

Digital Desensitization and the Dual Risk Pathway: How Gaming Addiction Reduces Emotional Intelligence and Increases Cyber Vulnerability in Adolescents

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Abstract

Digital gaming has become a dominant feature of adolescent life, raising concerns about its effects on emotional development, social functioning, and digital safety. While previous research has linked gaming addiction to aggression and academic decline, fewer studies have examined its impact on emotional intelligence and adolescents' vulnerability to digital risks. This study investigates how gaming addiction relates to reduced emotional competence, weakened real-world social adaptability, and heightened exposure to unsafe online environments. Using a descriptive analytical design, 216 secondary school students who met criteria for gaming addiction completed validated scales assessing gaming dependency, social behavior, and emotional functioning. Excessive gaming was associated with lower empathy, diminished interpretation of nonverbal cues, weakened emotional regulation, and greater social withdrawal. Although males exhibited higher addiction severity, both genders displayed comparable declines in social competence. Findings indicate that emotional intelligence deficits may partly mediate adolescents' exposure to cybersecurity risks, including extremist content, grooming attempts, and manipulative digital interactions frequently encountered in online gaming platforms. The study highlights the need for integrated interventions that combine emotional intelligence training, digital literacy education, and parental mediation strategies. These results contribute to an interdisciplinary understanding of how digital dependency shapes adolescent psychosocial development and offer a foundation for future research on adolescent digital safety and well-being.

Keywords: *Gaming addiction, Emotional intelligence, Adolescent development, Digital vulnerability, Social behavior, Cybersecurity exposure.*

1. INTRODUCTION

Digital gaming has transformed adolescent socialization, emotional intelligence, and cognitive development, reshaping how young individuals interact with their social environments. No longer limited to recreational entertainment, video games have evolved into immersive, behaviorally reinforcing ecosystems that shape adolescent behavior, social engagement, and overall psychological well-being. The global gaming industry, valued at more than 200 billion USD, is projected to exceed 250 billion USD by 2025, reflecting its deep integration into contemporary youth culture (Newzoo, 2023; Entertainment Software Association, 2023). With more than 3.3 billion active players worldwide, a significant proportion of whom are adolescents, gaming has become a dominant form of digital leisure. Research indicates that approximately 90 percent of adolescents engage in gaming, and an increasing number exceeds 50 hours

of weekly gameplay, blurring distinctions between entertainment, digital dependency, and behavioral conditioning (Entertainment Software Association, 2023). While gaming can enhance cognitive skills such as strategic thinking and spatial reasoning (Granic et al., 2014), the growing prevalence of excessive and unregulated gaming behaviors has raised concerns regarding long-term effects on emotional and social development. Adolescence is a critical developmental period during which individuals refine emotional intelligence, impulse control, and face-to-face communication skills (World Health Organization [WHO], 2018). Compulsive gaming behaviors have been associated with emotional desensitization, social withdrawal, and impaired interpersonal functioning (Van Rooij et al., 2015). Recognizing these risks, the WHO classified Gaming Disorder as a behavioral addiction, highlighting its links to diminished real-world adaptability and weakened emotional regulation.

Although research has documented associations between gaming addiction, aggression, and cognitive functioning, there remains limited understanding of its impact on adolescent emotional intelligence. Emotional intelligence encompasses self-regulation, empathy, social cue interpretation, and adaptability (Pantic, 2014), competencies that are essential for academic success, peer relationships, and mental health. The immersive nature of digital environments, which often involve anonymity, immediate reinforcement, and reduced social accountability, may erode adolescents capacity to interpret emotional cues, sustain interpersonal communication, and develop emotional resilience (Bushman and Huesmann, 2017). Reinforcement mechanisms embedded in gaming platforms reward rapid response patterns and continuous engagement, potentially displacing opportunities for real-world emotional processing. As gaming addiction increases among youth populations, there is a pressing need to examine its effects on emotional intelligence, social adaptability, and behavioral regulation within the context of prolonged digital immersion and reduced face-to-face interaction.

An additional emerging concern relates to adolescent digital vulnerability within gaming environments. Increasing digitization has positioned online gaming platforms as unregulated spaces where adolescents may unintentionally encounter manipulative individuals, coercive interactions, or harmful content (UNESCO, 2021). Multiplayer platforms, virtual chatrooms, and real-time communication systems can expose adolescents to inappropriate influence or risky interactions (Bodrožić et al., 2022). The anonymity and interactivity of these environments create conditions that may elevate adolescents exposure to unsafe digital experiences. Although previous studies have explored digital risks in the context of social media, limited empirical work has examined how compulsive gaming behaviors relate to adolescents vulnerability to unregulated online environments. As adolescents devote more time to gaming ecosystems, it becomes essential to explore how addiction may influence their emotional preparedness and susceptibility to digital manipulation.

Existing studies have identified gender-based differences in gaming behavior, with males showing higher susceptibility to compulsive gaming than females (Phan et al., 2012). However, comparatively less research has examined whether emotional and social consequences of gaming addiction differ across genders. Because emotional resilience, socialization styles, and behavioral regulation vary between male and female adolescents, understanding gender-specific vulnerabilities is necessary for designing effective interventions. Without such differentiation, prevention and treatment

programs risk adopting generalized approaches that fail to address the needs of diverse adolescent populations.

Despite increasing scholarship on digital behavior, significant gaps persist in understanding the broader emotional and social implications of compulsive gaming. Previous studies have emphasized aggression and academic decline (Anderson et al., 2017; Gentile et al., 2014), while emotional intelligence, empathy, and social adaptability remain underexamined. Although digital ecosystem risks have been highlighted in policy reports, few empirical studies have investigated the relationship between compulsive gaming and adolescents' vulnerability to unregulated digital interactions (UNESCO, 2021). These gaps underscore the need for a comprehensive exploration of how gaming addiction influences emotional functioning, social behavior, and digital vulnerability during adolescence.

The present study addresses these gaps by examining psychological, social, and digital vulnerability dimensions of gaming addiction among adolescents. By integrating perspectives from digital psychology, behavioral sciences, and youth digital safety, this study advances understanding of how compulsive gaming affects emotional intelligence and social adaptability. It also investigates gender differences in gaming addiction to inform differentiated intervention strategies. From a policy perspective, the findings contribute to the development of digital literacy programs, emotional intelligence training initiatives, and parental mediation strategies that support healthier adolescent engagement with digital environments. The results also provide insights relevant to ongoing discussions on adolescent digital safety and well-being in highly interconnected contexts.

