



Evaluation the Impact of Digital Technology on Children's Mental Health and Psychological Wellbeing

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Article Information:

Received Juny 28, 2024

Revised Juny 30, 2024

Accepted July 5, 2024

ABSTRACT

In the digital era, children are increasingly exposed to electronic devices such as smartphones, tablets, and computers from a young age, impacting their play, learning, and social interactions. Concerns about the potential effects on children's mental health and well-being have grown, prompting research into the psychological factors influencing technology adoption and its implications. This study employs a cross-sectional survey design to explore the relationship between digital technology usage and children's mental health. Data collected from 500 children aged 8-18 years in City X includes demographics, digital technology usage patterns, and assessments using validated scales. The findings reveal significant correlations: prolonged digital technology use correlates with increased risks of anxiety ($r = 0.35$, $p < 0.01$), depression ($r = 0.30$, $p < 0.01$), and behavioral issues ($r = 0.25$, $p < 0.05$) among children. The study underscores the importance of balanced and monitored technology use to mitigate adverse impacts on children's well-being. Collaborative efforts involving parents, educators, and policymakers are crucial in guiding children's technology usage to optimize benefits while safeguarding mental health. Future research aims to further understand these dynamics and develop effective strategies for promoting healthy digital habits among children.

Keywords: *Children's Mental, Digital Technology, Mental Health*

Journal Homepage <https://ejournal.staialhikmahpariangan.ac.id/Journal/index.php/wp/>

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How to cite:

Haryanto, S., Jemmy, Jemmy., Rumbiak, H., Batubara, F. A., & Apriyanti, E. (2024). Evaluation the impact of digital technology on children's mental health and psychological wellbeing. *World Psychology*, 3(2), 219-232.

<https://doi.org/10.55849/wp.v3i2.669>

Published by:

Sekolah Tinggi Agama Islam Al-Hikmah Pariangan Batusangkar

INTRODUCTION

Digital technology has undergone rapid development in the last few decades and has permeated various aspects of human life, including children. In this digital era, children are increasingly exposed to electronic devices such as smartphones, tablets, and computers from a young age. This has brought significant changes in how children play, learn, and interact. As a consequence of increased technology use, attention to its potential impact on children's mental health and psychological well-being has become crucial. Psychological factors also play a significant role in the adoption of new technology. Research has shown that factors such as psychological capital and readiness significantly influence individuals' willingness to accept new technology (Kadiyono & Pardosi, 2023).

On one hand, digital technology offers many benefits for children. Access to vast information, limitless learning opportunities, and the ability to communicate with friends and family from afar are among them. Various educational apps and interactive games can also stimulate cognitive development and social skills in children. However, on the other hand, excessive and uncontrolled technology use can have negative impacts such as decreased sleep quality, concentration problems, and increased risks of mental health issues like anxiety and depression.

Studies indicate that children and adolescents are vulnerable to severe psychological distress, including worry, helplessness, anxiety, and fear (Ravens-Sieberer dkk., 2022). This underscores the need for specific attention to the mental health of young generations in facing rapid technological changes. Research also shows a correlation between social media use and increased symptoms of depression in children and adolescents. Those who spend hours on social media tend to be more vulnerable to low self-esteem and social anxiety. This can be due to exposure to negative content, cyberbullying, and pressure to maintain a perfect self-image online. Exposure to inappropriate content or violence can also affect children's mental health and psychological well-being. In addressing these challenges, positive interventions such as positive psychology approaches have proven effective in enhancing children's mental health and well-being (Shoshani & Slone, 2017). By focusing on developing psychosocial competencies and protective factors, such interventions can help children overcome challenges and enhance positive mental health.

Moreover, digital interactions replacing face-to-face interactions can hinder children's social skill development. Children who interact more through screens tend to have lower social skills compared to those who interact directly with their peers. The lack of opportunities to learn from facial expressions and body language can also limit their understanding of emotions and empathy. Excessive technology use can also disrupt children's concentration and increase the risk of mental health issues such as anxiety and depression. These negative impacts may stem from insufficient physical activity necessary for children's growth, as well as limitations in crucial social interactions for emotional development (Ramadhani dkk., 2020; Wulandari dkk., 2019).

