Global Science Publishing

GSS

Global Sport Science

https://ojs.sgsci.org/journals/gss

Article

Missed Opportunities for Middle Childhood: Less Sport Predicts Increased Risk for Shyness in Millennial Girls with Preschool Access to Bedroom Television

Béatrice Necsa[1,2], Caroline Fitzpatrick[3,4], Eric F. Dubow[5], Linda S. Pagani[1,2,6]

[1] *School of Psycho-Education, Université de Montréal, Montreal, QC H3T1J4, Canada; beatrice.necsa@umontreal.ca (B.N); linda.s.pagani@umontreal.ca (L.S.P.)*

[2] *School Environment Research Group, Université de Montréal, Montreal, QC H3T1J4, Canada*

[3] *Department of Preschool and Primary Education, University of Sherbrooke, Sherbrooke, QC J0B2C0, Canada; caroline.fitzpatrick@usherbrooke.ca*

[4] *Department of Childhood Education, University of Johannesburg, Johannesburg 2001, South Africa*

[5] *Department of Psychology, Bowling Green State University, Bowling Green, OH 42104, USA; edubow@bgsu.edu*

[6] *Sainte-Justine Pediatric Hospital Research Center, Université de Montréal, Montreal, QC H3T1J4, Canada*

Abstract: Background and Purpose: Childhood bedroom screens represent a risk factor for negative behavioral outcomes. Childhood sport participation might be a protective factor for potential negative associations with having a bedroom screen in early childhood. Methods: This study examines whether extracurricular sport participation in middle childhood reduces developmental risks associated with bedroom screens in boys and girls. We use a millennial birth cohort from the QLSCD. Children reported having a bedroom television at age 4 years. Parents reported child participation in sport from ages 6 to 10 years. We examine subsequent teacher-reported depressive symptoms and shyness outcomes by the end of sixth grade. We used linear regression to examine the interaction between child-reported bedroom television placement (age 4 years) and parent-reported childhood sport participation trajectories (ages 6 to 10 years) in predicting behavioral outcomes at age 12 years. Key Results: For girls, inconsistent extracurricular sport amplified the relationship between having a preschool bedroom television and subsequent shyness (b = 0.6212, SE = 0.3245, $p < 0.05$), beyond individual and family characteristics. Conclusions: Less consistent sport participation was associated with increased risk of shyness in girls having grown up with a bedroom television. These findings corroborate that extracurricular activity can be a suitable candidate for enhancing skills and social interactions.

Keywords: extracurricular sport; physical activity; social skills; child development; behavioral development; adolescent health; shyness

1. Introduction

Since the digital revolution, the increasing availability and portability of screens has made the notion of living in a screen-free environment idealistic [1]. Television within the household has been documented to be

Received: 1 April 2024; Accepted: 8 April 2024

closely linked to screen time as it relates to where it is placed in the home [2]. It is not surprising that placement in the child's bedroom is problematic as it makes children more vulnerable to exceeding recommended screen time guidelines [3]. More specifically, children with such private access to media were found to consume more screen media, watch more television, and play more video games than children without private access [4,5].

Current screen time guidelines recommend under 1 hour of developmentally appropriate media content for children aged 2 to 5 years [6]. A systematic review and meta-analysis of ninety-five studies highlighted that only 35.6% of children are respecting the most recent guidelines while 56% of children were meeting the looser guidelines recommending under 2 hours per day of screen time [7]. Exceeding these established guidelines can have a negative impact on the well-being of children [8]. Specifically, higher levels of child screen time are associated with greater risk of experiencing depressive symptoms and engaging in anti-social behavior such as fighting with peers on and off school grounds [9]. Growing up with a bedroom television may further predispose children to spending less time engaging with their physical and social environments, partaking in an excess of sedentary time, receiving less parental supervision [10]. Thus, discovering ways to compensate for the associated risks remains imperative given the increasing trends of private screen access becoming more common [11]. While little recent literature addresses the presence of bedroom media by sex, recent studies have underlined that 29% of children aged from 0 to 8 years have been documented to have bedroom television [12].

As per the Canadian Paediatric Society, more of concern is that increasing media presence is displacing valuable and quality family interactions within the home, specifically as it relates to parent-child interactions [13]. Extant research has highlighted the long-term impact of television exposure as early as 4 years of age and later risks as it relates to exacerbating social isolation, depressive symptoms, emotional distress in middle childhood [14] and behavioral difficulties as it relates to regulating emotions and having difficulty with daily transitions [15]. Moreover, a cohort study demonstrated that both boys and girls using digital media heavily were more likely to show traits linked with suicidal behavior [16].

Social development in childhood is partly facilitated by a bidirectional influence with their environment. A child's behavior will have an influence on their context and their context will in turn have an influence on the child [17]. Ever since the digital explosion and availability of technology, researchers have documented the simultaneous decline in time spent having social interactions outside of the home, in-person conversations, doing household chores, engaging in personal care, and more [18]. According to the same researchers, these daily activities have been displaced for more time spent in a virtual world. Taking this into consideration, we argue that a child with a bedroom television might spend more time confined to their private space, creating a dilemma where the child is not allocating that time to other enriching activities such as hobbies, sporting activities, and conversations in and out of the home with other peers that may contribute to adequate social development [5]. Thus, the time displacement conceptualization allows to better understand why bedroom television can lead to a less than ideal adaptation to the daily demands of the environment.

The potential of each child to develop specific capacities such as social-emotional and cognitive skills, empathy, self-worth, self-control, and fair play with peers needs to be considered [19]. In order to develop some of these above-mentioned characteristics, the child's environment needs to make space for certain opportunities to occur in order for them to practice and encourage these life skills [20]. Having a television in the bedroom can act as an environmental inhibitor to positive youth development as it involves the child isolating themselves from social interaction and expending energy with others [19]. However, by encouraging screen-free opportunities within the child's environment, we increase the probability of developing essential life skills, expending energy that may help with self-regulation, and learning through engagement with others. Thus, it is important to examine to what extent a child's developmental trajectory is influenced putting time toward both risk activities such as bedroom television) and enriching activities such as sporting activities.

Sport participation is a known protective factor that contributes positively to overall well-being [21,22]. The benefits associated with sport participation partly explain why parents register their kids in sport [23]. Studies have outlined the benefits of increasing physical activity habits on alleviating anxiety and depression related symptomology [24,25]. The findings of a Canadian longitudinal study showed that long-term organized sport participation was beneficial in children being rated as shy in the reduction of their anxiety, suggesting the social

benefits that sport has on improving peer relations [26]. Nonetheless, the impact of sport participation in relation to screen exposure and mental health outcomes remains unclear [24,27,28]. Therefore, we want to observe the moderating effects of sport participation between the relationship of early bedroom television and later psycho-social risks to better understand the role of sport participation on at-risk children.

