

Smartphone Use and Its Impact on Young Children's Behavior and Emotional Development in the Digital World

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ABSTRACT

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Artificial intelligence (AI) has increasingly influenced educational practices by providing students with rapid access to information, explanations, feedback, and assistance in completing learning tasks. However, the growing use of AI also raises concerns regarding students' dependence on automatically generated information and its potential implications for critical thinking. This study aims to examine how AI-assisted learning influences students' critical thinking skills at Madrasah Aliyah Miftahussalam Wonosalam, Demak. This research employed a qualitative case study design to explore students' experiences, learning practices, and interactions with AI within an authentic educational context. Data were collected through desk review, classroom observation, and semi-structured interviews involving students and teachers as primary sources of information, supported by relevant institutional and learning documents. Data were analyzed using the interactive model of Miles, Huberman, and Saldaña, involving data condensation, data display, and conclusion drawing and verification, supported by content, discourse, and interpretive analysis. The findings indicate that AI-assisted learning functions as a supplementary learning resource that helps students access information, understand difficult concepts, generate ideas, and explore alternative explanations. However, its contribution to critical thinking depends on students' patterns of engagement. Students who questioned, compared, verified, and reflected on AI-generated information demonstrated more active critical-thinking processes, whereas uncritical copying and excessive dependence created risks of cognitive offloading. Teacher guidance and information-verification practices were also found to be important in directing students toward responsible AI use. The study concludes that AI can support students' critical thinking when it functions as a cognitive scaffold rather than a substitute for independent reasoning.

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INTRODUCTION

Digital technology has become an integral part of daily life, and its rapid development, accompanied by increasingly sophisticated and attractive designs, has brought significant changes to children's lives, including those of early childhood. Smartphones, as easily accessible digital devices, are increasingly used as tools to calm, entertain, or occupy children (Andersson, 2022; Nielsen & Arvidsen, 2021; Sultana & Hawken, 2023). From the perspective of child development, Piaget's cognitive development theory emphasizes that children learn optimally through direct interaction with their physical and social environments (Dasen, 2022; Wynberg et al., 2022). However, social realities indicate that an increasing number of young children spend considerable time using smartphones

rather than actively playing and interacting with their surrounding environment and peers. This shift creates a gap between developmental theory, which emphasizes direct environmental interaction, and contemporary patterns of smartphone use among young children. The discrepancy raises an important question concerning how smartphone use influences children's behavioral and emotional development. This issue is particularly significant because early childhood represents a critical period for the development of social, emotional, and behavioral competencies. Therefore, examining the gap between developmental theory and the current reality of smartphone use is essential for understanding its implications for early childhood development.

Previous studies have demonstrated that excessive use of digital devices may create various developmental problems among children. Children who frequently use smartphones tend to demonstrate lower levels of social skills (Park & Park, 2021; Przepiorka et al., 2021; Zayia et al., 2021). Excessive screen exposure has also been associated with impulsive behavior and reduced attention spans among children (Namazi & Sadeghi, 2024; Wu et al., 2022). These findings indicate that smartphone use is not merely a matter of entertainment or technological preference but may have consequences for children's behavioral and social development. Nevertheless, much of the existing research has focused on school-age children, while comparatively less attention has been directed toward early childhood, when children are still undergoing foundational cognitive, emotional, and social development. This distinction is important because experiences during early childhood may influence subsequent developmental trajectories. Understanding the consequences of smartphone exposure during this formative period can therefore provide an important basis for early intervention and prevention. Accordingly, focusing specifically on early childhood allows the present study to address an important developmental context that remains insufficiently explored in the existing literature.

The developmental implications of smartphone use should also be considered in relation to the potential benefits offered by digital technology. Smartphones can provide children with educational content, interactive activities, and forms of entertainment that may support learning and engagement. However, the potential benefits of technology may conflict with developmental needs when smartphones replace direct interaction with the physical and social environment. Piaget's theory emphasizes the importance of direct interaction with the environment as a fundamental component of children's learning and development (Pesch et al., 2024; Rochat, 2024; Saracho, 2023). In contemporary social contexts, however, many parents use smartphones as substitutes for traditional forms of interaction, particularly to calm children or occupy their free time. This practice may create a discrepancy between the expectation that technology can support development and the reality that excessive or inappropriate use may contribute to problems such as dependence, reduced social skills, and emotional difficulties. Therefore, the issue should not be reduced to whether smartphones are beneficial or harmful in themselves. Rather, it is necessary to examine how smartphone use interacts with children's developmental needs and everyday social environments. Such an examination can provide a more contextualized understanding of the relationship between digital technology and early childhood development.