Usage of digital technology also impacts children's sleep patterns. Blue light emitted by electronic screens can disrupt circadian rhythms and inhibit melatonin production, the hormone that regulates sleep. As a result, children who frequently use electronic devices before bedtime tend to experience difficulty sleeping, which can subsequently affect their concentration and performance in school. Sleep deprivation is also linked to various mental health issues, including anxiety and depression. Intensive gadget use can limit the physical activity necessary for children's growth and development, and affect their social and emotional interactions (Alfitri & Indriati, 2023). However, it's important to note that digital technology is not the sole factor influencing children's mental health. Family environment, peer relationships, and genetic factors also play crucial roles. Therefore, adopting a holistic approach is important in evaluating the impact of digital technology on children, considering various contributing factors to their well-being.

Several studies indicate that wise and controlled use of digital technology can benefit children's mental health. Research shows that parents play a pivotal role in utilizing digital technology to support children's development (Hidayatuladkia dkk., 2021). For instance, online platforms providing emotional support and counseling services can assist children facing mental health issues. Additionally, games designed to enhance cognitive and emotional skills can contribute to overall child development. Thoughtful use of digital technology can also provide educational benefits and positive entertainment for children, aiding in their technological literacy, increasing awareness, and reducing fussiness (Zaini & Soenarto, 2019). Strategic use of digital technology can enhance children's creativity, particularly when managed well and integrated into learning (Suartana dkk., 2024). Early digital literacy attention allows children to develop positive skills in utilizing technology for learning and creativity.

Therefore, thoughtful and controlled use of digital technology can yield significant benefits for children's mental health and development. Through proactive parental roles, appropriate education, and integration of technology in education, children can harness the positive potential of technology to support their growth and well-being. Comprehensive and ongoing research is needed to deeply understand the impact of digital technology on children's mental health and psychological well-being. This research aims to analyze various aspects of technology use, including duration, types of content consumed, and the social contexts in which technology is used. It's also crucial to consider children's and parents' perspectives in evaluating these impacts.

Ultimately, research outcomes are expected to provide guidelines for parents, educators, and policymakers in managing children's digital technology use. Furthermore, controlled use of digital technology can influence the parental role in educating children, offering concrete solutions and empowering parents as positive agents in controlling children's technology use in the digital era (Krisdiawan dkk., 2024). With the right approach, digital technology can be optimally utilized to support children's development and well-being while minimizing potential negative impacts.

This underscores the importance of awareness, education, and appropriate regulations to ensure that digital technology maximally benefits the younger generation.

