



Original Research

Current Status and Influencing Factors of Screen Device Usage Among Children Aged 3~6 Years: A Cross-Sectional Study

Jun Wang^{1*}, Kaiwei Xu¹, Shuzhen Ma², Yining Zhang³

¹Yongqing Center for Disease Control and Prevention, Langfang 065600, Hebei Province, China

²Department of Pediatrics, the Second Hospital of Hebei Medical University, Shijiazhuang 050200, Hebei Province, China

³Hebei Provincial Center for Disease Control and Prevention, Shijiazhuang 072550, Hebei Province, China

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ABSTRACT

Objective To investigate the current status of screen device usage among children aged 3~6 years and to analyze the associated influencing factors, providing a scientific basis for guiding rational screen use and formulating targeted interventions for young children. **Methods** A cross-sectional study was conducted among 2,969 children aged 3~6 years. Data regarding demographic characteristics, screen usage behaviors, home environment, and caregiver information were collected via questionnaires. Univariate analysis was performed using the χ^2 test, and independent influencing factors were identified through a multivariable logistic regression model. **Results** Among the 2,969 children surveyed, the prevalence of screen exposure was 77.16%. Specifically, 54.97% were exposed to screens before the age of 3, 23.37% possessed dedicated screen devices, 45.27% engaged in viewing short videos, and only 19.13% could terminate usage voluntarily. Multivariable logistic regression analysis revealed that independent influencing factors for screen usage included: only-child status (OR=0.79, 95% CI: 0.62~1.01), caregiver education level of high school/associate degree (OR=0.70, 95% CI: 0.52~0.94) or bachelor's degree and above (OR=0.44, 95% CI: 0.32~0.60), possession of dedicated screen devices (OR=2.39, 95% CI: 1.74~3.28), watching animations (OR=2.36, 95% CI: 1.75~3.18), playing video games (OR=1.67, 95% CI: 1.11~2.50), watching short videos (OR=1.97, 95% CI: 1.52~2.56), screen use during meals (OR=2.53, 95% CI: 1.64~3.90), caregivers permitting use due to work-related reasons (OR=1.86, 95% CI: 1.40~2.49), and caregiver home screen time > 2h (OR=1.57, 95% CI: 1.24~1.98) ($P < 0.05$). **Conclusion** Screen device usage among children aged 3~6 years is characterized by early onset and entertainment-driven motives, alongside weak self-regulation. Home environment, caregiver behaviors, device ownership, and content types are critical determinants. Multi-dimensional interventions involving families and society are warranted to facilitate the development of healthy screen habits in early childhood.

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1. Introduction

With the ubiquitous integration of smart electronic devices into modern life, screen media has emerged as an integral component of children's daily routines, leading to increasingly prominent concerns regarding early-age screen exposure. The preschool period, typically spanning ages 3 to 6 years, represents a critical window for neuroplasticity, cognitive development, and the formation of fundamental behavioral habits^[1]. Extensive research has demonstrated that prolonged and irrational screen device usage during this developmental stage not only compromises physical outcomes—such

as visual acuity, sleep quality, and motor proficiency—but also potentially impedes the development of social competencies, including linguistic expression and interpersonal interaction^{[2][3]}.

In recent years, the trend of screen usage among Chinese children has exhibited a significant shift toward earlier onset and normalization. Empirical evidence suggests that over 50% of children under the age of three in China have already been exposed to screen devices, with the average duration of daily usage showing a consistent upward trajectory^{[4][5]}. As the primary environment for early childhood development, the family unit plays a decisive role in shaping digital consumption habits. The behavioral patterns, educational philosophies, and modeling behaviors of caregivers are critical determinants of a child's screen-related behavior^[6].

* Corresponding author: Jun Wang. Email: 1352577120@qq.com

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However, current literature has predominantly focused on school-aged children, leaving a research gap concerning targeted investigations into the 3–6 age group. Furthermore, comprehensive analyses integrating multi-dimensional family-level factors remain insufficient [7]. Therefore, this study investigates the current status of screen device usage among 2,969 children aged 3–6 years and analyzes the underlying influencing factors. The findings are intended to provide an empirical foundation for formulating scientifically grounded intervention strategies to promote the holistic physical and mental well-being of young children.

