this effect gradually weakened when comparing high levels of time spent playing videogames.

Comparing the time spent playing videogames level 1 (*none*) with the other levels, no Physical activity was significantly and positively associated with the level 1 of the dependent variable. This means that absence of physical activity correlated with no use of videogames. Across the subsequent comparisons the effect of physical activity became non-significant until it negatively correlated with each low level of the dependent variable when comparing levels 1-4 or higher with the others. In other words, participants who were physically inactive were less likely to spent low or moderate time playing videogames than those physically active (e.g., no physical activity was associated with high amount of time spent playing videogames).

Comparing the time spent playing videogames level 1 (*none*) with the other levels, Somatic complaints (higher values indicate fewer and less severe complaints) showed no significant association. Across the subsequent comparisons between levels of the dependent variable, the effect of somatic complaints became significant and gradually higher. Participants who reported less severe complaints were more likely members of each low level of comparison of time spent playing videogames.

Finally, the proportional ordered logistic model and the PPO model were compared using the likelihood ratio test. The PPO model showed a better fit ($\chi2(49)= 392.99$, $p< 0.001$).

4. Discussion

Findings of the present study showed that daily hours spent playing videogames during weekdays significantly and consistently increased in both children and adolescent boys and girls between 2006 and 2014 in Italy. The analyses revealed a significant effect of HBSC survey wave on time spent playing videogames. The participants who did not use videogames decreased, while the participants who reported low and moderate use (half an hour – two hours) slightly increased. The percentage of participants who spent three hours or more per day playing videogames increased among both genders (from 16.6% in 2006 to 25.8% in 2014 for boys,

from 3.6% to 20.8% for girls). These results are in line and update those of a previous study (Bucksch et al., 2016) analysing trends in adolescent screen-time behaviours from 2002 to 2010 across thirty countries, including Italy.

Partial proportional odds model analysis highlighted socio-demographic and school factors as well as health behaviours associated with daily time spent playing videogames. At low level of videogames use, a younger age (11-13 years old) was positively associated with time spent playing videogames compared with an older age (15 years old). On the other hand, when comparing low use of videogames with high use, younger adolescents (11 years old) were more likely to play less than the older (15 years old). Moreover, at very high levels of use (i.e., four hours or more daily) no difference according to age group was observed. A previous study showed an inverse relationship between age and videogames playing (minutes per day) among Italian adolescents indicating that older adolescents played less than the younger (Patriarca et al., 2009). An explanation of the present findings is related to the role of playful activities for the social, physical and intellectual development (Else, 2014) and with the fact that young people receive their first smartphone during early adolescence, a phase of life during which the use of different electronic devices increases (Mascheroni & Ólafsson, 2016, 2018). In addition, heavy use of videogames can be more linked to symptoms of psychopathology such as Internet Gaming Disorder (Grüsser et al., 2007; Lukavská et al., 2016; Wichstrøm et al., 2019), difficulties in emotion regulation and personality functioning (González-Bueso et al., 2018; Marchica et al., 2019) rather than age.

Girls played videogames for a smaller amount of daily time than boys confirming findings of previous studies (Bucksch et al., 2016; Gong et al., 2019; Patriarca et al., 2009; Prince et al., 2020). In addition, students of low and medium SES were less likely to spend a large amount of time using videogames than those of high SES reflecting the relationship between socioeconomic factors and access to electronic devices as well as practices of parental monitoring (Mielke et al., 2017).

School engagement and participants acceptance by other students were differently associated with time spent playing videogames. In particular, poor school engagement correlated with videogames usage confirming previous findings about the protective effect of school engagement on problematic use of videogames (Yu et al., 2015). In addition, children and adolescents who were not accepted by peers spent less time playing videogames. According with this result, another study found that high videogame usage was associated with a decrease in peer relationships problem and in prosocial deficits (Kovess-Masfety et al., 2016). A possible

explanation for the result can be related to the fact that playing videogames is a social activity often involving friends. On the other hand, adolescents may play for social motives (e.g., find new friends, social support) (Demetrovics et al., 2011). However, causal direction of effect cannot be inferred due to the study design.

The use of videogames was positively associated with body mass index and adolescents who did not exercise regularly were more likely to report high use of videogames than peers who exercised regularly. As pointed out by previous studies (Bozzola et al., 2019; Carli et al., 2014; Domingues-Montanari, 2017; Kenney, 2016), these findings should increase the attention on the potential negative impacts of sedentary behaviours and videogames use on health.