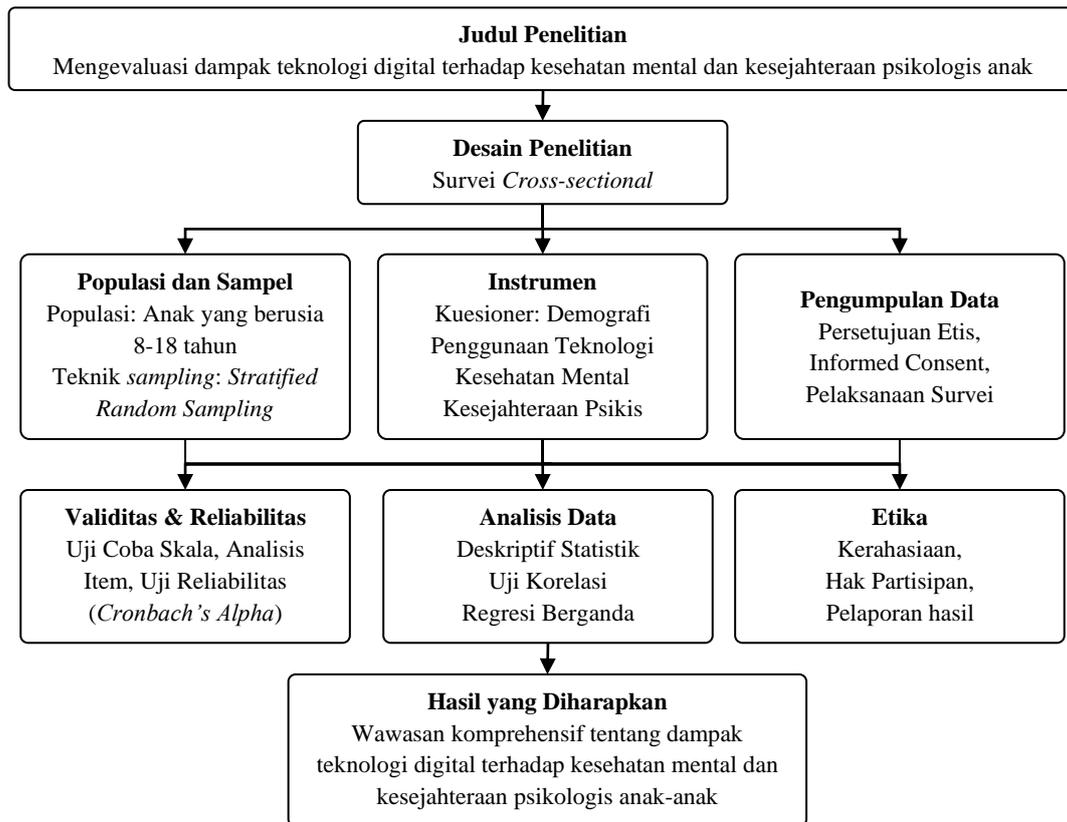
RESEARCH METHODOLOGY

This study employs a cross-sectional survey design to collect data at a single point in time from children aged 8-18 years who regularly use digital technology. The primary aim of this research is to explore the relationship between digital technology usage and children's mental health and psychological well-being. The sample will be selected using stratified random sampling techniques from various schools in city X, aiming to encompass diversity in social, economic, and demographic backgrounds.

Data will be gathered using a specific questionnaire covering several aspects: demographics (such as age, gender, family background, and socio-economic status), digital technology usage (including types of devices, daily usage duration, content types, and usage contexts), and evaluation of mental health and psychological well-being using validated scales like the Strengths and Difficulties Questionnaire (SDQ) and the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). Questionnaire validity and reliability will be tested prior to the main survey through a pilot study on a small sample. Item analysis and reliability tests such as Cronbach's alpha will be utilized to ensure the consistency and validity of the measurement instruments used in this study.

The questionnaire will be distributed directly in schools during school hours, with teacher supervision to ensure a conducive environment and minimal disruptions. Following data collection, analysis will be conducted using statistical software such as SPSS, encompassing descriptive statistics to depict sample characteristics and patterns of technology use, correlation analysis to assess the relationship between technology use and mental health/psychological well-being, and multiple regression analysis to identify significant predictors considering control variables like age and gender. Here is the research framework of the research.

Figure 1. Research Framework



RESULT AND DISCUSSION

Respondent Demographics

The survey involving 500 children aged 8-18 years from various schools in city X showed a fairly balanced distribution by gender, with 52% of respondents being male and 48% female. This reflects a good representation of the child population in city X, allowing for broader generalization of the results. The balanced distribution is also crucial for analyzing potential differences in the impact of digital technology based on gender, providing additional insights into how technology affects boys and girls differently.

In terms of age, the majority of respondents fell within the 12-15 years range (45%), followed by the age groups of 8-11 years (30%) and 16-18 years (25%). This distribution indicates that most children surveyed are in early to mid-adolescence, a period when digital technology usage tends to increase. This is significant as adolescence is a critical time for social and emotional development, during which the impact of digital technology can be more pronounced. The younger age group (8-11 years) and older group (16-18 years) also provide valuable perspectives on how the impact of digital technology may vary throughout childhood development. Socioeconomic status, encompassing parents' educational level, employment status, and family income, can influence how parents manage children's access to digital technology (Atika & Rasyid, 2018; Syahyoeseva & Nurhafizah, 2023). Research

indicates that these factors play a role in shaping the environment in which children grow and develop.

The diverse socioeconomic backgrounds of the respondents, with 40% coming from middle-income families, 35% from low-income families, and 25% from high-income families, provide a richer context for analysis. Variation in socioeconomic status allows researchers to explore how economic factors influence access to and use of digital technology, as well as its impact on mental health and psychological well-being. For example, children from low-income families may face different challenges in technology use compared to those from high-income families, such as limited access to adequate devices or internet. The use of digital technology associated with socioeconomic status can also affect children's mental health. Studies show that behavioral and emotional disorders in teenagers can be influenced by sociodemographic factors, such as parents' education level and family income (Aziz et al., 2021). This indicates that family economic conditions can impact children's mental health. This analysis can help identify specific needs and appropriate intervention strategies for different socioeconomic groups.

