



Social and Digital Ecology: The Impact of the School Environment, Peer Interaction, and Gadget Exposure on Children's Psychological Well-being

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Abstract

Psychological well-being during early childhood is a critical component in fostering social and emotional development during this pivotal growth phase. Nevertheless, increased exposure to electronic devices and variations in the quality of the school environment may influence children's psychological states. This study seeks to examine the impact of the physical school environment and gadget usage on children's psychological well-being, considering the mediating role of peer interactions. The research utilized a quantitative survey methodology, engaging 304 mothers of children aged 4–6 years who are enrolled in 19 kindergartens within the Bogor Barat District. Data analysis was conducted using SPSS and SEM via SmartPLS 4. The findings indicate that the physical school environment positively affects children's psychological well-being ($\beta = 0.359$; $p < 0.001$) and enhances the role of peers ($\beta = 0.292$; $p < 0.001$). Conversely, gadget usage negatively impacts peer interactions ($\beta = -0.356$; $p < 0.001$) and children's psychological well-being ($\beta = -0.116$; $p < 0.05$). The role of peers was found to significantly enhance children's psychological well-being ($\beta = 0.240$; $p < 0.001$). Consequently, achieving a balance between the quality of the school environment, the regulation of gadget usage, and social support from peers is essential in promoting the mental health of young children. These findings highlight the importance of school and family policies aimed at limiting gadget use duration while strengthening supportive physical environments and peer interactions to promote children's psychological well-being.

Keywords: *Gadget usage, Peers, Psychological Well-being, School Environment.*

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INTRODUCTION

Psychological well-being is a crucial aspect of school-age children's development, as it relates to their ability to manage emotions, build healthy social relationships, and develop self-confidence and a sense of purpose in life (Shum, Dockray, Gallagher, & McMahon, 2025). Psychological well-being is not merely defined as the absence of mental disorders, but as a comprehensively positive mental and emotional state. Children with good psychological well-being tend to be able to adapt to their environment, have positive interpersonal relationships, and demonstrate optimal learning motivation (Beaumont et al., 2023).

From the perspective of developmental psychology, psychological well-being is influenced by the interaction between individuals and their environments. This study adopts Bronfenbrenner's Ecological Systems Theory, which explains that child development is shaped by multiple interconnected environmental systems, including the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. However, this research primarily focuses on the microsystem, particularly the influence of family, school, and peer relationships, because these immediate social environments are considered the most directly related to children's psychological well-being. Through daily interactions within these contexts, children develop emotional security, social competence, and coping abilities that contribute to their overall psychological well-being. School, as one of the primary environments for children, plays a strategic role in shaping social and emotional experiences (Butler et al., 2022). Adequate school facilities, a safe learning environment, and social support within the school can serve as protective factors for children's mental health. Conversely, an uncondusive school environment can potentially cause psychological stress and diminish children's comfort in learning (Podiya, Navaneetham, & Bhola, 2025).

In addition to the physical school environment, peer interaction also significantly contributes to psychological well-being. Supportive relationships can enhance feelings of acceptance, strengthen self-esteem, and help children develop social skills (Butler et al., 2022). Peer support functions as a crucial source of emotional reinforcement during the school years. However, negative relational dynamics such as conflict, bullying, or social rejection can trigger stress, anxiety, and a decline in emotional well-being (Butler et al., 2022).

On the other hand, the development of digital technology has altered children's patterns of social interaction. Gadget use among school-age children has shown a significant increase, both for learning and entertainment purposes. Digital technology can offer benefits in expanding access to information and enhancing cognitive competence (Panjeti-madan & Ranganathan, 2023). However, excessive use intensity has the potential to reduce the quality of direct social interaction and affect children's emotional stability. Therefore, gadget exposure is an important factor to consider when examining children's psychological well-being in the digital era.

Based on these various studies, it can be understood that children's psychological well-being is not formed by a single factor, but through the interaction of physical, social, and digital environmental factors (Reinius, Korhonen, & Hakkarainen, 2021). However, research that integrates these three aspects within a single social and digital ecology framework is still limited. Most studies tend to examine school environment factors, peer interaction, or gadget use separately, thus failing to provide a comprehensive picture of the mechanisms linking these variables.

