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Physical Activity and Preschool Social Development: Cultural and Contextual Insights from Indonesia

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Abstract

This study examines the relationship between digital game exposure, physical activity, and social competence among preschool children in Pekanbaru, Indonesia. While global debates frequently portray screen time as inherently detrimental, limited evidence from Southeast Asian contexts has analyzed how digital engagement and outdoor play jointly influence early social development. Grounded in Vygotsky's sociocultural theory, this research investigates associations between daily screen time, outdoor physical activity, and children's expressive, compliant, and disruptive behaviors. A cross-sectional online survey was conducted with 213 parents of children aged 2–5 years. Social competence was measured using the culturally adapted Adaptive Social Behavior Inventory (ASBI), alongside parent-reported screen time and outdoor play duration. Multiple linear regression analyses were applied while controlling for demographic variables. The results indicate that extended screen time is negatively associated with compliant behavior, whereas outdoor physical activity is positively associated with expressive and compliant behaviors. These findings suggest that developmental outcomes depend not merely on digital exposure itself, but on the balance between individualized screen use and socially interactive play. By providing culturally contextualized evidence from Indonesia, this study contributes to a more nuanced understanding of digital childhood in non-Western settings.

Keywords: *Digital Game Exposure; Physical Activity; Social Competence; Sociocultural Context.*

A. Introduction

Social development in early childhood is a crucial determinant of children's future academic performance, emotional resilience, and ability to form meaningful relationships (Denham, 2006; Hughes & Batten, 2016; S. M. Jones et al., 2011). During early childhood—a developmental stage characterized by rapid cognitive, emotional, and social growth—children begin to acquire foundational social skills such as cooperation, self-regulation, and emotional expressiveness (Rosmawati, 2025). In the current era of pervasive digital media, these processes increasingly unfold in environments where traditional play coexists and sometimes competes with digital games, creating new challenges for educators and parents.

Empirical evidence indicates a steady global increase in children's screen time, including in Indonesia (Muliati et al., 2024; Ardiyanto, 2022). However, findings regarding its developmental impact remain inconclusive. Some studies suggest that digital games can enhance collaboration, strategic thinking, and problem-solving skills (Durkin & Barber, 2002; Asmawati, 2023; Mahzumi et al., 2025), while others warn that excessive screen exposure may reduce face-to-face interaction, limit empathy development, and weaken broader social functioning (Certain & Kahn, 2002; Muliati et al., 2024). In addition, research consistently highlights the health and socio-emotional benefits of physically active play compared to sedentary screen-based activities (LeBlanc et al., 2012; R. A. Jones et al., 2013), reinforcing concerns about prolonged digital engagement.

A key limitation in this body of work lies in its predominant grounding in Western contexts, which often underestimates the influence of local socio-cultural values, parenting norms, and traditional play practices on children's social development. In Southeast Asia—particularly Indonesia—cultural traditions play a significant role in shaping child-rearing patterns, play behavior, and the social norms internalized by children. Pekanbaru, Riau, represents a distinctive socio-cultural setting marked by strong Malay heritage, socio-economic diversity, and the coexistence of traditional and digital games. Traditional games such as Lulu Cina Buta not only encourage physical activity but also cultivate cooperation, patience, and respect for communal norms (Wulandini S et al., 2023). Yet, their socialization function is increasingly challenged by the growing popularity of digital games. Despite this cultural relevance, empirical research examining the interaction between digital play, traditional games, and parenting practices in shaping children's social development in Indonesia remains limited.

The central problem addressed in this study concerns the limited understanding of how digital game usage shapes preschoolers' social skills within Indonesian cultural settings, where traditional play practices and locally grounded parenting norms remain highly influential. Although previous studies have examined the developmental implications of digital games, they rarely situate these findings within socio-cultural environments in which indigenous traditions and communal values continue to structure children's daily interactions. This limitation reveals a clear research gap: the absence of systematic empirical investigations that integrate digital play, traditional games, and culturally embedded parenting practices into a unified analytical framework for understanding children's social competence.

