Correlates of preschoolers' screen time in China: parental factors

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Research Article

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Abstract

Background

With the advent of the electronic age, the long-term screen time (ST) of preschoolers in China is relatively high and is on the rise, which is likely to affect preschoolers' physical and mental health. This study aimed to explore the factors influencing ST in preschoolers, especially the role of parental factors, and to provide a basis for the prevention, control, and intervention of ST in preschoolers in China.

Methods

A questionnaire was completed by the parents of 1,546 preschoolers from four kindergartens in Pinghu City, Zhejiang Province, China, and a logistic regression model was used to analyze the correlates of excessive ST in preschoolers.

Results

A total of 43.8% of preschoolers, of which 50.3% were boys and 49.7% were girls, had > 1 hour/day of ST. For older preschoolers, greater screen accessibility, greater frequency of eating in front of a screen, longer ST of parents, and unclear rules of screen behavior were the risk factors for ST being > 1 hour/day ($P < 0.05$). After adjusting for confounders, the relationship between the ST of fathers and ST of preschoolers was still significant ($P < 0.01$), and the dose-effect relationship was observed ($P < 0.001$).

Conclusion

Prolonged parental ST (especially of fathers) and lack of rules for screen behavior of were independent risk factors for prolonged preschoolers' ST in this study.

Background

Screen time (ST) refers to the time spent doing sedentary activities in front of a screen, for example, watching television, using a computer, and playing on smartphones or electronic games [1], and is closely related to many health problems such as myopia and obesity [2, 3]. Preschoolers, known as the "electronic media generation," grow up in families and social environments surrounded by various screens. There is a trend of children using electronic media for the first time at younger ages, with long-term screen exposure being common in preschoolers at school and at home [4]. According to previous studies, the ST of preschoolers in China is relatively high and shows a rising trend [5, 6]. The average ST of children aged three to six is > 1 hour/day, and on weekends is > 2 hours/day [7]. At the same time, the overall prevalence of myopia in children and adolescents in China remains high (57.2%) and shows a trend of affecting children at a younger age. This may be closely related to exposure of near-sighted

environments, such as excessive ST [8]. The health behavior-related guidelines issued by the World Health Organization, developed countries in Europe, the United States, and relevant institutions in China all recommend that the ST of preschoolers be restricted (for example, to no more than 1 hour/day and as few hours as possible) [9]. Therefore, this study aimed to explore the factors affecting the home-based ST of preschoolers, and especially the influence of parents, in order to effectively prevent and control home-based ST in Chinese preschoolers.

Methods

Participants

From September to October 2019, the parents of preschoolers aged three to six years old ($n = 1,546$) from four kindergartens in Pinghu, China, participated in this study. A total of 1,424 subjects were analyzed after excluding participants with missing information.

Questionnaire

The questionnaire was designed with reference to previous studies [10-12], and was administered by trained teachers in each class. The contents of the questionnaire included: (1) children's information, including gender, date of birth, home-based ST per day, screen accessibility ("How easy it is for preschoolers to touch the screens of televisions, computers, mobile phones, or tablets"), and the number of meals eaten in front of a screen; (2) parents' information, including education level, home-based ST per day, parent-child screen-viewing behavior, parental perception of child ST ("Children spending too much time in front of screens is unhealthy"); and (3) the family rules regarding child ST ("There are clear rules for children's behavior in front of a screen such as strict control of the duration of watching animation"). The options used for the five-point Likert scale included "strongly agree," "relatively agree," "neutral," "relatively disagree," and "strongly disagree." The weighted kappa coefficients of the ST questions for preschool children, fathers, and mothers were 0.76, 0.69, and 0.72, respectively.

Statistical analysis

Categories were expressed as percentages, and the chi-square test was used for comparison between groups. Continuous variables were expressed as the mean and standard deviation, and an independent sample t-test was used for comparison between groups. A multivariate logistic regression model was used to analyze the factors influencing excessive ST in preschoolers. We used the odds ratio (OR) and a 95% confidence interval to describe the degree of influence of each factor on home-based ST and used an analysis of variance to test the trend. We used SPSS software (version 20.0) for statistical analysis. The significance level was $P < 0.05$.

