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Behavioral, Social, and Health Outcomes Associated with Video Game Addiction: A Systematic Literature Review

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ABSTRACT

Video game addiction, recognized as Gaming Disorder in the ICD-11, affects an estimated 3% of gamers worldwide, yet evidence on its consequences is scattered across behavioral, social, and health research. This systematic review aimed to identify and synthesize empirical evidence on the behavioral, social, and health outcomes associated with video game addiction in individuals. Following the PRISMA 2020 guideline, Web of Science and Scopus were searched for studies published from January 2018 to June 2023. Of 85 records identified, 46 were screened, 19 were assessed in full text, and 14 quantitative studies were included. Study quality was assessed against four predefined criteria, and the findings were synthesized narratively by outcome domain. Behaviorally, addiction was linked to achievement and escapist motivations, compensatory gaming under stress, and comorbid hyperkinetic and conduct problems, while associations with academic performance were inconsistent. Socially, disordered gaming predicted lower perceived social competence and was reciprocally related to loneliness, and offline social support buffered its link with depression. In terms of health, addiction was associated with depression, anxiety, lower self-esteem and life satisfaction, and neck pain. Because most studies were cross-sectional and several associations were bidirectional, the evidence indicates association rather than causation. Schools and families should address emotional difficulties, coping, and offline social support alongside gaming behavior, and longitudinal and intervention studies are needed.

Keywords: Gaming Disorder; Internet Gaming Disorder; Mental Health; Problematic Gaming; Systematic Review

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INTRODUCTION

Video gaming is one of the most widespread leisure activities worldwide, and for a minority of players it develops into a pattern of uncontrolled use with significant functional impairment. The World Health Organization formally recognized this pattern as Gaming Disorder in the 11th Revision of the International Classification of Diseases (ICD-11) (World Health Organization, 2019), and the DSM-5 lists Internet Gaming Disorder (IGD) as a condition for further study (American Psychiatric Association, 2013). Meta-analyses estimate the global prevalence of gaming disorder at approximately 3.05% (Stevens et al., 2021) to 3.3% (Kim et al., 2022), with substantially higher rates among males and adolescents. Problematic gaming has also been associated with a wide range of adverse health-related outcomes (Männikkö et al., 2020), making it a relevant concern for families, schools, and health services.

In this review, *video game addiction* refers to a persistent pattern of gaming characterized by impaired control over gaming, increasing priority given to gaming over other interests and daily activities, and continuation despite negative consequences, resulting in significant impairment (American Psychiatric Association, 2013; King, Delfabbro, et al., 2018; World Health Organization, 2019). Two theoretical models frame how such outcomes may arise. The Interaction of Person–Affect–Cognition–Execution (I-PACE) model proposes that predisposing characteristics (e.g., psychopathology, temperament) interact with affective and cognitive responses to gaming cues, reinforcement, and reduced executive control, so that gaming gradually shifts from being driven by gratification to being driven by compensation (Brand et al., 2016, 2019). The compensatory internet use model similarly argues that problematic use often reflects an attempt to cope with negative life situations such as stress, loneliness, or social anxiety (Kardefelt-Winther, 2014). In-game reward structures, such as level progression, rank promotions, and virtual items, can further strengthen these processes

and contribute to tolerance (King, Herd, et al., 2018). Both models imply that outcomes of addictive gaming may be bidirectional and may span behavioral, social, and health domains.

Several systematic reviews and meta-analyses have already examined specific consequences of problematic gaming. Männikkö et al. (2020) synthesized 50 studies and found associations with depression, anxiety, obsessive–compulsive symptoms, and somatization; Ostinelli et al. (2021) estimated that roughly one in three individuals with IGD presents with comorbid depression; Kristensen et al. (2021) linked problematic gaming to shorter sleep and poorer sleep quality; and Cheng et al. (2018), in a meta-analysis covering 20 countries, found that IGD was consistently associated with psychological problems and positively associated with interpersonal problems. However, these reviews each focus on a single outcome domain and are largely oriented towards clinical or public health audiences. Evidence that integrates behavioral (including academic), social, and health outcomes within one framework, and that distinguishes addiction from mere gaming time, remains limited, particularly for the period following the inclusion of Gaming Disorder in ICD-11.