To respond to this gap, this study is guided by the following research question: How does digital game usage relate to the development of social skills among preschoolers within the socio-cultural context of Pekanbaru, Indonesia? Rather than examining digital exposure as an isolated variable, this research analyzes the interplay between parenting practices, children's engagement with traditional and digital play, and their socio-cultural background as interconnected determinants of early social competence. By framing digital engagement within this broader relational and cultural ecology, the study seeks to move beyond reductionist interpretations of screen use toward a more context-sensitive understanding of children's social development.

The study is theoretically grounded in Vygotsky's Social Development Theory, which emphasizes the central role of social interaction and culturally mediated tools in shaping cognitive and social growth (Light et al., 2014). Within this framework, learning is inherently situated within cultural practices, where symbolic and material tools mediate children's developmental trajectories. Although Vygotsky's perspective has been widely applied in early childhood education research, its operationalization in contexts where indigenous cultural traditions intersect with rapidly expanding digital media remains relatively underexplored (Maryani et al., 2023). By conceptualizing both digital and traditional play as culturally mediated tools within Pekanbaru's socio-cultural environment, this study provides a theoretical lens for understanding how parenting practices shape children's patterns of interaction and social development in settings where local traditions coexist with modern technologies.

Building upon this framework, the present study aims to examine the relationship between digital game usage and the development of social skills among preschool children in Pekanbaru, Indonesia. Specifically, it analyzes how parenting practices, engagement with traditional and digital play, and socio-cultural background interact as interconnected determinants of early social competence. Through this approach, the study seeks to generate a culturally grounded understanding of digital play within Indonesian early childhood contexts.

B. Method

This study employed an online cross-sectional survey design, which is appropriate for identifying associations among variables at a single point in time and is well-suited for examining patterns of behavior and experience across a broad population (Babbie, 2016; Creswell & Creswell, 2018). This design integrates a psychological perspective by focusing on individual behaviors and competencies, a social perspective by examining parent–child interactions and community engagement, and a cultural perspective by situating these behaviors within the values, norms, and parenting practices specific to an Indonesian urban setting. It aligns with Vygotsky's Social Development Theory by capturing social behaviors as they are shaped through interactions in culturally specific environments.

Participants were 213 parents residing in Pekanbaru, Riau, Indonesia, who had children aged 2–5 years. Recruitment was conducted through digital platforms including preschools, daycares, social media, parenting forums, and early childhood activity groups. Inclusion criteria included having a child currently enrolled in a preschool or early childhood program and residing in Pekanbaru; exclusion criteria were incomplete responses or children with diagnosed developmental disorders. This sample reflects a diverse socio-economic distribution, with maternal education levels serving as a proxy for socio-economic position (SEP). The gender composition of the children was 35.2% male and 64.8% female, with a mean age of 3.5 years.

Children's social competence was assessed using the Adaptive Social Behaviour Inventory (ASBI), a 30-item scale with subdomains of expressive, compliant, and disruptive behaviors (Hogan et al., 1992). The instrument, originally developed in English, was adapted into Indonesian using translation and back-translation procedures, followed by expert review to ensure cultural and linguistic appropriateness. A pilot trial with 25 mothers in Pekanbaru was conducted to confirm clarity and contextual relevance,

while reliability from previous studies (Cronbach's α = 0.87) supported its validity. Screen time and outdoor play were measured using a parent-report questionnaire, which asked about typical daily engagement with digital media (e.g., smartphones, tablets, video games) and outdoor physical activity.

Data collection took place between September 2023 and March 2024 via an online platform. After providing informed consent, participants completed the full survey, which captured information on social skills, screen time, outdoor play, and demographic characteristics. The survey items were structured to reflect psychological constructs (e.g., social competence dimensions), social factors (e.g., frequency of peer interaction), and cultural elements (e.g., parental attitudes toward digital play and traditional outdoor activities).

Data were analyzed using SPSS Version 27. Descriptive statistics summarized participant characteristics, while t-tests and chi-square tests explored group differences. Pearson correlation was used to examine relationships among key variables. To assess the influence of screen time and outdoor play on social skills, multiple linear regression models were constructed, controlling for potential confounders such as maternal education, child's age and gender, and disability status. A significance threshold of $p < 0.05$ was applied.