Results

Characteristics of preschoolers' home-based ST

There were 624 (43.8%) preschoolers with a home-based ST of >1 hour/day; among them, 314 (50.3%) were boys and 310 (49.7%) were girls. The gender difference was not significant ($P > 0.05$), as shown in Table 1. The average age of preschoolers whose home-based ST was >1 hour/day was greater than those whose home-based ST was ≤ 1 hour/day ($P < 0.05$). The easier it was for preschoolers to touch an electronic screen at home, and the more time they spend eating while viewing the screen, the longer their ST was at home ($P < 0.05$). There were significant differences between the ST of ≤ 1 hour/day and >1 hour/day among preschoolers with different parental ST, fathers' age and education levels, parent-child ST, daily caregivers, and family rules on ST ($P < 0.05$).

Multivariate logistic regression on factors affecting preschoolers' home-based ST

Taking preschoolers' home-based ST as the dependent variable (≤ 1 hour/day = 0; >1 hour/day = 1), and preschoolers' gender, age, and the parents' ST as independent variables in the model (Model 1), child age, parent-child screen behaviors, eating while screen viewing, screen accessibility, daily caregivers, mothers' ST, parental perception, and family rules for child ST were shown to be significant ($P < 0.05$), as can be seen in Table 2. When the father's education level, age, and ST were included (Model 2), the fathers' age and ST were significant ($P < 0.001$), but mothers' ST was not ($P > 0.05$).

To further explore the dose-effect relationship between ST and related factors, the home-based ST of preschoolers was further divided into three levels: ≤ 1 hour/day, 1–2 hours/day, and >2 hours/day. The results showed that older ages of preschoolers, longer fathers' ST, easier access to ST, more frequent eating by preschoolers while screen viewing, worse parental perception of child ST, and less clear family rules about ST were associated with longer preschoolers' home-based ST ($P < 0.05$; Table 3). In addition, the trend relationship (changes in OR) between fathers' ST and preschoolers' home-based ST was significant ($P < 0.001$; data not shown).

Discussion

The results of this study show that preschoolers' ST is closely related to the preschoolers' age, fathers' ST, eating while screen viewing, screen accessibility, parents' perception of child ST, and family ST rules. Meanwhile, the potential adverse impact of the mothers' ST on preschoolers' screen viewing was explained mostly by the fathers' ST in our results. This suggests that reducing parents' (especially fathers') ST, improving parental awareness of the harmful effects of prolonged home-based ST for preschoolers, formulating family ST rules, and reducing screen accessibility may be of great significance for controlling preschoolers' ST in China.

The results on the positive correlation between parental ST and preschoolers' ST are consistent with those of previous related studies [11, 13–15]. Many studies have shown that parents' ST is closely related to children's ST. Longer daily ST of parents is a risk factor for children's ST being > 1 hour/day [13, 16]. Studies have also shown that the use of electronic media by preschoolers is easily influenced by family members, and this influence can be exerted in a variety of ways (e.g., children learning from their parents' screen-viewing behavior) [11, 15]. The theory of social cognition suggests that children may develop their

own screen-viewing behavior by observing and learning from that of their parents'. Therefore, reducing the home-based ST of preschoolers should start with the people around them (such as parents, grandparents, or other caregivers), especially to make parents aware of the modeling effect of their behavior on preschoolers. However, studies have shown that some parents appear to be unaware that their screen-viewing behavior is setting standards and imitation targets for preschoolers [5]. In contrast, the rules of parents regulating preschoolers' screen viewing are related to less home-based ST [11], which is consistent with the results of the present study. However, more than half of the parents seldom formulate rules related to children's ST [17, 18]. Therefore, clear rules of screen-viewing behavior may have a positive influence on reducing the ST of preschoolers at home.