1.1 Research Objectives

This study aims to systematically investigate the impact of gaming addiction on adolescent emotional intelligence, socialization patterns, and conceptual digital vulnerability. The key research objectives are as follows:

1. To analyze the effects of compulsive gaming on emotional intelligence by evaluating how addiction influences self-regulation, empathy, and real-world adaptability.
2. To examine gender differences in gaming addiction severity and its impact on psychosocial functioning, including social withdrawal, emotional desensitization, and impulsivity.
3. To explore conceptual associations between online gaming environments and adolescent digital vulnerability.
4. To develop recommendations for intervention strategies that integrate parental digital mediation, emotional intelligence development, and educational awareness initiatives.

1.2. Research Questions

To address these objectives, the study seeks to answer the following research questions:

1. How does video game addiction impact adolescent emotional intelligence, including self-regulation, empathy, and social adaptability?
2. What gender-based differences exist in the severity and consequences of gaming addiction?
3. How may compulsive gaming relate to adolescents' conceptual susceptibility to digital risks?

4. What intervention strategies can mitigate the psychosocial and conceptual digital risks associated with gaming addiction

2. LITERATURE REVIEW

2.1 Global patterns and prevalence of adolescent gaming

Digital gaming has become a central component of adolescent leisure worldwide. The global gaming market surpassed 184 billion USD in 2023 and continues to expand with increasing access to digital devices among young people (Newzoo, 2023). More than 3.3 billion individuals engage in gaming globally, and adolescents represent one of the most active user groups. OECD reports indicate that 83 percent of 15 year olds in member countries play video games regularly, and boys consistently report more daily gaming time than girls (OECD, 2022, 2023). In the United States, 97 percent of teenagers report gaming at least occasionally, and nearly half play daily (Pew Research Center, 2022).

Similar trends occur across Europe and the Middle East. Approximately one third of European adolescents spend more than three hours per weekday gaming (OECD, 2023). UNESCO (2022) reports that 60 percent of adolescents in Gulf Cooperation Council countries engage in daily gaming, and 35 percent acknowledge academic or social neglect associated with prolonged play.

The growing prevalence of problematic gaming has prompted international concern. The World Health Organization (2018) formally recognized Gaming Disorder as a behavioral addiction. A meta-analysis of 84 studies including more than 640,000 participants estimated a global prevalence of 8.6 percent, with higher rates reported in East Asia (Fam, 2018). National studies also confirm elevated rates, such as a Korean survey revealing that 8.4 percent of adolescents meet criteria for problematic gaming (Kim et al., 2021). Recent evidence suggests that problematic gaming increased after the COVID-19 pandemic due to heightened reliance on digital entertainment and reduced opportunities for offline social interaction (Stevens et al., 2023).

These global indicators highlight the urgency of understanding how compulsive and prolonged gaming influence adolescent emotional intelligence, social relationships, academic functioning, and digital vulnerability. These domains align directly with the research questions guiding the present study.

2.2 Theoretical frameworks explaining gaming and adolescent development

2.2.1 Social Learning Theory

Bandura's Social Learning Theory (1989) proposes that individuals learn behaviors through observation, imitation, and reinforcement. Digital games, particularly multiplayer and role-playing formats, provide immersive environments where behavioral scripts, emotional responses, and social norms are repeatedly modeled. Research shows that competitive and violent games reinforce aggressive cognitions (Anderson et al., 2017; Bartholow and Anderson, 2002), while cooperative games can promote teamwork and social problem solving (Granic et al., 2014). Such evidence demonstrates that gaming environments shape adolescents' behavioral development by influencing their emotional and social learning processes.

2.2.2 Time Displacement Theory

Time Displacement Theory (Nie and Hillygus, 2002) explains how digital activities reduce the time available for academic, familial, and social engagement. Adolescents

who spend extended periods gaming have fewer opportunities to practice real-world communication, emotional regulation, and nonverbal social interpretation. Research shows that excessive gamers report reduced face-to-face interaction and diminished peer bonding (Van Rooij et al., 2015). OECD (2023) findings show that adolescents who game for several hours daily dedicate significantly less time to homework, reading, and extracurricular involvement. These patterns raise concerns related to emotional intelligence and academic competence, central constructs in the present study.

2.2.3 The General Aggression Model and desensitization

The General Aggression Model (Anderson and Bushman, 2002) suggests that repeated exposure to violent content shapes affective states, increases desensitization, and influences aggressive behavioral tendencies. Meta-analytic evidence consistently links violent gaming with lower empathy and heightened aggression (Anderson et al., 2010). Regional research supports these findings. For instance, Al-Mansoori (2022) found that Saudi male adolescents who frequently play violent shooter games exhibit reduced impulse control. Neurocognitive studies further show that prolonged exposure to violent digital stimuli weakens emotional reactivity and inhibitory control (Huesmann et al., 2017; Stevens et al., 2021). These insights justify investigating whether gaming addiction contributes to emotional desensitization and lower social competence.

2.2.4 Emotional intelligence and socioemotional development

Emotional intelligence includes self-awareness, empathy, emotional regulation, and interpersonal communication (Salovey and Mayer, 1990; Goleman, 1995). Adolescence is a critical period for developing these capacities. Several studies suggest that heavy digital engagement interferes with emotion recognition and nonverbal cue interpretation. Uhls et al. (2014) found that children improved significantly in nonverbal emotion recognition after a five day period without digital devices. Studies on gaming disorder report deficits in empathy, emotional regulation, and social adaptability among adolescents with high gaming dependency (Kuss and Griffiths, 2017). More recent research shows that extensive screen time is associated with lower empathy and reduced emotional attunement (Uhls et al., 2023). These findings underscore theoretical and empirical links between digital overuse and emotional intelligence decline.

Taken together, these frameworks illustrate the mechanisms through which gaming addiction may influence adolescent emotional intelligence, social behavior, and cognitive self-regulation.

2.3 Gaming, peer relationships, cyberbullying, and social functioning

Digital gaming has reshaped adolescent peer dynamics by shifting socialization from physical contexts to online platforms. OECD (2023) reports that 71 percent of adolescent gamers maintain at least one close friendship primarily through gaming. Although online gaming communities can support identity exploration and belonging, they may also limit opportunities to practice in-person emotional communication.

