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Correlation of screen time with behavioral, emotional and psychosocial disorders–multicenter research at 5 Ciherang Village Elementary Schools

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ABSTRACT

There has been a recent increase in the use of screen time by children. Parents nowadays allow their children to use screen time from an early age, which can have a negative impact on their growth and development. Excessive screen time can lead to emotional and behavioral instability, hindering children's ability to interact socially with their surroundings. This is a cross-sectional study conducted in February-March 2024 at five elementary schools in Ciherang Village. Children who meet the inclusion criteria will be given a question about their screen time usage and questionnaire about emotion and behavior problem from the Pediatric Symptom Checklist 17 (PSC-17) questionnaire. A total of 246 children met the inclusion criteria, dominated by girls (52.8%), with median age of 12 years (range 10-14), and an average screen time duration of 121.5 minutes (SD 88.4). A significant correlation was found between screen time duration and attentional disturbance (r: 0.167; p-value: 0.009). However, no significant correlation was found with internalizing, externalizing, and overall PSC-17 subscales. Therefore, it is important for parents to limit their children's screen time to promote their mental health.

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INTRODUCTION

Today, technology has become crucial for people of all ages, from toddlers to adults. Electronic devices, such as televisions, gadgets, tablets, games, and laptops, are commonly owned items. As the result, children from an early age already familiarizes with watching and enjoying shows on electronic gadgets.(Panjeti-Madan & Ranganathan, 2023) Screen time refers to the time spent using electronic devices such as video games, television, computers, and tablets. This includes active engagement with the screen, such as interacting and practicing skills, and passive activities, such as

receiving and listening to information.(Riyana & Pd, 2020)(Darmawan et al., 2021)(Karani et al., 2022)

The prevalence of screen time among children has surged over the past six decades, especially during the COVID-19 epidemic. Social limitations imposed during COVID-19 have led to the isolation, resulting in their increased reliance on electronic devices for social interaction. Research has demonstrated that 75% of parents in the United States allow children under eight to use electronic gadgets or tablets.(Panjeti-Madan & Ranganathan, 2023) Utilizing these electronic devices encompasses various activities, including educational reasons, child development training programs, and recreational activities such as watching films and playing games. Using electronic media can be beneficial if used correctly, but many children tend to use it excessively, which can lead to negative consequences(Fitriana et al., 2021)(Sugiarti & Andyanto, 2022).(McArthur et al., 2022; Muppalla et al., 2023)

Excessive screen time has well-documented effects on physical activity, sedentary behavior (a lifestyle characterized by minimal bodily movement), and diet, particularly concerning obesity.(Baidhowi & SEI, 2022)(Alghadir et al., 2021) According to a study conducted in South Africa in 2018, 70% of children residing in remote areas and 73% of children in urban areas are used to a sedentary lifestyle. One contributing factor is that children and adolescents spend over 2 hours daily using electronic devices, excluding time spent on school-related activities(KALA, 2022)(Soysal, 2020)(ERLANGGA, 2022).(Karani et al., 2022) This is in contrast to recommendations from the American Academy of Pediatrics (AAP) in 2016, which recommends that children under two years of age not be exposed to electronic media and that screen time for children aged two to five years should not exceed one hour.(Sholihah et al., 2022)(Paluruan, 2022)(Sulistyawati et al., 2023)(Stiglic & Viner, 2019)

Excessive screen time not only affects growth but also impacts child development. Prolonged exposure to screens inhibit children's ability to manage their emotions, resulting in difficulties to regulate their emotion, leading to irritability and peer problems. In addition, research has demonstrated that excessive screen time not only hinders children's ability to finish work but also impairs their capacity to remain still, disturbs their sleep patterns, and diminishes their executive function. These symptoms are commonly observed in individuals with attention difficulties and hyperactivity.(Oflu et al., 2021; Webb, 2023)

The researchers are interested in studying the correlation between screen time and emotional and behavioral disorders in children attending elementary schools in the Ciherang area due to the potential impact of excessive screen time on behavioral, emotional and psychosocial disorders.

