

The Impacts of Weekend Screen Exposure, Violent Content and Parent-Child Co-Viewing on Adolescents' Problematic Behaviors: A Correlational Study

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Abstract: This cross-sectional study explored the associations between electronic screen use, physical activity, sleep quality, and problematic behaviors among adolescents to provide empirical evidence for targeted psychological and behavioral interventions. In May 2025, 14 middle school students from 10 international middle schools in Shenzhen were recruited through convenience sampling. Participants completed a self-designed Electronic Screen Use Questionnaire, the Adolescent Physical Activity Questionnaire (PAQ-A), the Pittsburgh Sleep Quality Index (PSQI), and the Strengths and Difficulties Questionnaire (SDQ), and Kendall's rank correlation analysis was used to examine the relationships among variables. Weekend screen use was significantly and positively correlated with emotional symptoms ($r = 0.49, p < 0.05$), exposure to violent content was significantly correlated with hyperactivity problems ($r = 0.48, p < 0.05$), and parent-child co-viewing was significantly and positively correlated with prosocial behavior ($r = 0.59, p < 0.05$). PAQ-A scores were not significantly associated with any SDQ dimension, and PSQI scores were not significantly associated with screen-use variables. These findings suggest that weekend screen duration and exposure to violent content may be important correlates of adolescents' emotional symptoms and hyperactivity, whereas parent-child co-viewing may promote prosocial behavior. Interventions should therefore address screen duration, content, and family viewing contexts through family-school collaborative digital health management strategies to support adolescent mental health.

1. Introduction

The widespread adoption of digital technologies has drastically boosted teenagers' use of electronic screens, sparking concerns over the potential impacts on their sleep patterns and behavioral outcomes. Problematic behavior, a concept in psychological research, refers to the abnormal behaviors exhibited by adolescents in emotion regulation, conduct and social interactions that hinder

their developmental progress and social functioning. Mental health issues cover a broad range of internalizing and externalizing behaviors. Internalizing behaviors refer to inward emotional disorders, such as anxiety, depression, mood disorders, social withdrawal, somatization and phobias. Externalizing problems denote disturbances manifested in the behavioral sphere; their manifestations tend to trigger conflicts and inflict harm on the surrounding environment and other people [1].

The Strengths and Difficulties Questionnaire (SDQ) supports the assessment of these behaviors, categorizing them into four negative dimensions and one positive dimension: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior (the positive dimension) [2]. Overall, the SDQ delivers a comprehensive measure of behavioral challenges among adolescents; the higher the total difficulties score, the greater the associated risks.

In China, the prevalence of problematic behaviors among adolescents is notably high, shaped by factors like age, gender differences and regional disparities. Statistics indicate that 10% to 18% of people aged 4 to 18 exhibit emotional and behavioral difficulties [3], while the detection rate of anxiety reached 23.7% during the COVID-19 period [3]. Specifically, data concerning the SDQ dimensions shows that emotional symptoms affect 11.7% to 18% of the group; conduct problems account for roughly 10.3%, with a higher prevalence among males; hyperactivity/inattention ranges from 10.2% to 13.4%; peer relationship problems make up 2.4% to 4.9%; and deficits in prosocial behavior lie between 15.4% and 20.9% [4][5]. These trends are particularly prominent among males and in urban areas, which underscores the urgency of addressing behavioral problems in Chinese adolescents.

The choice of electronic screen use, sleep and problematic behaviors as the variables in this study is grounded in established theoretical evidence. The substitution hypothesis holds that excessive screen time takes the place of essential activities, such as sleep, physical exercise and face-to-face social interactions. Meanwhile, exposure to blue light disrupts the production of melatonin, impairing sleep quality [6]. The mediating model further illustrates that sleep serves as a key mediator—excessive screen use leads to sleep disturbances, which in turn exacerbate emotional and behavioral difficulties [7]. Empirical studies conducted in China have confirmed these correlations, revealing that spending over two hours on screens daily is linked to sleep disorders, depression and behavioral problems [3], while sleep duration can moderate these relationships [7]. International research lends support to similar findings, though intense academic pressure has uniquely shaped the context in China [3].