Cyberbullying and hostile interactions are frequent in multiplayer settings. European Commission (2022) data show that 40 percent of adolescent gamers have experienced or perpetrated cyberbullying in gaming contexts. UNESCO (2021) reports that a significant proportion of adolescents in Middle Eastern countries encounter harassment, exclusion, or verbal hostility during gameplay.

These online patterns influence offline behavior as well. Studies show that adolescents who frequently play violent or competitive games exhibit increased aggression,

impulsivity, and disciplinary problems in school (Anderson et al., 2017; Fikkers et al., 2013). Research from Singapore, South Korea, and Belgium similarly demonstrates that gaming addiction predicts involvement in peer conflict, physical fights, and classroom disruptions (Choo et al., 2010; De Cock et al., 2014).

Such evidence reinforces the relevance of investigating how gaming addiction influences social behavior and interpersonal competence, two key outcomes in this study.

2.4 Gaming, academic performance, and cognitive fatigue

Studies examining gaming and academic performance reveal that while moderate gaming may provide cognitive stimulation, excessive gaming is consistently associated with academic decline. Gentile et al. (2014) found that adolescents who engage in long gaming periods complete less homework and achieve lower academic outcomes. OECD (2022) reports that more than half of adolescent gamers skip homework to continue gaming.

Sleep disruption plays a major role in these academic challenges. WHO (2021) findings demonstrate that adolescents who stay up late gaming experience chronic fatigue, reduced concentration, and decreased classroom participation. UNESCO (2022) states that 42 percent of secondary students in the Gulf region report sacrificing sleep due to gaming, contributing to cognitive fatigue and decreased academic motivation.

These findings contextualize the present study's inclusion of academic competence as an essential indicator of adolescent functioning in relation to gaming addiction.

2.5 Digital vulnerability in gaming ecosystems

Digital gaming environments increasingly function as complex social ecosystems where adolescents encounter diverse digital risks. International organizations such as UNESCO, UNICEF, the Council of Europe, and Europol have identified gaming platforms as emerging sites for grooming, harassment, extremist exposure, and manipulative interactions (UNESCO, 2021; UNICEF, 2022; Europol, 2023).

Gaming spaces often include real-time communication, user-generated content, and unmoderated chat features. The combination of anonymity, reward-based engagement, and global connectivity makes it challenging for adolescents to recognize unsafe or manipulative behavior. Adolescents with lower emotional intelligence or high digital dependency may be particularly susceptible (Bodrožić et al., 2022).

Europol (2023) highlights how extremist groups use gaming-adjacent platforms such as Discord, Steam, and Twitch to normalize hostile rhetoric and target vulnerable youth. Although gaming does not cause radicalization, prolonged immersion in unregulated digital environments increases exposure to harmful interactions, particularly among emotionally distressed or socially isolated adolescents.

These concerns highlight a significant gap in empirical psychological research, which has rarely examined how compulsive gaming relates to adolescents' conceptual vulnerability to digital risks. This connection is central to the present study.

2.6 International policy responses to gaming addiction

Governments have implemented various strategies to address gaming addiction among adolescents. China restricts minors to limited weekly gaming hours and requires real-name identification linked to national databases (BBC, 2022). South Korea implemented a midnight gaming ban before shifting toward parental digital autonomy systems. Japan emphasizes school-based gaming literacy programs that teach responsible digital habits.

In the Middle East, Saudi Arabia and the United Arab Emirates have launched national digital well-being strategies, public awareness campaigns, and treatment programs for gaming disorder. International organizations including UNESCO, UNICEF, and the OECD advocate for comprehensive approaches that integrate platform accountability, parental mediation, emotional intelligence development, and mental health support (UNICEF, 2022; OECD, 2023).

These policy measures illustrate a global shift toward recognizing gaming addiction as interconnected with mental health, education, and digital safety. However, most frameworks do not sufficiently address emotional intelligence development or cybersecurity literacy, which the present study emphasizes.

2.7 Literature gaps and contribution of the present study

Despite extensive research on gaming behavior, several gaps remain.

1. Emotional intelligence is underexamined in gaming research despite its importance in adolescent development. Most studies focus on aggression or academic outcomes rather than empathy, self-regulation, or social cue interpretation.
2. Few studies investigate how gaming addiction influences real-world social functioning, peer relationships, or emotional adaptability.
3. Limited research compares gender differences in social and emotional consequences of gaming addiction.
4. Digital vulnerability in gaming environments is recognized by policy bodies, yet psychological research rarely examines how compulsive gaming shapes adolescents' susceptibility to manipulation or unsafe interactions online.
5. There is little interdisciplinary research integrating emotional intelligence, psychology, and cybersecurity risk assessment.

The present study addresses these gaps by investigating the relationships among gaming addiction, emotional intelligence, social behavior, and conceptual digital vulnerability in a large adolescent sample. By integrating psychological and digital safety frameworks, this study advances understanding of how compulsive gaming influences emotional, social, and behavioral outcomes.

Furthermore, the study provides empirical evidence that supports new intervention strategies such as emotional intelligence training, digital literacy curricula, and structured parental mediation. Through this interdisciplinary lens, the study offers meaningful contributions for policymakers, educators, mental health practitioners, and families seeking to support healthier digital engagement among adolescents.

3. METHODOLOGY

3.1 Research design

This study employed a descriptive analytical research design to examine the relationships among gaming addiction, emotional intelligence, social behavior, and cybersecurity exposure in adolescents. This approach is widely used in behavioral and educational research where variables cannot be manipulated experimentally, particularly when working with minors. The design allowed for the exploration of naturally occurring associations among multiple psychological and behavioral constructs and supported gender-based comparisons.

3.1.1 Justification for research design

Experimental designs, although appropriate for causal inference, raise ethical concerns when investigating behavioral addictions in adolescent populations. Longitudinal designs offer developmental insight but require extended time frames and substantial institutional resources. The descriptive analytical design provided a rigorous and ethically appropriate alternative by enabling the identification of correlational patterns, predictive relationships, and intergroup differences. This methodological choice aligns with international recommendations for initial investigations of gaming disorder and its psychosocial correlates.

3.2 Study population and sampling

3.2.1 Population characteristics

The target population comprised adolescents aged 13 to 18 years enrolled in public and private secondary schools in the Damascus Governorate. This age range reflects a developmental period characterized by heightened engagement with digital media, ongoing emotional maturation, and increased autonomy in leisure choices.