RESEARCH METHOD

Study Methodology and Participant Selection

This study is an analytical observational research conducted using a cross-sectional approach. The study was conducted between February and March 2024 in five primary schools in Ciherang Village. This study specifically targets elementary school pupils in grades 5 and 6. The study necessitates a minimum sample size of 97 participants, with a type I error rate of 5% and a research power of 20%. The participants in this study were elementary school children at levels 5 and 6 who attended five different schools: SDN A, SDN B, SDN C, SDN D, and SDN E. The eligibility requirements for this study required individuals to be at least ten years old. The study's exclusion criteria encompassed students who displayed uncooperative behavior, experienced challenges in engaging in effective two-way communication, lacked comprehension of the Indonesian language, and were disapproved of by their parents on joining the research.

Study Design and Factors

The research was conducted by initially submitting a research proposal, submitting research ethics, collaborating with partnerships, collecting, organizing, analyzing, and presenting the findings. Research variables are categorized into two distinct groups: independent variables and dependent variables. The variable being manipulated in this research is screen time. The screen time examination methodology, which utilizes a screen time questionnaire, entails a systematic process for gathering data on the length and caliber of an individual's screen usage. Participants were administered a questionnaire designed to evaluate different facets of screen utilization, encompassing the specific device employed (e.g., smartphone, computer, or tablet) and the precise time intervals during which screens were utilized throughout the day. This questionnaire consists of closed-ended questions, which enables quantitative analysis.

The study's dependent variable was the child's emotional disturbance, which was evaluated using the Pediatric Symptom Checklist 17 (PSC-17). The Pediatric Symptom Checklist 17 (PSC-17) is a concise questionnaire with 17 questions. Its purpose is to detect and evaluate alterations in emotional and behavioral issues in children. PSC-17 is not intended for diagnostic purposes but serves as a screening tool to identify and address early emotional and behavioral issues in children, enabling timely identification and treatment. The PSC-17 is divided into three distinct subscales: the internalization subscale, the externalization subscale, and the attention subscale. Suppose any of the following four criteria are met, it is advisable to be cautious and skeptical about the presence of behavioral, emotional, and psychological disorders: 1) The score for the subscale of total internalization should be equal to or greater than 5. 2) The score for the subscale of total externalization should be equal to or greater than 7. 3) The score for the subscale of total attention should be equal to or greater than 7. 4) The total score should be equal to or greater than 15.

Statistical analysis

This study analysis comprises both descriptive and analytical presentations. Descriptive presentation involves expressing qualitative data in proportions (%) and representing quantitative data using measures of central tendency. The statistical analysis employed in this research involves using the Spearman correlation test, with a significance level of 5% for type I errors

RESULTS AND DISCUSSIONS

The study included a total of 246 youngsters who satisfied the specified requirements for participation. Girls were the predominant group in this study, with an average age of 11.83. Table 1 presents the demographic parameters, including age and gender, as well as the duration of screen usage in a single day. Additionally, the emotional disturbance is measured using three subscales, and the overall emotional and behavioral disturbance scores are also shown.

Table 1. Demographic characteristics of research respondents

Variable	N (%)	Mean (SD)	Med (Min-Max)
Gender			
• Male	116 (47,2)		
• Female	130 (52,8)		
Age, years		11,83 (0,82)	12 (10-14)
• 10	7 (2,8)		
• 11	83 (33,7)		
• 12	103 (41,9)		
• 13	50 (20,3)		
• 14	3 (1,2)		
Screen time, minutes		121,5 (88,4)	120 (0 – 540)
Assessment of internalizing disorders		4,3 (2,06)	4 (0 – 10)
• At risk/suspect of interference	110 (44,7)		
• Normal	136 (55,3)		