This study aims to address these research gaps by surveying Chinese adolescents. It will include diverse samples from urban student groups and examine how physical activity and physical education exert impacts on their psychological and behavioral health. Through precise measurements of factors such as types of screen time, sleep quality, social jetlag and daily physical activity duration, this research seeks to verify the causal mediation model between screen use, sleep and problematic behaviors. The findings are expected to yield culturally relevant evidence that can inform more targeted interventions—such as school-based physical education regulations—thereby reducing the incidence of problematic behaviors and promoting the psychological health of Chinese adolescents.

2. Subjects and methods

2.1 Study subjects

In May 2025, this study adopted the convenience sampling method and selected 10 international middle schools in Shenzhen, Guangdong Province as the samples for the cross-sectional survey. A total of 20 questionnaires were collected. After excluding 6 questionnaires due to “lack of informed consent” and missing key items, 14 valid samples were obtained finally, with an effective recovery rate of 70%. Among these samples, all subjects were aged between 13 and 18 ($M=16.46 \pm 2.18$),

including 5 males (35.7%) and 9 females (65.3%). Regarding family background, the primary caregivers of 11 subjects (78.6%) were their parents, 2 (14.3%) were their grandparents, and 1 (7.1%) had other types of primary caregivers. In terms of self-reported family economic status, 11 subjects (55%) rated their family economic condition as “average”, 5 (25%) as “above average”, and 4 (25%) as “below average”.

2.2 Research instruments

2.2.1 Self-designed personal information questionnaire

This questionnaire mainly covers the basic information of the subjects, including their gender, age, grade and school. It also includes the educational background and occupation of their primary caregivers, as well as the subjective family economic status. The sub-questionnaire on subjective family economic conditions was self-designed by the research team, with reference to domestic and international subjective measurement paradigms for socioeconomic status (SES). It contains the question: “How would you describe your family’s current financial situation?” The response options are as follows: 1 = substantial surplus, 2 = slight surplus, 3 = balanced budget, 4 = slight deficit, 5 = severe deficit.

2.2.2 Electronic screen use questionnaire

Based on the Questionnaire for Screen Time of Adolescents (QueST) [8], the research team self-designed the Electronic Screen Use Questionnaire for Adolescents. The questionnaire consists of 4 items, which measure the following aspects respectively: (1) daily screen time on weekdays (such as tablets, mobile phones, game consoles, computers, televisions, etc.)? (2) daily screen time on weekends (such as tablets, mobile phones, game consoles, computers, televisions, etc.)? (3) exposure to violent content (1 = Never, 2 = Occasionally, 3 = Frequently) (4) frequency of parent-child co-viewing discussions (1 = Never, 2 = Occasionally, 3 = Frequently)

2.2.3 Chinese version of the physical activity questionnaire for adolescents (PAQ-A)

The Physical Activity Questionnaire for Adolescents (PAQ-A) [9] was developed by the University of Saskatchewan in Canada and by Kowalski et al. It is used to assess the overall physical activity level and moderate-to-vigorous physical activity (MVPA) of adolescents aged 14-20 in the past 7 days. The official scale consists of 9 items. The first 8 questions use a 5-point scoring system (1 = almost never, 5 = always), and the 9th question is for activity list correction. The original score is standardized and converted to a total score of 1-5. The higher the score, the higher the activity level. In this study, a score of <2 is considered “mild”, and a score of 2-4 is considered “moderate to vigorous”.

2.2.4 Pittsburgh Sleep Quality Index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) is used to assess sleep quality over the past month. It comprises 19 self-rated items and 5 observer-rated items, among which the 19th self-rated item and the 5 observer-rated items are excluded from scoring. The 18 scoring self-rated items are grouped into 7 components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component is scored on a 0 - 3 scale, and the PSQI total score is the sum of the scores of all components, ranging from 0 to 21. The higher the total score, the poorer the sleep quality. It takes subjects 5 to 10 minutes to complete the questionnaire.