The novelty of this review lies in (a) mapping the behavioral, social, and health outcomes of video game addiction simultaneously within the I-PACE and compensatory use frameworks, (b) explicitly distinguishing addictive gaming from heavy but non-problematic engagement when interpreting the evidence, and (c) deriving implications for educators and parents, who are often the first to observe the consequences of problematic gaming among children, adolescents, and students. Accordingly, the objective of this systematic literature review is to identify and synthesize empirical evidence on the behavioral, social, and health outcomes associated with video game addiction in individuals. The objective, research question, and review framework are summarized in Table 1.

Table 1. Objective, research question, and PEO framework of the review

Element	Description
Research objective	To identify and synthesize empirical evidence on the behavioral, social, and health outcomes associated with video game addiction in individuals.
Research question	What behavioral, social, and health outcomes are associated with video game addiction in individuals?
Population (P)	Individuals of any age (children, adolescents, university students, and adults).
Exposure (E)	Video game addiction, gaming disorder, internet gaming disorder, or problematic/excessive gaming.
Outcomes (O)	Behavioral (including academic), social, and physical or mental health outcomes.

METHOD

This review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement (Page et al., 2021). The review proceeded through identification, screening, eligibility assessment, quality appraisal, data extraction, and synthesis. The study selection process is presented in Figure 1.

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Vol. 3, No. 2, 2025

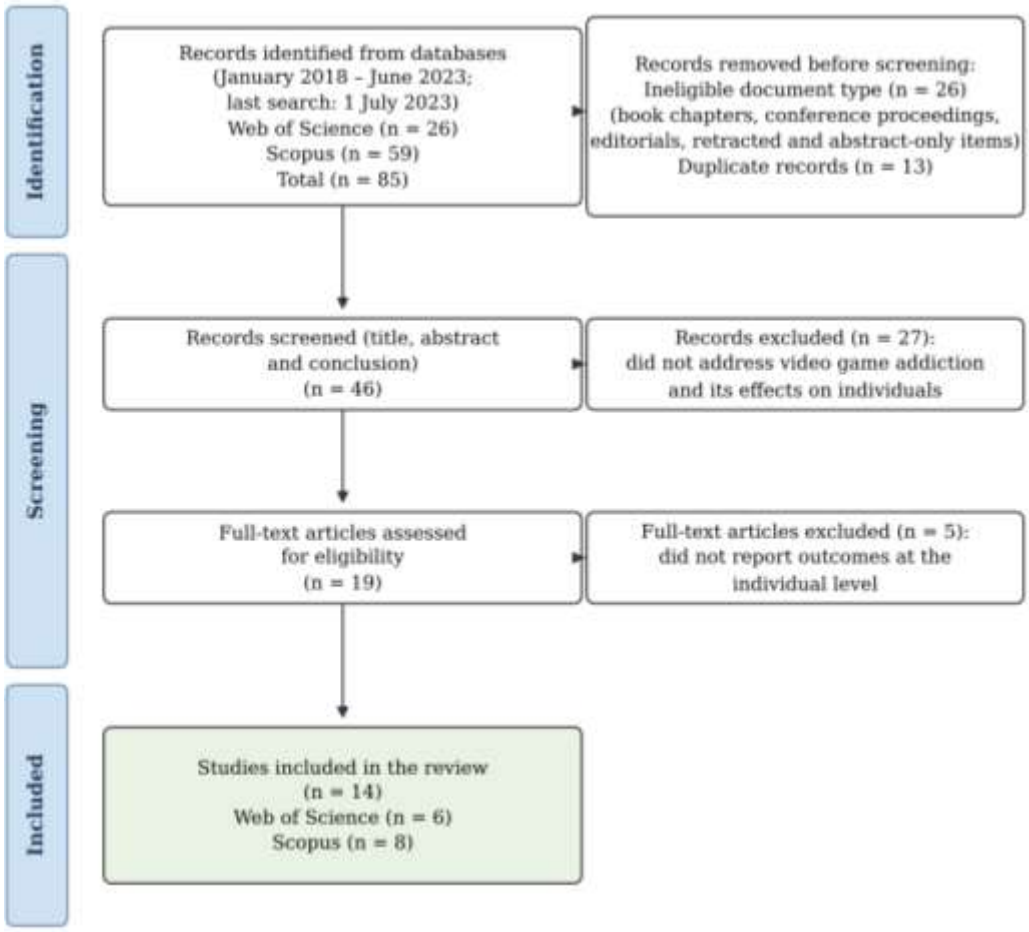


Figure 1. PRISMA 2020 flow diagram of the study selection process

Identification

The search strategy combined three concept blocks: (1) gaming (video game, online game), (2) the addiction construct (addicted, obsessive, compulsive), and (3) outcomes (effects, consequence, outcome). Synonyms and related terms were derived from online thesauri and from the keywords of previous studies.

