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The relevance of mobile gaming impact on the social and emotional behavior of game-addicted elementary school children: a scoping review

Relevansi Dampak Mobile Gaming terhadap Perilaku Sosial dan Emosional Anak Pecandu Game Sekolah Dasar: Scoping Review

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ABSTRACT

Background: *The increasing prevalence of mobile game addiction has raised serious concerns regarding its impact on children's social and emotional development.*
Objective: *This study aimed to map and examine the relevance of mobile gaming effects on the social and emotional behavior of elementary school children using a scoping review approach.*
Methods: *The review was conducted in accordance with the PRISMA-ScR guidelines, with article screening supported by the Rayyan tool. Literature searches were performed in ScienceDirect, ProQuest, and Wiley Online Library using the keywords* "mobile gaming", "online games", "social impact", "emotional impact", "intensity", "children", *and* "elementary school children"*. A total of 953 articles were initially identified. After duplicate removal, 930 articles were screened by title, resulting in 50 articles eligible for abstract screening. Subsequently, 26 articles underwent full-text review, and 9 studies met the inclusion criteria and were analyzed using narrative synthesis (Table 1)**.*
Results: *The findings indicate that excessive mobile gaming is associated with social withdrawal, reduced empathy, emotional dysregulation, and increased aggression among children.*
Conclusion: *However, several studies also reported adaptive emotional outcomes when gaming occurred within controlled and supervised environments. These findings highlight the importance of preventive interventions, parental supervision, and the development of educational and socially constructive game content to minimize risks for elementary school-aged children.*

Keywords*: elementary school children, emotional behavior, game addiction, mobile gaming, social development, scoping review*

ABSTRAK

Latar Belakang: Prevalensi kecanduan game mobile yang terus meningkat menimbulkan kekhawatiran terhadap dampaknya pada perilaku sosial dan emosional anak.
Tujuan: Penelitian ini bertujuan memetakan dan mengkaji relevansi dampak mobile gaming terhadap perilaku sosial dan emosional anak sekolah dasar melalui pendekatan scoping review**.**
Metode: Peninjauan dilakukan mengikuti protokol PRISMA-ScR, dengan proses seleksi artikel dibantu oleh perangkat Rayyan. Pencarian literatur dilakukan pada basis data ScienceDirect, ProQuest, dan Wiley Online Library menggunakan kata kunci *"mobile gaming", "game online", "social impact", "emotional impact", "intensity", "children",* dan *"elementary school children"*. Sebanyak 953 artikel teridentifikasi pada tahap awal. Setelah penghapusan duplikasi, tersisa 930 artikel yang diseleksi

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berdasarkan judul, menghasilkan 50 artikel untuk penyaringan abstrak. Selanjutnya, 26 artikel ditelaah secara full-text, dan 9 studi memenuhi kriteria inklusi untuk dianalisis melalui sintesis naratif (Tabel 1).

Hasil: Hasil kajian menunjukkan bahwa penggunaan game mobile secara berlebihan berkaitan dengan penarikan sosial, penurunan empati, disregulasi emosi, dan peningkatan agresivitas pada anak. Namun, beberapa studi juga melaporkan dampak emosional adaptif ketika aktivitas bermain berlangsung dalam lingkungan yang terkontrol.

Kesimpulan: Temuan ini menegaskan pentingnya intervensi preventif, pendampingan orang tua, serta pengembangan konten game yang edukatif dan konstruktif bagi anak usia sekolah dasar.

Kata kunci: anak sekolah dasar, kecanduan game, mobile gaming, perilaku emosional, perkembangan sosial, scoping review

INTRODUCTION

The rapid development of digital technology has introduced various forms of interactive entertainment, one of which is mobile gaming. This form of entertainment is now highly accessible to a wide range of audiences, including elementary school-aged children. The widespread adoption of this phenomenon is driven by the advancement of smart devices, increasingly widespread internet connectivity, and the presence of games that are engaging, addictive, and often designed with interactive social features. Mobile gaming is no longer merely a recreational activity but has become an integral part of children's modern lifestyle, particularly among elementary school-aged children who increasingly use mobile devices for daily entertainment [1], [7], [8].