Digital Technology Usage

The average daily duration of digital technology use is 3.5 hours, with 30% of respondents using digital technology for less than 2 hours per day, 50% between 2-4 hours per day, and 20% more than 4 hours per day. The majority of respondents (70%) use digital technology for entertainment, 20% for educational purposes, and 10% for communication. The most frequently accessed content includes social media (60%), video streaming (50%), and online gaming (40%). Research findings indicate a close relationship between the duration of digital technology use and children's mental health. Excessive use of digital technology (more than 4 hours per day) is associated with increased symptoms of anxiety and depression. This is consistent with previous studies showing that excessive screen time can disrupt sleep patterns and increase the risk of mental disorders in children. Therefore, it is crucial for parents and educators to monitor and regulate children's digital technology usage.

Controlled use of digital technology can impact children's social interactions and cognitive skill development (Fidan & Olur, 2023; Wan Zakaria dkk., 2022). The survey results reveal that the average daily duration of digital technology use among children is 3.5 hours. Thirty percent of respondents use digital technology for less than 2 hours per day, 50% between 2-4 hours per day, and 20% more than 4 hours per day. The majority primarily use digital technology for entertainment (70%), followed by education (20%) and communication (10%). This indicates that entertainment is the primary reason children spend time in front of screens, engaging in activities such as online gaming, video streaming, and social media browsing.

Further analysis shows a significant relationship between the duration of digital technology use and children's mental health. Children who use digital technology for more than 4 hours per day exhibit increased symptoms of anxiety and depression

compared to those who use it for less than 2 hours per day. These findings are consistent with previous research indicating that excessive screen exposure can negatively impact children's mental health, including disrupting their sleep patterns, which in turn can affect their emotional and cognitive well-being. Research suggests that excessive use of digital technology can contribute to increased risks of mental health issues such as anxiety, depression, and sleep disorders in children (Misirli & Ergulec, 2021; Wood dkk., 2016). Therefore, monitoring and regulating the duration of children's digital technology use can help mitigate these negative impacts.

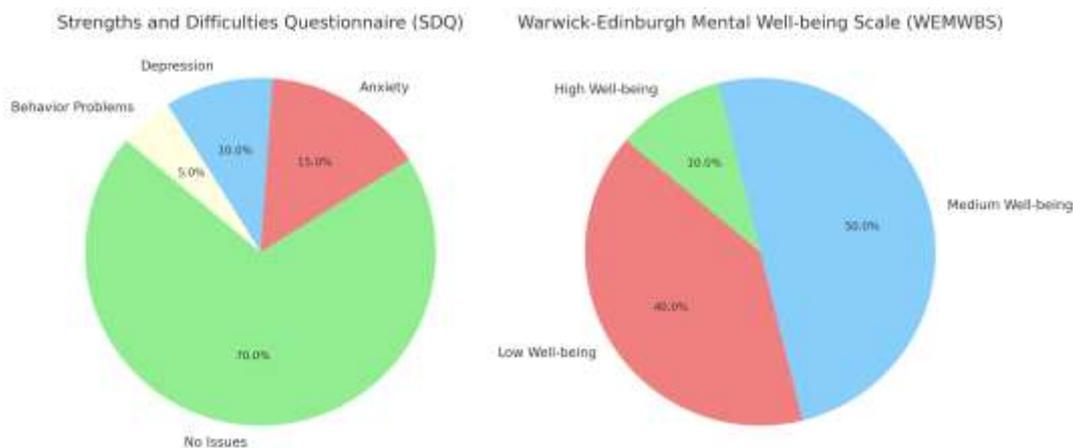
Given the negative impacts found, it is crucial for parents and educators to monitor and regulate children's digital technology usage. Limiting screen time and ensuring a balance with non-digital activities such as sports, face-to-face social interaction, and sufficient sleep are steps that should be taken to protect children's mental health. Interventions that educate children about healthy technology use and provide beneficial alternative activities can also help reduce the risks associated with excessive digital technology use. Thus, monitoring and regulating children's digital technology usage by parents and educators are critical steps in safeguarding children's mental health, psychological well-being, and development in this digital era.

The purpose of the results and discussion is to state your findings and make interpretations and/or opinions, explain the implications of your findings, and make suggestions for future research. Its main function is to answer the questions posed in the Introduction, explain how the results support the answers and, how the answers fit in with existing knowledge on the topic. The discussion is considered the heart of the paper and usually requires several writing attempts. The discussion will always connect to the introduction by way of the research questions or hypotheses you posed and the literature you reviewed, but it does not simply repeat or rearrange the introduction; the discussion should always explain how your study has moved the reader's understanding of the research problem forward from where you left them at the end of the introduction. To make your message clear, the discussion should be kept as short as possible while clearly and fully stating, supporting, explaining, and defending your answers and discussing other important and directly relevant issues. Care must be taken to provide commentary and not a reiteration of the results. Side issues should not be included, as these tend to obscure the message.