The search was conducted in the Web of Science Core Collection and Scopus, two multidisciplinary databases with extensive coverage of peer-reviewed literature in psychology, health sciences, and education. The search covered publications from January 2018 to June 2023 and was last run on 1 July 2023. This period covers the five years preceding data collection, including the years in which Gaming Disorder was formally recognized in ICD-11. Searches were applied to the topic field (title, abstract, and keywords) in both databases; the exact search strings are shown in Table 2.

Table 2. Search strings

Database	Search string
Web of Science (n = 26)	TS=(("effects*" OR "consequence*" OR "outcome*") AND ("addicted" OR "obsessive" OR "compulsive") AND ("video game" OR "online game"))
Scopus (n = 59)	TITLE-ABS-KEY(("effects*" OR "consequence*" OR "outcome*") AND ("addicted" OR "obsessive" OR "compulsive") AND ("video game" OR "online game"))

Screening

Records were first filtered by document type; book chapters, conference proceedings, editorials, retracted articles, and abstract-only records were removed (n = 26). Duplicate records retrieved from both databases were then removed (n = 13). The titles, abstracts, and conclusions of the remaining 46 records were screened against the inclusion and exclusion criteria in Table 3. Eligible designs were empirical quantitative studies (cross-sectional, longitudinal, or experimental) reporting primary data.

https://doi.org/10.59923/joinme.v3i2.441
Vol. 3, No. 2, 2025

Table 3. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Publication period	January 2018 – June 2023	Published outside the search period
Publication type	Peer-reviewed journal article reporting primary data	Reviews, book chapters, conference proceedings, editorials, retracted and abstract-only records
Language	English	Other languages
Population	Individuals of any age	Studies reporting only aggregate (e.g., national or market-level) data
Exposure	Video game addiction, gaming disorder, IGD, or problematic/excessive gaming	Gaming studies without any measure of addictive, problematic, or excessive gaming
Study design	Empirical quantitative design (cross-sectional, longitudinal, or experimental)	Qualitative studies, case reports, and non-empirical papers
Outcomes	Behavioral, social, or health outcomes at the individual level	Outcomes not related to the individual (e.g., game design, marketing)

Eligibility

Nineteen full-text articles were assessed for eligibility, and five were excluded because they did not report outcomes at the individual level, leaving 14 studies for the review (Web of Science n = 6; Scopus n = 8).

Quality Assessment

A quality assessment was carried out to evaluate whether each study was adequate to answer the research question. Four criteria were applied (Table 4): the study presents its findings, provides empirical evidence for those findings, presents its objectives and results clearly, and uses appropriate and sufficient references. Each criterion was scored 1 if met and 0 if not met, giving a maximum score of 4. Only studies that achieved the maximum score of 4 were included in the synthesis.

Table 4. Quality assessment criteria

Criterion	Score
The study presents its findings	1 = met; 0 = not met
The study provides empirical evidence for its findings	1 = met; 0 = not met
The research objectives and results are clearly presented	1 = met; 0 = not met
The references used are appropriate and sufficient	1 = met; 0 = not met

Data Extraction and Synthesis

Data were extracted with a standardized form that captured the author(s), year, country, study design, sample characteristics, gaming measure, outcomes, and main findings of each study (Table 6).

Because the included studies differed in design, measures, and outcomes, a meta-analysis was not appropriate. The findings were therefore synthesized narratively following the Synthesis Without Meta-analysis (SWiM) guideline (Campbell et al., 2020). Findings were coded deductively into the three outcome domains defined in the research question, namely behavioral, social, and health outcomes, and within each domain the direction, consistency, and design-based strength of the associations were compared. The domains were then re-examined to ensure that they addressed the research question.