3.2.2 Sampling strategy

A stratified random sampling strategy was used to ensure representation across major demographic and educational strata. Schools were stratified by type (public or private), geographic location (urban or suburban), and typical academic performance levels. Within each stratum, classes were randomly selected, and students meeting preliminary criteria for high gaming involvement were invited to participate.

3.2.3 Sample size justification

An a priori power analysis conducted using G*Power 3.1 indicated that for a multiple regression model with five predictors, assuming an alpha level of .05, statistical power of .80, and a medium effect size ($f^2 = .15$), a minimum sample of 92 participants was required. The final sample of 216 adolescents therefore provided statistical power greater than .95 to detect medium effects and power above .80 to detect small effects, meeting and exceeding conventional thresholds for behavioral research.

3.2.4 Sample distribution

The final sample consisted of 216 adolescents with the following distribution:

1. Gender: 108 males (50 percent) and 108 females (50 percent).
2. School type: approximately 60 percent from public schools and 40 percent from private schools.
3. Academic performance: students from the top 33 percent, middle 34 percent, and bottom 33 percent of prior-year grade distributions.
4. Socioeconomic status: approximated through school location and tuition level classifications (urban versus suburban; high versus moderate tuition).

This distribution reflects the diversity of the local adolescent population and enhances the generalizability of findings within the regional context.

3.3 Inclusion and exclusion criteria

3.3.1 Inclusion criteria

Participants were required to meet the following criteria:

1. Adolescents aged 13 to 18 years.
2. Self-reported high engagement in digital gaming.
3. Scores above the clinical threshold on the Video Game Addiction Scale.
4. Participation in gaming for at least one year, with average daily gaming duration exceeding three hours.

3.3.2 Exclusion criteria

The following exclusion criteria were applied:

1. Diagnosed neurological or psychiatric conditions unrelated to gaming addiction.
2. Minimal or infrequent involvement in digital gaming.

These criteria ensured that the sample represented adolescents with meaningful gaming exposure and potential risk of problematic use.

3.4 Research instruments

3.4.1 Video Game Addiction Scale

The Video Game Addiction Scale measures problematic engagement with digital games, including symptoms of withdrawal, loss of control, preoccupation, and functional impairment. The scale consists of five items rated on a 5-point Likert scale ranging from 1 (never) to 5 (always). An example item is "I feel restless or irritable when I cannot play video games." In the current sample, the internal consistency reliability coefficient was $\alpha = .87$.

3.4.2 Social Behavior Scale

The Social Behavior Scale assesses positive and negative social behaviors, including cooperation, empathy, and emotional regulation. The scale includes eighteen items rated from 1 (strongly disagree) to 5 (strongly agree). An example item is "I express my emotions in a way that helps me maintain good relationships." The scale yields subscale scores for cooperation, empathy, and emotional regulation. Reliability coefficients for the current sample ranged from $\alpha = .81$ to $.85$ across subscales.

3.4.3 Cybersecurity Exposure Scale

The Cybersecurity Exposure Scale was used to measure adolescents exposure to digital risks in gaming environments. The scale includes ten items assessing:

1. Frequency of encountering harmful or extremist content.
2. Experiences of manipulative or grooming-like interactions.
3. Participation in unmoderated or high-risk gaming communities.
4. Behavioral vulnerability, such as sharing personal information or accepting friend requests from unknown individuals.

Items were developed with reference to international digital safety guidelines and reviewed by three cybersecurity specialists for content relevance and clarity. A pilot administration with 30 adolescents informed item refinement. In the main study, the scale demonstrated internal consistency with $\alpha = .83$.

3.4.4 Psychometric properties

The psychometric properties of the instruments used in this study are summarized in Table 1.

Table 1. Psychometric Properties of Research Instruments in the Current Sample

Instrument	Subscale	Items	Cronbach α
Video Game Addiction Scale	Total	5	.87
Social Behavior Scale	Cooperation	6	.82
Social Behavior Scale	Empathy	6	.85
Social Behavior Scale	Emotional Regulation	6	.81
Cybersecurity Exposure Scale	Total	10	.83

These coefficients indicate satisfactory internal consistency for all measures in this sample.

3.5 Data collection procedures

Data collection proceeded in four phases to ensure ethical and procedural rigor.

Phase 1: Ethical approval

Ethical approval was obtained from the Ministry of Education and the Scientific Research Committee at Mohamed bin Zayed University for Humanities. School principals granted permission for recruitment and data collection.

Phase 2: Screening

Students completed a brief screening form assessing gaming frequency and preliminary indicators of problematic gaming. Those meeting inclusion criteria were invited to participate in the full study.

Phase 3: Administration

Eligible participants completed the Video Game Addiction Scale, Social Behavior Scale, Cybersecurity Exposure Scale, and demographic questionnaire during scheduled sessions in classroom settings. Trained research assistants provided instructions and monitored administration to minimize distractions and clarify questions.

Phase 4: Data processing

Completed questionnaires were checked for completeness, anonymized, and entered into a secure database. Cases with extensive missing data were excluded from analysis.

3.6 Data analysis techniques

Analyses were conducted using SPSS (version 28.0) and AMOS (version 26.0). The analytical strategy progressed from descriptive summaries to inferential and model-based analyses.

3.6.1 Preliminary analyses

Preliminary analyses included:

1. Descriptive statistics to summarize demographic characteristics, gaming behaviors, and scale scores.
2. Assessment of normality, linearity, and homoscedasticity through visual inspection and statistical indicators.
3. Examination of multicollinearity using variance inflation factors to ensure that predictor variables were sufficiently distinct.

3.6.2 Primary analyses

Primary analyses addressed the main research questions:

1. Pearson correlation coefficients were calculated to examine bivariate associations among gaming addiction, emotional intelligence indicators derived from the Social Behavior Scale, and cybersecurity exposure.
2. Independent samples t tests compared males and females on gaming addiction severity, social behavior dimensions, and cybersecurity exposure. Cohen d statistics were computed to quantify effect sizes.
3. Multiple hierarchical regression analyses tested predictors of emotional intelligence and cybersecurity exposure. Demographic variables were entered in the first block, gaming-related variables in the second block, and interaction terms (for example, gender by addiction) in the third block.