However, the ease of access and the growing intensity of usage have brought consequences that cannot be ignored. Several studies have shown that excessive exposure to mobile games can lead to addiction, which directly affects the social and emotional development of children. Empirical evidence indicates that approximately 10.1% of young gamers meet the criteria for Internet Gaming Disorder, which is significantly associated with psychological distress, depressive symptoms, and emotional regulation difficulties [7], [9], [8].Online games addiction can have an cognitive impact (decreased academic performance, cognitive disorders, decreased social skills, sleep disorders [1], decreased multitasking ability, etc), emotional impact (anxiety, depression, anger, social isolation, etc), and behavioral impact (social withdrawal, delay or absenteeism in daily life, lack of planning and discipline, etc) [2], [3], [4]. This addiction is often characterized by a lack of control over playtime, symptoms of social withdrawal, and emotional regulation disorders such as irritability, anxiety, and aggression. In some cases, children become less empathetic, struggle to socialize, and experience stress when not engaged in gameplay [4],[5],[7].

In the 11th Revision of the International Classification of Diseases (ICD-11), the WHO defines gaming disorder as uncontrollable gaming behavior[5]. This is a particular concern, especially since gaming disorder or game addiction among elementary school-aged children is a concern because this developmental stage is critical for shaping character, social skills, and emotional management abilities[2],[4]. If mobile game consumption is left unregulated, the risk of behavioral and emotional disorders will increase significantly. Nevertheless, not all impacts of mobile gaming are negative. In certain contexts, games designed with educational or collaborative elements can contribute to the development of cognitive skills, cooperation, and problem-solving abilities.

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This study addresses three central issues. First, it investigates the relevance of mobile gaming's impact on the social and emotional behavior of elementary school children who exhibit signs of game addiction. Second, it explores the extent to which excessive mobile gaming use contributes to emotional disturbances, social withdrawal, and behavioral changes in children. Third, it identifies risk factors and adaptive potentials of mobile gaming that should be considered in preventive efforts and the development of appropriate interventions for this age group.

To comprehensively understand how mobile gaming affects elementary school children, a broad review of recent scientific literature is required. Therefore, this study adopts a scoping review approach to map the existing research findings related to the relevance of mobile gaming's impact on the social and emotional behavior of game-addicted elementary school children. The results of this review are expected to serve as a foundation for preventive interventions, educational policy recommendations, and the development of healthier digital media for children.

METHODS

Study Design

This study employed a scoping review design conducted in accordance with the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) guidelines. The review aimed to systematically map existing empirical evidence regarding the social and emotional impacts of mobile gaming among elementary school-aged children. The screening and selection process was facilitated using the Rayyan web-based tool to ensure transparency and consistency throughout the review stages.

Data Source and Search Strategy

Literature searches were conducted in three electronic databases: ScienceDirect, ProQuest, and Wiley Online Library. The search strategy used combinations of the following keywords: *"mobile gaming" OR "online games" AND "social impact" AND "emotional impact" AND "intensity" OR "intensity level" AND "children" OR "elementary school children"*. Searches were limited to peer-reviewed articles published between 2020 and May 22, 2025, written in English, to capture recent evidence reflecting contemporary mobile gaming behaviors among children.

Eligibility Criteria (PICOTS Framework)

The eligibility criteria were defined using the PICOTS framework. The population (P) included elementary school-aged children and closely related age groups (grades 4–6 or early adolescents). The intervention/exposure (I) was mobile gaming or online game use. The comparison (C) was not mandatory, consistent with scoping review methodology. The outcomes (O) focused on reported social and/or emotional impacts, including social interaction, withdrawal, emotional regulation, empathy, aggression, anxiety, and related behaviors. The timeframe (T) included studies published within the defined period (2020–2025). The study design (S) encompassed primary empirical research with quantitative, qualitative, or mixed-method approaches.

Studies were excluded if they focused exclusively on cognitive outcomes, involved adult populations without relevance to children, were review-based articles (systematic reviews, narrative reviews, or meta-analyses), or were unavailable in full text.

Study Selection Process

Study selection was conducted in three sequential stages using Rayyan. First, duplicate records were removed, resulting in 930 unique articles. Second, titles and abstracts were screened to assess relevance to mobile gaming intensity and social-emotional outcomes, yielding 26 articles for full-text assessment. Third, full-text

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screening was performed to confirm eligibility based on population characteristics and outcome relevance. A total of 9 studies met all inclusion criteria and were included in the final synthesis.