2. Participants and Methods

2.1. Study Population

Using a cluster sampling method, a total of 2,969 children aged 3–6 years, registered in kindergartens and community health service centers across multiple regions in China between September and November 2025, were recruited.

2.1.1 Inclusion Criteria: (1) Aged 3 to 6 years; (2) Informed consent provided by guardians; (3) Ability to cooperate with the questionnaire survey.

2.1.2 Exclusion Criteria: (1) Presence of mental or intellectual developmental disabilities or physical disabilities hindering daily activities; (2) Guardians unable to accurately complete the questionnaire due to cognitive impairment or other reasons.

2.2. Survey Methodology

A cross-sectional survey was conducted using a self-designed Questionnaire on Screen Device Usage Among Children Aged 3–6 Years. The instrument demonstrated robust psychometric properties, with a Content Validity Index (CVI) of 0.92 and a Cronbach's α coefficient of 0.86. Trained medical staff and kindergarten teachers served as investigators, administering one-on-one surveys to primary guardians via a combination of onsite and online formats. Questionnaires were audited immediately upon completion to ensure integrity. Out of 3,050 distributed questionnaires, 2,969 valid responses were recovered, yielding an effective recovery rate of 97.34%. The survey encompassed:

- Demographic Characteristics: Gender, age, only-child status, and family structure (nuclear vs. non-nuclear).
- Screen Usage Patterns: Age of initial exposure (<3 years), possession of dedicated devices, content types (animations, education, gaming, video calls, short videos), self-regulation ability, and usage during meals.

- Family Environment and Caregiver Factors: Caregiver type, educational attainment, daily parent-child engagement time, caregiver's own screen exposure, frequency of screen use during supervision, attitudes toward child screen use, and supervisory behaviors.

2.3. Definitions

2.3.1 Screen Devices: Electronic devices with video display functions, including smartphones, tablets, televisions, and computers.

2.3.2 Screen Exposure: According to the American Academy of Pediatrics' screen exposure guidelines, screen exposure is defined as more than 1 hour of daily use of visual electronic devices. Average daily screen exposure time = (weekday screen exposure time \times 5 days + weekend screen exposure time \times 2 days) / 7 days [8].

2.4. Statistical Analysis

Data analysis was performed using R version 4.5.1. Categorical data are presented as frequencies and percentages (%). Group differences were analyzed using the χ^2 test. Variables identified as significant ($P < 0.05$) in the univariate analysis were entered into a multivariable logistic regression model to identify independent influencing factors for high screen exposure. The significance level was set at $\alpha = 0.05$.

3. Results

3.1. Baseline Characteristics of the Study Population

A total of 2,969 children were included in this study. Among them, 2,291 (77.16%) were in the exposed group (with screen use), while 678 (22.84%) were in the non-exposed group (without screen use). There were no significant differences between the two groups in terms of gender, age, family structure (nuclear family), or guardian type ($P > 0.05$). However, statistically significant differences were observed in the distribution of only-child status, guardian educational level, possession of a personal screen device, types of screen content viewed, and guardian screen use behavior ($P < 0.05$). Initial exposure occurred before age 3 for 54.97% of children, and 23.37% possessed dedicated devices. Content was primarily dominated by animations (77.84%) and short videos (45.27%). Only 19.13% of children could terminate usage voluntarily, and 13.90% used devices during meals. Regarding caregiver attitudes, 90.02% permitted usage, primarily as a reward (51.03%) or due to work-related busy-ness (28.07%). Detailed demographic characteristics are presented in Table 1.