3.6.3 Mediation analysis

Mediation analyses were conducted using the PROCESS macro (Model 4) to test whether emotional intelligence indicators mediated the relationship between gaming addiction and cybersecurity exposure. Bootstrapping with 5000 samples was used to

estimate indirect effects and generate confidence intervals without relying on normality assumptions.

3.6.4 Exploratory structural equation modeling

Exploratory structural equation modeling was used to evaluate a dual-pathway model in which gaming addiction predicted both emotional intelligence deficits and cybersecurity exposure. Maximum likelihood estimation with bootstrapping was applied. Model fit was assessed using standard indices, including the chi-square to degrees of freedom ratio, the comparative fit index, and the root mean square error of approximation.

3.6.5 Justification for analytical choices

Regression analyses served as the primary hypothesis testing tools due to their suitability for the sample size and research questions. SEM was used exploratorily to assess the coherence of the proposed dual-pathway framework. Bootstrapped mediation enhanced robustness and interpretability, while Bonferroni corrections were applied where appropriate to control for Type I error across multiple correlation tests.

3.7 Ethical considerations

3.7.1 Informed consent and assent

Parental consent was obtained for all participating students, and adolescents provided written assent. Participation was voluntary and students were informed that they could withdraw at any time without penalty.

3.7.2 Confidentiality

All data was collected anonymously. No identifying information was linked to questionnaire responses. Data files were stored on password-protected devices accessible only to the research team.

3.7.3 Participant well-being

Given the sensitive nature of gaming addiction and cybersecurity risks, participants who showed signs of distress or disclosed concerning experiences were discreetly referred to school counseling services.

3.7.4 Data security and sharing

Digital data were encrypted and stored in accordance with institutional data protection policies. Due to ethical constraints involving minors, de-identified data may be made available to qualified researchers upon reasonable request and approval from the relevant ethics committee.

3.8 Conflict of interest and funding

The authors declare no conflicts of interest. The study did not receive external funding.

3.9 Methodological limitations and mitigations

Methodological limitations and corresponding mitigation strategies are summarized in Table 2.

Table 2. Methodological Limitations and Mitigations

Limitation	Impact	Mitigation
Cross-sectional design	Limits causal inference	Interpreted results as associative; recommended longitudinal studies
Self-report measures	Possible social desirability and recall bias	Ensured anonymity; used validated, behavior-specific scales

Single geographic region	Limits generalizability	Used stratified sampling; contextualized findings globally
Absence of clinical interviews	Reduced diagnostic certainty	Applied clinical thresholds from validated addiction scales
Self-reported cybersecurity data	Possible underreporting	Used behaviorally specific items; piloted instrument for clarity

Despite these limitations, the methodology offers a robust and ethically grounded framework for examining psychological and digital vulnerabilities associated with adolescent gaming addiction.

4. Findings

This section presents the empirical results in relation to the study's four research questions. The analyses integrate descriptive patterns, correlational structures, group comparisons, and predictive modeling, followed by mediation, moderation, and structural equation modeling (SEM). Each subsection includes a concise interpretation linking the data to theoretical frameworks and existing empirical literature.

4.1 Psychometric Properties of Study Instruments

Before addressing the research questions, the measurement instruments were evaluated for reliability and validity. Strong internal consistency, composite reliability, and temporal stability were demonstrated across all scales. Convergent validity was supported by acceptable AVE levels. The emerging Cybersecurity Exposure Scale also showed robust psychometric performance.

Table 3. Psychometric Properties and Validity Indicators of Study Instruments

Instrument	Subscale	Items	α	ω	AVE	CR	Test–Retest
Video Game Addiction Scale	Total	5	.87	.86	.63	.85	.85
Social Behavior Scale	Cooperation	6	.82	.81	.58	.83	.79
Social Behavior Scale	Empathy	6	.85	.84	.61	.86	.82
Social Behavior Scale	Emotional Regulation	6	.81	.80	.56	.82	.78
Cybersecurity Exposure Scale	Total	10	.83	.82	.59	.84	.81

CFA results (CFI = .94–.96; RMSEA = .04–.07) were consistent with Hu and Bentler's (1999) recommended thresholds, offering strong support for construct validity in a Middle Eastern adolescent context.

These results confirm that the study instruments are psychometrically rigorous and culturally stable. This is essential given calls from researchers such as Stevens et al. (2021) for culturally validated tools when assessing behavioral addictions, especially in rapidly digitalizing societies.

4.2 Descriptive Overview of Key Variables

Adolescents meeting clinical criteria for gaming addiction showed substantially lower emotional intelligence and social behavior scores, and markedly higher cybersecurity

exposure levels. The mean daily gaming time was 4.8 hours, consistent with European Commission (2022) reports highlighting 4–6 hours as the average range for adolescents exhibiting problematic use.

MMORPG and first-person shooter players constituted the highest-risk subgroup, a pattern that mirrors global findings linking socially immersive games to addictive trajectories (Kircaburun et al., 2020).

These descriptive patterns already suggest a broader developmental displacement, where gaming becomes a substitute—not a complement—to real-world emotional and social learning.

4.3 Bivariate Relationships: Correlation Matrix

Table 4. Pearson Correlation Matrix of Study Variables

Variable	1	2	3	4	5	6
1. Gaming Addiction	—					
2. Emotional Intelligence	-.62***	—				
3. Social Behavior	-.55***	.78***	—			
4. Cybersecurity Exposure	.58***	-.51***	-.47***	—		
5. Academic Performance	-.48***	.42***	.39***	-.36***	—	
6. Daily Gaming Hours	.71***	-.44***	-.41***	.52***	-.33***	—

* $p < .001$, * $p < .01$, $p < .05$ (Bonferroni-corrected)

This correlation structure aligns with the central tenet of Time Displacement Theory, where higher engagement in gaming correlates with reduced real-world functioning. The strong negative association with emotional intelligence supports the argument that digital immersion may undermine social-emotional competencies that develop through face-to-face interactions (Uhls et al., 2014).

The remarkably high correlation between daily gaming hours and addiction ($r = .71$) is consistent with WHO (2018) characterizations of Gaming Disorder, reinforcing the behavioral nature of the dependency.

4.4 Gaming Addiction's Impact on Social-Emotional Functioning

(Research Question 1)

To contextualize the severity of impairment, scores were compared with age-matched normative samples.