The urgency of this research is particularly pronounced in West Bogor District, a rapidly urbanizing area facing distinct socio-digital challenges. Based on preliminary observations and data from the 19 kindergartens involved in this study, several schools exhibit suboptimal physical infrastructure, including limited outdoor play areas and inadequate learning centers, which potentially restricts children's social exploration. Furthermore, a preliminary survey indicated that a significant portion of children (approx. 35-50%) exceeded the WHO-recommended screen time of one hour per day, with many mothers reporting difficulties in controlling gadget use. These specific conditions—overcrowded, less stimulating school environments coupled with high gadget dependency at home—create a 'perfect storm' that threatens the psychological well-being of young children in this area, making a targeted investigation in West Bogor both timely and essential.

Therefore, this study examines the impact of the school environment and gadget exposure on children's psychological well-being, considering peer interaction as a mediating process in these relationships. This research aims to analyze the influence of school facilities and the intensity of technology use on children's psychological well-being, and to test the role of peer interaction within the dynamics of these relationships. The results of this study are expected to provide a theoretical contribution to the development of social ecology studies in a digital context, as well as serve as a practical consideration for schools and parents in creating an environment that better supports children's mental health.

METHODS

This study employed a quantitative approach using a survey method. This design was utilized to explain the causal relationships among the variables under study, specifically the influence of the physical school environment and gadget use on children's psychological well-being, considering peer interaction as a mediating variable. The research was conducted in 2025–2026 at 19 Early Childhood Education institutions (Kindergartens) in West Bogor District, Bogor City, West Java. The educational institutions were selected purposively, considering their characteristics and the accessibility of the research location.

The population in this study was mothers of young children enrolled in kindergartens in the area. The research sample consisted of 304 mothers of children aged 4–6 years. The sampling technique used was purposive sampling, with the criterion that respondents were mothers whose children were actively attending kindergarten and who were willing to complete the research questionnaire. This approach was chosen to ensure that respondents had direct relevance to the variables studied, particularly concerning the school environment conditions and their children's gadget use.

Data were collected through the distribution of closed-ended questionnaires using a Likert scale. The physical school environment instrument was adapted from a scale developed by Harms, Crayer, Clifford, and Yazejian (2022), which measures the quality of facilities and physical conditions of the children's learning environment. The gadget use variable was adapted from an instrument developed by Kaur, Gupta, Kiran, Malhi, and Grover (2021), which measures the intensity and patterns of digital technology use in children. Peer interaction was measured using a scale developed by Rigby and Slee (1993), which assesses the quality of children's social relationships with their peers. Meanwhile, children's psychological well-being was measured by adapting the Psychological Well-Being concept from Ryff and Keyes (1995),

encompassing the dimensions of self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth. All instruments underwent a process of adaptation and language adjustment to suit the context of early childhood and the characteristics of the respondents.

The exogenous variables in this study include the children's physical school environment and gadget use, while the mediating variable is the role of peers, and the endogenous variable is psychological well-being. The conceptual framework illustrating the relationships among the variables in this study is presented in Figure 1.