The quality and pattern of children's interactions with smartphones are therefore important dimensions that require further examination. Unlike approaches that focus primarily on the duration of smartphone use, understanding the developmental consequences of smartphones also requires attention to what children do with these devices and how they interact with digital content (Konrad et al., 2021; Lederer et al., 2022; Matthes et al., 2021). The same amount of smartphone exposure may produce different developmental experiences depending on whether children engage with educational content, passive entertainment, interactive applications, or activities that replace social interaction. In addition, parental involvement represents an important contextual factor because

parents play a central role in regulating children's access to and use of technology within the home environment (Coyne et al., 2021; Misirli & Ergulec, 2021; Steinfeld, 2021). Parental supervision, rules, and patterns of interaction may influence how children experience smartphone use and how they respond behaviorally and emotionally. Thus, examining smartphone use requires consideration of both children's digital interactions and the family environment in which those interactions occur. Combining behavioral, emotional, and parenting dimensions provides a more comprehensive perspective for understanding the role of smartphones in early childhood development.

A number of previous studies have examined the relationship between smartphone or digital-device use and children's development. Studies by Chang et al. (2022) and Fang et al. (2021) found that excessive smartphone use can reduce children's ability to focus and may contribute to behavioral problems. Other studies have identified relationships between digital-device use and delays in children's social-emotional development (Gou & Perceval, 2023; Radesky et al., 2023). Research has also indicated that frequent smartphone use is associated with reduced social interaction and difficulties in children's emotional development (Abdulla et al., 2023; Mallawaarachchi et al., 2022). Furthermore, smartphone dependence may interfere with children's ability to cope with frustration and develop independence (Rodríguez-Torrico et al., 2023). These findings collectively demonstrate that smartphone use may influence several dimensions of children's development, including attention, behavior, social interaction, emotional regulation, and independence. However, the existing literature remains dominated by studies involving school-age children rather than children in early childhood. Consequently, although previous research provides substantial evidence concerning the potential developmental risks of smartphone use, it provides a less specific understanding of how these risks emerge during the early childhood period.

Based on the existing literature, an important research gap can be identified concerning the specific influence of smartphone use on the behavior and emotions of early childhood. Most previous studies have emphasized the duration or intensity of smartphone use and have frequently examined school-age children, whereas the behavioral and emotional consequences of smartphone use during the earlier developmental period remain comparatively less explored. This gap is particularly important because early childhood represents a foundational stage in which children develop social competencies, emotional regulation, behavioral patterns, and independence. In addition, the developmental consequences of smartphone use cannot be fully understood by examining exposure time alone because the quality of children's interactions with smartphones and the role of parents may also shape their experiences (Konrad et al., 2021; Lederer et al., 2022; Matthes et al., 2021; Coyne et al., 2021; Misirli & Ergulec, 2021; Steinfeld, 2021). Therefore, the present study seeks to move beyond a simple duration-based perspective by considering behavioral, emotional, interactional, and parenting dimensions. The position of this study is consequently to provide a more focused understanding of how smartphone use is associated with early childhood behavior and emotions. By addressing this gap, the study offers a more contextualized perspective on the developmental risks and opportunities associated with smartphone use during the early years.

The novelty of this research lies in its comprehensive examination of smartphone use in relation to the behavioral and emotional development of early childhood within the context of the contemporary digital era. Rather than examining smartphone use solely in terms of frequency or duration, this study considers the quality and pattern of children's interactions with smartphones and their potential relationship with children's ability to manage emotions and interact socially. This perspective is important because different forms of smartphone engagement may generate different developmental experiences, even when the duration of use is similar (Konrad et al., 2021; Lederer et al., 2022; Matthes et al., 2021). Furthermore, the study incorporates the role of parents in regulating children's technology use, recognizing that children's smartphone experiences occur within family

environments shaped by parental practices and supervision (Coyne et al., 2021; Misirli & Ergulec, 2021; Steinfeld, 2021). By integrating behavioral, emotional, interactional, and parenting dimensions, this research provides a broader analytical perspective than studies that examine smartphone exposure as an isolated variable. This approach is expected to generate a more nuanced understanding of the risks and opportunities associated with smartphones during early childhood. Therefore, the study contributes to the literature by placing smartphone use within the broader context of children's developmental needs and family dynamics.