Mental Health and Psychological Well-being

The survey results indicate significant variations in children's mental health and psychological well-being:

Figure 2. Survey Results on Children



The survey revealed significant variation in children's mental health based on the Strengths and Difficulties Questionnaire (SDQ). Thirty percent of respondents experienced emotional or behavioral issues. Among them, 15% showed symptoms of anxiety, 10% exhibited signs of depression, and 5% had behavioral problems. These findings suggest that nearly a third of children in the survey face significant mental health challenges, requiring attention and intervention from parents, educators, and mental health professionals.

Furthermore, economic and social factors also influence children's access to and use of digital technology, highlighting the importance of addressing digital divides and ensuring equal access (Rini Dwi Astuti dkk., 2023; Smahelova dkk., 2017). Parents and educators need to understand how these factors affect children's technology use and take steps to ensure that all children have equal opportunities to grow and develop healthily.

Additionally, analysis based on the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) revealed that 40% of respondents had low psychological well-being, 50% were at moderate levels, and only 10% had high levels of well-being. Through a holistic and collaborative approach involving parents, educators, and mental health professionals, we can create an environment that supports children's mental health and psychological well-being in this digital age (Cranmer, 2020; Whitehead dkk., 2024).

These findings indicate that the majority of children experience suboptimal levels of well-being, with nearly half of them showing low or moderate psychological well-being. Low psychological well-being can impact various aspects of children's lives, including academic achievement, social relationships, and emotional development. Research shows a positive relationship between psychological well-being and academic performance (Amholt dkk., 2020; Marasca dkk., 2021). Children with good psychological well-being tend to have higher motivation, better learning abilities, and improved academic outcomes.

In addition to duration and content types, other factors such as family environment, peer relationships, and physical activity also contribute to children's

mental health. Children who have strong relationships with family and peers tend to have better psychological well-being, even with significant digital technology use. This suggests that strong social support can buffer against the negative impacts of digital technology use.

Interpreting these findings underscores the need for more proactive and holistic strategies to support children's mental health and psychological well-being. Effective interventions include educational programs that raise awareness about mental health, improved access to counseling and psychological services in schools, and support from families and communities to create environments that foster children's well-being. By addressing emotional and behavioral issues early and enhancing psychological well-being, it is hoped that children can develop more optimally and better cope with life's challenges.

Correlation Between Digital Technology Usage and Mental Health

The correlation analysis results from the survey indicate a significant relationship between the duration of digital technology use and children's mental health. With a correlation coefficient of 0.35 ($r = 0.35$, $p < 0.01$), there is a moderate positive correlation between the duration of digital technology use and SDQ scores. This means that the longer children use digital technology daily, the higher the likelihood they experience emotional and behavioral issues.

Higher SDQ scores among children using digital technology for more than 4 hours per day indicate increased problems such as anxiety, depression, and behavioral issues. Statistically, a p-value less than 0.01 indicates that these findings are highly significant, suggesting that this relationship is unlikely to occur by chance. This is consistent with previous research showing that prolonged screen exposure can disrupt sleep patterns, reduce time for physical activity and social interaction, all of which contribute to poor mental health.

Table 1. Table of Correlation Analysis between Variables

Variable	R	P Value	Interpretation
Duration of Digital Technology Use	0.35	< 0.01	Moderate Positive Correlation
SDQ Score			Duration of Digital Technology Use

This interpretation underscores the importance of regulating the duration of children's digital technology use. Parents and educators need to be more vigilant about the time children spend in front of screens, ensuring they do not exceed healthy limits. Additionally, providing alternative activities that are more beneficial and healthy, such as sports, hobbies, or direct social interaction, can help mitigate the negative impacts of excessive digital technology use on children's mental health. Understanding and

addressing the impact of digital technology use duration is crucial in maintaining children's emotional and behavioral well-being in this digital era.

Parents play a crucial role in understanding and mitigating the negative effects of digital technology use on children. Studies indicate that parents need to provide guidance, empower children in technology use, and limit gadget usage to reduce its negative impact (Nugroho dkk., 2022; Sugiarti & Andyanto, 2022). Thus, parents can become positive agents in educating children about digital technology use.