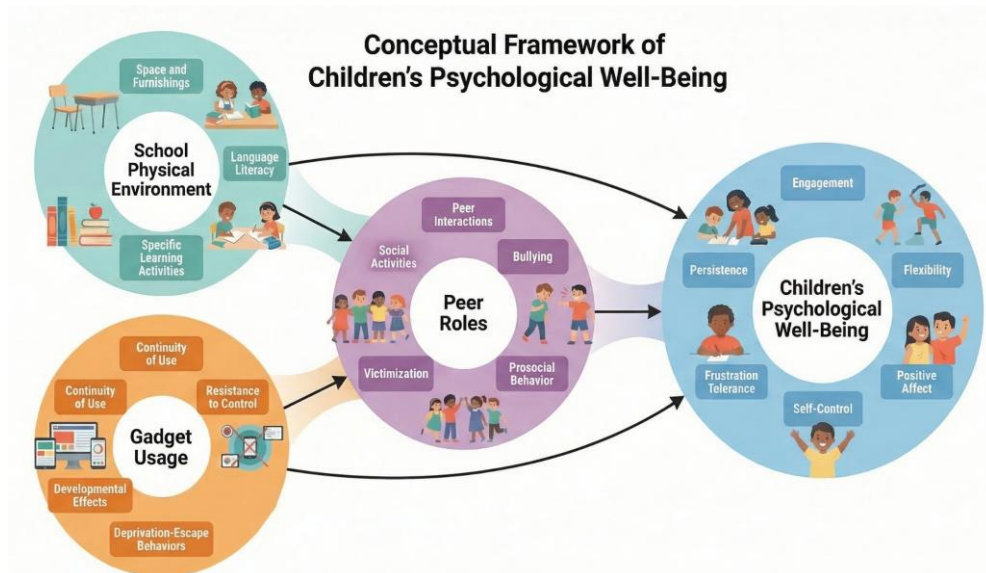


Figure 1. Research Model

Based on this framework, this study proposes the following hypotheses:

1. H1: The physical school environment has a significant effect on the role of peers.
2. H2: The physical school environment has a significant effect on Psychological Well-Being.
3. H3: Gadget use has a significant effect on the role of peers.
4. H4: Gadget use has a significant effect on Psychological Well-Being.
5. H5: The role of peers has a significant effect on Psychological Well-Being.
6. H6: The physical school environment has a significant effect on Psychological Well-Being through the role of peers.
7. H7: Gadget use has a significant effect on Psychological Well-Being through the role of peers.

Before testing the structural model, construct validity and reliability tests were conducted to ensure that the indicators used could measure the research variables consistently and accurately. Each variable in this study was operationalized through specific measurable indicators. The physical school environment was measured based on indicators such as classroom layout, availability of learning facilities, safety, and comfort. Gadget use was assessed through duration, frequency, and purpose of use. Peer interaction was measured through indicators of cooperation, communication, social acceptance, and conflict resolution. Psychological well-being was operationalized using dimensions adapted from Ryff's model, including self-acceptance, positive relations, autonomy, environmental mastery, purpose in life, and personal growth. All indicators were measured using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Reliability in this study was assessed using Cronbach's Alpha and Composite Reliability values, while convergent validity was tested using the Average Variance Extracted (AVE) value. The test results indicated that most latent variables met the established reliability and validity criteria. The Cronbach's Alpha and Composite Reliability values were generally above the recommended minimum threshold of 0.70, while the AVE values were above 0.50, indicating that the constructs have adequate convergent validity. The results of the validity and reliability testing for each latent variable are presented in Table 1.

Table 1. Cronbach's Alpha, Composite Reliability, and AVE Values of Latent Variables

Path	Path Coef.	t-value
Physical School Environment → Role of Peers	0.292	5.930
Physical School Environment → Psychological Well-being	0.359	6.811
Gadget Use → Role of Peers	-0.356	6.332
Gadget Use → Psychological Well-being	-0.116	2.520
Role of Peers → Psychological Well-being	0.240	4.223

Data analysis was conducted in several stages. First, descriptive analysis was performed using SPSS software to describe respondent characteristics and the distribution of answers for each research variable. Subsequently, structural model testing was conducted using Structural Equation Modeling (SEM) based on Partial Least Squares with the assistance of SmartPLS 4 software. SEM analysis was used to test the direct relationships between variables and the mediating role of peer interaction in the relationship between the physical school environment, gadget use, and children's psychological well-being. Model evaluation was carried out through testing construct validity and reliability, as well as testing path significance using the bootstrapping procedure.

Although the Cronbach's Alpha value for the "Role of Peers" variable (0.537) is slightly below the commonly accepted threshold of 0.60, the Composite Reliability value (0.755) exceeds the recommended level, indicating acceptable internal consistency for exploratory research. This condition may be influenced by the limited number of items and the heterogeneous nature of peer interaction constructs in early childhood contexts. Previous studies have also noted that Cronbach's Alpha may underestimate reliability when item numbers are small or when constructs are multidimensional. Therefore, the reliability of this construct is still considered adequate for further analysis.

RESULTS AND DISCUSSION

This study aims to analyze the effect of school facilities and the intensity of gadget use on children's psychological well-being, as well as to examine the role of peer interaction within the dynamics of these relationships. The research results are presented in Table 2.