Table 1 - Baseline Characteristics and Univariate Analysis of Screen Use Among Study Participants (N=2,969)

Variable	Category	Total (N=2969)	Non-exposed (n=678)	Exposed (n=2291)	χ^2	P-value
Sex	Female	1510 (50.86%)	336 (22.25%)	1174 (77.75%)	0.52	0.47
	Male	1459 (49.14%)	342 (23.44%)	1117 (76.56%)		
Age (years)	3~	413 (13.93%)	86 (20.82%)	327 (79.18%)	7.98	0.05
	4~	774 (26.07%)	192 (24.81%)	582 (75.19%)		
	5~	890 (29.98%)	207 (23.26%)	683 (76.74%)		
	6~	892 (30.04%)	193 (21.64%)	699 (78.36%)		
Only Child	No	2311 (77.85%)	504 (21.81%)	1807 (78.19%)	5.98	0.01
	Yes	658 (22.15%)	174 (26.44%)	484 (73.56%)		
Guardian Education	\leq Junior high	892 (30.04%)	161 (18.05%)	731 (81.95%)	36.89	<0.01
	High school/junior college	1167 (39.31%)	245 (20.99%)	922 (79.01%)		

Variable	Category	Total (N=2969)	Non-exposed (n=678)	Exposed (n=2291)	χ^2	P-value
Has Personal Device	≥Bachelor	970 (32.67%)	272 (28.04%)	698 (71.96%)	61.56	<0.01
	No	2275 (76.63%)	602 (26.46%)	1673 (73.54%)		
Content: Cartoons	Yes	694 (23.37%)	76 (10.95%)	618 (89.05%)	20.12	<0.01
	No	658 (22.16%)	190 (28.87%)	468 (71.13%)		
Content: Games	Yes	2311 (77.84%)	488 (21.12%)	1823 (78.88%)	24.58	<0.01
	No	2635 (88.75%)	640 (24.29%)	1995 (75.71%)		
Content: Short Videos	Yes	334 (11.25%)	38 (11.38%)	296 (88.62%)	70.89	<0.01
	No	1625 (54.73%)	471 (28.99%)	1154 (71.01%)		
Use During Meals	Yes	1344 (45.27%)	207 (15.40%)	1137 (84.60%)	45.89	<0.01
	No	2615 (88.08%)	650 (24.86%)	1965 (75.14%)		
	Yes	354 (11.92%)	28 (7.91%)	326 (92.09%)		

3.2. Univariate Analysis Results

Univariate chi-square analysis revealed that the following factors were significantly associated with children's screen use ($P < 0.05$):

- Demographic characteristics: Only-child status ($\chi^2 = 5.98, P = 0.01$), guardian educational level ($\chi^2 = 36.89, P < 0.01$);
- Device and content: Having a personal screen device ($\chi^2 = 61.56, P < 0.01$), watching cartoons ($\chi^2 = 20.12, P < 0.01$), playing video games ($\chi^2 = 24.58, P < 0.01$), watching short videos ($\chi^2 = 70.89, P < 0.01$);
- Usage behavior and supervision: Screen use during meals ($\chi^2 = 45.89, P < 0.01$), frequency of guardian screen use while accompanying the

child ($\chi^2 = 17.98, P < 0.01$), guardian daily screen exposure time > 2 hours ($\chi^2 = 44.28, P < 0.01$);

- Motivations for allowing screen use: To keep the child occupied while busy with work ($\chi^2 = 67.98, P < 0.01$), to calm a crying child ($\chi^2 = 12.56, P < 0.01$), for learning purposes ($\chi^2 = 11.68, P < 0.01$), whenever the child wanted ($\chi^2 = 3.78, P = 0.05$);
- Parent-child interaction: Parent-child companionship time ($\chi^2 = 3.98, P = 0.04$).

Other variables, such as gender, supervision of screen use, screen exposure before age 3, cognitive score, and guardian attitudes toward screen use, showed no significant differences in univariate analysis ($P > 0.05$).