In accordance with the identified research gap and novelty, the purpose of this study is to examine how smartphone use affects the social behavior and emotional development of early childhood. The central research question is: How does smartphone use affect the social behavior and emotional development of early childhood? This question is directed toward identifying the behavioral and emotional changes that may emerge in young children as a consequence of smartphone exposure and the ways in which these changes are related to their patterns of smartphone interaction. The study also considers how the quality of smartphone use and parental regulation may shape children's experiences with digital technology. Addressing this question is important because understanding the developmental consequences of smartphone use can provide a stronger basis for parents and educators to make informed decisions concerning children's technology use. Rather than viewing smartphones solely as harmful or beneficial devices, this study seeks to understand the conditions under which smartphone use may contribute to developmental challenges or potentially provide developmental benefits. The findings are expected to provide practical guidance for reducing potential negative consequences while maximizing the appropriate educational and developmental benefits of digital technology. Accordingly, the research question establishes a direct connection between the identified social phenomenon, the theoretical gap, and the empirical focus of the study.

This study argues that although smartphones have the potential to support children's learning through educational content and interactive entertainment, excessive or uncontrolled smartphone use may negatively influence behavioral and emotional development during early childhood. Children who are frequently exposed to smartphones may experience reduced opportunities for direct social interaction, which can affect the development of social skills and emotional management (Abdulla et al., 2023; Mallawaarachchi et al., 2022). Smartphone dependence may also reduce opportunities for children to experience frustration, negotiation, and problem-solving through direct interaction, potentially affecting their ability to cope with frustration and develop independence (Rodríguez-Torrico et al., 2023). Nevertheless, the argument of this study does not imply that all smartphone use is inherently detrimental. Instead, the developmental consequences are expected to depend on the intensity and pattern of use, the quality of digital interactions, and the extent of parental supervision. Parental regulation and appropriate strategies for limiting smartphone use are therefore considered essential for maintaining a balance between technological exposure and children's developmental needs (Coyne et al., 2021; Misirli & Ergulec, 2021; Steinfeld, 2021). Based on this argument, the study examines the extent to which smartphone use is associated with changes in the behavior and emotions of early childhood. Ultimately, the study seeks to provide empirical evidence supporting the importance of balanced, supervised, and developmentally appropriate smartphone use to ensure that children can benefit from digital technology without compromising their social and emotional development.

RESEARCH METHOD

This study will examine early childhood students enrolled at PAUD Siratul Islam Sumenep, with particular attention to the influence of smartphone use on children's behavior and emotions. The material object of the study will include the PAUD setting, learning and play activities involving

smartphone use, and children's interactions with digital media within the educational environment. The research will specifically focus on cases involving behavioral and emotional changes observed among children who are exposed to smartphones during learning, playing, and other daily activities at the institution. The study will consider several dimensions of children's development, including social interaction, emotional regulation, behavioral responses, and cognitive engagement. The selection of PAUD Siratul Islam Sumenep as the research setting is intended to provide a contextual understanding of how smartphone use occurs within an early childhood educational environment. The research will not examine smartphones solely as technological devices but will investigate how their use becomes part of children's everyday activities and interactions. Particular attention will be given to changes in children's patterns of interaction with peers and teachers, emotional responses, attention, independence, and behavioral tendencies. Through this focus, the study will investigate the relationship between children's exposure to smartphones and their behavioral and emotional development. Thus, PAUD Siratul Islam Sumenep will serve as the bounded research setting for understanding the phenomenon of smartphone use among early childhood students.

This study will employ a mixed-method research design that combines qualitative and quantitative approaches to obtain a more comprehensive understanding of the influence of smartphone use on early childhood behavior and emotions. The qualitative component will use a case study approach to explore the experiences, perceptions, and observations of parents and educators concerning children's smartphone use and its behavioral and emotional consequences. In-depth semi-structured interviews will be conducted to obtain detailed information about children's patterns of smartphone use, behavioral changes, emotional responses, social interactions, and parental or educational strategies for regulating smartphone exposure. The quantitative component will use questionnaires to obtain structured information concerning the frequency and patterns of smartphone use and observable behavioral and emotional characteristics among children. The integration of qualitative and quantitative data will enable the researcher to compare measurable patterns with contextual explanations derived from participants' experiences. The researcher will serve as the primary instrument for the qualitative component and will be responsible for collecting, organizing, interpreting, and integrating the research data. The combination of the two approaches is expected to strengthen the comprehensiveness of the findings by allowing the study to examine both observable patterns and the meanings underlying those patterns. Therefore, the mixed-method design will provide a broader basis for understanding the relationship between smartphone use and early childhood development.