Table 2. Results of Direct Effect Analysis

Path	Path Coef.	t-value
Physical School Environment → Role of Peers	0.292	5.930
Physical School Environment → Psychological Well-being	0.359	6.811
Gadget Use → Role of Peers	-0.356	6.332
Gadget Use → Psychological Well-being	-0.116	2.520
Role of Peers → Psychological Well-being	0.240	4.223

The Effect of the Physical School Environment on Peer Relationships

The analysis results indicate that the physical school environment has a positive and significant effect on the role of peers ($\beta = 0.292$; $t = 5.930$). This finding suggests that the quality of facilities and physical conditions at school significantly contributes to shaping the dynamics of social relations among students. Statistically, this coefficient indicates a moderate effect, implying that while the physical environment is not the sole determinant, it remains a relevant structural factor in explaining the variation in the role of peers.

Conceptually, the physical school environment can be understood as an ecological context that mediates children's social experiences. School is not merely an academic institution but also a social space where children undergo secondary socialization processes. Classroom conditions, facility layout, availability of open spaces, and aspects of physical comfort and safety serve as prerequisites for the formation of intense and high-quality social interactions (Reinius, Korhonen, & Hakkarainen, 2021). A conducive environment enables more spontaneous, collaborative interactions with minimal psychological pressure, thereby fostering the development of supportive peer relationships.

From the perspective of ecological systems theory, the school environment is part of the microsystem that directly influences children's daily experiences. The quality of interactions within this microsystem is largely determined by the characteristics of the physical environment that encompasses it. Cramped and disorganized spaces can potentially increase social density, which in several studies has been associated with heightened irritability, interpersonal conflict, and a tendency toward withdrawal (Obi et al., 2023). Conversely, a well-organized environment creates a sense of security and situational control, facilitating openness in interaction.

Previous research has shown that the quality of school facilities is significantly related to the patterns and quality of social relations among students. Various empirical studies indicate that interventions targeting the physical aspects of the school environment can substantially alter peer interaction dynamics (Jhu-ting Yang, Chen, & Zheng, 2023). The provision of playgrounds and equipment designed to encourage collective participation has been shown to shift children's tendencies from individual play activities towards more intense social interactions at more complex levels, including cooperation and cross-age collaborative play (Smith, Asantewa, AndohKwaw, & Ampaw, 2024). These findings demonstrate that the design of physical facilities not only increases the frequency of interaction but also enriches the quality of social relationships formed among students (Laboy, 2019).

In the context of physical education, the availability of adequate fields and sports facilities has been reported to have a very strong direct effect on the quality of peer relationships, as well as an indirect effect through increased participation in shared physical activities. Such collective activities create a social space that enables the development of interpersonal trust, solidarity, and group cohesion (Jianhui Yang, Guozhi, & Wang, 2023). Similarly, the arrangement of inclusive classroom zones, such as the division of sensory, learning, and play areas, has been proven to enhance engagement and communication among students, including in contexts of diverse abilities. In this situation, peers function not only as interaction partners but also as a source of support and facilitators of social learning.

Overall, these empirical findings reinforce the results of this study, which demonstrate a positive influence of the physical school environment on the role of peers. An adequately designed physical environment can be understood as an opportunity structure that facilitates more intense and meaningful social interaction. Thus, the quality of school facilities should not

be positioned merely as a supplementary factor, but rather as a structural element that helps shape children's social dynamics and strengthens the function of peers in the social development process.

The Effect of the Physical School Environment on Children's Psychological Well-being

The analysis results show that the physical school environment has a positive and significant effect on children's psychological well-being, with a coefficient of 0.359 and a t-value of 6.811. The magnitude of this coefficient is the strongest compared to other paths in the model, indicating that the quality of the physical school environment is a structural determinant with a substantial contribution to children's psychological well-being. This finding confirms that psychological well-being in an educational context is not solely shaped by individual characteristics but also by the objective conditions of the environment where children engage in academic and social activities daily.

Conceptually, a safe, comfortable physical school environment supported by adequate facilities contributes to the formation of a sense of psychological security and perceived control over the environment. This condition is closely related to the dimensions of environmental mastery, emotional stability, and positive social relations as important components of psychological well-being. Empirical evidence supports this argument. A review of various interventions at the K-12 level in the United States showed that improvements to the physical school environment, including the provision of adequate movement space, dining facilities that support healthy nutrition, and representative play areas, are associated with healthier lifestyles and several improvements in student mental health indicators (Hawkins, Chung, Hertz, & Antolin, 2023). This suggests that the physical quality of schools, which supports physical activity and healthy lifestyles, contributes to children's psychological stability through mechanisms of emotion regulation and enhanced general well-being.