This study aims to respond to several methodological issues. Available studies exploring childhood screen use and later outcomes tend to control for child sex. Boys and girls experience risk and protective factors differently due to unique biological and contextual influences [29]. Past studies have highlighted gender-differences in both mental health outcomes and sport participation. Specifically, one study found that girls were more at risk of social isolation which led to more depressive symptoms [30]. Girls participate less frequently in extracurricular sport than boys [31]. Girls are also more inclined to use social media as a replacement for social interactions [32]. In both genders, feeling socially isolated was positively associated with suicidal ideation [33]. These gender differences further support the notion of studying girls and boys separately.

Finally, other methodological issues in the existing literature include the isolation of screen exposure. Mobility and the different types of screen media makes it difficult to harness and measure screen time today [34]. Having access to historical data prior to the media surge may help estimate the effect size of the association between children's private access to a television and later risk outcomes. Second, much of the past research exploring screen use has been challenged by omitted variable bias [35]. Confound control must take into consideration both individual and family characteristics that might influence interpretations, such as child baseline shyness. Third, while studies have looked at how screen use negatively impacts different life spheres [36], not many existing studies looking at factors that might counter the risks associated with private access to screens.

The purpose of this study is to investigate the protective role in organized sport in the relationship between having a bedroom television and later internalizing behavioral risks in early adolescence. More specifically, we aim to explore how participation in organized sport between ages 6 to 10 years reported by the parents can impact self-reported early bedroom television placement at age 4 and later depressive symptoms and shyness levels at age 12 using teacher-reported data. Compared to their same-sex counterparts, we expect that boys and girls with a history of bedroom television will show less psycho-social difficulties at age 12 if they were involved in consistent extracurricular sport.

2. Methods

2.1. Participants

This IRB-approved study obtained its data from the Quebec Longitudinal Study of Child Development (QLSD) coordinated by the Institut de la Statistique du Québec (https://www.iamillbe.stat.gouv.qc.ca, accessed during the period of 2022–2023) which consists of 2837 randomly selected 5-month old infants born between 1997 – 1998 and followed annually and biennially. After informed consent, 2120 eligible participants were retained (93 were excluded, 172 were untraceable, 14 were unreachable and 438 refused participation). The sample included children from single births born to mothers residing in Québec. Children were deemed ineligible for the study if they were born highly premature and/or were residing in Nord-du-Québec, Nunavik, Terres-Cries-de-la-Baie-James at the time of data collection. After exclusion and inclusion criteria, a subsample of 707 girls and 684 boys with complete data on bedroom television at age 4 years old and sport participation habits between 6 and 10 years old was used. Data was collected from ages 5 months to 12 years old through questionnaires administered to the mother, father, child, and teachers.

2.2. Measures

Predictor Variable. At 4 years of age, the interviewer asked the child about the presence of a television in the bedroom (coded as 0 = no, 1 = yes). 1 representing the risk category.

Moderator. Child sport participation habits over the last year at ages 6, 7, and 8 years were reported by the mothers over the two following items: outside of school hours, how often does your child⋯take part in sport

with a coach or instructor (with the exception of dance and gymnastics courses)?... take organized physical activity lessons or classes such as dance, gymnastics, martial arts, or circus arts? Both items were rated on a Likert scale with response options including roughly once a month (1), roughly once a week (2), several times a week (3), roughly every day (4), one session (5), two sessions (6). At age 10 years, mothers reported on their child's sport participation (3 items): how many times a week has your child⋯ a) participated in organized sport or physical activity with a coach or instructor last summer (lessons, classes or team sport), b) participated in extracurricular sports with an instructor or coach since last September, and c) practice physical activity or organized sport outside of school? These items were rated on a Likert scale with response options including never (0), less than once a week (1), once a week (2), twice a week (3), three times a week (4), four times a week (5), five times a week or more (6). Using this data, trajectories were created and established in past studies using growth mixture modelling [37]. From this analysis, four trajectories were tested but the best model rendered two typical trajectories that were significantly different from the other groups: inconsistent sport participation and consistent sport participation. Being a child in the inconsistent sport participation trajectory implies that child sport participation was less likely through the 4 time points observed. Specifically, children participated in organized PA on average 1.3 time points out of 4. Being a child in the consistent sport participation trajectory implies that that child sport participation was more likely through the 4 time points observed. Specifically, children participated in organized PA on average 3.6 time points out of 4. Given that there were two derived trajectories found, the current study coded past-year sport participation as 0 = inconsistent sport participation and 1 = consistent sport participation.

Outcome Variables. At 12 years of age, the child's teacher reported on traits of shyness and depressive symptoms in the last 6 months using items from the Social Behavior Questionnaire [38]. Teachers reported on child shyness (4 items, $\alpha = 0.71$): child was shy with strangers; readily approached strangers; took a long time to warm up to strangers; and is excessively shy. Teachers reported on child depressive symptoms (5 items, $\alpha = 0.79$): child seemed unhappy/sad; was not as happy as other children; lacked energy/felt tired; trouble enjoying themselves; and able to make decisions. All items were rated on a Likert scale with response options including never or not true (1), sometimes or somewhat true (2), and often or very true (3). For each factor, a mean score was calculated and transformed into a scale ranging from 0 to 10, where a higher score indicates more traits on the variable.

Pre-existing and Concurrent Control Variables. To account for pre-existing and concurrent confounding variables between bedroom television, sport participation, and later psycho-social outcomes, we identified individual and family characteristics that can explain the study variables. These characteristics were selected based on theoretical (e. g., established contributors to the selected outcomes) and the statistical relationship between variables. Individual characteristics include child temperament problems (0 = below the median, 1 = above the median) [Infant Characteristics Questionnaire [39], neurocognitive skills (0 = above the median, 1 = below the median) [Imitation Sorting Task [40], and baseline variables at ages 3.5 years such as shyness [41] and depressive symptoms [42]. Family characteristics include a scale of maternal post-partum depressive symptoms at 5 months (13 items, $\alpha = 0.81$), CES-D [43, 44] where a higher score represents more traits of maternal post-partum depressive symptoms, family dysfunction at 5 months (0 = below the median, 1 = above the median) McMaster Family Assessment Device [45], maternal education (0 = post-secondary education or above, 1 = high-school diploma or below), and family income threshold as defined by the Canadian low-income cut-off for that year provided by Statistics Canada (0 = above the median, 1 = below the median). Finally, we controlled for bedroom television for boys and girls at 12 years old given that bedroom television placement at age 4 years increases the likelihood for later bedroom television. 1 representing the risk category.

2.3. Data Analytic Strategy

Two series of Ordinary Least Squares multiple linear regressions were conducted with SPSS (v.26) using the PROCESS macro (4.0) to examine the interaction between child-reported bedroom television placement (age 4 years) and parent-reported childhood sport participation trajectories (ages 6 to 10 years) in predicting teacher-reported shyness and depressive symptoms variables at age 12 years. To account for possible third-variable bias,

we estimated this relationship by including pre-existing and concurrent child and family characteristics in each model. Baseline psycho-social risks at ages 3.5 years were added according to the outcome assessed in the model. The statistical analyses were done for boys and girls separately.