Adolescents who were directly involved in bullying episodes were more likely to spend time playing videogames than peers who were not. This result is in line with those of a recent meta-analytic study reporting that violent videogames increased physical aggression overtime (Prescott et al., 2018) as well as with the previously reported association between problematic use of videogames, victimisation and violent behaviours (Castro-Sánchez et al., 2020; Fitzpatrick et al., 2019). This could be due to common causal mechanism such as difficulties in regulating intense and negative emotions and personality traits (Ferguson, 2011; González-Bueso et al., 2018; Marchica et al., 2019).

Psychological and somatic complaints were significantly associated with the amount of daily time spent using videogames. Heavy use of videogames has been consistently found to be associated with symptoms of psychopathology (Carli et al., 2014; Grüsser et al., 2007; Kaczmarek & Drążkowski, 2014; Lukavská et al., 2016; Mikuška & Vazsonyi, 2018; Wang et al., 2019; Wichstrøm et al., 2019; Yabe et al., 2018). Indeed, the problematic use of videogames and other electronic devices may represent a strategy to alleviate negative and painful emotions and coping with real life difficulties (Deleuze et al., 2019; Demetrovics et al., 2011). Finally, adolescents who reported poor health were less likely to spent time playing videogames than those who reported excellent health. Findings of previous studies exploring the association between videogames use and perceived health are mixed and a negative association between playing time and self-reported health has been observed (Huard Pelletier et al., 2020; Rudolf et al., 2020). This association could be due to biological and health factors that negatively affect the possibility to play videogames.

This study has some limitations that should be considered when interpreting the results. First, the data analysed was collected using self-report measures. Therefore, the results may be affected by the social desirability response bias. Time perception in videogames (Zagal &

Mateas, 2010) and, specifically, concordance between effective time spent on videogames and time spent playing videogames as self-reported is an aspect under debate in scientific research. For example, it has been postulated that individuals playing videogames may under-report gaming time because they lose track of time while immersed in the activity (Jeong et al., 2018). However, Kahn et al. (2014) showed that videogame players underreported their weekly gaming time. Furthermore, a recent study (Lee et al., 2021) has shown that young people tend to over-report the time spent on smartphone due to social network, instant messaging and web browsing, showing large discrepancies between self-reported smartphone and objectively-measured smartphone usage except for self-reported usage on game apps. Consequently, despite these encouraging findings on the use of self-report to measure gaming time, researchers and clinicians should be cautious when using self-reported videogame use due to the paucity of studies exploring discrepancies between self-reported and objectively-measured videogame use. Second, the causal relationship between the time spent playing videogames and variables of interest cannot be clarified due to the cross-sectional design of the HBSC. Third, data collection was not originally designed to analyse trends in videogames usage. Despite these limitations, the study adds important knowledge on trend in time spent playing videogames among Italian children and adolescents.

5. Conclusion

Results of the present study showed a large increase in the amount of time that Italian adolescents spent playing videogames from 2006 to 2014. Guidelines supporting young people health recommend no more than two hours per day as an adequate amount of recreational screen time (Australian Government - Department of Health, 2019; Council on Communications and Media, 2013; Tremblay et al., 2016). In the present study, 25.8% and 20.8% of adolescent boys and girls, respectively, spent three hours or more per day playing videogames exceeding the recommended threshold. Furthermore, time spent playing videogames was associated with psychophysical health. Parents and clinicians are encouraged to monitor, explore, discuss and educate the young about the use of electronical devices (Bozzola et al., 2019; Lauricella et al., 2015). Considering that children and adolescents may not be aware of those recommendations, they should receive clear information on the use of digital technology in order to gain benefits minimizing the potential for harm (Straker et al., 2018).

Availability of data and material Data from the Italian HBSC 2006, 2010, and 2014, was obtained from the HBSC Data Management Centre (https://www.uib.no/en/hbscdata) that

coordinates the work with the international datafile and the trend data, and is the Data Bank for the HBSC study. The centre distributes data in accordance with the HBSC data access policy.