Furthermore, large-scale quantitative studies have found that a positive school environment is associated with healthier brain connectivity patterns in children aged 9 to 10 years, which in turn is associated with better mental health (Mann et al., 2022). This finding introduces a neuropsychological dimension to the relationship between the school environment and child well-being, demonstrating that the quality of the educational context not only affects subjective experience but also correlates with biological indicators of mental development (Nurmayanti, Prasetyawan, & Iswahyudi, 2024). Thus, the results of this study are not only consistent with previous literature but also strengthen the argument that improving the quality of the physical school environment is a fundamental strategy for comprehensively and sustainably building children's mental health and psychological well-being.

The Effect of Gadget Use on the Role of Peers

The analysis results indicate that gadget use has a negative and significant effect on the role of peers, with a coefficient of -0.356 and a t-value of 6.332. The magnitude of this coefficient indicates a relatively strong effect compared to other paths, suggesting that the intensity of gadget use substantially contributes to diminishing the quality of the peer role. Substantively, this finding indicates that the higher the duration and frequency of gadget use, the weaker the quality of children's social interaction in face-to-face contexts.

This finding aligns with various studies showing that the duration and frequency of digital device use are negatively correlated with the quality of interpersonal communication, cooperation, and empathy in children from preschool to elementary school age (Kumulloh & Nurhafizah, 2022). Prolonged gadget use tends to reduce the time allocated for direct play with others, thereby limiting children's opportunities to practice social skills (Jain, 2025). Furthermore, the aspect of dependency or addictive tendencies towards screens amplifies this impact. Children who exhibit higher levels of dependency tend to avoid physical play activities and prefer screen-based interactions, which in the long term can lead to withdrawal tendencies and reduced engagement in peer group dynamics (Panjeti-madan & Ranganathan, 2023).

Moreover, gadget use without parental accompaniment or adequate supervision has also been reported to contribute to reduced quality of cooperative play and direct social interaction. The lack of external regulation can increase the potential for conflict, miscommunication, and social isolation (Habiby et al., 2025). Within the framework of displacement theory, time spent on digital activities directly replaces time for conventional social interaction (Jain, 2025). In the context of West Bogor, this phenomenon may be associated with the increasing accessibility of smartphones and digital entertainment among young children, particularly short-form video content and mobile games that are often consumed individually for extended periods. Such patterns potentially reduce opportunities for outdoor play and face-to-face interaction with peers in both neighborhood and school environments. In addition, gadget use is frequently utilized by parents as a practical means of keeping children occupied while managing work and household responsibilities. Although this practice may offer short-term convenience, excessive and unsupervised screen exposure may gradually limit children's opportunities to develop communication, cooperation, and emotional skills through direct peer interaction. Therefore, the results of this study reinforce the argument that gadget use is not merely a technological issue but a social phenomenon with implications for the restructuring of children's peer relationship patterns. This finding underscores the importance of managing gadget use proportionally to prevent the degradation of the peer role as a source of social support and a vehicle for social learning.

The Effect of Gadget Use on Children's Psychological Well-being

The analysis results indicate that gadget use has a negative and significant effect on children's psychological well-being, with a coefficient of -0.116 and a t-value of 2.520. Although the magnitude of this coefficient is relatively smaller compared to other influential paths in the model, its statistical significance demonstrates that gadget use still makes a tangible contribution to the variation in children's psychological well-being. In other words, while the intensity of gadget use is not the primary determinant, it remains a relevant risk factor in explaining the decline in psychological well-being.

This finding aligns with various research results showing that excessive gadget use is associated with increased emotional and behavioral symptoms in children, such as anxiety, irritability, sleep disturbances, and a tendency towards externalizing behavior problems (Muppalla, Vuppalapati, Pulliahgaru, & Sreenivasulu, 2023). Empirical studies also indicate that screen time duration exceeding two hours per day in preschool-age children is associated with lower flourishing scores, reflecting a decline in general well-being indicators (Kwon, Armstrong, Wetoska, & Capan, 2024). This condition suggests that high screen exposure has the potential to disrupt the balance of children's activities, including rest time, physical activity,

and social interaction, all of which are important components in the formation of psychological well-being.