The sources of information will consist of parents, educators, and early childhood students at PAUD Siratul Islam Sumenep, supported by relevant institutional documents and academic literature. Parents and educators will serve as key informants because they have direct experience observing children's smartphone use and can provide information about behavioral and emotional changes that may occur in everyday contexts. Children will function as research subjects whose behavior, emotional responses, social interactions, and engagement during smartphone-related activities will be observed directly. Data collection will involve four main techniques: observation, interviews, questionnaires, and desk review. Direct observation will be conducted to document children's behavior and emotional responses before, during, and after smartphone use, including their interactions with peers and educators. Semi-structured interviews will be conducted with parents and educators using an interview guide covering smartphone-use patterns, perceived behavioral changes, emotional responses, social interaction, and strategies for regulating smartphone use. Questionnaires will be distributed to parents or educators to obtain structured information concerning children's smartphone exposure and behavioral and emotional characteristics. The desk-review process will examine relevant academic literature and institutional documents concerning digital technology,

smartphone use, early childhood development, behavior, and emotional development. The use of multiple data sources and collection techniques will facilitate data triangulation and strengthen the credibility of the findings. Accordingly, the data collection process will provide both contextual and structured evidence concerning smartphone use among early childhood students.

The data analysis will integrate qualitative and quantitative findings to develop a comprehensive interpretation of the influence of smartphone use on children's behavior and emotions. Qualitative data obtained from observations and interviews will be analyzed through an interactive process consisting of data reduction, data display, and conclusion drawing and verification. During data reduction, the researcher will select, organize, categorize, and code information relevant to smartphone-use patterns, behavioral changes, emotional responses, social interactions, and parental or educator supervision. The reduced data will then be displayed through thematic categories, descriptive narratives, and matrices to identify recurring patterns and relationships. The final stage will involve drawing and verifying conclusions by comparing information from observations, interviews, questionnaires, and documentary sources. Content analysis will be used to identify recurring themes and behavioral or emotional patterns within interview and observation data, while interpretive analysis will be applied to understand the meaning and context of children's responses and developmental changes associated with smartphone use. Quantitative questionnaire data will be analyzed descriptively to identify patterns concerning smartphone exposure, behavioral characteristics, and emotional responses. The qualitative and quantitative findings will subsequently be compared and integrated through triangulation to identify areas of convergence or divergence. This analytical process will allow the study to move beyond isolated observations and develop a contextual interpretation of how smartphone use may influence early childhood behavior and emotions.

RESULTS AND DISCUSSION

Changes in Social Behavior among Young Children

Changes in social behavior among young children at PAUD Siratul Islam Sumenep refer to transformations in children's attitudes, interactions, and social skills during the learning process. These changes include the ability to share, cooperate with peers, follow rules, initiate interaction, and express emotions appropriately. The findings indicate that children's social behavior was influenced by the learning environment, interactions with teachers and peers, and the instructional activities implemented at the PAUD. The results of an interview with Anisah, a teacher at PAUD Siratul Islam, indicated that some children initially experienced difficulties interacting with peers and tended to play alone (WR/2024). However, after routinely participating in group activities, including role-playing and traditional Madurese games, these children began to demonstrate positive behavioral changes. They increasingly shared toys, initiated assistance to friends, and demonstrated a better understanding of rules such as taking turns. These findings indicate that structured social activities provide opportunities for children to practice cooperation and interaction. Thus, changes in social behavior were particularly visible when children were engaged in activities that required direct interaction with their peers.

The findings demonstrate that children who initially displayed shy, individualistic, or less interactive behavior experienced positive changes after participating in learning activities emphasizing direct social interaction. The interviews and observations consistently indicate that group-based activities created repeated opportunities for children to practice sharing, cooperating, communicating, and responding to the needs of others. Traditional Madurese games were particularly relevant because they combined physical activity, enjoyment, social interaction, and cultural familiarity within a single learning experience. From an interpretive perspective, these findings suggest that children's social development is strengthened when learning provides authentic

opportunities for interaction rather than relying primarily on individual or passive activities. The findings are also relevant to the issue of smartphone use because excessive smartphone engagement may reduce opportunities for such direct interaction, whereas structured group activities restore opportunities for children to communicate and cooperate. Therefore, the observed improvement in social behavior should be understood as evidence of the importance of maintaining direct social interaction within children's daily learning experiences.