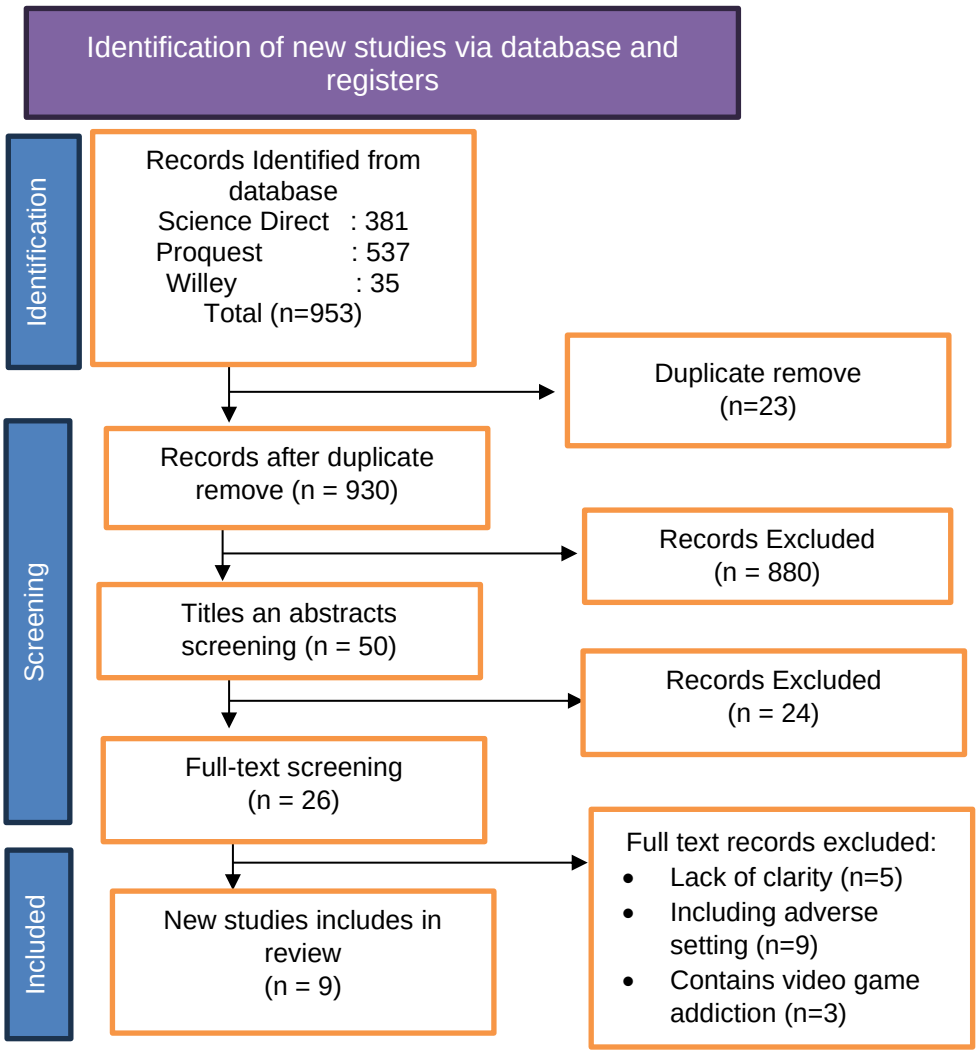

Figure 1. Indentification Diagram of New Studies Via Database and Registers

Data Extraction and Synthesis

Data extraction was performed using a standardized Microsoft Excel form. Extracted information included author(s), year of publication, study design, sample characteristics, research objectives, and key findings related to social and emotional impacts of mobile gaming. The findings were synthesized descriptively to identify patterns, trends, and research gaps without quantitative pooling, in line with scoping review methodology.