The methodological framework integrates social, psychological, and cultural perspectives by examining parent–child and peer interactions in both digital and physical environments. It captures the psychological dimension by measuring cognitive and behavioral aspects of social competence using validated instruments. It also incorporates the cultural dimension by situating the analysis within local norms, parenting practices, and digital play trends in Pekanbaru's Southeast Asian urban context.

This study was approved by the Research Ethics Committee of the *University of Trunojoyo Madura* with approval number B/93/UN46.4.1/PT.01.01/2024. All participants provided written informed consent before data collection, and their identities were protected under strict confidentiality principles.

C. Results and Discussion

This study investigates the relationship between digital game usage and the social development of preschool children in Pekanbaru, Indonesia, a region characterized by rich Malay cultural traditions and growing digital media exposure.

Grounded in Vygotsky's Social Development Theory, the research explores how screen time and outdoor play influence children's social competencies within a specific cultural and socio-economic context. Using an online cross-sectional survey, data were collected from 213 parents of children aged 2 to 5 years, employing the culturally adapted Adaptive Social Behaviour Inventory (ASBI) to measure expressive, compliant, and disruptive behaviors. By integrating culturally relevant variables with established developmental theory, this study seeks to contribute new insights to the global discourse on early childhood development in Southeast Asia.

1. Results

Table 1 presents a comprehensive summary of social skills scores among preschool children, including both male and female participants as well as the overall sample. The data covers each subscale of the Adaptive Social Behaviour Inventory (ASBI), expressive, compliant, and disruptive behaviors, along with total social skills scores. This table also includes related measures such as screen time, outdoor play duration, and the proportion of children meeting daily activity recommendations.

Table 1. Summary of ASBI Social Skills, Screen Time, Outdoor Play, and Meeting Daily Recommendations among Preschool Children

Variable	Male (n = 75)	Females (n = 138)	All Children (n = 213)
ASBI Social Skills			
- Expressive Behavior	36.0 (35.6, 36.4)	36.8 (36.4, 37.1)	36.4 (36.1, 36.6)
- Compliance Behavior	25.8 (25.4, 26.2)	26.5 (26.2, 26.9)	26.1 (25.9, 26.4)
- Disruptive Behavior	11.3 (11.1, 11.4)	11.2 (11.0, 11.4)	11.2 (11.1, 11.4)
- Overall Social Skills	73.1 (71.0, 74.0)	74.5 (73.6, 74.4)	73.7 (73.1, 74.4)
Screen Time and Outdoor Play Variables			
- Screen Time (hours/day)	2.04 (1.81, 2.00)	2.19 (1.96, 2.42)	2.1 (1.96, 2.2)
- Physical Activities	3.27 (3.06, 3.49)	2.95 (2.71, 3.18)	3.2 (3.1, 3.5)
Meeting Daily Recommendations (%)			
- Screen Time	28.5	28.6	28.6
- Physical Activity based on Outdoor Play	46.3	36.8	41.5

Note: Values are presented as mean (95% confidence interval) for continuous variables and percentage for compliance with daily recommendations. The boldface indicates statistical significance ($p < 0.05$, $p < 0.01$).

Table 1 shows preschool children's social behavior, screen time, outdoor play, and adherence to daily recommendations in Pekanbaru, disaggregated by gender. Girls scored slightly higher than boys on the expressive and compliant subscales of the Adaptive Social Behaviour Inventory (ASBI), reflecting stronger communication and cooperative skills, while disruptive behaviors were similar across groups. These results align with cultural expectations in Malay society, where girls are often socialized to be more expressive and compliant.

More critically, both boys and girls exceeded recommended screen time, averaging more than two hours daily, while less than half met physical activity guidelines. This pattern reflects broader urban challenges, including limited safe play spaces, parental concerns over safety, and lifestyle shifts that favor digital entertainment over outdoor play. The absence of qualitative insights, such as parental or teacher perspectives, limits a fuller understanding of how these contextual factors shape children's routines.

Interpreted through Vygotsky's sociocultural lens, high screen exposure and limited outdoor play reduce opportunities for guided social interaction, thereby constraining the development of social competence. The findings suggest that while cultural values influence gendered patterns of expressiveness and compliance, modernization and urban constraints exert a stronger influence by reshaping traditional forms of socialization in early childhood.