The results of this study show that the influence of fathers and mothers on the ST of Chinese preschoolers at home does not appear independently, and that the fathers' ST seems to have a greater influence on the preschoolers' ST. This may be due to the fact that fathers are often better at using electronic media than mothers and have more knowledge of and more opportunities to be exposed to electronic media, which has a greater impact on children's related behavior. Moreover, fathers in China are often less involved in the upbringing of preschoolers. Studies have shown that there are currently unscientific parenting methods and fewer father-son interactions than mother-son interactions, that family education concepts include an insufficient understanding of the unique educational significance of fathers [19]. Therefore, fathers' own ST and related perceptions need to be highlighted in the prevention and control of Chinese preschoolers' home-based ST in the future.

Conclusions

Parents' (especially fathers') ST, family rules regarding child ST, and screen accessibility are important risk factors for excessive home-based preschoolers' ST in our cross-sectional study, with a dose-effect relationship also having been observed. This suggests that we should focus on intervening in parental behavior of screen viewing, formulating family ST rules, declining screen accessibility, and reducing preschoolers' ST at home as much as possible to improve preschoolers' physical health. Further studies using a longitudinal design are required.

Abbreviations

OR
Odds ratio
ST
Screen time

Declarations

Ethics approval and consent to participate

All participants signed an informed consent form, and the research proposal was approved by the Ethics Committee of Jiaxing First Hospital (LS2019-107).

Consent for publication

The consent for publication was obtained from the parents of the preschoolers.

Availability of data and materials

The data of this study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SY and XYW conceptualized and designed the study, drafted the initial manuscript, and critically reviewed and revised the manuscript. CY, XTW, and YR were in charge of the collected data, and reviewed and revised the manuscript. Dr. YW reviewed and revised the manuscript. All authors have read and approved the final manuscript.

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Table 1 Characteristics of correlates of screen time in Chinese preschoolers

Variables		Screen time (ST), `X (SD)/n(%), n=1424			X ² or t	P value
		Total	≤1 h/d, n=800	>1 h/d, n=624		
Child sex						
	Girls	704(49.4)	394(49.2)	310(49.7)	0.03	0.872
	Boys	720(50.6)	406(50.8)	314(50.3)		
Child age (years)		4.52(0.86)	4.45(0.87)	4.60(0.84)	-3.24	0.001
Parental age						
	Father (≥40 years)	137(9.6)	96(12.0)	41(6.6)	11.89	0.001
	Mother (≥40 years)	74(5.2)	45(5.6)	29(4.6)	0.68	0.410
Parental education levels						
	Father (high school and more)	1133(79.6)	621(77.6)	512(82.1)	4.22	0.040
	Mother (high school and more)	1098(77.1)	603(75.4)	495(79.3)	3.10	0.078
Parental ST						
	Father (>1 h/d)	1080(75.8)	560(70.0)	520(83.3)	34.02	0.000
	Mother (>1 h/d)	996(69.9)	515(64.4)	481(77.1)	26.93	0.000
Accessibility of screen devices		3.68(1.03)	3.47(1.07)	3.95(0.91)	-8.92	0.000
Eats while screen viewing		2.74(1.06)	2.47(1.03)	3.09(1.00)	-11.53	0.000
Parent-child screen viewing		2.67(0.90)	2.54(0.88)	2.84(0.89)	-6.49	0.000
Child cared by parent		809(56.8)	484(60.5)	325(52.1)	10.12	0.001
Parental perception on child ST		1.43(0.82)	1.40(0.82)	1.48(0.82)	-1.95	0.051
Family rules on child ST		1.63(0.82)	1.46(0.74)	1.84(0.87)	-8.85	0.000

h/d: hour per day; $\bar{X}$ (SD): mean (standardized deviation); n(%): number(percentage).