An attrition analysis was conducted which included comparing complete data and incomplete data on the retained sample. The analysis revealed that 21.1% of boys and 26.5% of girls had complete data. For boys, the Levene's test was non-significant for post-partum maternal depressive symptoms at 5 months ($F = 1.734$, $p = 0.188$). There was a significant difference between the two groups as it relates to the average score for post-partum maternal depressive symptoms ($t(332.730) = -2.675$, $p < 0.01$). Thus, boy participants having complete data on post-partum maternal depressive symptoms have higher scores on this scale than those with missing data. There were no significant differences between the two groups for any of the continuous variables analyzed for boys and girls.

Further comparative analyses using chi-squared tests on categorical variables allowed us to examine the differences between boys and girls with complete data and incomplete data. Based on the Pearson chi-squared coefficient, significant differences between groups were found for boys on the following variables: family income threshold ($p < 0.001$), family dysfunction ($p < 0.001$), bedroom television placement at 4 years ($p \leqslant 0.01$) and sport participation between ages 6 and 10 years ($p < 0.01$). More specifically, boys with missing data were more likely to experience family dysfunction at 5 months (X^2 (1, N = 918) = 19.915), more likely to be part of families falling below the family income threshold (X^2 (1, N = 909) = 12.139), were more likely to have had a bedroom television (X^2 (1, N = 788) = 5.802), and were more likely to belong to the consistent sport participation trajectory (X^2 (1, N = 696) = 7.103) compared to those with complete data. Based on the Pearson chi-squared coefficient, significant differences between groups were found on the following variables for girls: maternal education ($p < 0.05$), family income threshold ($p < 0.001$), and family dysfunction ($p < 0.01$). Girls with missing data are more likely to have mothers having education below the median (X^2 (1, N = 921) = 4.873), more likely to fall below the family income threshold (X^2 (1, N = 910) = 16.391), less likely to experience family dysfunction at 5 months. Finally, we corrected for response and attrition bias using multiple imputation and aggregated 5 imputed datasets to compute moderation analyses.

3. Results

Table 1 reports descriptive statistics for the study's predictor, moderator, outcome, and control variables. Nearly 11 % of girls (n = 707) and 15 % of boys (n = 684) had a bedroom television. Moreover, 40 % of girls and 38 % of boys were found to be in the inconsistent sport participation trajectory. As it relates to the outcome variables at age 12 years, the average score for depressive symptoms in girls was 2.05 ($SD = 1.54$) and 2.71 ($SD = 1.78$) for boys while the average score for shyness in girls was 2.63 ($SD = 1.69$) and 2.38 ($SD = 1.43$) in boys. Both outcomes are measured on a scale of 0 to 10 where an average score closer to 0 suggests less reported traits on the scale.

Table 2 reports adjusted unstandardized regression coefficients for the relationship between baseline child and family characteristics from ages 5 months to 12 years and bedroom television at age 4 years and sport participation trajectories between ages 6 to 10 years. For girls and boys, having a preschool bedroom television was strongly associated with higher probabilities of having a later bedroom television at 12 years of age (girls: standardized $\beta = 0.214$, $p < 0.001$; boys: standardized $\beta = 0.310$, $p < 0.001$). Boys and girls of mothers having a high school diploma or below were associated with having a higher likelihood of being in the inconsistent sport participation trajectory (boys: standardized $\beta = -0.256$, $p < 0.001$; girls: standardized $\beta = -0.129$, $p < 0.001$). Moreover, boys and girls were more likely to be in the consistent sport participation trajectory if they came from families below the low-income threshold (boys: standardized $\beta = 0.106$, $p < 0.01$; girls: standardized $\beta = 0.103$, $p < 0.05$). Boys experiencing more family dysfunction at ages 1.5 years were more likely to be in the inconsistent sport participation trajectory during later childhood (standardized $\beta = -0.156$, $p < 0.001$). Boys who reported bedroom television placement at age 12 years had a higher probability of being in the inconsistent sport trajectory during childhood (standardized $\beta = -0.037$, $p < 0.001$). Finally, boys who were in the consistent sport participation trajectory during childhood had more traits of shyness at ages 3.5 years (standardized $\beta = 0.116$,

$p < 0.01$) while girls who were in the consistent sport participation had less traits of shyness (standardized $\beta = -0.083$, $p < 0.05$) but more traits of depressive symptoms at ages 3.5 years (standardized $\beta = 0.101$, $p < 0.01$).

Table 1. Descriptive statistics for predictor, moderator, outcome, and control variables for boys and girls.

	Boys (N = 684)		Girls (N=707)		
	M (SD)	**Categorical Variables (%)**	**M (SD)**	**Categorical Variables (%)**	**Range**
Predictor variable (4 years)					
Bedroom television					0.00–1.00
0 = no	-	84.80	-	89.00	-
1 = yes	-	15.20	-	11.00	-
Moderator variable (6–10 years)					
Sport participation trajectory					0.00–1.00
0 = Inconsistent participation	-	38.90	-	40.40	-
1 = Consistent participation	-	61.10	-	59.60	-
Outcome variables (12 years)					
Shyness	2.38 (1.43)	-	2.63 (1.69)	-	0.00–10.00
Depressive symptoms	2.71 (1.78)	-	2.05 (1.54)	-	0.00–10.00
Pre-existing and concurrent controls					
Maternal depressive symptoms (5 Mo)	1.34 (1.32)	-	1.27 (1.19)	-	0.00–10.00
Family dysfunction (5 Mo)					
0 = below the median	-	55.80	-	53.20	-
1 = above the median	-	44.20	-	45.60	-
Maternal education (5 Mo)	-	60.50	-	57.30	-
0 = Post-secondary education or above					
1 = High-school diploma or below	-	39.50	-	41.70	-
Family income threshold (2 years)					
0 = above the median	-	5.10	-	7.80	-
1 = below the median	-	94.90	-	90.00	-
Child temperament problems (1.5 years)					
0 = below the median	-	52.30	-	44.40	-
1 = above the median	-	47.70	-	39.60	-
Neurocognitive skills (2 years)					
0 = above the median	-	78.90	-	73.10	-
1 = below the median	-	21.10	-	18.40	-
Bedroom television (12 years)					
0 = no	-	60.80	-	68.30	-
1 = yes	-	39.20	-	31.70	-
Shyness (3.5 years)	2.92 (2.45)	-	1.83 (1.30)		0.00–10.00
Depressive symptoms (3.5 years)	1.59 (1.40)	-	3.68 (1.81)		0.00–10.00

Notes. M = mean; SD = standard deviation. Mo = months. Analyses corrected for attrition bias.

Table 2. Unstandardized regression coefficients (standard error) reflecting the adjusted relationship between baseline child and family characteristics from ages 5 months to 12 years and bedroom television at age 4 years and sport participation trajectories between ages 6 to 10 years for boys and girls.