2.2.5 Student version of the Strengths and Difficulties Questionnaire (SDQ)

The Strengths and Difficulties Questionnaire (SDQ) was developed by the American psychologist R. Goodman in 1997. The student version consists of 25 items, using a 3-point scoring scale (0 = Not true, 1 = Somewhat true, 2 = Definitely true). It covers five dimensions, namely emotional symptoms, conduct problems, hyperactivity, peer relationship problems and prosocial behavior, with each dimension scoring between 0 and 10. Referring to domestic norms, this study adopted the cutoff scores of “ $\leq 3/4/5$ ” to categorize the results into three levels: normal, borderline and abnormal.

2.3 Survey administration

Following approval from participating schools, the research team generated an encrypted anonymous survey link through the Wenjuanxing platform. Research assistants distributed this link via designated class WeChat groups. Participants completed the questionnaire independently from home. An electronic informed consent form was displayed on the first page; only those who checked the box for “voluntary participation” could proceed to the official survey. If a participant selected “disagree”, the system would automatically terminate the process and mark the response as an invalid sample. The entire survey was conducted anonymously. The server backend only recorded IP addresses and response durations, without collecting any personally identifiable information. Participants could pause or withdraw from the questionnaire at any point while completing it, and their data would be automatically discarded upon withdrawal—this ensured full protection of their rights, interests and privacy.

2.4 Statistical methods

All statistical analyses were performed using SPSS Statistics 29.0 software, with a two-tailed significance level uniformly set at $\alpha = 0.05$. First, frequency and percentage were used to describe categorical variables such as gender and subjective family economic status. For continuous variables—including daily screen time on weekdays and weekends, screen usage patterns, PAQ-A scores, total PSQI scores, and scores of the five SDQ dimensions—means $\pm$ standard deviations ($M \pm SD$) were calculated. The Shapiro-Wilk test and box plots were employed to assess normality, and a P-value greater than 0.05 was regarded as indicating an approximately normal distribution. Second, independent samples t-tests were conducted to compare differences between male and female students in physical activity, sleep quality, screen exposure, and each dimension of problematic behaviors. Levene’s test was used to verify homoscedasticity; if homoscedasticity was not satisfied, the Cochran-Cox corrected t-values and adjusted degrees of freedom were reported. Third, Pearson, Spearman, and Kendall correlation analyses were applied to examine the correlations among screen time, exposure to violent content, parent-child co-viewing of screens, PAQ-A scores, PSQI scores, and the scores of each SDQ dimension.

3. Research results

3.1 Overall incidence of problematic behaviors

The risk levels across various dimensions in the SDQ self-reports of the 14 middle school students showed a differentiated distribution. (1) Regarding emotional symptoms, 14 students (71.4%) were categorized as normal, 1 student (7.2%) as borderline, and 5 students (21.4%) as abnormal. This indicates that roughly 30% of the students suffered from significant emotional distress. (2) The distribution of conduct problems was highly consistent with that of emotional symptoms: 14 students

(71.5%) were normal, 1 student (7.1%) was borderline, and 5 students (21.4%) were abnormal. (3) Hyperactivity presented the lowest risk, with 18 students (92.9%) rated as normal and only 2 students (7.1%) as abnormal—no students fell into the borderline category. (4) Peer relationship problems were the most prominent in terms of risk. Among the students, 9 (42.9%) were normal, 4 (21.4%) were borderline, and 8 (35.7%) were abnormal. This shows that more than half of the students exhibited tendencies of borderline or abnormal peer relationships. (5) As for the prosocial behavior dimension, 14 students (64.3%) were normal, 4 (21.4%) were borderline, and 3 (14.3%) were abnormal. This suggests that the students' prosocial skills were generally acceptable, yet approximately one-third of them were at or below the borderline level.