Overall, the first finding indicates that social behavior among young children at PAUD Siratul Islam Sumenep can develop positively when children are consistently involved in interactive and collaborative learning activities. Children who initially demonstrated reluctance to interact, difficulty sharing, or limited cooperation gradually showed greater confidence, empathy, and willingness to participate in group activities. The findings from teachers, parents, and observations demonstrate a consistent pattern in which repeated social interaction contributes to the development of children's social skills. Traditional Madurese games and group-based activities appear particularly useful because they provide enjoyable and contextual opportunities for children to practice cooperation and communication. The findings also suggest that the development of social behavior requires a learning environment that prioritizes direct interaction with peers and teachers. In the context of smartphone use, this finding reinforces the importance of ensuring that children's engagement with digital devices does not replace opportunities for face-to-face interaction. Thus, social development can be supported by balancing technological exposure with activities that require children to communicate, cooperate, share, and respond directly to others.

Influence on Emotional Regulation

Emotional regulation among young children at PAUD Siratul Islam Sumenep refers to their ability to recognize, manage, and express emotions appropriately and in a controlled manner. The findings indicate that some children initially experienced difficulties controlling emotional responses, including excessive crying, anger, and impulsive reactions when their wishes were not fulfilled. An interview with Rahma, a teacher at PAUD Siratul Islam, showed that several children initially struggled to manage their emotions during everyday classroom situations (WR/2024). However, following participation in activities such as role-playing and listening to folk tales containing moral values, children began to demonstrate greater ability to calm themselves and communicate their feelings.

The three-month observation at PAUD Siratul Islam further demonstrated changes in children's emotional regulation. At the beginning of the observation period, approximately 50% of children frequently demonstrated impulsive behaviors such as crying loudly, throwing toys, or reacting excessively during conflicts. Following the implementation of reflective play activities and "emotion corner" sessions, this figure decreased to 20%. During these activities, children were encouraged to identify and name their feelings and to communicate their emotional experiences to teachers and peers. Most children subsequently demonstrated a greater ability to calm themselves, seek assistance from teachers when experiencing anger, and use verbal expressions to communicate disappointment or sadness. These observations suggest that emotional regulation develops through repeated opportunities to recognize and discuss emotions. The findings also indicate that teachers can facilitate this process by creating a supportive environment in which children feel safe to express their emotions. Rather than suppressing emotional responses, children were encouraged to understand and communicate them in more appropriate ways. Therefore, the observed changes indicate that emotional learning integrated into play-based activities can provide children with practical opportunities to develop emotional awareness and self-regulation.

The findings demonstrate that emotional regulation among young children improved following consistent implementation of activities that explicitly addressed emotional awareness and management. The interviews and observations indicate that children who initially responded to frustration through crying, anger, or impulsive behavior gradually learned to identify their feelings and express them verbally. Role-playing, storytelling, reflective games, and emotion-corner activities provided children with concrete experiences through which emotional concepts could be understood. From an interpretive perspective, emotional regulation should not be viewed as an ability that develops automatically with age but as a competence that can be strengthened through repeated social and educational experiences. This finding is relevant to smartphone use because digital devices may provide immediate entertainment or distraction when children experience boredom or frustration, potentially reducing opportunities to practice emotional regulation through direct interaction. In contrast, activities that require children to communicate their feelings and negotiate situations with teachers and peers provide opportunities for developing emotional competence. Therefore, the findings highlight the importance of maintaining learning environments in which children can experience, recognize, and manage emotions through direct social experiences.

In general, the second finding demonstrates that young children at PAUD Siratul Islam Sumenep showed positive development in emotional regulation when learning activities explicitly encouraged emotional recognition, expression, and management. Children who initially demonstrated tantrums, excessive crying, or impulsive responses gradually became more capable of calming themselves and communicating their feelings. Teacher guidance, storytelling, role-playing, reflective games, and emotion-corner activities provided structured opportunities for this development. The findings suggest that children require repeated experiences in which emotions are acknowledged and discussed rather than immediately distracted or suppressed. In relation to smartphone use, the findings reinforce the importance of ensuring that digital devices do not become the primary mechanism for managing children's boredom, frustration, or emotional distress. Instead, children need opportunities to develop emotional regulation through direct interaction, communication, and guided experiences. Therefore, appropriate management of smartphone exposure should be accompanied by learning activities that actively develop emotional awareness and self-regulation.