	***b* (SE)**			
	Bedroom Television (4 Years)		**Sport Participation Trajectories (6 to 10 Years)**	
	Boys	**Girls**	**Boys**	**Girls**
Pre-existing control variables				
Maternal depressive symptoms (5 Mo)	0.018 (0.011)	−0.003 (0.010)	0.007 (0.015)	0.005 (0.016)
Maternal education (5 Mo)	0.015 (0.027)	0.036 (0.024)	−0.253 (0.037) ***	−0.125 (0.039) **
Family income threshold (2 years)	−0.016 (0.059)	−0.046 (0.060)	0.229 (0.080) **	0.220 (0.100) *
Child temperament problems (1.5 years)	0.002 (0.026)	−0.049 (0.023) *	−0.019 (0.035)	0.039 (0.037)
Family dysfunction (5 Mo)	0.020 (0.027)	0.034 (0.023)	−0.078 (0.037) *	0.063 (0.038)
Neurocognitive skills (2 years)	0.056 (0.031)	−0.031 (0.027)	−0.053 (0.043)	0.071 (0.045)
Concurrent control variables				
Bedroom television (12 years)	0.225 (0.027) ***	0.145 (0.025) ***	−0.145 (0.037) ***	−0.046 (0.041)
Shyness (3.5 years)	−0.008 (0.005)	−0.004 (0.005)	0.022 (0.007) **	−0.015 (0.007) *
Depressive symptoms (3.5 years)	−0.017 (0.009)	−0.010 (0.008)	−0.009 (0.013)	0.035 (0.013) **
R^2	0.132 ***	0.080 ***	0.159 ***	0.064 ***

Notes. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$. Mo = months. Analyses corrected for attrition bias. Variables are coded as the following (1 representing the risk category): Maternal education (1 = high-school diploma or below), family income threshold (1 = below the median), child temperament problems (1 = above the median), family dysfunction (1 = above the median), neurocognitive skills (1 = below the median), and bedroom television age 12 (1 = yes).

Table 3 documents the adjusted unstandardized regression coefficients reflecting the direct relationship between bedroom television age 4 years and later shyness at age 12 years and moderation effect of sport participation trajectories between ages 6 to 10 years for boys and girls. There were two significant main effects for boys. Having a bedroom television at age 4 years significantly predicted an increase in later shyness (standardized $\beta = 0.140$, $p < 0.001$). Secondly, consistent sport participation in boys predicted a decrease in later shyness at 12 years old (standardized $\beta = -0.1190$, $p < 0.01$).

Moreover, there was a significant interaction effect for girls. The sport participation trajectories between ages 6 to 10 years significantly moderated the relationship between bedroom television at age 4 years and shyness at age 12 years. Sport participation moderates the association between having a bedroom television and later shyness (standardized $\beta = -0.0936$, $p \leqslant 0.01$, 95% CI: = 0.169, −0.018). Specifically, girls having grown up with a bedroom television were more likely to display increased shyness at 12 years old when they participated inconsistently in sport during childhood (standardized $\beta = 0.1110$, $p \leqslant 0.05$, 95% CI: −0.0069, 0.2290). Figure 1 illustrates the decomposition of this interaction. No interaction results were found in boys.

Table 4 documents the adjusted unstandardized regression coefficients reflecting the direct relationship between bedroom television age 4 years and later depressive symptoms at age 12 years and moderation effect of sport participation trajectories between ages 6 to 10 years for boys and girls. For girls, being in the consistent sport participation trajectory during childhood predicted a decrease in depressive symptoms at 12 years old (standardized $\beta = -0.219$, $p < 0.001$). Moreover, for girls, having a bedroom television at age 4 years significantly predicted an increase in later depressive symptoms at 12 years old (standardized $\beta = 0.078$, $p < 0.05$). No significant findings were found boys and no interaction findings were found for both boys and girls.

Table 3. Unstandardized regression coefficients (standard error) reflecting the adjusted direct relationship between bedroom television age 4 years and shyness at age 12 years and moderation effect of sport participation trajectories between ages 6 to 10 years for boys and girls.

	Shyness (Boys)	95% CI	Shyness (Girls)	95% CI
Interaction				
Sport Participation Trajectories (6–10 years) x Bedroom television (4 years)	−0.004 (0.304)	−0.593, 0.601	−1.032 (0.424) **	−0.186, −0.199
Moderator variable				
Sport Participation Trajectories (6–10 years)	−0.358 (0.126) **	−0.605, −0.111	−0.218 (0.137)	−0.486, 0.049
Predictor variable				
Bedroom television (4 years)	0.572 (0.215) **	0.149, 0.994	0.621 (0.324)	−0.015, 1.258
Control variables				
Maternal depressive symptoms (5 Mo)	−0.001 (0.043)	−0.080, 0.077	0.043 (0.055)	−0.065, 0.151
Maternal education (5 Mo)	0.048 (0.117)	−0.061, 0.093	0.605 (0.136) ***	0.338, 0.872
Family income threshold (2 years)	0.133 (0.246)	−0.064, 0.113	0.291 (0.347)	−0.389, 0.971
Child temperament problems (1.5 years)	−0.207 (0.108)*	−0.142, 0.001	0.317 (0.127) **	0.066, 0.566
Family dysfunction (5 Mo)	−0.046 (0.113)	−0.091, 0.059	0.018 (0.132)	−0.241, 0.277
Neurocognitive skills (2 years)	0.616 (0.130) ***	0.099, 0.240	0.313 (0.154) *	0.010, 0.615
Bedroom television (12 years)	−0.072 (0.119) *	−0.102, 0.054	−0.151 (0.146)	−0.438, 0.136
Shyness (3.5 years)	0.096 (0.022) ***	0.090, 0.235	0.066 (0.023) **	0.020, 0.112
R^2	0.0996 ***		0.0791 ***	

Notes. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$. Mo = months. Analyses corrected for attrition bias. Data were compiled from the final master file of the Québec Longitudinal Study of Child Development (1997-2019), ©Gouvernement du Québec, Institut de la Statistique du Québec. Variables are coded as the following (1 representing the risk category): Maternal education (1 = high-school diploma or below), family income threshold (1 = below the median), child temperament problems (1 = above the median), family dysfunction (1 = above the median), neurocognitive skills (1 = below the median), and bedroom television age 12 (1 = yes).

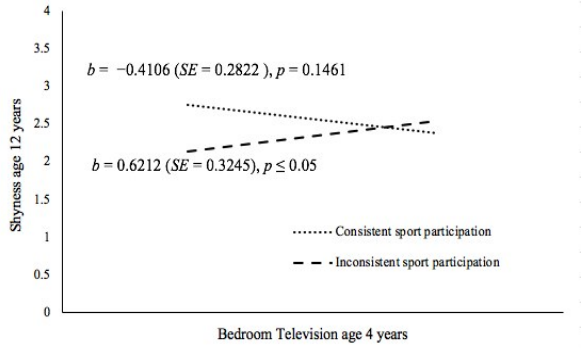

Figure 1. Decomposition of the interaction between bedroom television at age 4 years with sport participation trajectories from ages 6 to 10 years associated with shyness at age 12 years in girls. Illustrating that inconsistent sport participation amplified the relationship between bedroom television at ages 4 years and later shyness.