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Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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Appendix

Supplementary information

Trends and correlates of the time spent playing videogames in Italian children and adolescents

Table 1S. Characteristics of the sample according to HBSC survey wave and gender

Variable	2006 (N= 3,929)			2010 (N= 4,790)			2014 (N= 4,029)		
	Total n (%)	Male n (%)	Female n (%)	Total n (%)	Male n (%)	Female n (%)	Total n (%)	Male n (%)	Female n (%)
Sociodemographic									
Age group									
11 years	1,233 (31.6)	627 (32)	606 (31.2)	1,559 (32.7)	790 (33.2)	769 (32.3)	1,324 (33.4)	652 (32.9)	672 (33.9)
13 years	1,337 (34.3)	658 (33.6)	679 (35)	1,671 (35.1)	833 (35)	838 (35.2)	1,398 (35.2)	702 (35.4)	696 (35.1)
15 years	1,329 (34.1)	673 (34.4)	656 (33.8)	1,536 (32.2)	759 (31.9)	777 (32.6)	1,244 (31.4)	630 (31.8)	614 (31)
Gender									
Male	1,981 (50.4)	-	-	2,395 (50)	-	-	2,022 (50.2)	-	-
Female	1,948 (49.6)	-	-	2,395 (50)	-	-	2,007 (49.8)	-	-
Socio-economic status									
Low	318 (8.1)	145 (7.4)	173 (8.9)	183 (3.8)	76 (3.2)	107 (4.5)	325 (8.1)	141 (7)	184 (9.2)
Medium	1,339 (34.2)	624 (31.6)	715 (36.8)	1,319 (27.7)	612 (25.7)	707 (29.6)	1,662 (41.3)	765 (37.9)	897 (44.7)
High	2,259 (57.7)	1,203 (61)	1,056 (54.3)	3,264 (68.5)	1,691 (71.1)	1,573 (65.9)	2,039 (50.6)	1,115 (55.2)	924 (46.1)
Family and school									
Talk to father									
Do not have or see	135 (3.5)	63 (3.3)	72 (3.7)	172 (3.7)	71 (3.1)	101 (4.3)	147 (3.7)	72 (3.6)	75 (3.8)
Difficult	1,534 (39.9)	577 (30)	957 (49.7)	1,821 (38.8)	690 (29.7)	1,131 (47.9)	1,322 (33.4)	485 (24.5)	837 (42.3)
Easy	2,179 (56.6)	1,281 (66.7)	898 (46.6)	2,695 (57.5)	1,566 (67.3)	1,129 (47.8)	2,489 (62.9)	1,423 (71.9)	1,066 (53.9)
Talk to mother									
Do not have or see	52 (1.4)	33 (1.8)	19 (1)	56 (1.2)	30 (1.3)	26 (1.1)	36 (0.9)	22 (1.1)	14 (0.7)
Difficult	754 (19.9)	376 (20)	378 (19.8)	938 (20.1)	486 (21)	452 (19.3)	746 (18.9)	323 (16.3)	423 (21.5)
Easy	2,982 (78.7)	1,470 (78.2)	1,512 (79.2)	3,668 (78.7)	1,800 (77.7)	1,868 (79.6)	3,166 (80.2)	1,633 (82.6)	1,533 (77.8)
Perceived academic achievement									
Below average	377 (9.6)	236 (12)	141 (7.3)	388 (8.1)	254 (10.7)	134 (5.6)	326 (8.1)	205 (10.2)	121 (6.1)
Average	1,423 (36.4)	763 (38.8)	660 (34)	1,757 (36.9)	915 (38.4)	842 (35.4)	1,436 (35.8)	759 (37.7)	677 (34)
Above average	2,108 (53.9)	970 (49.3)	1,138 (58.7)	2,616 (54.9)	1,212 (50.9)	1,404 (59)	2,246 (56)	1,050 (52.1)	1,196 (34)
School engagement									
No	1,597 (40.8)	876 (44.5)	721 (37.1)	1,821 (38.2)	1,027 (43.1)	794 (33.3)	1,654 (41.2)	950 (47.2)	704 (35.2)
Yes	2,319 (59.2)	1,094 (55.5)	1,225 (62.9)	2,950 (61.8)	1,357 (56.9)	1,593 (66.7)	2,360 (58.6)	1,064 (52.8)	1,296 (64.8)