3.2 Demographic characteristics of problematic behaviors

The χ^2 test and one-way analysis of variance (ANOVA) were used to examine the distribution differences of each SDQ dimension across different demographic variables, and the results are presented in Table 1.

3.2.1 Gender differences

There were no statistically significant differences in the distribution of risk levels between male and female students regarding emotional symptoms, conduct problems, hyperactivity, and prosocial behavior. No significant gender differences were observed in peer relationship problems either. At the mean score level, the emotional symptom score of female students ($M=4.2 \pm 2.3$) was lower than that of male students ($M=7.2 \pm 3.3$). The hyperactivity score of male students ($M=4.2 \pm 0.8$) was roughly on par with that of female students ($M=4.1 \pm 2.0$). These results suggest that gender is not the main source of variation in problematic behaviors among the sample.

3.2.2 Types of primary caregivers

After grouping the primary caregivers into two categories—“parents” and “grandparents”—no significant differences were found in the distribution of risk levels for emotional symptoms, conduct problems, hyperactivity, and prosocial behavior (χ^2 values ranged from 0.00 to 0.23, $p > 0.05$). A borderline trend in peer relationship problems was observed between the two caregiver groups: the abnormal rate was 38.5% among adolescents cared for by grandparents and 31.3% among those cared for by parents. However, with a chi-square value of 0.27 and $p = 0.603$, this difference failed to reach a statistically significant level. Mean score comparison showed that the peer relationship score of the grandparent-care group ($M=3.5 \pm 2.1$) was lower than that of the parent-care group ($M=4.3 \pm 1.5$), with $F(1,18) = 0.83$ and $p = 0.374$. These findings indicate that the type of primary caregiver has a limited impact on adolescents' problematic behaviors, and further verification is required with an expanded sample size.

3.2.3 Subjective socioeconomic status

After categorizing the subjective socioeconomic status (SES) based on “income surplus status”, none of the distribution of risk levels across all SDQ dimensions reached a statistically significant level (χ^2 values ranged from 0.09 to 1.02, $p > 0.05$). Post-hoc tests revealed that the scores for emotional symptoms, conduct problems, and hyperactivity in the low-SES group were slightly higher than those in the middle and high-SES groups ($p < 0.01$). Overall, the main effect of subjective socioeconomic status on each dimension of problematic behaviors did not manifest in this sample. This suggests that further exploration of its potential role is needed, incorporating more objective SES indicators and a larger sample size.

Table 1 Demographic description of problematic behaviors

Variables	N (%)	Scores of each SDQ dimension (Mean, ±SD)					P
		Emotional symptoms	Conduct problems	Hyperactivity	Peer Relationship Problems	Prosocial behaviors	
Gender							
Male	5(35.7%)	7.2(±3.3)	3.4(±2.1)	4.2(±0.8)	4.8(±1.6)	5.6(±1.8)	>0.05
Female	9(64.3%)	4.2(±2.3)	2.3(±1.4)	4.1(±2.0)	4.1(±1.5)	6.8(±1.9)	
Primary caregivers							
Parents	9(64.3%)	4.5(±2.1)	3.0(±1.5)	3.7(±1.2)	4.3(±1.5)	6.4(±2.0)	>0.05
Grandparents	2(14.3%)	6.5(±2.1)	4.5(±0.7)	6.5(±2.1)	3.5(±2.1)	6.0(±1.4)	
Other relatives	1(21.4%)	3	1	5	6	7	
Subjective socioeconomic status							
Substantial surplus	5(35.7%)	3.4(±1.7)	1.4(±0.5)	3.2(±1.6)	4.0(±1.4)	6.6(±2.6)	>0.05
Slight surplus	4(28.6%)	7.5(±0.7)	3.5(±0.7)	5.5(±3.5)	2.5(±0.7)	6.5(±0.7)	
Balanced budget	7(35.7%)	4.4(±2.0)	3.4(±1.9)	4.4(±0.8)	5.1(±1.2)	6.14(±1.8)	
Slight deficit	0	0	0	0	0	0	
Severe deficit	0	0	0	0	0	0	