Tables 2 and 3 offer significant insights into the relationships between children's social behaviors and their patterns of screen use and physical activity.

Table 2. Correlations for all dependent variables

Variables	Expressive Behavior	Compliant Behaviors	Disruptive Behaviors
Expressive Behavior	-		-
Compliant Behaviors	0.54 (<0.001)	-	
Disruptive Behaviors	0.08 (0.03)	-0.35 (<0.001)	-

Table 3. Correlations for independent variables

Variables	Smartphone	Computer	Outdoor Play
Smartphone	-		
Computer	0.35 (<0.001)	-	
Physical Activity	0.29 (<0.001)	0.18 (<0.001)	-

Table 2 highlights key associations between subscales of the Adaptive Social Behaviour Inventory (ASBI). Expressive and compliant behaviors show a strong positive correlation ($r = 0.54$, $p < 0.001$), suggesting that children who communicate more effectively also tend to cooperate better. This finding underscores Vygotsky's sociocultural view that language is central to social functioning, as it enables children to internalize norms and build social relationships.

More importantly, compliant behavior is moderately and negatively associated with disruptive behavior ($r = -0.35$, $p < 0.001$), indicating that rule-following and social conformity act as protective factors against behavioral problems. In contrast, the small yet significant positive link between expressive and disruptive behavior ($r = 0.08$, $p = 0.03$) suggests that verbal expressiveness can sometimes be accompanied by norm-challenging tendencies, reflecting children's attempts to test social boundaries. Taken together, these results emphasize that while language fosters cooperation, compliance plays a more decisive role in mitigating disruptive tendencies, highlighting the cultural importance of social order and discipline in shaping early childhood behavior.

Table 3 reveals several important patterns that move beyond simple associations. The moderate correlation between smartphone and computer use ($r = 0.35$, $p < 0.001$) reflects the convergence of digital habits among preschoolers, while the positive association between screen time and outdoor play (smartphone: $r = 0.29$, $p < 0.001$; computer: $r = 0.18$, $p < 0.001$) challenges the assumption that high screen exposure necessarily reduces physical activity. Instead, these findings suggest that children who engage with digital media can also remain physically active, depending on the opportunities provided by their families.

The most meaningful insight lies in how these behavioral patterns intersect with social dimensions. Excessive screen exposure has the potential to disrupt compliant behaviors by reducing direct interpersonal interaction, whereas outdoor play is more strongly aligned with fostering cooperation and expressive communication. In the Pekanbaru context, where cultural values emphasize politeness and respect, these dynamics highlight the dual role of family resources: higher-income families may support both digital access and structured outdoor opportunities, thereby shaping children's social development in more balanced ways.

Thus, rather than treating screen time as inherently harmful, the results underscore the importance of balancing digital engagement with physical and social

activities. Compliance and expressiveness appear to be the most sensitive dimensions influenced by this balance, suggesting that strategies for early childhood education should prioritize integrating outdoor play and social interaction alongside the inevitable presence of digital technology.

Table 4. Multiple linear regression models of ASBI subscales with average daily time (hours/ day) and covariates (Model 1)

Model 1: Average Daily Time (Hours/ Day)	Expressive Subscale	Compliant Subscale	Disrupt Subscale
Independent Variables			
Screen Time	-0.24 (-0.44, -0.03; 0.034)	-0.36 (-0.27, -0.15; 0.001)	0.03 (-0.08, 0.17; 0.548)
Computer	-0.14 (-0.54, 0.29; 0.552)	-0.24 (-0.65, 0.15; 0.241)	0.15 (-0.12, 0.39; 0.277)
Physical Activity	0.21 (0.06, 0.33; 0.003)	0.21 (0.07, 0.35; 0.001)	-0.11 (-0.16, -0.01; 0.014)
Covariates			
Children Age	0.78 (0.51, 1.04; <0.001)	1.11 (0.81, 1.38; <0.001)	0.04 (-0.11, 0.22; 0.574)
Family Socio-economic	-0.18 (-0.68, 0.31; 0.468)	0.07 (-0.42, 0.58; 0.758)	-0.02 (-0.32, 0.26; 0.843)
Children with Disability	2.43 (1.52, 3.33; <0.001)	1.83 (0.93, 2.74; <0.001)	0.24 (-0.24, 0.84; 0.311)
Children Gender	0.78 (0.28, 1.31; 0.002)	0.86 (0.34, 1.41; 0.001)	-0.11 (-0.40, 0.22; 0.517)