RESULTS

This study initially identified a total of 953 articles through database searches, with the following distribution: ProQuest (537 articles), ScienceDirect (381 articles), and Wiley (35 articles). After duplicate removal, 930 unique articles were identified. During title screening, studies unrelated to the social and emotional impacts of mobile gaming on children were excluded, leaving 50 articles. Abstract screening further reduced the

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number to 26 articles eligible for full-text review, as presented in Table 1. A full-text screening was then conducted to assess their alignment with the predefined inclusion criteria. As a result, 9 articles were included in the final review. These 9 articles were then analyzed narratively based on their research objectives, methodologies, study populations, types of reported impacts, prisma flow diagram.

Table 1. Summary of The Nine Reviewed Journals

No	Researchers, Year, Title (IEEE Citation Style)	Method (Design, Sample, Sampling Technique, Instruments, Analysis)	Findings and Conclusions
1	A. Sudirman et al., "Determinants of mobile game service adoption in Generation Z and Millennials in Indonesia," 2022	Design: Quantitative. Sample: 210 Gen Z and Millennial respondents. Sampling: Purposive. Instruments: Online questionnaire. Analysis: PLS-SEM.	Perceived enjoyment, perceived ease of use, and habit significantly influence intention to use mobile games.
2	X. Liu et al., "Exploring the Impact of Smartphone Addiction on Risk Decision-Making Behavior among College Students Based on fNIRS Technology," 2023	Design: Mixed experimental. Sample: 42 students (25 addicts, 17 controls). Sampling: Not specified (university-based). Instruments: fNIRS, risk decision-making tasks. Analysis: Experimental statistics.	Smartphone addiction increases impulsivity and alters prefrontal activation during risky decision-making.
3	W. Tu et al., "Does the Effect of Stress on Smartphone Addiction Vary Depending on the Gender and Type of Addiction?," 2023	Design: Cross-sectional survey. Sample: 596 adolescents aged 12–19. Sampling: Not specified. Instruments: Stress and addiction questionnaires. Analysis: Regression and gender moderation.	Stress predicts addiction, with different patterns based on gender and type of addiction.
4	S. Ahmed et al., "Mobile Game Addiction and Musculoskeletal Pain among Students," 2024	Design: Cross-sectional. Sample: 840 students across educational levels. Sampling: Convenience. Instruments: Musculoskeletal and addiction questionnaires. Analysis: Logistic regression.	Mobile game addiction is significantly associated with neck, back, and hand pain due to prolonged gaming.
5	J. Oscarido et al., "Impact of Competitive FPS Games on Decision-Making," 2023	Design: Experimental. Sample: 22 participants aged 17–25. Sampling: Volunteer. Instruments: Rapid decision-making tasks. Analysis: Comparative tests.	Competitive FPS games improve decision speed and accuracy, indicating potential cognitive enhancement.
6	M. Pape et al., "Alexithymia and IGD Severity," 2022	Design: Clinical cross-sectional. Sample: 77 males (38 IGD, 39 non-pathological gamers). Sampling: Clinical recruitment. Instruments: Alexithymia and IGD scales. Analysis:	Alexithymia strongly predicts IGD severity independent of depression.

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No	Researchers, Year, Title (IEEE Citation Style)	Method (Design, Sample, Sampling Technique, Instruments, Analysis)	Findings and Conclusions
		Correlation and regression.	
7	H. Khrad et al., "Prevalence of IGD and Psychological Distress," 2022	Design: Cross-sectional. Sample: 306 university students. Sampling: Stratified random. Instruments: IGD Scale, PHQ-9. Analysis: Descriptive statistics and regression.	IGD prevalence is 10% and correlates with psychological distress and depression, heightened during COVID-19 lockdown.
8	P. Merchant, T. Pitman, and E. King, "Video Games in Environmental Humanities Education," 2024	Design: Qualitative narrative study. Sample: University students. Sampling: Purposive (Latin American case studies). Instruments: Case study analysis, learning observation. Analysis: Thematic analysis.	Video games enhance digital literacy and critical understanding of environmental issues.
9	L. Bowditch et al., "Gamer Typologies and Problematic Gaming Outcomes," 2025	Design: Cross-sectional survey with cluster analysis. Sample: 913 international gamers. Sampling: Global volunteer sampling. Instruments: Coping, boredom, and escapism scales. Analysis: Cluster analysis and regression.	Three gamer types identified; "detached" gamers are most at risk; adaptive coping reduces negative outcomes.