Attention and Concentration in Early Childhood

Attention deficit in the context of PAUD Siratul Islam Sumenep is operationally defined as difficulty maintaining attention on an activity for a period appropriate to children's developmental stage. Children demonstrating this pattern tend to become easily distracted, move from one activity to another before completing it, experience difficulty following instructions, or appear restless during learning activities. The findings indicate that environmental conditions, teaching methods, and individual characteristics may influence children's ability to maintain attention. An interview with Atik, a teacher at PAUD Siratul Islam, revealed that several children experienced difficulties concentrating during learning activities. One child, for example, frequently failed to complete drawing assignments and instead walked around the classroom or talked with peers. According to Atik, interactive and sensory-based learning activities were more effective in attracting the child's attention (WR/2024). Similar information was obtained from Wildan, a parent of one of the children, who stated, "The teacher's child is always busy reading books, but he can't focus, but he can't focus on the objects he reads, but he can't focus on the objects he reads, but he can't focus on the objects he reads, and he can't focus on the objects he plays, even if he catches the ball, he can't focus on the objects he plays." (WF/2024). The parent explained that the child often changed activities before completing reading or listening activities but demonstrated greater engagement when activities involved physical movement.

Observations conducted over three months indicated that approximately 30% of children at PAUD Siratul Islam demonstrated signs of difficulty maintaining concentration. These children were frequently distracted by sounds or movements in the surrounding environment, became bored when required to remain seated, and experienced difficulty completing tasks that required concentration for more than ten minutes. However, their engagement increased when learning activities involved physical movement, songs, or multisensory experiences such as playing with sand and finger painting. In these situations, children appeared more focused and were more capable of completing activities. These findings indicate that attention among young children is closely connected to the characteristics of the learning environment and the methods used by teachers. Activities that are monotonous or predominantly static may provide fewer opportunities for active engagement, whereas dynamic activities stimulate children through movement, sound, touch, and direct participation. The findings are also relevant to smartphone use because prolonged exposure to highly stimulating digital content may influence children's expectations concerning the speed and intensity of stimulation. Consequently, providing varied and multisensory learning experiences may help children maintain attention while reducing dependence on passive digital stimulation.

The findings indicate that concentration difficulties among children at PAUD Siratul Islam are associated with the need for more interactive, dynamic, and multisensory learning approaches. Children who experienced difficulties maintaining attention during static activities were more engaged when learning involved physical movement, sensory experiences, songs, and interactive games. From an interpretive perspective, these findings suggest that teachers need to consider the developmental characteristics of young children when designing learning activities. Early childhood learners may not be expected to maintain prolonged attention through passive activities alone. Instead, attention can be supported by providing meaningful changes in activity, opportunities for movement, and sensory engagement. This finding also provides an important perspective on smartphone use. Smartphones can provide highly stimulating audiovisual experiences, but they do not necessarily provide the same social, physical, and sensory experiences as real-world play. Therefore, the issue is not simply whether children can concentrate while using a smartphone but whether they can transfer their attention to developmentally appropriate activities beyond the screen. Accordingly, learning environments should provide sufficient opportunities for physical, social, and sensory experiences to balance children's digital exposure.

The third finding demonstrates that children's attention and concentration at PAUD Siratul Islam can be supported through dynamic and multisensory learning activities. Approximately 30% of the observed children initially demonstrated concentration difficulties, particularly during static or monotonous activities. However, their engagement improved when learning involved movement, songs, physical games, and sensory experiences. The findings suggest that teachers need to adopt flexible instructional strategies that accommodate children's developmental characteristics and individual needs. In the context of smartphone use, the findings also indicate the importance of maintaining a balance between digital activities and direct physical and sensory experiences. Children need opportunities to practice sustained attention through activities that involve real-world interaction rather than relying exclusively on digital stimulation. Therefore, appropriate smartphone management should be accompanied by learning activities that promote movement, sensory engagement, social interaction, and task completion.

Recommendations for Wise Smartphone Use

Wise smartphone use at PAUD Siratul Islam Sumenep refers to practices that enable children aged 3–6 years to use smartphones in a controlled and developmentally appropriate manner. The findings indicate that appropriate use involves limiting duration, selecting educational content, and

ensuring active supervision by parents or teachers. These practices are intended to allow children to obtain potential educational benefits from technology while minimizing possible negative consequences such as excessive dependence, reduced social interaction, and decreased engagement in physical activities. An interview with Rahmah, a teacher at PAUD Siratul Islam, indicated that some children appeared less focused during classroom activities because of excessive smartphone use at home. She recommended limiting smartphone use to approximately 30 minutes per day and prioritizing educational content, such as applications for learning letters and picture-based stories (WR/2024). According to her, appropriate regulation can help establish a balance between digital activities and physical and social activities. This finding indicates that smartphone management should not be based solely on prohibition but should involve clear rules concerning duration, content, and supervision.