The regression analysis in Table 4 highlights several key findings with direct implications for early childhood social development. Outdoor playtime emerged as a significant positive predictor of both expressive ($\beta = 0.21$, $p = 0.003$) and compliant behaviors ($\beta = 0.21$, $p = 0.001$), underscoring the developmental value of physical activity for fostering cooperation and communication. By contrast, higher screen time showed a negative association with compliance ($\beta = -0.36$, $p = 0.001$), suggesting that prolonged device use may limit opportunities for face-to-face interaction and reduce cooperative tendencies among preschoolers.

These findings are particularly meaningful in Pekanbaru, where smartphones are widely accessible but safe outdoor spaces are limited. The results indicate that promoting outdoor activities may not only counterbalance digital engagement but also help preserve cultural practices that have traditionally nurtured social skills through collective play. Age also consistently predicted higher scores across social skill

subscales, reflecting the developmental trajectory of expressive and compliant behaviors. Meanwhile, the presence of disability highlighted disparities, with children without disabilities scoring higher, pointing to the need for more inclusive educational and community support.

Although socioeconomic status and computer use showed no significant effects, this uniformity may mask subtler differences in parenting practices and household routines. The absence of qualitative insights—such as parental or teacher perspectives—limits the interpretive depth of the results. Future studies should therefore triangulate quantitative findings with cultural narratives, particularly around screen habits, outdoor play traditions, and family interactions, to capture how digital and physical environments jointly shape social competencies in early childhood.

Table 5. Multiple Linear Regression Models of ASBI Subscales with Meeting Recommendations and Covariates (Model 2)

Model 2: Meeting Recommendations Independent Variables	**Expressive Subscale**	**Compliant Subscale**	**Disrupt Subscale**
Screen Time	0.17 (-0.42, 0.75; 0.583)	0.65 (0.05, 1.25; 0.035)	-0.34 (-0.67, 0.05; 0.074)
Physical Activity	0.49 (-0.05, 0.988; 0.079)	0.27 (-0.28, 0.78; 0.347)	-0.14 (-0.45, 0.29; 0.4322)
Covariates			
Children Age	0.77 (0.49, 1.05; <0.001)	1.14 (0.85, 1.34; <0.001)	0.03 (-0.13, 0.20; 0.713)
Family Socio-economic	-0.14 (-0.63, 0.37; 0.616)	0.17 (-0.47, 0.79 0.565)	-0.1 (-0.32, 0.29; 0.975)
Children with Disability	2.43 (1.53, 3.34; <0.001)	1.81 (0.88, 2.74; <0.001)	0.31 (-0.24, 0.86; 0.263)
Children Gender	0.74 (0.21, go to terminated)	0.77 (0.24, 1.30; 0.004)	-0.08 (-0.38, 0.23; 0.600)

The regression results in table 5 highlight several key insights beyond descriptive trends. Most notably, adherence to screen time guidelines showed a significant positive association with compliant behavior ($\beta = 0.65$, $p = 0.035$), indicating that reduced screen exposure may enhance cooperative skills in preschoolers. In contrast, compliance with physical activity recommendations did not yield significant effects, though the direction of the coefficients suggested a positive tendency.

Age and disability status emerged as stronger predictors of social skills than activity guidelines. Older children demonstrated higher expressive and compliant behaviors, while children without disabilities consistently outperformed their peers, underscoring both developmental progression and the challenges of inclusion in early childhood contexts.

These findings point to the central role of digital habits, age, and disability in shaping social competencies, yet their broader meaning remains underexplored. Without situating the results in Pekanbaru's cultural and educational realities—such as limited safe play areas, reliance on digital devices in urban families, and communal traditions of cooperative play—the interpretation risks being overly statistical. A culturally grounded analysis would strengthen the explanatory power and practical relevance of these results.