Assessment of attention disorders		4,26 (1,68)	4 (0 – 9)
• At risk/suspect of interference	26 (10,6)		
• Normal	220 (89,4)		
Assessment of externalizing disorders		3,37 (2,29)	3 (0 – 11)
• At risk/suspect of interference	29 (11,8)		
• Normal	217 (88,2)		
Assessment of Pediatric Symptom Checklist 17 (PSC-17)		11,93 (4,81)	11 (2 – 27)
• At risk/suspect of interference	68 (27,6)		
• Normal	178 (72,4)		

The relationship between the length of time spent on screens and emotional, behavioral, and psychosocial disorders was examined using the Spearman-rho correlation test due to the non-normal distribution of the data, as determined by the Kolmogorov Smirnov Test. The Spearman-rho correlation test showed a significant correlation (r: 0.167; *p*-value: 0.009) between screen time duration and attention disorders. However, no significant correlation was observed between the sub-scales of internalization and externalization disorders and the total PSC-17 score. These findings offer valuable understanding that there is a direct correlation between the length of time spent using screens and the level of attention disruption experienced by students. However, while there is no statistically significant correlation between internalization, externalization disorders, and the total PSC-17 score, the plotted results indicate a positive correlation. This suggests that as the duration of screen time increases, the risk of experiencing behavioral disorders also increases. Emotional and psychological. (Refer to Table 2 and Figures 1-4)

Table 2. Correlation of screen time with behavioral, emotional and psychosocial disorders

	Variable	Internalization	Attention	Externalization	PSC-17 value
Screen time, minutes	Correlation Coefficient	0.103	0.167**	0.009	0.117
	Sig. (2-tailed)*	0.109	0.009	0.887	0.068
	N	246	246	246	246

*. Correlation testing uses Spearman-rho correlation
**. Correlation is significant at the 0.01 level (2-tailed).

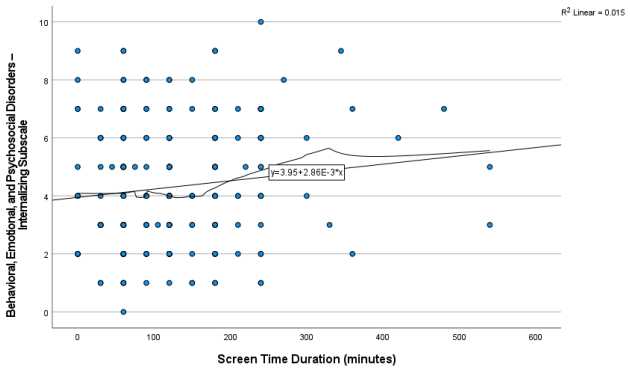

Figure 1. Correlation distribution of screen time duration with the internalization sub-scale of behavioral, emotional and psychosocial disorder

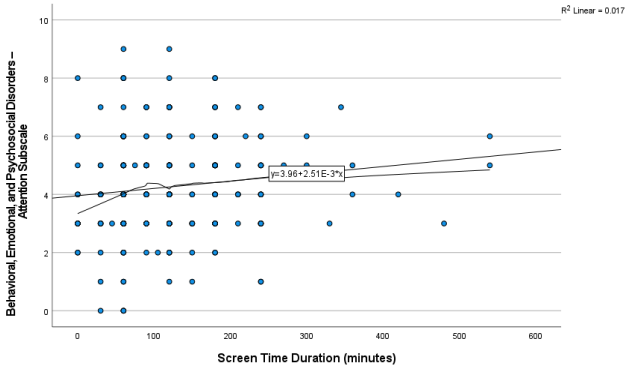

Figure 2. Correlation distribution of screen time duration with attention sub-scale for behavioral, emotional and psychosocial disorders