Table 4. Unstandardized regression coefficients (standard error) reflecting the adjusted direct relationship between bedroom television age 4 years and depressive symptoms at age 12 years and moderation effect by sport participation trajectories between ages 6 to 10 years for boys and girls.

	Depressive Symptoms (Boys)	95% CI	Depressive Symptoms (Girls)	95% CI
Interaction				
Sport Participation Trajectories (6–10 years) x Bedroom television (4 years)	0.496 (0.378)	−0.246, 1.239	−0.654 (0.381)	−0.094, 1.401
Moderator variable				
Sport Participation Trajectories (6–10 years)	−0.231 (0.155)	−0.537, 0.073	−0.628 (0.123) ***	0.387, 0.868
Predictor variable				
Bedroom television (4 years)	0.204 (0.267)	−0.320, 0.729	0.782 (0.291) **	−0.368, 0.626
Control variables				
Maternal depressive symptoms (5 Mo)	0.216 (0.054) ***	0.085, 0.252	0.082 (0.050)	−0.015, 0.179
Maternal education (5 Mo)	0.127 (0.145)	−0.044, 0.116	−0.002 (0.123)	−0.243, 0.239
Family income threshold (2 years)	0.067 (0.306)	−0.082, 0.103	−0.666 (0.311) *	−1.274, −0.054
Child temperament problems (1.5 years)	0.101 (0.133)	−0.103, 0.045	0.055 (0.113)	−0.167, 0.276
Family dysfunction (5 Mo)	0.186 (0.141)	−0.025, 0.132	0.160 (0.119)	−0.072, 0.392
Neurocognitive skills (2 years)	0.284 (0.161)	−0.007, 0.139	0.377 (0.139) **	0.104, 0.648
Bedroom television (12 years)	0.453 (0.147) **	0.046, 0.209	0.027 (0.132)	−0.230, 0.285
Depressive symptoms (3.5 years)	0.036 (0.047)	−0.046, 0.104	−0.031 (0.040)	−0.109, 0.047
R^2	0.0960 ***		0.1022 ***	

Notes. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$. Mo = months. Analyses corrected for attrition bias. Data were compiled from the final master file of the Québec Longitudinal Study of Child Development (1997-2019), ©Gouvernement du Québec, Institut de la Statistique du Québec. Variables are coded as the following (1 representing the risk category): Maternal education (1 = high-school diploma or below), family income threshold (1 = below the median), child temperament problems (1 = above the median), family dysfunction (1 = above the median), neurocognitive skills (1 = below the median), and bedroom television age 12 (1 = yes).

4. Discussion

Past literature has outlined that exceeding television screen time guidelines during childhood predisposes youth to long-term risks [46]. Bedroom television placement is an environmental factor that can lead to exacerbating this relationship [3]. Although seemingly harmless, the decision to place the television in the bedroom predisposes a child to short-term risks such as more isolation, sedentariness, and less exploration and interaction with their social environment [10]. These short-term risks have been documented to lead to later problems as it relates to social isolation, depressive symptoms, emotional distress, and self-regulation difficulties [14,15].

The present study revealed multiple findings for girls and boys. Consistent sport significantly predicted less

traits of depressive symptoms in girls and less traits of shyness in boys, irrespective of bedroom television placement. Moreover, it was not surprising to see that bedroom television placement predicted more depressive symptoms in girls. All of these results are in line with the current literature suggesting that organized sporting activities have been found to alleviate depressive symptoms [24, 25] and to promote social interactions [26], while bedroom television seems to aggravate psycho-social risks [10]. Therefore, it was not unexpected that participating in organized sport less frequently amplified the relationship between preschool bedroom television placement and subsequent shyness in high school for girls. More specifically, private television access predicted girls being less willing to interact with strangers, less readily approach peers they do not know, more time to warm up to strangers, and present with excessive shyness when participating in organized sport at a lesser frequency than girls who participated more frequently.

These results raise the question as to why no explicit protective effects were found on mental health outcomes in girls who consistently participated sport (e.g., consistent sport attenuating the relationship between bedroom television and later psycho-social risks). However, given the protective effect that consistent sport participation had on depressive symptoms, it is only sensible to consider that the results are still speaking to the potential benefits and social implications that organized sport has been documented to have. More specifically, not participating in enough sport may result in a significant missed opportunity for girls to build appropriate skills to interact with peers. Moreover, consistent sport having no protective effects for boys can be partially explained by their television habits. It has been documented that boys are more likely to consume violent content on television which makes them more predisposed to develop externalized behavioral difficulties such as conduct disorders [47]. Given this, it is possible that sport participation would yield a protective effect on other psycho-social difficulties similar to the ones included in the cited study.

Some researchers argue that the explosion of technology has changed the way the human can satisfy their socialization needs [48]. With the trends of time spent on social media and other technologies only increasing [49], it is only logical that less time can be allocated to more beneficial activities, such as sports or live-interactions where girls can be exposed to social opportunity. In fact, a study showed that girls use smartphone features such as talking through the phone, text messaging and social networking more frequently than boys [50], making technology a more convenient medium to satisfy social needs. However, research has shown that asynchronous virtual communication does not necessarily translate into real-life social skills [50].

For boys, consistent sport significantly predicted less traits of shyness, irrespective of bedroom television placement. This result is not surprising given the social nature of organized sport that may increase feelings of acceptance and social inclusion [51], possibly allowing room for peer engagement and leading to less overall shyness. Another possible mechanism involved are gender-roles that are attributed to children. Specifically, literature has pointed to boys using organized sport participation (ex. team sports) as one of the main sources to obtain social interaction [52].

In line with the time displacement concept [18], having grown up with a television in the bedroom may be a factor that predisposes girls to adapt to an environment that is primarily sedentary in nature resulting in less time engaging in activities that can promote behavioral and interpersonal preparedness for middle childhood sport participation. This would explain why girls are presenting with more traits of shyness due to not obtaining adequate exposure to activities that promote social skills and engagement with peers. Nonetheless, this study highlights the protective effect of sport participation during childhood through a mechanism that seems to alleviate the mental health outcomes associated with bedroom television placement. This only further credits sport participation as a beneficial activity that warrants being part of a child's routine. While recommendations suggest keeping the child's bedroom a screen-free environment, this has become challenging to control given the increase in digital media [53]. Rather than attempting to remove screens altogether, the findings of this study point to a viable solution of integrating alternative activities such as sport that can allow children to flourish and develop the capacities that they all have the potential to acquire [54].