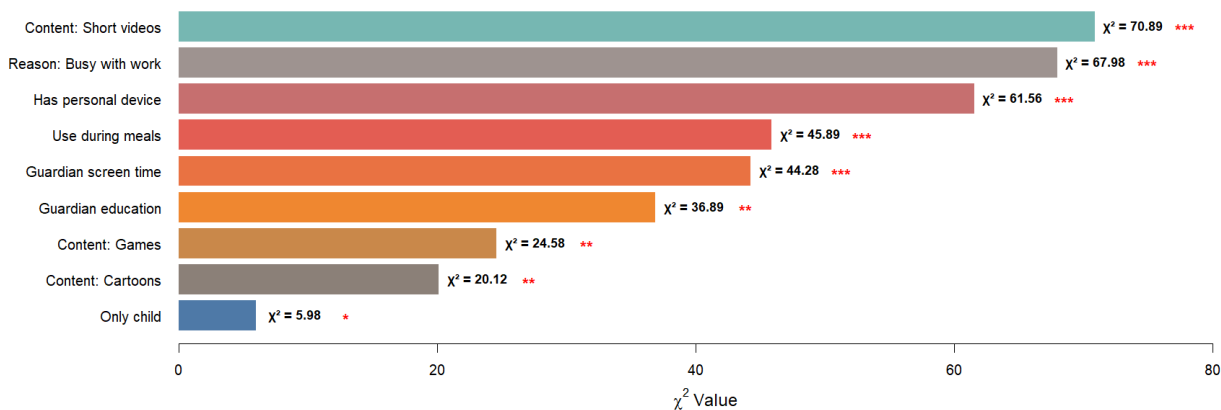


Fig. 1 - Univariate Analysis (* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$)

3.3. Multivariate Logistic Regression Analysis Results

After adjusting for potential confounders, multivariate logistic regression analysis identified the following as independent factors associated with children's screen use:

3.3.1 Protective factors:

- Guardian educational level of high school (including junior college) ($OR = 0.70, 95\% CI: 0.52-0.94, P < 0.01$) or bachelor's degree or above ($OR = 0.44, 95\% CI: 0.32-0.60, P < 0.01$), compared to junior high school or below, was associated with a reduced risk of screen use;

- Being an only child ($OR = 0.79, 95\% CI: 0.62-1.01, P = 0.05$) was marginally associated with a lower risk of screen use.

3.3.2 Risk factors:

- Having a personal screen device ($OR = 2.39, 95\% CI: 1.74-3.28, P < 0.01$);
- Watching cartoons ($OR = 2.36, 95\% CI: 1.75-3.18, P < 0.01$);
- Playing video games ($OR = 1.67, 95\% CI: 1.11-2.50, P < 0.01$);
- Watching short videos ($OR = 1.97, 95\% CI: 1.52-2.56, P < 0.01$);
- Screen use during meals ($OR = 2.53, 95\% CI: 1.64-3.90, P < 0.01$);
- Allowing screen use to keep the child occupied while busy with work ($OR = 1.86, 95\% CI: 1.40-2.49, P < 0.01$);

- Guardian daily screen exposure time > 2 hours (OR = 1.57, 95% CI: 1.24–1.98, P < 0.01).

Other factors, such as "use for learning," "use to calm a crying child," and "ability to voluntarily stop screen use," did not show independent associations in the regression model (P > 0.05).

Table 2 - Multivariate Logistic Regression Analysis of Factors Associated with Children's Screen Use

Variable	Group	Reference	β	Wald χ ²	P-value	Adjusted OR (95% CI)
Only Child	Yes	No	-0.23	3.89	0.05	0.79 (0.62–1.01)
Guardian Education	High school	≤Junior high	-0.35	7.68	<0.01	0.70 (0.52–0.94)
	≥Bachelor	≤Junior high	-0.83	41.05	<0.01	0.44 (0.32–0.60)
Has Personal Device	Yes	No	0.87	42.56	<0.01	2.39 (1.74–3.28)
Content: Cartoons	Yes	No	0.86	48.98	<0.01	2.36 (1.75–3.18)
Content: Games	Yes	No	0.51	8.76	<0.01	1.67 (1.11–2.50)
Content: Short Videos	Yes	No	0.68	39.65	<0.01	1.97 (1.52–2.56)
Use During Meals	Yes	No	0.93	26.05	<0.01	2.53 (1.64–3.90)
Reason: Busy with Work	Yes	No	0.62	25.68	<0.01	1.86 (1.40–2.49)
Guardian Screen Time	>2h	≤2h	0.45	19.89	<0.01	1.57 (1.24–1.98)