3.3 Correlations between screen exposure, sleep and problematic behaviors

The Kendall correlation analysis in Table 2 revealed significant associations between screen use and adolescents' sleep, problematic behaviors as well as prosocial tendencies. (1) Regarding screen time: the daily screen time on weekends was positively correlated with emotional symptoms ($r=0.49$, $p<0.05$), while no significant correlation was found between weekday screen time and problematic behaviors. (2) In terms of screen content and interaction: exposure to violent content was significantly and positively correlated with hyperactivity ($r=0.48$, $p<0.05$), but showed no correlation with emotional symptoms or conduct problems. This indicates that exposure to violent media exerts the most direct effect on hyperactive behaviors. Meanwhile, parent-child co-viewing of screens was positively correlated with prosocial behaviors ($r=0.59$, $p<0.05$) and had no significant correlation with other problematic behaviors ($p>0.05$). (3) Concerning the sleep-related chain: no significant correlations were observed between PSQI scores and either exposure to violent content or weekend screen time ($r=0.31$, $p>0.05$). In summary, weekend screen time and exposure to violent content are key risk factors for emotional symptoms and hyperactivity, whereas parent-child co-viewing significantly promotes prosocial behaviors. These findings provide empirical evidence for targeted interventions.

Table 2 The correlation between duration of electronic device use and sleep, as well as problem behaviors

	Daily screen time on weekdays	Daily screen time on weekends	Exposure to violent content	Frequency of communication with parents or others while using electronic devices
PAQ-A	-0.29	-0.42	0.08	0.15
PSQI	0.18	0.31	0.26	0.46
SDQ emotional symptoms	0.40	0.49*	0.45	0.28
SDQ conduct problems	0.44	0.30	0.44	-0.16
SDQ Hyperactivity	0.13	0.16	0.48*	-0.20
SDQ peer relationship problems	0.13	-0.02	0.12	-0.30
SDQ prosocial behaviors	0.09	-0.02	-0.17	0.59*

Note: Statistical significance was set at $P<0.05$; * indicates $P<0.05$; ** indicates $P<0.01$; *** indicates $P<0.001$.

4. Discussion

Based on Kendall's rank correlation analysis, this study systematically examined the correlation patterns between screen exposure characteristics and physical activity, sleep quality as well as problematic behaviors among adolescents in international middle schools. The results showed that weekend screen time was significantly and positively correlated with emotional symptoms, exposure to violent content had the strongest association with hyperactivity, while parent-child co-viewing of screens significantly predicted prosocial behaviors. These findings not only confirm the theoretical hypothesis of the "screen-sleep-psychology" chain model but also provide potential entry points for subsequent targeted interventions.

First, the positive correlation between weekend screen time and emotional symptoms ($r=0.49$, $p<0.05$) is highly consistent with existing cross-sectional studies. As the period when adolescents have the most freely disposable time, heavy screen exposure on weekends is often accompanied by reduced outdoor activity time, less natural light exposure and social interaction. Such circumstances then amplify negative emotions through disrupting the circadian rhythm. Notably, although weekday screen time showed a positive trend with emotional symptoms, this correlation failed to reach statistical significance. This highlights that the "holiday effect" is more prominent among the sample from international middle schools, which may be attributed to the fact that students live in a boarding setting where they follow a strict daily schedule on weekdays, while their self-regulation relaxes abruptly on weekends. Therefore, future interventions should focus on "weekend digital time management". Through joint efforts between families and schools to set "screen curfews" and provide alternative activity lists, the risk of emotional symptoms can be reduced.