Several previous studies also indicate that the more time children spend in front of electronic screens, the higher the likelihood they experience symptoms of depression or anxiety. This can be explained by various factors, including social media influence, exposure to potentially harmful content, and the physical impacts of excessive use, such as lack of physical activity and disrupted sleep. Research has found that high levels of electronic learning time are associated with higher levels of depression and anxiety in children (Li dkk., 2021). Moreover, research indicates that playing video games and watching television have a stronger correlation with depression and anxiety compared to internet browsing and mobile phone use (Mougharbel dkk., 2023).

However, it is important to note that this correlation does not always indicate direct causation. While there is a relationship between digital technology use and mental health, other factors such as family environment, parenting styles, and genetic factors also play crucial roles in determining children's mental health conditions. Furthermore, individual differences in how children respond to digital technology can affect the outcomes of each correlation study. Therefore, while acknowledging the significant correlation, further research is needed to better understand the mechanisms behind this relationship and to develop more precise recommendations regarding digital technology use among children.

Correlation Between Content Types and Psychological Well-being

The type of content consumed also has a significant influence. Intensive use of social media correlates with lower WEMWBS scores ($r = -0.30$, $p < 0.01$), indicating lower psychological well-being. Conversely, using technology for educational purposes shows a positive correlation with psychological well-being ($r = 0.25$, $p < 0.01$).

Table 2. Table of Correlation Analysis: Content Type and Psychological Well-being

Type of Content	R	P Value	Interpretation
Intensive Use of Social Media	-0.30	< 0.01	Moderate Negative Correlation; Lower Psychological Well-being
Use of Technology for Educational Purposes	0.25	< 0.01	Weak Positive Correlation; Higher Psychological Well-being

Studies indicate that intensive use of social media correlates negatively with psychological well-being, as measured by WEMWBS scores. A correlation of -0.30

suggests that the more intensive the use of social media, the lower the perceived level of psychological well-being. This factor can be influenced by various aspects such as exposure to negative content, social comparisons, or usage that disrupts rest or physical activity. On the other hand, using technology for educational purposes shows a positive correlation with psychological well-being, although the relationship is weaker with a correlation coefficient of 0.25. This may be due to the positive experiences gained from learning or exploring through technology, which can enhance children's sense of achievement, skills, and confidence.

While these findings provide a clear picture of how the type of content consumed via digital technology can affect psychological well-being, it's important to note that correlation does not always imply causation. This study highlights the importance of considering the type and manner of technology use in promoting children's mental health. Policy recommendations and educational practices focusing on healthy and productive use of digital technology have the potential to reduce negative impacts and enhance the benefits for children's psychological well-being.

Practical Recommendations

Based on these findings, several practical recommendations can be suggested: parents and educators should set limits on children's digital technology use to prevent negative impacts on mental health. Furthermore, encouraging children to access educational content and limiting social media use can help improve psychological well-being. Another recommendation is to strengthen family and social relationships and promote physical and outdoor activities to mitigate the negative impacts of digital technology use.

This research highlights the importance of a holistic approach in assessing the impact of digital technology. Further research is needed to understand the mechanisms underlying the relationship between digital technology use and mental health, and to identify effective interventions to mitigate the negative impacts. By understanding these factors, more effective steps can be taken to harness the benefits of digital technology while minimizing the risks to children's mental health and psychological well-being.

CONCLUSION

Based on the research findings, it is evident that there is a notable correlation between children's mental health and their use of digital technology. The study encompassed a diverse sample of 500 children aged 8-18 from various schools in city X, reflecting a balanced representation by gender. The predominant use of digital technology for entertainment purposes, especially through social media, video streaming, and online gaming, underscores its pervasive role in children's daily lives.

The survey revealed significant mental health challenges among children, with a substantial portion experiencing emotional or behavioral issues such as anxiety, depression, and problematic behaviors. This highlights the importance of parental, educational, and professional interventions to address these issues effectively.

Moreover, the correlation analysis demonstrated a moderate positive relationship between the duration of digital technology use and mental health issues, indicating that prolonged use may contribute to higher levels of emotional and behavioral problems among children. This emphasizes the need for balanced and monitored use of digital technology to mitigate potential negative impacts on children's well-being.

In conclusion, the findings underscore the critical role of managing children's digital technology use to safeguard their mental health and overall development. Efforts should focus on promoting healthy screen time habits, encouraging alternative activities, and fostering supportive environments to enhance children's well-being in today's digital age.

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