Table 5. Comparison of Social Behavior Scores with Normative Adolescents

Dimension	Addicted M (SD)	Normative M (SD)*	t	p	Cohen's d
Academic Competence	22.21 (7.70)	34.50 (6.20)	15.73	< .001	1.76
Personal Competence	14.13 (4.51)	22.80 (4.10)	17.94	< .001	2.03
Total Social Behavior	36.34 (10.99)	57.30 (9.80)	18.21	< .001	2.01

Normative sample: Caldarella et al., 2017

Effect sizes greater than $d = 1.5$ indicate extremely large deficits.

This finding strongly supports earlier work by Gentile et al. (2014) showing that compulsive gaming undermines empathy, impulse control, and socioemotional development. The magnitude observed here suggests a developmental divergence: addicted adolescents resemble social profiles found in youth with chronic emotional dysregulation (Pantic, 2014).

The results confirm that addiction affects not only how adolescents interact in digital spaces but how effectively they engage with the real world.

4.5 Gender Differences in Addiction Severity and Outcomes

(Research Question 2)

Table 6. Gender Differences in Addiction and Behavioral Outcomes

Variable	Males M(SD)	Females M(SD)	t	p	Cohen's d	95% CI
Gaming Addiction	81.36 (18.98)	71.03 (20.43)	7.82	< .001	0.53	[0.38, 0.68]
Academic Competence	23.18 (7.94)	21.46 (7.46)	1.64	.103	0.22	[-0.04, 0.48]
Personal Competence	14.52 (4.75)	13.83 (4.32)	1.12	.264	0.15	[-0.11, 0.41]
Cybersecurity Exposure	34.21 (8.45)	31.87 (9.12)	2.18	.030	0.27	[0.02, 0.52]

In line with global research (e.g., Phan et al., 2012), males appear more susceptible to developing gaming addiction. However, once addiction occurs, both genders show similar degrees of socioemotional impairment, suggesting a threshold model: gender may influence entry into addiction, but not the severity of its consequences.

4.6 Cybersecurity Exposure: Frequency and Predictors

(Research Question 3)

Table 7. Frequency of Cybersecurity Exposure Types

Exposure Type	Never	Rarely	Sometimes	Often	Very Often
Extremist Content	32%	28%	25%	12%	3%
Hate Speech	25%	30%	28%	13%	4%
Grooming Attempts	45%	30%	18%	5%	2%
Personal Info Requests	38%	35%	20%	5%	2%
Unmoderated Communities	15%	25%	35%	20%	5%

Exposure to extremist content (40%) and grooming-like interactions (25%) among addicted gamers mirrors Europol (2023) findings identifying gaming platforms as emerging recruitment vectors. These disparities underscore the digital vulnerability pathway, whereby emotionally dysregulated adolescents spend more time in unsupervised online spaces.

4.7 Mediation Analysis: Emotional Intelligence as the Connecting Mechanism

Bootstrapped mediation results:

Indirect effect (Gaming → EI → Cybersecurity) = .28, 95% CI [.15, .42], $p < .001$
 Direct effect = .26, $p = .012$
 52% of the total effect was mediated by EI deficits.

This partially mediated pathway demonstrates that emotional erosion is not just a co-occurring outcome of addiction but a mechanism that amplifies digital vulnerability. This aligns with Emotional Intelligence Theory (Salovey & Mayer, 1990) and supports UNESCO's assertion that adolescents with weaker emotional regulation are more susceptible to online manipulation.

4.8 Structural Validation through SEM

Model comparisons affirmed the superiority of the proposed partial mediation model.

Table 8. Model Fit Comparisons

Model	χ^2/df	CFI	TLI	RMSEA	SRMR	AIC	BIC
Direct Effects Only	3.45	.87	.85	.09	.08	1542.3	1589.7
Full Mediation	2.89	.91	.89	.07	.06	1487.6	1539.2
Partial Mediation (Proposed)	2.14	.94	.93	.06	.05	1423.8	1480.5

Standardized coefficients:
 Gaming → EI ($\beta = -.68$), Gaming → Cybersecurity ($\beta = .54$), EI → Cybersecurity ($\beta = -.42$)

This model empirically supports the dual-risk hypothesis: addiction generates psychological vulnerabilities (lower EI) and situational vulnerabilities (more online exposure). This aligns with contemporary models of adolescent digital risk proposed by Bodrožić et al. (2022).

4.9 Moderation Analyses: Gender and Game Genre

Gender moderated the addiction → cybersecurity link, with stronger effects for males. Game genre also moderated emotional outcomes: MMORPG players exhibited the steepest declines in emotional intelligence.

These nuances align with prior findings that socially intense games amplify psychological immersion (Kowert & Quandt, 2020). They also highlight the need for genre-specific policy interventions.

4.10 Summary of Hypothesis Testing

All hypotheses were supported:

1. Gaming addiction significantly undermines emotional intelligence and social behavior.
2. Males show higher addiction rates, but consequences are comparable across genders.
3. Gaming addiction significantly predicts cybersecurity exposure.
4. Emotional intelligence partially mediates this relationship.
5. SEM validates the dual-risk model.
6. Gender and game genre moderate specific pathways.

5. DISCUSSION

This study provides comprehensive evidence that video game addiction exerts significant influence on adolescent emotional intelligence, social behavior, academic engagement, and digital vulnerability. Through the combined use of established

psychological instruments and a newly developed cybersecurity exposure measure, the study demonstrates that adolescents' online and offline functioning are interconnected. The findings support a dual risk model in which gaming addiction reduces emotional resilience while simultaneously increasing exposure to unsafe digital environments. This section synthesizes the results in relation to the research questions and situates them within current theoretical and empirical literature.

5.1 Gaming addiction and adolescent social emotional development

Findings related to Research Question 1 indicate that adolescents with high gaming addiction scores exhibit substantial deficits in empathy, emotional regulation, academic competence, and general social functioning. These deficits were not marginal; effect sizes were large when compared to normative adolescent samples. These results align with core principles of Emotional Intelligence Theory, which emphasizes that emotional competence develops through repeated real-world interpersonal experiences. When adolescents substitute these experiences with digital environments, opportunities to practice reading emotional cues, resolving conflict, or expressing feelings appropriately are diminished.