As with many longitudinal studies, this study is not without limitations. Firstly, our study was vulnerable to a large amount of attrition due to the temporal nature of a longitudinal design. We used multiple imputation as a correctional method to account for possible attrition bias [55]. Secondly, due to the nature of our design, we

cannot imply causal relationships from our findings. However, we attempted to isolate our findings by rigorously accounting for pre-existing and concurrent controls in our model. For example, this study accounts for the possibility of the child having private access to a television at age 12, which lowers the likelihood that the observed results are due to concurrent private access to television. Moreover, the existing scientific literature on this subject predominantly controls for sex. This study used a sex-stratified analysis that allowed to observe girls and boys as their own population. In addition, the participants having been randomly selected from a birth registry. These aspects promote external validity. Lastly, use of historical data may not accurately represent today's trends of screen access in the bedroom. However, the growing trends of private screen access outside of the bedroom may similarly reproduce isolating behavior in children [56].

Data has been demonstrating that girls are withdrawing from sports more and more while simultaneously enrolling in sports less and less [57]. More recent research only confirms this trend [31,58]. This can be due to external factors such as parental and household rules restricting girls from participating in sport [59] or policy having yet to find creative and innovative ways to encourage sport participation in girls [60]. The findings of this study only further support that sport participation is a meaningful venue that can be implemented in various contexts in order to promote a sense of inclusion in youth and emotional regulation [61,62]. Thus, this study is in direct response to the various calls to action put forth such as the Canadian Women & Sport Rally report (2020), and the literature addressing the decline in sport participation in girls [63-65]. It is imperative that researchers, policy makers, parents, and clinicians continue to find innovative ways to promote and encourage young girls to participate in physical activity given the established and proposed benefits.

Funding

We gratefully acknowledge the contribution of Frédéric Nault-Brière to this research (deceased, June 2020). This work was supported by the Social Sciences and Humanities Research Council (LSP as PI, grant number 435-2017-0784) and the School Environment Research Group. We acknowledge that the Québec Longitudinal Study of Child Development was supported by funding from the ministère de la Santé et des Services sociaux, le ministère de la Famille, le ministère de l' Éducation et de l'Enseignement supérieur, the Lucie and André Chagnon Foundation, the Institut de recherche Robert-Sauvé en santé et en sécurité du travail, the Research Centre of the Sainte-Justine University Hospital, the ministère du Travail, de l'Emploi et de la Solidarité sociale and the Institut de la Statistique du Québec. These original sponsors funded the larger public data set that constitutes the original QLSCD. Source: Data is compiled from the final master file 'E1-E22′ from the Quebec Longitudinal Study of Child Development (1997–2019), ©Gouvernement du Québec, Institut de la statistique du Québec. Accessibility of data is upon request at the source given privacy and ethical restrictions.

Author Contributions

B. N.: Conceptualization, Methodology, Formal analysis, Writing—original draft, review & editing, Visualization. C.F.: Writing—review & editing. E.F.D.: Writing—review & editing, L.S.P.: Conceptualization, Methodology, Writing—review & editing, Supervision, Funding acquisition. We have approved the final draft for submission and take responsibility for the entire manuscript.

Institutional Review Board Statement

The study was approved by the Institutional Review Board of the University of Montreal (Protocol project # 2022–2024, approved 22 March 2023).

Informed Consent Statement

Informed consent was obtained from all subjects involved in this study.

Data Availability Statement

Restrictions apply to the availability of these data. Data were obtained from the Institut de la statistique du

Québec and are available with the permission of the Institut de la statistique du Québec.

Conflicts of Interest

The authors declare no conflict of interest. The study sponsors did not have any role in study design; collection, analysis, and interpretation of data; writing the report; and the decision to submit the report for publication.

References

1 Bull F.C., Al-Ansari S.S., Biddle S., Borodulin K., Buman M. P., Cardon G., Carty C., Chaput J.-P., Chastin S., Chou R., et al. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, **54**(**24**), 1451–1462.

2 LeBlanc A. G., Katzmarzyk P. T., Barreira T. V., Broyles S. T., Chaput J. P., Church T. S., Fogelholm M., Harrington D.M., Hu G., Kuriyan R., et al. (2015). Correlates of total sedentary time and screen time in 9–11 year-old children around the world: the international study of childhood obesity, lifestyle and the environment. *PLoS ONE*, **10**(**6**), e0129622. https://doi.org/10.1371/journal.pone.0129622.

3 Borghese M. M., Tremblay M. S., Katzmarzyk P. T., Tudor-Locke C., Schuna J. M., Leduc G., Boyer C., LeBlanc A.G., & Chaput J.P. (2015). Mediating role of television time, diet patterns, physical activity and sleep duration in the association between television in the bedroom and adiposity in 10 year-old children. *International Journal of Behavioral Nutrition and Physical Activity*, **12**(**1**), 1–10. https://doi.org/10.1186/s12966-015-0221-5.

4 Wartella E., Richert R. A., & Robb M. B. (2010). Babies, television and videos: How did we get here? *Developmental Review*, **30**(**2**), 116–127. https://doi.org/10.1016/j.dr.2010.03.008.

5 Gentile D.A., Berch O.N., Choo H., Khoo A., & Walsh D.A. (2017). Bedroom media: One risk factor for development. *Developmental Psychology,* **53**(**12**), 2340–2355. https://doi.org/10.1037/dev0000399.

6 World Health Organization. (2019). *Guidelines on Physical Activity, Sedentary Behavior, and Sleep for Children under 5 Years of Age*. Geneva: World Health Organization. https://apps.who.int/iris/handle/10665/340892.

7 McArthur B.A., Volkova V., Tomopoulos S., & Madigan S. (2022). Global prevalence of meeting screen time guidelines among children 5 years and younger: a systematic review and meta-analysis. *JAMA Pediatrics*, **176**(**4**), 373–383. https://doi.org/10.1001/jamapediatrics.2021.6386.

8 Eirich R., McArthur B.A., Anhorn C., McGuinness C., Christakis D.A., & Madigan S. (2022). Association of screen time with internalizing and externalizing behavior problems in children 12 years or younger: A systematic review and meta-analysis. *JAMA Psychiatry*, **79**(**5**), 393–405.

9 Ferguson C.J. (2017). Everything in moderation: Moderate use of screens unassociated with child behavior problems. *Psychiatric Quarterly*, **88**, 797–805. https://doi.org/10.1007/s11126-016-9486-3.

10 American Academy of Pediatrics. (2016). Media use in school-aged children and adolescents. *Journal of Pediatrics,* **138**(**5**). https://doi.org/10.1542/peds.2016-2592.

11 MacDonald K.B., Patte K.A., Leatherdale S.T., & Schermer J.A. (2022). Loneliness and screen time usage over a year. *Journal of Adolescence,* **94**(**3**). https://doi.org/10.1002/jad.1202.

12 Helm A. F., & Spencer R. M. (2019). Television use and its effects on sleep in early childhood. *Sleep Health*, **5**(**3**), 241–247. https://doi.org/10.1016/j.sleh.2019.02.00.