The role of parents was also evident in the interview with Icha, one of the parents of the students, who stated, "You are not allowed to use the rules for your child, but the teacher will admit that the cellphone is not used for daily tasks, but it is still used if there is a lot of time for it" (WF/2024). The parent explained that she began implementing a "device-free time" rule after receiving advice from the teacher. Under this rule, the child was allowed to use a smartphone only after completing daily responsibilities and was encouraged to spend more time playing outdoors or participating in family activities. According to the parent, this practice was followed by increased physical activity and easier interaction with peers. Observations conducted at PAUD Siratul Islam over two months indicated that children who used smartphones without adequate supervision tended to demonstrate lower concentration and became bored more easily during learning activities. Approximately 40% of children showed signs of reduced participation in group play. However, after teachers and parents implemented rules concerning smartphone use, including duration limits and selection of educational content, children's participation and interaction increased to 80%. Children appeared more enthusiastic about classroom activities and demonstrated stronger social engagement. These findings indicate that consistent cooperation between home and school can influence children's patterns of technology use.

Teacher-parent collaboration Consistent technology rules More balanced technology use

The findings demonstrate that wise smartphone use is associated with more balanced participation in learning, social, and physical activities. Children who were previously exposed to smartphones without sufficient supervision tended to demonstrate lower concentration and participation in group activities. After parents and teachers implemented rules concerning duration, content, and supervision, children showed greater participation and interaction. From an interpretive perspective, these findings suggest that smartphone use should be managed through a collaborative approach rather than through isolated parental or institutional rules. Parents control much of children's smartphone exposure at home, while teachers observe children's behavior and participation in educational settings. Cooperation between the two environments can therefore create greater consistency in children's daily routines. The findings also indicate that "wise use" does not necessarily mean eliminating smartphones from children's lives. Instead, it means positioning smartphones within a balanced routine in which digital activities do not replace physical movement, social interaction, family engagement, or developmentally appropriate play. Therefore, smartphone management should focus on maintaining developmental balance rather than simply reducing access to technology.

The overall findings indicate that wise smartphone use requires collaboration between teachers and parents. Limiting the duration of use, selecting educational content, and providing active supervision can help children obtain potential benefits from technology while reducing the risk of

excessive dependence and reduced social interaction. The findings further demonstrate that technology management is most effective when accompanied by opportunities for physical activity, group play, and direct social interaction. In the context of PAUD Siratul Islam Sumenep, the implementation of device-free periods and supervised smartphone use was associated with increased participation in classroom activities and peer interaction. These findings emphasize that smartphones should function as supplementary tools rather than replacements for children's direct experiences. Accordingly, the management of smartphone use needs to be integrated into broader educational strategies that promote social development, emotional regulation, concentration, and physical activity.

Discussion

The findings of this study demonstrate that children's development at PAUD Siratul Islam Sumenep is closely related to the balance between digital technology use and direct social, emotional, physical, and sensory experiences. The findings concerning social behavior indicate that children demonstrated more positive interaction after participating in group-based learning and traditional Madurese games. Similarly, emotional regulation improved when children participated in storytelling, role-playing, reflective play, and emotion-corner activities. These findings indicate that young children require direct and meaningful interaction to develop social and emotional competencies. In relation to smartphone use, the findings suggest that excessive or poorly supervised digital engagement may reduce opportunities for such experiences, particularly when smartphones are used as substitutes for play, communication, or emotional interaction. This does not mean that smartphones are inherently harmful, but rather that their developmental consequences depend on how they are integrated into children's everyday routines. The findings therefore support an approach in which digital technology is balanced with direct interaction and developmentally appropriate activities.

The findings concerning attention and concentration further demonstrate the importance of providing children with dynamic learning experiences. Approximately 30% of children demonstrated concentration difficulties during the observation period, particularly when activities were static or monotonous. However, children became more engaged during physical games, songs, and multisensory activities. These findings suggest that early childhood learning needs to accommodate children's developmental characteristics by providing opportunities for movement, exploration, and sensory engagement. The issue becomes particularly relevant in relation to smartphone use because digital content can provide continuous audiovisual stimulation that differs from the pace and demands of real-world learning. If smartphones become the dominant form of entertainment, children may have fewer opportunities to practice attention in activities that require patience, physical involvement, and social interaction. Therefore, parents and educators need to create routines that expose children to varied forms of learning and play. The findings reinforce the importance of ensuring that smartphone use complements rather than replaces physical, social, and sensory experiences.