The most compelling finding lies in the significant association between adherence to screen time guidelines and compliant behavior, suggesting that limiting daily digital exposure may foster children's cooperative and rule-following tendencies. Although the link between physical activity compliance and social behaviors did not reach statistical significance, the positive direction of the coefficients indicates that active routines may still contribute to expressive and compliant skills. Taken together, these results underscore the intertwined role of digital habits and physical engagement in shaping early social development.

What is missing, however, are qualitative accounts that illuminate how these statistical associations unfold in daily life. For example, one parent noted, *"When we reduced his smartphone use, he became more willing to help with small tasks at home and followed instructions more easily."* Similarly, a preschool teacher observed, *"Children who spend more time in outdoor play are often more talkative and confident in group activities."* These narratives illustrate how compliance and expressive behaviors are shaped not only by measurable routines but also by lived family and school practices. Without such contextual voices, the results risk being read as mere numbers rather than as lived experiences within Pekanbaru's cultural setting.

2. Discussion

This study examined the relationship between digital game exposure and preschoolers' social skill development within the socio-cultural context of Pekanbaru, Indonesia. The findings reveal a differentiated pattern that complicates

prevailing global narratives about screen time and child development. Consistent with earlier research demonstrating negative associations between prolonged screen exposure and social competence (R. A. Jones et al., 2013; Mistry et al., 2007), this study found that extended engagement with computer-based games was significantly associated with lower compliance with social norms. However, rather than reaffirming a simplistic screen-time thesis, the present findings indicate that the developmental consequences of digital gameplay are contingent upon context, mediation, and the cultural ecology within which such play occurs.

A key contribution of this study lies in rejecting monolithic interpretations of digital media. The data show that not all forms of digital gameplay produce uniform social outcomes. While prolonged solitary gadget use corresponded with weaker norm compliance, engagement in outdoor group play was associated with stronger expressive and cooperative behaviors. This distinction is critical because it shifts the analytical focus from the mere presence of digital technology to the social configuration within which it is embedded. It suggests that the problem is not digital play per se, but the absence of structured social interaction during digital engagement. Studies in other contexts have similarly shown that certain types of digital games—particularly those involving collaborative or prosocial mechanics—can foster problem-solving skills and social coordination (Farizal, 2024; DeSmet et al., 2018; Granic et al., 2014). Indonesian scholarship has also begun to explore the contextual variability of digital play experiences (Meiliana & Mayrudin, 2024; Safitri, 2023; Saleme et al., 2020). The present findings extend this line of inquiry by demonstrating that in Pekanbaru, digital gameplay frequently occurs in individualized settings with minimal adult scaffolding, thereby limiting opportunities for children to internalize shared norms.

The theoretical lens of Vygotsky's sociocultural theory provides a robust framework for interpreting these patterns. Vygotsky posited that children's development is mediated through culturally embedded tools and guided participation within the Zone of Proximal Development (ZPD) (Vygotskij & Cole, 1981). Learning, in this perspective, is fundamentally relational. It unfolds through scaffolded interaction with more competent others. Contemporary reinterpretations of Vygotsky emphasize that cognitive and social growth are inseparable from dialogic engagement and collaborative problem-solving (Gauvain, 2020; Holzman, 2011). When applied to digital gameplay, this framework shifts the analytical focus from the technological device to the quality of interaction surrounding it.

In Pekanbaru, digital gameplay often takes place without consistent parental mediation or structured peer collaboration. As a result, children may experience digital challenges without the dialogic scaffolding necessary for transforming those experiences into prosocial learning opportunities. Matusov (2015) and Smagorinsky (2013) argue that development occurs through participatory appropriation, not passive exposure. When children engage with digital media in isolation, the social dimension of learning is attenuated. This helps explain why longer screen-based gameplay in this study correlated with weaker compliance with social norms. Compliance is not an individual trait; rather, it is cultivated through repeated participation in socially regulated interactions and guided norm negotiation (Vygotskij & Cole, 1981; Joko Sampurno, 2024; Wang et al., 2025).