Students accept me									
No	364	147	217	358	146	212	411	175	236
	(9.4)	(7.5)	(11.2)	(7.5)	(6.2)	(8.9)	(10.3)	(8.8)	(11.8)
Neutral	577	250	327	693	301	392	659	253	406
	(14.8)	(12.8)	(16.9)	(14.6)	(12.7)	(16.5)	(16.5)	(12.7)	(20.4)
Yes	2,947	1,556	1,391	3,693	1,922	1,771	2,922	1,572	1,350
	(75.8)	(79.7)	(71.9)	(77.8)	(81.1)	(74.6)	(73.2)	(78.6)	(67.8)
Pressured by schoolwork									
A lot	725	334	391	665	353	312	760	357	403
	(18.9)	(17.4)	(20.4)	(14)	(14.9)	(13.1)	(18.9)	(17.7)	(20.1)
Some	1,120	548	572	1,293	615	678	1,316	636	680
	(29.2)	(28.6)	(29.8)	(27.2)	(25.9)	(28.5)	(32.8)	(31.5)	(34)
A little	1,633	829	804	2,265	1,114	1,151	1,646	846	800
	(42.5)	(43.2)	(41.9)	(47.7)	(46.9)	(48.4)	(41)	(41.9)	(40)
Not at all	362	208	154 (8)	529	292	237	296	178	118
	(9.4)	(10.8)		(11.1)	(12.3)	(10)	(7.4)	(8.8)	(5.9)
Health behaviours and complaints									
Physical activity									
No	461	150	311	784	250	534	646	240	406
	(11.8)	(7.6)	(16.1)	(16.5)	(10.5)	(22.5)	(16.2)	(12)	(20.5)
Yes	3,438	1,812	1,626	3,965	2,130	1,835	3,338	1,760	1,578
	(88.2)	(92.4)	(83.9)	(83.5)	(89.5)	(77.5)	(83.8)	(88)	(79.5)
Body mass index (M±SD)	20.13 ± 3.3	20.51 ± 3.37	19.74 ± 3.18	19.79 ± 3.41	20.04 ± 3.45	19.53 ± 3.34	19.89 ± 3.35	20.17 ± 3.34	19.61 ± 3.33
Somatic complaints (M±SD)	15.94 ± 3.38	16.56 ± 3.19	15.31 ± 3.44	15.89 ± 3.43	16.66 ± 3.11	15.12 ± 3.57	15.81 ± 3.54	16.71 ± 3.11	14.91 ± 3.71
Psychological complaints (M±SD)	13.95 ± 3.88	14.63 ± 3.78	13.27 ± 3.87	14.14 ± 3.95	14.81 ± 3.79	13.48 ± 4.00	13.73 ± 4.22	14.61 ± 3.91	12.85 ± 4.33
Been bullied									
No	3,031	1,447	1,584	3,976	1,921	2,055	3,364	1,645	1719
	(77.7)	(73.9)	(81.6)	(88.8)	(86.2)	(91.5)	(84.4)	(82.7)	(86.2)
Yes	869	512	357	499	308	191	621	345	276
	(22.3)	(26.1)	(18.4)	(11.2)	(13.8)	(8.5)	(15.6)	(17.3)	(13.8)
Bullied others									
No	2,783	1,260	1,523	3,906	1,844	2,062	3,349	1,595	1,754
	(71.4)	(64.3)	(78.5)	(82.4)	(77.8)	(87.1)	(83.9)	(79.8)	(87.9)
Yes	1,117	701	416	833	527	306	644	403	241
	(28.6)	(35.7)	(21.5)	(17.6)	(22.2)	(12.9)	(16.1)	(20.2)	(12.1)
Satisfaction									
Health									
Poor	33	15	18 (0.9)	39 (0.8)	14	25 (1)	44 (1.1)	24 (1.2)	20 (1)
	(0.8)	(0.8)			(0.6)				
Fair	315	107	208	400	135	265	334	123	211
	(8.1)	(5.4)	(10.7)	(8.4)	(5.7)	(11.1)	(8.3)	(6.1)	(10.5)
Good	2,170	1,010	1,160	2,657	1,232	1,425	2,247	1,030	1,217
	(55.6)	(51.3)	(59.9)	(55.8)	(51.7)	(59.8)	(55.9)	(51.1)	(60.8)
Excellent	1,384	835	549	1,669	1,000	669	1,395	840	555
	(35.5)	(42.5)	(28.4)	(35)	(42)	(28.1)	(34.7)	(41.6)	(27.7)
Life satisfaction (M±SD)	7.52 ± 2.01	7.67 ± 1.99	7.36 ± 2.02	7.53 ± 1.93	7.65 ± 1.85	7.41 ± 2.01	7.36 ± 1.95	7.6 ± 1.78	7.12 ± 2.08

Valid percentage is reported.

Data Sources: Italian Health Behaviour in School-aged Children (HBSC) studies (2006, 2010 and 2014).