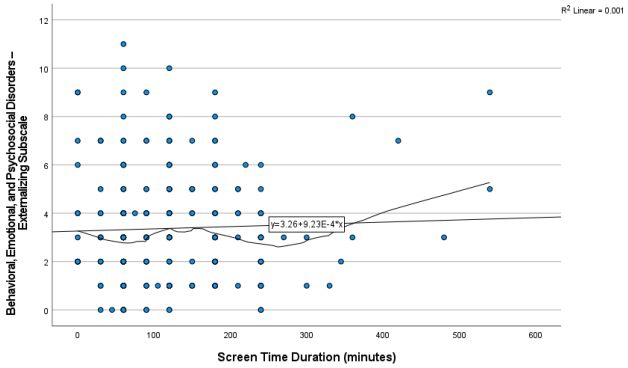

Figure 3. Correlation distribution of screen time duration with the externalization sub-scale of behavioral, emotional and psychosocial disorders

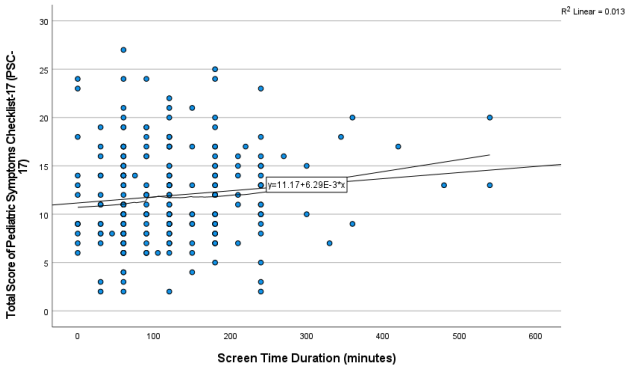

Figure 4. Correlation distribution of screen time duration with behavioral, emotional and psychosocial disorders (total score from psc-17)

Electronic media have become an essential that almost everybody using it. Electronic media serves several purposes: education, entertainment, socialization, and communication. Nevertheless, prolonged usage has been found to have detrimental effects, particularly on children and adolescents.(Goswami & Parekh, 2023; Muppalla et al., 2023; Webb, 2023)

It is crucial for children to develop in communication skill in the first two year of life, and this is fostered through interactive communication, including that of parents and caretakers. However, there are concerns about the potential negative impact of prolonged screen time on young children, it may diminish the level and extent of social engagement, thereby impeding their

language acquisition. The relationship between screen time and language development is complex and influenced by multiple factors, including the use of electronic media by parents or family members, the quality of the content being viewed, and the interactions between children and media. While some research suggests that screen time may have advantages for children, other studies highlight its negative impact on comprehension, language skills, and cognitive development, especially when children under two are exposed to screens. Furthermore, prolonged use of electronic screens, particularly without parental oversight, has been linked to behavioral issues and language development.(Karani et al., 2022; Panjeti-Madan & Ranganathan, 2023; Stiglic & Viner, 2019)

Excessive and prolonged screen time in children hinders crucial development in areas such as gross motor skills, fine motor skills, language skills, and social skills. Several research has examined the impact of excessive screen time on brain anatomy, revealing that this addiction can disrupt the frontal lobe and anterior cingulate, which are responsible for cognitive performance and socio-emotional regulation. (Nakshine et al., 2022) Parents often unknowingly using electronic media to calm their children with behavioral abnormalities. Preschool children who exceed 3 hours of daily screen time are susceptible to encountering developmental delays and internalizing and externalizing behaviors. However, the likelihood of youngsters displaying externalizing behavior increases when they exceed a daily screen time of 1 hour.(McArthur et al., 2022)

Prolonged exposure to screens in older children leads to behavioral issues. Excessive screen time are correlated with an increase risk to social disorders, cognitive impairments, disruptive behaviors, and violent behaviors. Excessive screen time can also disturb children's sleep patterns and elevate the likelihood of developing internalizing and externalizing behaviors. Insufficient sleep in children aged 8-10 can lead to delayed brain maturation, reducing regulation and learning capabilities. Insufficient sleep in children leads to daytime sleepiness, impairing focus and activity performance. Hence, the AAP advises against keeping displays in the bedroom and restricting access to gadgets for at least 30 minutes before a child's bedtime.(Guerrero et al., 2019; Liu et al., 2021)