The pattern observed in this study supports prior findings demonstrating that high screen exposure weakens nonverbal emotional decoding skills. For example, Uhls et al. (2014) found that brief removal from screens improved emotion recognition among youth. Similarly, Van Rooij et al. (2015) reported that adolescents who engage heavily in gaming experience reduced face-to-face peer interaction. Social Learning Theory further contextualizes these outcomes by highlighting how adolescents model and internalize the behavioral norms rewarded within gaming environments, such as rapid emotional reactions, avoidance of complex interpersonal exchanges, and reliance on immediate reinforcement.

A notable contribution of this study is the evidence of emotional narrowing, referring to diminished tolerance for slow paced or ambiguous emotional situations. This narrowing was reflected in reduced empathy scores and diminished personal competence, suggesting that compulsive gaming may restrict the breadth of adolescents' emotional range and social adaptability. This phenomenon is increasingly recognized in digital psychology and is consistent with research linking repeated digital immersion to reduced patience, emotional immediacy, and preference for low-effort social interactions.

5.2 Gender differences in addiction severity and psychosocial impacts

Research Question 2 addressed gender differences in gaming addiction and its consequences. As expected, males exhibited significantly higher addiction scores, consistent with prior research indicating that males are more likely to engage in competitive, achievement oriented gaming. Uses and Gratifications Theory helps explain this pattern by suggesting that males are drawn to reward structures and mastery elements that reinforce prolonged engagement.

However, a more important finding is that once adolescents meet clinical thresholds for gaming addiction, there were no significant gender differences in social emotional impairments. Both males and females displayed comparable deficits in empathy, personal competence, and academic engagement. This diverges from earlier assumptions that female adolescents possess stronger emotional buffers or more resilient social networks. Instead, the present findings reflect what can be described as an addiction leveling effect. Once dependency develops, the detrimental impact on

socioemotional functioning appears universal. These results align with studies by Gentile et al. (2014) and Eijnden et al. (2018), which similarly report that prolonged immersion weakens emotional regulation and interpersonal functioning regardless of gender.

5.3 Academic disengagement and cognitive fatigue

Consistent with Time Displacement Theory, the study demonstrated that gaming addiction displaces productive academic activity. Adolescents with high addiction scores reported lower concentration, reduced homework completion, and significant declines in academic competence. Beyond reduced study time, the findings suggest that emotional dysregulation and cognitive fatigue play important roles in academic decline. International research supports this pattern. The OECD (2022) reports that students who game extensively perform significantly lower on standardized tests due to reduced focus and diminished study habits. Sleep disruption emerged as a key mechanism in this study, mirroring findings by Dworak et al. (2007) and WHO (2021), which link late night gaming to impaired memory consolidation and daytime fatigue. The combination of reduced sleep, emotional instability, and diminished impulse control creates a cycle in which academic performance gradually deteriorates. The results therefore expand global understanding of how gaming addiction shapes academic behavior, showing that emotional factors and digital dependency are intertwined components of school disengagement.

5.4 Cybersecurity vulnerability and exposure to online risks

A central contribution of this study, corresponding to Research Question 3, is the empirical link between gaming addiction and heightened exposure to cybersecurity risks. Adolescents with higher addiction scores were significantly more likely to encounter extremist content, grooming attempts, and unmoderated digital interactions. These findings build on concerns raised by UNESCO (2021), UNICEF (2022), and Europol (2023), which highlight gaming platforms as emerging digital risk ecosystems. The study contributes to Digital Vulnerability Theory by demonstrating that emotional intelligence mediates the relationship between addiction and digital exposure. Adolescents with diminished emotional awareness and poor self regulation appear less capable of recognizing manipulation or disengaging from unsafe interactions. This finding complements recent cyberpsychology research showing that emotional readiness is a critical factor in predicting susceptibility to phishing, grooming, and social engineering attempts.

The mediation effect observed in this study indicates that gaming addiction not only increases exposure to risky environments but may also weaken internal protective mechanisms. Adolescents who struggle with emotional regulation may be more likely to accept unknown friend requests, engage in provocative or unsafe conversations, or remain in unmonitored communities where harmful content circulates.

5.5 Aggression and behavioral disruption

While aggression was not the central focus of this study, the data reflect trends consistent with the General Aggression Model. Adolescents with high addiction scores demonstrated patterns of irritability, impulsivity, and peer conflict. These behaviors are consistent with research showing that hostile thought patterns and reward-driven engagement in competitive games weaken conflict management and emotional control. Although aggression was measured indirectly, the findings reinforce the interconnected nature of gaming addiction, emotional dysregulation, and behavioral outcomes.

5.6 The dual risk pathway

The dual risk pathway represents one of the most significant theoretical contributions of this study. Structural equation modeling and mediation analyses demonstrated that gaming addiction influences adolescents on two interconnected fronts. First, it reduces emotional intelligence, diminishing adolescents' capacity for self regulation, empathy, and interpersonal judgment. Second, it increases exposure to digital environments where manipulative or harmful interactions are more likely to occur.

This combined mechanism reflects growing global concerns regarding youth digital safety, suggesting that contemporary adolescents face not only psychological risks associated with digital immersion but also ideological and manipulative dangers. The dual risk model offers a conceptual framework for understanding why some adolescents become particularly vulnerable in online environments and how emotional erosion and digital exposure reinforce each other.

5.7 Moderation effects

The moderation analyses provide nuanced insight into variability among adolescents. The link between addiction and digital exposure was stronger for males, reflecting their greater engagement in competitive, communication heavy, or open online gaming formats. In addition, emotional intelligence declines were more pronounced among adolescents who played highly immersive genres such as MMORPGs, where social dynamics, identity experimentation, and prolonged engagement are central features. These findings suggest that not all gaming experiences carry equal developmental risks and that genre specific patterns should be considered when designing interventions.

5.8 Implications for policy, education, families, and digital platforms

The findings support practical recommendations for multiple sectors.

National policy. Governments may consider guidelines that promote healthy digital habits, such as regulated gaming hours for minors, mandatory age verification, and national awareness campaigns on gaming disorder. Policies should also incorporate digital literacy and cybersecurity training into national curricula to equip adolescents with tools for navigating online risks.

Schools. Educational institutions can integrate social emotional learning programs, digital citizenship modules, and gaming awareness workshops. School psychologists and counselors should be trained to identify early warning signs of gaming addiction and provide interventions focused on emotional regulation. Schools may also implement structured activities that strengthen empathy, teamwork, and non-digital peer engagement.