The findings concerning smartphone regulation provide further evidence that collaboration between parents and teachers is important. Rahmah's recommendation to limit smartphone use to 30 minutes per day and prioritize educational content demonstrates the importance of clear and practical rules for technology use (Arnold et al., 2021; Cunha et al., 2021; Liu et al., 2021). Similarly, the implementation of "device-free time" by Icha demonstrates how parental rules can encourage children to engage in non-digital activities (Dennis, 2021). These findings suggest that technology regulation is more effective when children receive consistent expectations across home and school environments. Parents can regulate the timing and content of smartphone use, while teachers can monitor children's participation and behavioral responses within educational settings. Therefore,

technology management should be understood as a shared responsibility rather than an individual parental task.

The observation findings also indicate that unsupervised smartphone use was associated with lower participation in group activities and greater difficulty maintaining attention. Approximately 40% of children demonstrated reduced participation in group activities before the implementation of smartphone-use rules. Following the implementation of appropriate regulations, participation increased to 80%. These findings are consistent with the importance of supervision and balanced digital engagement identified in previous discussions concerning children's technology use (Chia et al., 2022; Pontin et al., 2021). The improvement in participation suggests that children's engagement with peers can increase when opportunities for direct interaction are prioritized. However, these findings should not be interpreted as demonstrating that smartphone use alone caused the observed behavioral changes because children's development is influenced by multiple factors, including learning methods, family practices, peer relationships, and individual characteristics. Instead, the findings indicate that smartphone management forms an important part of a broader developmental environment.

The discussion demonstrates that the central issue is not the complete elimination of smartphone use but the development of an appropriate balance between technology and children's developmental needs. Group play, traditional games, storytelling, emotional activities, physical movement, and multisensory learning provide experiences that cannot be fully replaced by smartphone-based activities. At the same time, appropriately selected digital content can potentially support learning when used for limited periods and under adult supervision. The findings therefore support a balanced approach in which technology is integrated as a supplementary resource while direct social interaction, emotional learning, physical activity, and sensory experiences remain central components of early childhood education. Parents and teachers play complementary roles in establishing this balance. Through consistent rules, supervision, and developmentally appropriate activities, children can be encouraged to benefit from technology without allowing smartphone use to replace essential developmental experiences.

CONCLUSION

The most important finding of this study is that early childhood development at PAUD Siratul Islam Sumenep is strengthened when children receive sufficient opportunities for social interaction, emotional learning, physical activity, and sensory experiences while smartphone use is appropriately managed. The findings demonstrate improvements in children's social behavior through group-based learning and traditional Madurese games, including greater willingness to share, cooperate, interact, and demonstrate empathy. Emotional regulation also improved through storytelling, role-playing, reflective games, and emotion-corner activities. In addition, children who experienced concentration difficulties demonstrated greater engagement when learning involved movement, songs, and multisensory activities. These findings collectively indicate that direct and interactive learning experiences remain essential for early childhood development. At the same time, the findings concerning smartphone management demonstrate the importance of limiting duration, selecting appropriate content, and providing parental and teacher supervision. Therefore, the main lesson from this study is that smartphones should be positioned as supplementary tools rather than substitutes for social interaction, physical activity, emotional learning, and direct engagement with the environment.

The strength of this study lies in its contribution to understanding the relationship between smartphone management, social interaction, emotional regulation, concentration, and early childhood learning within the specific local context of PAUD Siratul Islam Sumenep. The study also provides a practical perspective by emphasizing collaboration between parents and teachers in regulating

children's technology use and by highlighting interactive and culturally relevant learning activities. However, this study is limited to a specific research setting and sample at PAUD Siratul Islam Sumenep, involving particular age groups and not fully accommodating gender and regional variations. Therefore, the findings should be interpreted within the context of the institution and participants involved in the study. Further research using a broader survey approach and involving greater variation in age, gender, educational settings, and geographical areas is needed to obtain a more comprehensive understanding of smartphone use and early childhood development. Such research may provide a stronger basis for developing effective and context-sensitive educational policies concerning children's use of digital technology.

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