A study involving 240 preschool-age children about the correlation between excessive screen use and emotional stability, accounting for 40.8% of the total, had screen time for at least 4 hours daily. A correlation was observed between emotional volatility and the utilization of screen time beyond 4 hours. In addition, this study revealed that children who watched more than 4 hours per day had moms who had introduced them to devices when they were older than 12 months. Furthermore, this introduction to gadgets was not supervised by parents. Parents with higher education allowing screen time less than parents with lower education levels. This phenomenon is linked to parental anxiety and preoccupation with their children's progress and advancement.(Oflu et al., 2021)

Excessive screen time alone is insufficient to induce problems in adolescents. This is because 12 out of 50 research indicated no correlation between the screen time and mental health. The causal relationship between the duration of screen time and mental health disorders is a decrease in the amount of sleep. Shortened sleep duration is associated with the development of depression and anxiety, while the illumination emitted by computers and electronic devices disturbs the circadian rhythm responsible for regulating sleep. Exposure to light-emitting diode (LED) rays has been found to impact the melatonin hormone levels, the quality of sleep, and the cognitive function of children. Prolonged exposure to screens, along with reduced physical activity, is also linked to psychosocial disorders and an increased risk of depression. In addition to the length, the quality of the media is also important. The emergence of FOMO (fear of missing out) has arisen due to social media and its widespread usage. This phenomenon is described as apprehension about others' joy without social media. The fear of missing out (FOMO) leads adolescents to overly engage with social media to prevent social exclusion, which in turn increases

the likelihood of children developing depression and anxiety.(Paulich et al., 2021; Santos et al., 2023)

This research may have significant therapeutic consequences by enhancing health professionals' understanding of the criticality of early detection and intervention for children displaying excessive screen use. Medical professionals, psychologists, and therapists can formulate more efficacious intervention strategies by comprehending the relationship between screen time and emotional and behavioral issues. This study highlights the significance of considering lifestyle factors, such as time spent using screens, when evaluating and addressing emotional and behavioral issues in children. This may promote a comprehensive approach to children's mental health care, encompassing not only therapy and medication but also lifestyle modification.

This study is subject to various methodological limitations that may impact the accuracy and applicability of the findings. An inherent vulnerability is the dependence on personal data acquired via questionnaires completed by children, lacking objective verification from teachers or parents. This can result in bias when reporting screen time, either because of memory inaccuracies or students' inclination to give responses they believe are favorable. In addition, cross-sectional study designs have a limitation in determining cause-and-effect linkages due to the collection of data at a single point in time without considering variables that may change or occur simultaneously. The sample size is restricted to only five primary schools in the Ciherang area, which consequently restricts the generalizability of the findings. It is possible that demographic and socioeconomic differences beyond the study area are not adequately reflected. Moreover, the study failed to consider additional variables that could potentially impact children's emotional and behavioral well-being, such as the specific kind of content they engage with during screen time, as well as external factors like family support and socioeconomic position. It is crucial to consider all these elements while analyzing the findings and strategizing future investigations in this field.

CONCLUSION

This study discovered a substantial correlation between the duration of screen exposure in children and the occurrence of attention issues. These findings emphasize worries about the adverse effects of excessive screen time on the mental well-being of children. This research also highlights the crucial role that schools and parents can play in overseeing and controlling children's screen usage to reduce the likelihood of emotional and behavioral issues. Researchers anticipate additional investigations into cohort studies to evaluate further the influence of screen time usage on emotional and behavioral issues in youngsters. In addition, it is imperative to do additional evaluations about the caliber of the content that children consume since this may have a greater impact than the duration of screen time in conjunction with the proliferation of social media.

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