Furthermore, the literature also indicates that compulsive gadget use or use leading to addictive patterns can predict a decline in psychological well-being over a certain period (Alkal, 2025). Mechanisms explaining this relationship include decreased psychological flexibility and weakened emotion regulation abilities due to dependence on instant stimulation from digital devices.

The Effect of the Role of Peers on Children's Psychological Well-being

The analysis results show that the role of peers has a positive and significant effect on children's psychological well-being, with a coefficient of 0.240 and a t-value of 4.223. The magnitude of this coefficient indicates that the role of peers has a moderate yet meaningful contribution to enhancing psychological well-being. This finding confirms that positive social relations are not merely complementary in a child's life but constitute a protective factor that directly contributes to a healthy psychological state.

Theoretically, peers function as an important source of social and emotional support during a child's developmental stages. This support can take the form of acceptance, empathy, instrumental assistance, and validation of emotional experiences. Several studies have shown that peer support significantly contributes to increasing psychological well-being; in some studies, its contribution ranges from 17 to 19 percent of the variance in psychological well-being (Situmorang, Milfayetty, & Hasanuddin, 2024). Social support from peers has also been proven to play a role in reducing psychological distress, including social anxiety and academic stress. In certain contexts, the presence of supportive peers can mitigate the negative impact of unpleasant experiences, such as social pressure or bullying, through mechanisms that strengthen a sense of belonging and social acceptance (Nurhidayah, Ekasari, Muslimah, Pramintari, & Hidayanti, 2021).

The findings of this study reinforce the view that children's psychological well-being develops within a relational context. Children who have positive peer relationships tend to demonstrate better self-confidence, more stable emotion regulation, and a sense of security within their social environment. Conversely, limited social support from peers can increase vulnerability to stress and feelings of isolation (Marciano, Ostroumova, Schulz, & Lorenzo, 2022). Thus, these results confirm that the role of peers is a crucial component in a child's developmental ecosystem and functions as a protective factor that sustainably strengthens psychological well-being.

Overall, the findings of this study can be understood through Bronfenbrenner's Ecological Systems Theory, particularly within the microsystem context, which emphasizes that children's development and psychological well-being are shaped through direct interactions with their immediate environments, such as school, peers, and daily social experiences. The positive influence of the physical school environment and peer relationships indicates that supportive ecological settings facilitate healthy emotional and social development. Conversely, excessive gadget use may weaken children's direct social engagement within the microsystem, thereby reducing opportunities for supportive peer interaction and negatively affecting psychological well-being. These findings highlight that

children's well-being is not formed solely by individual factors, but also by the quality of interactions occurring within their surrounding ecological systems.

The Effect of Mediating Variables

This study also analyzed how the role of peers mediates the relationship between gadget use, the physical school environment, and children's psychological well-being.

Table 3. Results of Mediation Analysis

Path	Path Coef.	t-value
Physical School Environment → Role of Peers → Psychological Well-being	0.070	3.266
Gadget Use → Role of Peers → Psychological Well-being	-0.085	3.659

The analysis results indicate that the indirect path from the physical school environment to psychological well-being through the role of peers is significant, with a coefficient of 0.070 and a t-value of 3.266. This finding suggests that the influence of the physical school environment on psychological well-being is not only direct but also operates through the quality of peer relationships as a mediator. Although the magnitude of the mediation coefficient is smaller than its direct effect, its statistical significance confirms that part of the effect of the school environment on psychological well-being is channeled through the dynamics of children's social relations.

This finding aligns with a large-scale longitudinal study in Korea which showed that a warm, democratic, and flexible school environment enhances peer attachment, whereas a controlling and repressive environment diminishes it (Hnin & Kim, 2022). Furthermore, that study found that peer attachment serves as an important mediator in the relationship between the school environment and children's psychological adjustment. Good attachment to peers fully mediated the relationship with internalizing behavior problems such as anxiety and withdrawal, and partially mediated the relationship with externalizing behavior problems such as aggressiveness and rule-breaking (Lee & Lim, 2024). Thus, the effect of the school environment on children's emotional and behavioral conditions largely operates through the quality of peer relationships, rather than solely through direct exposure to environmental conditions.