Based on the analysis of nine articles that met the inclusion criteria, the included studies reported social, emotional, cognitive, and physical outcomes associated with mobile gaming. The study populations originated from Indonesia, China, Bangladesh, Germany, Saudi Arabia, several Latin American countries, and Australia. Most studies involved adolescents and young adults; none specifically examined elementary school-aged children.

Across the studies, reported emotional and psychological outcomes included anxiety, depressive symptoms, psychological distress, and alexithymia. Physical outcomes included sleep disturbances, insomnia, and musculoskeletal complaints. Cognitive-related findings involved decision-making patterns and levels of cognitive engagement. Social and behavioral outcomes included reduced academic engagement and problematic behavioral tendencies.

Several studies identified associated factors such as high-frequency gaming, competitive game types, escapism-oriented motivation, and limited parental regulation. In contrast, some studies reported potential positive outcomes, including improved cognitive engagement and adaptive coping under moderated gaming conditions. A summary of these findings is presented in Table 1.

Table 2. Summary table of the nine reviewed journals

Author (Year)	Objective	(+) Impact	(–) Impact	Aspect	Key Findings	Search Query	Relevance to Elementary School Children
Ahmed et al. (2024)	Game addiction & muscle pain	–	Neck, back, hand pain	Physical	52% experienced pain, mostly among	"mobile gaming" AND "addiction" AND "physical impact" AND	High – shows physical risks for children who actively play games

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Author (Year)	Objective	(+) Impact	(–) Impact	Aspect	Key Findings	Search Query	Relevance to Elementary School Children
					addicted users	children	
Khrad et al. (2022)	IGD & psychological stress	–	Stress, depression	Emotional	10.1% experienced IGD with high depression levels	"online games" AND "gaming disorder" AND "emotional impact" AND adolescents	Important for early screening in children
Pape et al. (2022)	Alexithymia & IGD	–	Emotional blunting, depression	Emotional	Alexithymia is a strong predictor of IGD	"gaming disorder" AND "emotional regulation" AND adolescents	Relevant for early emotional intervention in children
Oscarideo et al. (2023)	FPS & decision-making	Improved reflexes, strategy	–	Cognitive	FPS games enhance quick decision-making	"mobile gaming" AND "decision-making" AND "cognitive impact"	Positive potential if content is age-appropriate
Liu et al. (2023)	Decision-making & anxiety	–	Impulsivity	Cognitive	dlPFC activation increases during losses	"smartphone addiction" AND "decision-making" AND "children"	Emphasizes need for self-control education
Tu et al. (2023)	Gender & addiction	–	Higher risk in males	Emotional, Social	Gender differences in addiction patterns	"mobile gaming" AND "stress" AND "gender" AND adolescents	Indicates need for gender-based interventions
Merchant et al. (2024)	Games & digital literacy	Improved literacy, interaction	–	Social, Educational	Games support learning and communication	"digital games" AND "education" AND "social impact"	High potential for elementary school learning
Sudirman et al. (2022)	Game adoption factors	Entertainment, stress relief	Risk of addiction	Emotional	Enjoyment increases addiction risk	"mobile gaming" AND "intensity" AND "children"	Children are at risk without proper supervision
Bowditch et al. (2025)	Gamer typology & mental health	Adaptive coping	Escapism, poor mental health	Psychological	Three gamer types: immersed, detached, balanced	"gaming behavior" AND "escapism" AND "mental health"	Limited relevance (adult sample), but useful for understanding coping patterns

Table 2 summarizes empirical studies examining the impacts of mobile and online gaming across physical, emotional, cognitive, and social aspects. The findings indicate that most studies emphasize negative outcomes, particularly physical pain, psychological distress, and gaming disorder, while a smaller number report positive effects on cognitive skills and digital literacy when games are age-appropriate and well controlled. Overall, the table highlights that although gaming may offer developmental benefits, elementary school children remain vulnerable to physical and psychological risks without adequate supervision.

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DISCUSSION

The synthesis of findings indicates that the impact of mobile gaming is multidimensional and influenced by contextual and behavioral factors. While the included studies predominantly examined adolescents and young adults, the identified patterns of emotional, behavioral, and cognitive outcomes highlight mechanisms that may also be relevant to younger populations exhibiting comparable gaming behaviors.