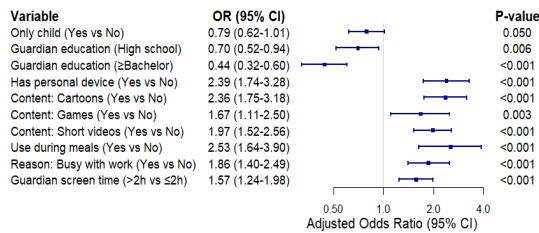


Fig. 2 - Multivariate Logistic Regression Analysis

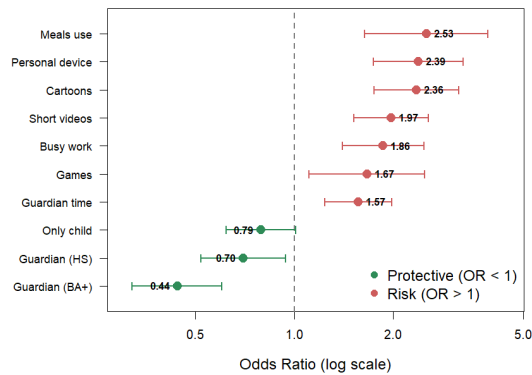


Fig. 3 - Odds Ratios with 95% Confidence Intervals

4. Discussion

4.1. Principal Findings

Our study revealed several key findings regarding screen use among preschool children aged 3–6 years in China. First, the prevalence of screen use was remarkably high at 77.16%, indicating that screen exposure has become a near-universal experience in early childhood. Second, multiple modifiable factors were identified as significant predictors of screen use, with the strongest associations observed for having a personal screen device, screen use during meals, and watching short-form videos. Third, we found important protective effects associated with higher guardian education levels, particularly bachelor's degree or above, suggesting that education may play a crucial role in mediating screen exposure practices [9][10].

4.2. Comparison with Previous Studies

Our findings align with and extend the existing literature on children's screen use. The high prevalence rate of 77.16% is consistent with recent studies reporting screen exposure rates ranging from 70% to 90% among preschool children in various countries [11][12]. However, our rate appears slightly higher than the 50.02% reported in a similar Chinese cohort study from 2018 [13], possibly reflecting the accelerated digitalization following the COVID-19 pandemic.

4.3. The Pivotal Role of Family Environment

The protective effect of higher guardian education (OR = 0.44 for bachelor's degree vs. junior high) is particularly noteworthy. This finding likely reflecting higher digital literacy and stricter adherence to health guidelines [9]. Crucially, the "modeling effect" was evident: caregiver screen time > 2h increased child risk by 1.57 times. This aligns with Bandura's Social Learning Theory, suggesting children internalize screen use as a default behavior by observing guardians [14]. Furthermore, using screens as a "digital babysitter" when parents are busy (OR=1.86) highlights a deficit in high-quality offline engagement, where devices replace interpersonal interaction [15].

4.4. Contextual Risks and Only-Child Status

Mealtime usage (OR=2.53) emerged as the most significant behavioral risk factor, this practice not only disrupts digestive cues but also signals a high level of screen-dependency that overrides basic family social rituals [16][17]. The lower risk for non-only children (OR=0.79) suggests that siblings provide a natural "offline" social environment, reducing the reliance on digital entertainment [18]. This highlights a specific vulnerability for only-children in urban China, where screens often fill the social void left by a lack of playmates [19][20].

5. Conclusion

In conclusion, this study identifies multiple modifiable factors associated with screen use among preschool children, with particularly strong effects for personal device ownership, meal-time screen use, and short-form video consumption. The protective effect of higher guardian education suggests

that educational interventions may be effective in promoting healthier screen habits. These findings provide evidence-based targets for clinical counseling and public health interventions aimed at promoting healthy media use in early childhood. Given the high prevalence of screen exposure, coordinated efforts involving families, healthcare providers, educators, and policymakers will be essential to address this emerging public health concern.

A.1. Data Availability Statement

The data in this study is restricted by privacy and ethical protection. Since the data contains sensitive personal information of children and their families, in accordance with the requirements of the Research Ethics Committee and the informed consent terms of the participants, the original data is not publicly available to protect the privacy of the participants. However, upon reasonable request, de-identified data can be provided by the corresponding author under the premise of complying with ethical norms and legal requirements.

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