In this context, a comfortable and supportive physical school environment can be understood as the foundation for forming positive social relations, which subsequently contributes to enhancing children's sense of security, self-confidence, and emotional stability. An environment that provides representative learning spaces, adequate play areas, and facilities for collective activities encourages healthy social interaction and strengthens attachment among peers (Podiya et al., 2025). This attachment then functions as a protective mechanism that channels the positive influence of the environment on psychological well-being. Thus, the results of this study emphasize that the role of peers is an important psychosocial pathway in explaining how the quality of the school environment contributes to child well-being.

The analysis results show that the indirect path from gadget use to psychological well-being through the role of peers is significant, with a coefficient of -0.085 and a t-value of 3.659. This finding indicates that the negative impact of gadget use on psychological well-being occurs not only directly but also operates through changes in the quality of peer relationships. In other

words, part of the decline in psychological well-being associated with the intensity of gadget use occurs due to disruption in the function and quality of peer relationships.

Empirical literature supports this pattern. Peer pressure to constantly use smartphones and social media has been shown to increase the risk of developing addictive tendencies in children. Gadget use influenced by such social pressures often ceases to be instrumental or educational, instead becoming a means to maintain social status and group acceptance (Xu, Han, & Liu, 2023). A longitudinal study on children in China showed that excessive online social activity diminishes well-being through increased problems in peer relationships. This means that disruption in social relations becomes an important pathway bridging online activity with decreased well-being (Shen et al., 2025). When digital interaction replaces or damages the quality of direct interaction, friendships can become more fragile, competitive, or even conflictual.

Furthermore, various findings indicate that addictive usage patterns correlate with increased symptoms of depression and anxiety, especially when peer relations are characterized by social rejection or bullying (Haddow, Taylor, & Schwannauer, 2021). In such situations, the virtual world often becomes an escape, yet it actually reinforces social isolation and worsens emotional conditions. Systematic reviews also show that digital addiction correlates with decreased well-being, and that social factors such as peer support or rejection determine whether media use functions as an adaptive or maladaptive coping strategy (Chen, 2024). Thus, the results of this study confirm that the quality of peer relationships is a crucial mediating mechanism in explaining how gadget use impacts children's psychological well-being (Marciano et al., 2022).

CONCLUSION

This study demonstrates that the physical school environment, gadget use, and the role of peers have significant effects on children's psychological well-being. The physical school environment positively influences the role of peers and children's psychological well-being, whereas gadget use negatively affects both of these aspects. Furthermore, the role of peers is proven to contribute positively to enhancing children's psychological well-being. The findings of this study also indicate that the role of peers mediates the relationship between the physical school environment and gadget use with children's psychological well-being. Thus, children's psychological well-being is influenced not only by the conditions of the school environment and technology use but also by the quality of social interaction with peers as an essential part of the child's social and emotional development process.

This study has several limitations. First, the data were collected solely from the mothers' perspectives, which may introduce self-report bias. Second, the study did not include direct observation of children's behavior or input from teachers, which could provide a more comprehensive assessment of psychological well-being. Future research is recommended to incorporate multi-informant approaches, including teachers and direct behavioral observations, to enhance data validity. Although the composite reliability values in this study were within acceptable ranges, future research is encouraged to develop more specific measurement items tailored to early childhood characteristics to improve internal consistency.

For schools, it is recommended that schools establish a maximum gadget use policy on school grounds, limiting device usage to a maximum of 30 minutes per day for educational

purposes only, under direct teacher supervision. Furthermore, schools should invest in redesigning outdoor play areas to include more nature-based elements (e.g., gardens, sand pits) and collaborative play equipment that encourages face-to-face interaction.

For parents, schools should organize parenting workshops focused on conscious gadget parenting, providing strategies for setting daily screen time limits (e.g., no more than 1 hour, following WHO guidelines), selecting high-quality educational content, and creating gadget-free zones and times (e.g., during family meals) at home. Encouraging co-play—where parents engage with children during gadget use—is also crucial to turn screen time into an interactive learning opportunity rather than a passive, isolating activity.

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