13 Canadian Paediatric Society, Digital Health Task Force. (2017). Screen time and young children: Promoting health and development in a digital world. *Paediatrics & Child Health*, **22**(**8**), 461–468. https://doi.org/10.1093/pch/pxx123.

14 Pagani L. S., Harbec M. J., & Barnett T. A. (2019). Prospective associations between television in the preschool bedroom and later bio-psycho-social risks. *Pediatric Research*, **85**(**7**), 967–973. https://doi.org/10.1038/s41390-018-0265-8.

15 Radesky J. S., Silverstein M., Zuckerman B., & Christakis D. A. (2014). Infant self-regulation and early childhood media exposure. *Pediatrics*, **133**(**5**), 1172–1178. https://doi.org/10.1542/peds.2013-2367.

16 Twenge J.M., & Martin G.N. (2020). Gender differences in associations between digital media use and psychological well-being: Evidence from three large datasets. *Journal of Adolescence*, **79**, 91–102. https://doi.org/10.1016/j.adolescence.2019.12.018.

17 Sameroff A. (1975). Transactional models in early social relations. *Human Development*, **18**(**1**–**2**), 65–79. https://doi.org/10.1159/00027147

18 DiMaggio P., Hargittai E., Neuman W.R., & Robinson J.P. (2001). Social implications of the Internet. *Annual Review of Sociology*, **27**(**1**), 307–336. https://doi.org/10.1146/annurev.soc.27.1.307.

19 Holt, N.L. (2016). *Positive Youth Development through Sport* (p. 264). London, UK: Routledge. https://doi.org/10.4324/9781315709499.

20 Holt N., Deal C., Pankow K., Tenenbaum G., Eklund R., & Boiangin N. (2020). Chapter 20: Positive youth development through sport. In: *Handbook of Sport Psychology*, 4th edition. Hoboken, NJ, USA: John Wiley & Sons, Inc. https://doi.org/10.1002/9781119568124.ch20.

21 White R.L., Babic M.J., Parker P.D., Lubans D.R., Astell-Burt T., & Lonsdale C. (2017). Domain- specific physical activity and mental health: a meta-analysis. *American Journal of Preventive Medicine*, **52**(**5**), 653–666. https://doi.org/10.1016/j.amepre.2016.12.008.

22 Bruner M.W., McLaren C.D., Sutcliffe J.T., Gardner L.A., Lubans D.R., Smith J.J., & Vella S.A. (2023). The effect of sport-based interventions on positive youth development: A systematic review and meta-analysis. *International Review of Sport and Exercise Psychology*, **16**(**1**), 368–395. https://doi.org/10.1080/1750984X.2021.1875496.

23 Strandbu Å., Bakken A., & Stefansen K. (2020). The continued importance of family sport culture for sport participation during the teenage years. *Sport, Education and Society*, **25**(**8**), 931–945. https://doi.org/10.1080/13573322.2019.1676221.

24 Gunnell K.E., Flament M.F., Buchholz A., Henderson K. A., Obeid N., Schubert N., & Goldfield G.S. (2016). Examining the bidirectional relationship between physical activity, screen time, and symptoms of anxiety and depression over time during adolescence. *Preventive Medicine*, **88**, 147–152. https://doi.org/10.1016/j.ypmed.2016.04.002.

25 Piché G., Huỳnh C., & Villatte A. (2019). Physical activity and child depressive symptoms: Findings from the QLSCD. *Canadian Journal of Behavioural Science/Revue Canadienne des Sciences du Comportement*, **51**(**2**), 114. https://doi.org/10.1037/cbs0000120.

26 Findlay L.C., & Coplan R.J. (2008). Come out and play: Shyness in childhood and the benefits of organized sports participation. *Canadian Journal of Behavioural Science/Revue Canadienne des Sciences du Comportement*, **40**(**3**), 153. https://doi.org/10.1037/0008-400X.40.3.153.

27 Primack B.A., Swanier B., Georgiopoulos A.M., Land S.R., & Fine M.J. (2009). Association between media use in adolescence and depression in young adulthood: a longitudinal study. *Archives of General Psychiatry*, **66**(**2**), 181–188. https://doi.org/10.1001/archgenpsychiatry.2008.532.

28 Tremblay M.S., Colley R.C., Saunders T.J., Healy G.N., & Owen N. (2010). Physiological and health implications of a sedentary lifestyle. *Applied Physiology, Nutrition, and Metabolism*, **35**(**6**), 725–740. https://doi.org/10.1139/H10-079.

29 Tannenbaum C., Ellis R.P., Eyssel F., Zou J., & Schiebinger L. (2019). Sex and gender analysis improves science and engineering. *Nature*, **575**(**7781**), 137–146. https://doi.org/10.1038/s41586-019-1657-6.

30 Hall-Lande, J.A., Eisenberg, M.E., Christenson, S. L., & Neumark-Sztainer, D. (2007) Social isolation, psychological health, and protective factors in adolescence. *Adolescence*, **42**(**166**).

31 Zarrett, N., Veliz P., & Sabo D. (2020). Keeping girls in the game: Factors that influence sport participation. In Women's Sports Foundation. https://doi.org/10.13140/RG.2.2.20188.33920.

32 Ali S. (2018). Social media usage among teenage girls in Rawalpindi and Islamabad. *Global Media Journal*, **16**(**31**), 1–9.

33 Calati R., Ferrari C., Brittner M., Oasi O., Olié E., Carvalho A.F., & Courtet P. (2019). Suicidal thoughts and behaviors and social isolation: A narrative review of the literature. *Journal of Affective Disorders*, **245**, 653–667. https://doi.org/10.1016/j.jad.2018.11.022.

34 Anderson D. R., Subrahmanyam K., & Cognitive Impacts of Digital Media Workgroup. (2017). Digital screen media and cognitive development. *Pediatrics*, **140**(**Suppl._2**), S57–S61. https://doi.org/10.1542/peds.2016-1758C.

35 Wilms R., Mäthner E., Winnen L., & Lanwehr R. (2021). Omitted variable bias: A threat to estimating causal relationships. *Methods in Psychology*, **5**, 100075. https://doi.org/10.1016/j.metip.2021.100075.

36 McArthur B. A., Browne D., McDonald S., Tough S., & Madigan S. (2021). Longitudinal associations between screen use and reading in preschool-aged children. *Pediatrics*, **147**(**6**), e2020011429. https://doi.org/10.1542/peds.2020-011429.

37 Brière F. N., Imbeault A., Goldfield G. S., & Pagani L. S. (2020). Consistent participation in organized physical activity predicts emotional adjustment in children. *Pediatric Research*, **88**(**1**), 125–130. https://doi.org/10.1038/s41390-019-0417-5.

38 Pagani L., Tremblay R. E., Vitaro F., Boulerice B., & McDuff P. (2001). Effects of grade retention on academic performance and behavioral development. *Development and Psychopathology*, **13**(**2**), 297–315. https://doi.org/10.1017/S095457940100206.