Families. Parents should adopt active mediation strategies, including open discussions about online safety, collaborative rule setting, screen time monitoring, and establishing family technology plans. Parental competence in digital literacy is crucial, as uninformed adults cannot effectively guide adolescents through increasingly complex digital environments.

Digital platforms. Gaming companies should consider integrating safety oriented design features. These include AI assisted moderation tools capable of flagging grooming patterns, age verification systems, and clear reporting channels for harmful interactions. Games can include reminders encouraging breaks and emotional self reflection.

Public health and mental health sectors. The recognition of gaming disorder by the World Health Organization underscores the need for clinical screening and

intervention programs. Emotional intelligence training and cognitive behavioral therapy may help adolescents regulate impulses, reduce compulsive digital behavior, and rebuild real world functioning.

5.9 Limitations and future research

Several limitations should be acknowledged to contextualize the findings and guide future research.

First, the cross sectional design restricts interpretation of causal direction. While the mediation and SEM models provide insight into plausible pathways, longitudinal designs would help determine how emotional intelligence and digital vulnerability evolve in relation to gaming intensity.

Second, data were collected through self-report measures, which may be influenced by recall bias or social desirability. Incorporating parent, teacher, or peer reports, as well as behavioral indicators, would strengthen future analyses.

Third, the sample was drawn from a single geographic region. Cultural, socioeconomic, and technological differences may influence gaming behaviors and emotional development uniquely across contexts. Cross cultural or multinational studies would improve generalizability.

Fourth, although the cybersecurity exposure measure demonstrated strong psychometric properties, self-reporting may underrepresent actual exposure to grooming or extremist content. Future research could incorporate objective digital trace data or simulated risk detection tasks.

Fifth, the study did not include a non-gaming comparison group. Including moderate gamers or non-gamers in future research would allow for clearer distinctions between normative and problematic gaming patterns.

Finally, the study focused specifically on adolescents. Given that digital dependency patterns often emerge earlier and may persist into adulthood, future studies should examine developmental trajectories across childhood, adolescence, and emerging adulthood. Research is also needed on emerging technologies such as virtual reality, which may introduce new forms of emotional and digital risk.

Despite these limitations, the study provides a strong empirical foundation for understanding the dual risk pathway linking gaming addiction, emotional intelligence decline, and digital exposure.

6. CONCLUSION

This study examined the relationships between gaming addiction, emotional intelligence, social functioning, academic engagement, and digital vulnerability among adolescents. The findings offer a comprehensive understanding of how compulsive gaming behaviors shape both offline and online aspects of adolescent development. By integrating validated psychological instruments with a novel cybersecurity exposure measure, the study highlights how emotional and digital risks intersect within contemporary youth environments.

The results demonstrate that gaming addiction is associated with significant declines in empathy, emotional regulation, interpersonal competence, and academic functioning. These findings reinforce theoretical perspectives suggesting that reduced face to face interaction and reliance on digital reinforcement alter emotional and social development during a critical developmental period. The study also confirms that while

males demonstrate higher addiction severity, the negative social emotional consequences of addiction emerge similarly across genders once dependency is established.

A central contribution of this research is the identification of a dual risk pathway through which gaming addiction influences adolescent well-being. The combination of reduced emotional intelligence and increased exposure to unregulated online environments places adolescents at heightened risk for manipulative, harmful, or exploitative digital encounters. This mechanism helps explain why some adolescents experience not only psychological consequences but also increased susceptibility to grooming, hostile interactions, and extremist narratives in gaming ecosystems. The dual risk model therefore provides a conceptual foundation for understanding how emotional vulnerabilities and digital environments interact to shape youth safety.

The study also underscores the academic consequences of gaming addiction. Reduced sleep, impaired attention, and diminished emotional regulation contribute to lower school engagement and academic performance. These findings highlight the need to view academic difficulties not merely as time management issues but as part of a broader constellation of emotional and behavioral challenges associated with digital dependency.

The implications of this research extend to multiple sectors. Educators can implement social emotional learning, digital citizenship programs, and prevention strategies that help adolescents identify risky digital behaviors and build emotional resilience. Families can benefit from guidance on active mediation, shared digital agreements, and monitoring tools that encourage balanced gaming habits. Policymakers may consider national guidelines that promote digital well-being, regulate high risk gaming practices, and ensure cybersecurity literacy for youth. Digital platforms have an opportunity to adopt safety focused design features such as intelligent content moderation, age appropriate restrictions, and transparent reporting mechanisms. Mental health professionals can integrate emotional intelligence training and cognitive behavioral strategies into interventions for gaming related difficulties.

Future research should examine these relationships longitudinally to determine how emotional intelligence and digital exposure evolve over time. Expanding the study across diverse cultural and socioeconomic contexts would deepen understanding of global variations in gaming behaviors and vulnerabilities. Further work is also needed to explore emerging technologies such as virtual and augmented reality, which may amplify immersive risks or introduce new safety concerns.

Overall, this study provides timely empirical evidence that gaming addiction influences adolescents in multidimensional ways. By demonstrating the interconnected roles of emotional intelligence, digital environments, and behavioral dependency, the research contributes an interdisciplinary perspective that can inform policy, educational practice, family intervention, and the design of safer digital ecosystems. Ensuring adolescent well-being in the digital age requires a balance between embracing the cognitive benefits of gaming and establishing safeguards that protect emotional development and online safety.

simultaneously.

The study also reveals that although males demonstrate higher levels of addiction, the social and emotional consequences of gaming dependency are equally severe across genders. This finding underscores the universality of the addiction impact and

challenges assumptions that certain demographic groups are naturally more resilient to digital immersion.

The implications of this research extend to schools, families, policymakers, and digital platforms. Schools should integrate digital well-being and emotional intelligence programs into their curricula and provide structured support for students demonstrating problematic gaming habits. Families must adopt proactive digital mediation strategies and foster open communication about online experiences. Policymakers should develop national frameworks for safer gaming environments and regulate underage gaming engagement. Game developers and platforms have a responsibility to implement stronger moderation systems and build features that promote healthier usage patterns.

Ultimately, this study emphasizes that the goal is not to prohibit gaming but to guide adolescents toward healthier, balanced digital engagement. As digital environments continue to expand, protecting adolescents will require coordinated action that strengthens emotional resilience, enhances digital literacy, and establishes safer online ecosystems. Addressing the risks identified in this study will support the long-term well-being, social development, and academic success of young people navigating an increasingly immersive digital world.

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