Negative outcomes were more frequently reported in studies involving high-intensity or excessive gaming patterns. Emotional dysregulation and psychological distress were commonly associated with problematic or addictive gaming behaviors. Physical complaints, particularly sleep disturbances, were often linked to prolonged screen exposure. Additionally, motivational factors such as escapism and limited external regulation appeared to strengthen vulnerability to adverse outcomes.Conversely, moderated and structured gaming contexts were associated with potentially adaptive cognitive engagement and coping responses. These findings suggest that the consequences of mobile gaming are not uniform but vary according to usage intensity, game characteristics, motivational drivers, and environmental regulation.

Positive Impacts

Across the reviewed studies, a limited number of positive impacts of mobile gaming were reported, primarily within cognitive, educational, and social domains (reported in 3 of 9 studies). These studies indicated that certain game types particularly educational, strategic, or collaborative games were associated with improved reflexes, faster decision-making, strategic thinking, and digital literacy skills. Multiplayer or cooperative games were also reported to facilitate communication and social interaction when used in a controlled and age-appropriate manner. These findings suggest that mobile games may offer developmental benefits; however, such outcomes were generally observed under conditions of regulated use and appropriate supervision.

Negative Impacts

Negative impacts were more consistently reported across the literature and represented the dominant pattern among the reviewed studies (identified in 7 of 9 studies). Excessive or uncontrolled mobile gaming was associated with psychological distress, including increased stress, depressive symptoms, emotional dysregulation, and reduced empathy. Physical consequences were also documented, particularly musculoskeletal pain affecting the neck, back, and hands due to prolonged gameplay durations. Several studies identified a clear association between gaming addiction and adverse mental health outcomes, with gender differences noted in gaming behavior and addiction risk. These findings indicate that elementary school-aged children are particularly vulnerable to physical and psychological risks when gaming intensity is not adequately managed.

Triggering Factors and Behavioral Patterns

Common triggering factors for problematic gaming behavior were reported in 6 of the 9 reviewed studies. These included boredom, limited access to alternative recreational activities, low parental supervision, and persuasive game design features such as competitive mechanics and reward-based systems. Competitive and online multiplayer games were frequently associated with higher engagement intensity and increased addiction risk. Some studies also noted that motivation and coping style moderated outcomes, with adaptive engagement linked to learning or emotional coping, while maladaptive patterns were associated with stress, withdrawal, and dependency.

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Synthesis and Research Gaps

Taken together, all 9 reviewed studies demonstrate that mobile gaming among children presents a mixed pattern of potential benefits and more prevalent risks, with outcomes largely dependent on usage intensity, game type, and environmental context. Despite this, most studies focused on adolescents or adult populations, limiting direct applicability to elementary school-aged children. Variations in study design, measurement tools, and definitions of gaming addiction further constrain comparability. These gaps highlight the need for future research that is child-focused, longitudinal, and context-sensitive to better inform prevention strategies and policy development.

The implications of these findings are substantial for educators, parents, policymakers, and game developers. Schools and families should implement structured digital literacy programs, establish guidelines on healthy gaming habits, and promote balanced routines that integrate physical, academic, and social activities. Policymakers should consider creating regulatory frameworks for child-friendly game design, including content filters, time-limit features, and ethical reward systems. Developers are encouraged to incorporate educational, prosocial, and non-addictive elements into game mechanics. Overall, the evidence reinforces the importance of proactive, multi-level strategies to maximize the developmental benefits of mobile gaming while minimizing its risks for elementary school-aged children.

CONCLUSION

Based on the analysis of nine relevant scientific journals, it can be concluded that mobile gaming has a significant impact on the social and emotional development of elementary school children, particularly when used excessively and without supervision. Game addiction contributes to the emergence of emotional disturbances, reduced empathy, and physical as well as behavioral issues. Nevertheless, not all forms of digital games are inherently harmful; some types have educational potential and can support children's development when used wisely.

This study emphasizes the need for preventive approaches involving the active roles of parents, educators, and policymakers in guiding children's use of digital games. Such efforts include limiting screen time, filtering content, providing active supervision, and promoting the development of constructive and age-appropriate games. Furthermore, future research should be encouraged to explore psychological coping mechanisms, children's gaming patterns, and school-based intervention strategies to ensure more effective and sustainable risk mitigation.

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