39 Bates J. E., Freeland C. A. B., & Lounsbury M. L. (1979). Measurement of infant difficultness. *Child Development*, **50**(**3**), 794–803. https://doi.org/10.2307/112894.

40 Alp I.E. (1994). Measuring the size of working memory in very young children: The Imitation Sorting Task. *International Journal of Behavioral Development*, **17**(**1**), 125 – 141. https://doi. org/10.1177/016502549401700108.

41 Karevold E., Ystrom E., Coplan R.J., Sanson A.V., & Mathiesen K.S. (2012). A prospective longitudinal study of shyness from infancy to adolescence: Stability, age-related changes, and prediction of socio-emotional functioning. *Journal of Abnormal Child Psychology*, **40**, 1167 – 1177. https://doi. org/10.1007/s10802-012-9635-6.

42 Hankin B. L. (2015). Depression from childhood through adolescence: Risk mechanisms across multiple systems and levels of analysis. *Current Opinion in Psychology*, **4**, 13–20. https://doi.org/10.1016/j.copsyc.2015.01.003.

43 Radloff L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, **1**(**3**), 385–401. https://doi.org/10.1177/014662167700100306.

44 Morin A.J., Moullec G., Maiano C., Layet L., Just J.L., & Ninot G. (2011). Psychometric properties of the Center for Epidemiologic Studies Depression Scale (CES-D) in French clinical and nonclinical adults. *Revue D'epidemiologie et de Sante Publique*, **59**(**5**), 327–340. https://doi.org/10.1016/j.respe.2011.03.061.

45 Epstein N.B., Baldwin L.M., & Bishop D.S. (1983). The McMaster Family Assessment Device. *Journal of Marital and Family Therapy*, **9**(**2**), 171–180. https://doi.org/10.1111/j.1752-0606.1983.tb01497.x

46 Saunders T.J., & Vallance J.K. (2017). Screen time and health indicators among children and youth: current evidence, limitations and future directions. *Applied Health Economics and Health Policy*, **15**, 323 – 331. https://doi.org/10.1007/s40258-016-0289-3.

47 Pagani L. S., Bernard J., & Fitzpatrick C. (2023). Prospective associations between preschool exposure to violent televiewing and psychosocial and academic risks in early adolescent boys and girls. *Journal of Developmental & Behavioral Pediatrics*, **44**(**1**), e1–e11. https://doi.org/10.1097/DBP.0000000000001135.

48 Kross E., Verduyn P., Sheppes G., Costello C.K., Jonides J., & Ybarra O. (2021). Social media and well-being: Pitfalls, progress, and next steps. *Trends in Cognitive Sciences*, **25**(**1**), 55–66. https://doi.org/10.1016/j.tics.2020.10.005.

49 Sharov S., Vorovka M., Sharova T., & Zemlianska A. (2021). The impact of social networks on the development of students' social competence. *Journal of Engineering Pedagogy*, **11**(**3**), 84–98. https://doi.org/10.3991/ijep.v11i3.20491.

50 Przepiorka A., Błachnio A., Cudo A., & Kot P. (2021). Social anxiety and social skills via problematic smartphone use for predicting somatic symptoms and academic performance at primary school. *Computers & Education*, **173**, https://doi.org/10.1016/j.compedu.2021.104286.

51 Wikman, J.M., Elsborg P., & Ryom K. (2017). Psychological benefits of team sport. In Sport and Health

(pp. 132–146). London, UK: Routledge.

52 Messner M. A. (2008). Boyhood, organized sports, and the construction of masculinities. *Sociology: Exploring the Architecture of Everyday Life*, 87–98.

53 Hill D., Ameenuddin N., Reid Chassiakos Y. L., Cross C., Hutchinson J., Levine A., Boyd, R., Mendelson, R., Moreno, M., Swanson, W.S. (2016). Media and young minds. Pediatrics, **138**(**5**), e20162591. https://doi.org/10.1542/peds.2016-2591.

54 Lerner, R.M. (2018). *Concepts and Theories of Human Development*. London, UK: Routledge.

55 Cummings P. (2013). Missing data and multiple imputation. *JAMA Pediatrics*, **167**(**7**), 656-661. 508 https://doi.org/10.1001/jamapediatrics.2013.1329.

56 Smith L., Jacob L., Trott M., Yakkundi A., Butler L., Barnett Y., Armstrong N.C., McDermott D., Schuch F., Meyer J., et al. (2020). The association between screen time and mental health during COVID-19: A cross sectional study. *Psychiatry Research*, **292**, 113333. https://doi.org/10.1016/j.psychres.2020.113333.

57 Vilhjalmsson R., & Kristjansdottir G. (2003). Gender differences in physical activity in older children and adolescents: the central role of organized sport. *Social Science & Medicine*, **56**(**2**), 363–374. https://doi.org/10.1016/s0277-9536(02)00042-4.

58 Silva D.R.P.D., Werneck A.O., Collings P., Fernandes R.A., Ronque E.R.V., Sardinha L.B., & Cyrino E.S. (2019). Identifying children who are susceptible to dropping out from physical activity and sport: a cross-sectional study. *Sao Paulo Medical Journal*, **137**(**4**), 329 – 335. https://doi. org/10.1590/1516-3180.2018.033305071.

59 Cooky C. (2009). “Girls just aren't interested”: the social construction of interest in girls' sport. *Sociological Perspectives*, **52**(**2**), 259–283.

60 Abadi E., & Gill D.L. (2020). The role of socializing agents on dropout and continuing participation of adolescent girls in masculine-typed sports. *International Journal of Kinesiology in Higher Education*, **4**(**3**), 77–90. https://doi.org/10.1080/24711616.2019.1656118.

61 Elling A., & Knoppers A. (2005). Sport, gender and ethnicity: Practises of symbolic inclusion/exclusion. *Journal of Youth and Adolescence*, **34**, 257–268. https://doi.org/10.1007/s10964-005-4311-6.

62 Britton D., & Polman R. (2023). Validation of the Interpersonal Regulation Questionnaire in sports: measuring emotion regulation via social processes and interactions. *International Journal of Sport and Exercise Psychology*, **21**(**5**), 857–868. https://doi.org/10.1080/1612197X.2022.2089197.

63 Catherine Cabiston. (2020). *Canadian Women & Sport*, The Rally Report.

64 Lau E. Y., Riazi N. A., Qian W., Leatherdale S. T., & Faulkner G. (2019). Protective or risky? The longitudinal association of team sports participation and health-related behaviours in Canadian adolescent girls. *Canadian Journal of Public Health*, **110**, 616–625. https://doi.org/10.17269/s41997-019-00221-4.

65 Pedersen M., & King A.C. (2023). How can sport-based interventions improve health among women and girls? A scoping review. *International Journal of Environmental Research and Public Health*, **20**(**6**), 4818. https://doi.org/10.3390/ijerph200641.

© The Author(s) 2024. Published by Global Science Publishing (*GSP*).

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.