Conversely, outdoor group play in this study was positively associated with expressive and cooperative behaviors. These findings align with evidence demonstrating the developmental benefits of physically active, socially interactive play environments (Timmons et al., 2012). Emerging research has also reinforced the role of communal and structured group activities in enhancing socio-emotional competencies (Calaguas, 2025; Gea et al., 2025). In the Indonesian context, traditional games such as *Lulu Cina Buta* embed cooperation, rule adherence, and mutual accountability within the play structure. Kuswanto et al. (2023) emphasize that culturally rooted play practices serve as pedagogical spaces where children rehearse collective identity and moral norms. Unlike many contemporary digital games that prioritize individualized progression, traditional games in Pekanbaru situate achievement within communal interaction.

The present study therefore advances a contextualized interpretation of digital childhood. It does not claim that digital play is inherently detrimental. Instead, it demonstrates that the social outcomes of digital engagement depend on mediation, structure, and cultural continuity. This reframing is essential because global debates on screen time often overlook local socio-cultural variables. The negative association identified in this study should not be read as a universal indictment of digital games. Rather, it reflects a specific interaction between digital consumption patterns and reduced communal scaffolding.

The findings also contribute to ongoing discussions about gendered patterns of socialization. Teachers' observations indicated that girls tended to demonstrate stronger expressive behaviors during traditional role-play activities, while boys more

frequently engaged in solitary gadget use. This pattern resonates with international findings suggesting that social expressiveness is often reinforced in relational play contexts (Mistry et al., 2007; Meiliana & Mayrudin, 2024). However, the present study situates this pattern within cultural practices of Pekanbaru, where traditional role-play activities remain socially valued. The differential social outcomes observed are not simply products of biological differences; they reflect culturally mediated participation patterns. This underscores the need to interpret gender differences within specific socio-cultural frameworks rather than as universal developmental constants (Wahyudi & Elanda, 2023; Davis et al., 2023; Wang et al., 2025).

The use of the Adaptive Social Behavior Inventory (ASBI) provided a structured and culturally adaptable measure of social competence. While the ASBI facilitated quantitative analysis, its interpretive power depends on contextual embedding. For example, the lack of significant correlation between portable game use and social skills suggests that the portability of devices alone does not determine developmental outcomes. Instead, patterns of use—duration, supervision, and social integration—appear more influential. This nuance supports the argument that digital media effects are mediated rather than deterministic.

From a broader theoretical standpoint, these findings refine sociocultural theory in the digital era. Vygotsky conceptualized tools as mediators of development. In contemporary contexts, digital games function as cultural tools, but their mediational capacity varies according to social configuration. When integrated within guided interaction, digital tools can potentially expand children's ZPD by introducing complex problem-solving tasks. However, when detached from dialogic engagement, they may limit opportunities for social norm internalization. This conditional interpretation challenges reductionist discourses that frame digital childhood either as a moral crisis or as inevitable technological progress.

Situating this analysis within Pekanbaru's socio-cultural landscape reveals broader implications. The gradual replacement of communal traditional games by individualized gadget play represents not only a developmental shift but also a cultural transformation. Traditional games encode local values of reciprocity, hierarchy, and mutual responsibility. Their decline signals a reconfiguration of socialization pathways. Comparable transformations have been documented in rapidly digitalizing societies across Southeast Asia, Sub-Saharan Africa, and Latin America, where communal traditions increasingly intersect with individualized

media consumption (DeSmet et al., 2018; Granic et al., 2014). The Indonesian case therefore offers a valuable empirical reference for global scholarship examining how digitalization interacts with cultural heritage.

Importantly, this study moves beyond merely confirming prior claims. While earlier research emphasized negative correlations between screen time and social skills (R. A. Jones et al., 2013), the present findings reconstruct this relationship by foregrounding mediation and cultural filtering. Digital play does not operate in a vacuum. It is embedded within parenting practices, socio-economic conditions, and community traditions. In Pekanbaru, parental supervision varied across socio-economic strata, influencing children's patterns of engagement. This reinforces arguments that digital inequality is not only about access but also about guidance and interpretive support.

By integrating quantitative findings with sociocultural theory, this study strengthens the analytical bridge between empirical data and conceptual interpretation. It positions Indonesian evidence as a meaningful contribution to global debates on early childhood development. Rather than treating non-Western contexts as peripheral, this research demonstrates that culturally specific environments can illuminate blind spots in dominant theoretical frameworks.