Table 2 Logistic regression models for correlates of screen time in Chinese preschoolers

Variables			References	Screen time (ST, ≤1 h/d vs. >1 h/d)			
				Model 1		Model 2	
				OR(95%CI)	P	OR(95%CI)	P
Child							
	sex	Girls	1.03(0.82,1.30)	0.787	1.03(0.82,1.31)	0.782	
	age	Younger	1.21(1.05,1.39)	0.008	1.23(1.07,1.41)	0.004	
	Eats while screen viewing	Less	1.58(1.40,1.77)	0.000	1.59(1.41,1.79)	0.000	
	Screen Accessibility	Poor	1.36(1.20,1.53)	0.000	1.35(1.19,1.52)	0.000	
	Caregiver (grandparent)	Parent	1.40(1.10,1.77)	0.006	1.39(1.09,1.76)	0.007	
	Parent-child screen viewing	Less	1.24(1.08,1.42)	0.002	1.22(1.06,1.40)	0.005	
	Parental perception on child ST	Harmful	1.14(0.98,1.32)	0.082	1.16(1.00,1.35)	0.058	
	Family rules on child ST	Clear	1.60(1.38,1.86)	0.000	1.63(1.40,1.88)	0.000	
Mother							
	ST	≤1h/d	1.58(1.22,2.06)	0.001	1.26(0.92,1.71)	0.147	
	education levels	≥high school	0.91(0.68,1.22)	0.543	1.10(0.76,1.58)	0.612	
	age	≥40 years	1.11(0.64,1.92)	0.702	0.65(0.34,1.26)	0.200	
Father							
	ST	≤1h/d			1.63(1.16,2.28)	0.005	
	education levels	≥high school			0.87(0.60,1.27)	0.481	
	age	≥40 years			2.26(1.34,3.81)	0.002	

h/d: hour per day; OR: Odds ratio; CI: confidence interval.

Table 3 Multinomial logistic regression model for screen time in Chinese preschoolers

Variables			References	Screen time (ST)			
				1-2h/d vs.≤1 h/d		>2h/d vs.≤1 h/d	
				OR(95%CI)	P	OR(95%CI)	P
Child							
	sex	Girls	1.01(0.78,1.29)	0.969	1.06(0.74,1.52)	0.753	
	age	Younger	1.19(1.03,1.39)	0.021	1.40(1.12,1.75)	0.003	
	Eats while screen viewing	Less	1.52(1.34,1.73)	0.000	1.86(1.54,2.25)	0.000	
	Screen Accessibility	Poor	1.22(1.07,1.39)	0.003	1.83(1.48,2.27)	0.000	
	Caregiver (grandparent)	Parent	1.38(1.06,1.78)	0.015	1.45(1.00,2.10)	0.048	
	Parent-child screen viewing	Less	1.23(1.06,1.42)	0.006	1.22(0.99,1.50)	0.061	
Father ST							
	1-2h/d	≤1h/d	1.22(0.84,1.79)	0.297	3.06(1.53,6.11)	0.002	
	>2h/d	≤1h/d	1.44(0.95,2.19)	0.083	5.93(2.88,12.21)	0.000	
Mother ST							
	1-2h/d	≤1h/d	1.32(0.92,1.88)	0.127	0.94(0.54,1.64)	0.819	
	>2h/d	≤1h/d	1.11(0.74,1.66)	0.627	1.15(0.64,2.08)	0.637	
	Father education levels	≥high school	0.85(0.57,1.28)	0.432	0.99(0.56,1.76)	0.974	
	Mother education levels	<high school	0.95(0.64,1.42)	0.811	1.70(0.98,2.95)	0.061	
	Father age	≥40 years	2.17(1.22,3.83)	0.008	2.27(0.97,5.34)	0.059	
	Mother age	≥40 years	0.76(0.37,1.58)	0.460	0.49(0.18,1.36)	0.171	
	Parental perception on child ST	Harmful	1.08(0.91,1.28)	0.375	1.41(1.14,1.76)	0.002	
	Family rules on child ST	Clear	1.54(1.32,1.81)	0.000	1.96(1.58,2.43)	0.000	

h/d: hour per day; OR: Odds ratio; CI: confidence interval.