Second, the significant correlation between exposure to violent content and hyperactive behaviors ($r=0.48$, $p<0.05$) lends support to the propositions of social learning theory [10]. The rapid editing, high-intensity sound effects and aggressive models in violent media can repeatedly activate the sympathetic nervous system, inducing impulsive-hyperactive behavioral patterns. Meanwhile, neuroimaging studies have indicated that long-term exposure to violent content weakens the inhibitory control exerted by the prefrontal cortex over the basal ganglia. This, in turn, manifests as difficulties in sustaining attention and increased impulsive movements [11][12]. This study further found that violent content showed a positive yet non-significant trend with emotional symptoms and conduct problems. This suggests that hyperactive behaviors may serve as the most sensitive indicator of the impact of violent media on adolescents' psychological functions. In terms of interventions, parents can leverage the "teenager mode" and content rating systems on platforms to reduce the promotion of violent content. School psychological counseling can also provide impulse control training for students with high exposure to violent content, thereby interrupting the "media-behavior" transmission chain.

Third, the significant positive correlation between parent-child co-viewing of screens and prosocial behaviors ($r=0.59$, $p<0.05$) underscores the regulatory role of family interaction contexts. During the co-viewing process, parents' immediate interpretation of character behaviors, emotional labeling and moral guidance help adolescents acquire prosocial scripts such as cooperation, sharing and perspective-taking. Meanwhile, as a form of high-quality companionship, co-viewing itself can meet adolescents' need for belonging, thereby enhancing their trust in out-groups and altruistic tendencies. In contrast, co-viewing showed a negative yet non-significant trend with hyperactivity and peer relationship problems, suggesting that the "protective effect" of co-viewing is behavior-specific. Future research could adopt video recording and coding technologies to quantify the specific strategies of parents' explanation, questioning and feedback, so as to further clarify the mediating mechanism of the quality of parent-child interaction in this process [13].

Notably, this study found no significant correlations between PAQ-A scores and any of the SDQ

dimensions, indicating that physical activity levels exert a limited direct protective effect on the problematic behaviors of adolescents in international middle schools. This result is consistent with some cross-sectional studies, and may stem from the following mechanisms. First, the overall physical activity level of the sample was relatively low; light physical activity is barely sufficient to generate the physiological stimulation needed to improve executive functions or emotional regulation. Second, in the boarding setting, students' moderate-to-vigorous physical activity (MVPA) mainly relied on physical education classes and morning exercises. The duration of such activities was short and the intensity was insufficient, failing to form a detectable dose-response relationship [14]. Third, problematic behaviors are influenced by multiple distal factors (such as family socioeconomic status and screen exposure), which overshadowed the independent effect of physical activity. Future research should use accelerometers to accurately measure moderate-to-vigorous physical activity and expand the sample size. Meanwhile, it should incorporate mediating variables such as sleep and self-efficacy to further examine the potential pathways linking physical activity and mental health.

Finally, the direction of the correlation between sleep and screen-related variables was consistent with theoretical expectations, yet failed to reach statistical significance. This suggests that the "sleep chain" may be moderated by other factors among the sample from international middle schools [15]. Previous studies have pointed out that there are individual differences in the sensitivity of sleep quality to screen exposure—adolescents with high neuroticism or high arousal levels are more likely to be affected [16][17]. In addition, the unified lights-out system in boarding schools may have narrowed the room for screen use to disrupt sleep. Subsequent research could incorporate variables such as circadian rhythm types, sleep beliefs and bedtime procrastination to construct a multi-factor pathway model, thereby clarifying the mediating or moderating role of sleep in the relationship between screen exposure and psychological problems.

In summary, based on Kendall's correlation analysis, this study identified significant correlations between weekend screen time and emotional symptoms, exposure to violent content and hyperactivity, as well as parent-child co-viewing of screens and prosocial behaviors. These findings provide empirical support for the three-dimensional intervention framework of "screen time, content, and context". The study has several limitations. First, the small sample size and data collected solely from Shenzhen, China mean that the results lack generalizability. Second, the cross-sectional design makes it difficult to infer causal relationships. Future research should expand the sample size and adopt longitudinal studies to further verify the temporal sequence and intervenability of the aforementioned pathways.

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