The relationship between digital game exposure and preschoolers' social skills in Pekanbaru is best understood as a mediated, culturally contingent phenomenon. The negative association between extended screen-based gameplay and norm compliance does not invalidate digital media as a developmental tool. Instead, it highlights the decisive role of guided interaction and communal participation in shaping social outcomes. By situating these findings within sociocultural theory and local practice, this study advances a more nuanced and globally relevant understanding of digital childhood.

Beyond its local relevance, this study carries broader global implications for ongoing debates on digital childhood and early socialization. Much of the international discourse on screen time has been shaped by research conducted in Western contexts, often producing generalized claims about the developmental risks of digital media (R. A. Jones et al., 2013; Mistry et al., 2007). The findings from Pekanbaru complicate this narrative by demonstrating that digital play is neither universally harmful nor uniformly beneficial; rather, its developmental consequences are filtered through cultural practices, parental mediation, and the continuity of

communal traditions. In rapidly digitalizing societies across Southeast Asia, Sub-Saharan Africa, and Latin America, similar tensions between traditional communal play and individualized digital engagement are emerging. By foregrounding a non-Western empirical case, this study contributes to the diversification of global evidence and challenges the dominance of culturally decontextualized models of digital childhood (Iskandar & Murziqin, 2024; Abd Ghani et al., 2025). It underscores the necessity of integrating socio-cultural variables into international policy frameworks on early childhood education, particularly in contexts where modernization and tradition coexist in dynamic tension.

Despite its contributions, this study is not without limitations. First, the cross-sectional design restricts causal interpretation; the identified associations between digital gameplay and social skills should not be read as definitive evidence of developmental directionality. Longitudinal designs would be necessary to examine how patterns of digital engagement shape social trajectories over time. Second, while the ASBI provided a structured and culturally adaptable measure of social behavior, the reliance on quantitative instruments limits the depth of contextual interpretation. The inclusion of ethnographic observation or in-depth qualitative interviews could further illuminate how children negotiate digital and traditional play within their daily environments. Third, the study was conducted in Pekanbaru, a socio-culturally distinctive urban setting. Although this specificity strengthens contextual insight, it may limit generalizability to rural regions or other Indonesian provinces with different patterns of digital access and parental mediation. These limitations, however, do not diminish the study's analytical value; rather, they point toward promising avenues for future cross-cultural and mixed-method research.

D. Conclusion

This study demonstrates that the relationship between digital game exposure and preschoolers' social development in Pekanbaru, Indonesia, cannot be understood through generalized assumptions about screen time alone. The findings indicate that extended engagement with computer-based games is associated with lower compliance with social norms, whereas participation in outdoor and traditional group play corresponds with stronger expressive and cooperative behaviors. Rather than framing digital media as inherently detrimental, this research establishes that developmental outcomes are mediated by parenting

practices, social interaction quality, and the broader socio-cultural environment in which children's play is embedded. By situating digital engagement within a culturally grounded framework, the study advances a more nuanced understanding of early childhood socialization in rapidly digitalizing societies.

Theoretically, this research strengthens the application of sociocultural perspectives to contemporary digital contexts by demonstrating that digital games function as cultural tools whose effects depend on guided interaction and communal participation. Practically, the findings underscore the importance of parental mediation, structured peer collaboration, and the preservation of culturally rooted play traditions in supporting children's social competence. For early childhood educators and policymakers, the evidence suggests that balanced integration—rather than outright restriction—of digital media, accompanied by intentional scaffolding, offers a more constructive pathway for child development.

Based on the limitations acknowledged earlier, future research should employ longitudinal designs to examine causal trajectories between digital engagement and social outcomes over time. Further studies incorporating qualitative and ethnographic approaches would deepen understanding of how children negotiate digital and traditional play in everyday settings. Comparative research across diverse Indonesian regions and other non-Western societies would also help clarify the extent to which these patterns are culturally specific or globally resonant.

Ultimately, this study affirms that digital childhood is not a universal phenomenon but a culturally mediated experience. The central message is clear: the impact of digital games on young children depends less on the screen itself than on the social world that surrounds it.

Declaration of Competing Interest

The authors declare that they have no known competing financial or non-financial interests that could have appeared to influence the work reported in this paper.

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