RESULTS AND DISCUSSION

The 14 included studies were published between 2018 and 2021 (2018: n = 2; 2020: n = 4; 2021: n = 8), and no eligible study published between 2022 and June 2023 was identified (Figure 2). Ten studies collected data at a single time point (nine cross-sectional surveys, including one repeated cross-sectional comparison, and one laboratory-based comparison) and four used a longitudinal design. Five studies examined children or adolescents, five examined university students, and four examined adult or mixed-age gamers.

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Vol. 3, No. 2, 2025

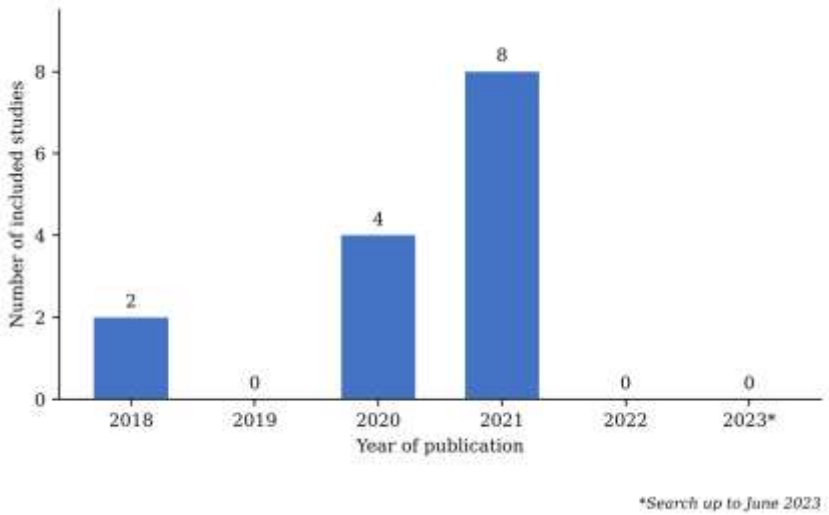


Figure 2. Number of included studies by year of publication (n = 14)

The studies were conducted in 12 countries, namely Germany (n = 2), the United States, Saudi Arabia, Malaysia, Belgium, South Korea, Ghana, the Netherlands, Canada, Iran, the United Kingdom, and Norway, and one study used an international online sample of players. The country of each study is reported in Table 6.

The studies were published in 12 journals in the fields of psychology, psychiatry, public health, medicine, and information systems, with *Frontiers in Psychology* and the *International Journal of Environmental Research and Public Health* each contributing two articles (Table 5).

Table 5. Number of articles by journal

Journal	No. of Articles
Behaviour & Information Technology	1
Cyberpsychology-Journal of Psychosocial Research on Cyberspace	1
Decision Support Systems	1
Entertainment Computing	1
Frontiers in Psychology	2
Heliyon	1
Psychiatry and Clinical Psychopharmacology	1
International Journal of Environmental Research and Public Health	2
JAMA Network Open	1
Journal of Behavioral Addictions	1
Journal of Research in Health Sciences	1
Malaysian Journal of Medicine and Health Sciences	1
Total	14

Table 6 summarizes the characteristics of the included studies and the outcome domains they informed. Ten studies reported behavioral outcomes, five reported social outcomes, and nine reported health outcomes; most studies contributed to more than one domain.

Table 6. Characteristics of the included studies and distribution of outcome domains

Author(s) (year)	Country	Design; sample	Main findings relevant to the review	B	S	H
Kewitz et al. (2021)	Germany	Cross-sectional; outpatient psychotherapy patients aged 5–17 (n = 358)	IGD criteria met by 4.0% (self-report) and 14.0% (parent report) of 11–17-year-olds; hyperkinetic, anxiety and conduct disorders were the most frequent co-occurring diagnoses	✓		✓

https://doi.org/10.59923/joinme.v3i2.441
Vol. 3, No. 2, 2025

Author(s) (year)	Country	Design; sample	Main findings relevant to the review	B	S	H
Wang et al. (2021)	United States	Cross-sectional; undergraduate students (n > 400)	Achievement motivation and escapism predicted psychological ownership of the game world, which was linked to online game addiction	✓		
Adžić et al. (2021)	Saudi Arabia	Cross-sectional; university students	High-achieving students spent comparatively more time gaming but maintained high GPAs	✓		
Koban et al. (2022)	Germany	Cross-sectional online survey; mostly heavy gamers	Results supported compensatory gaming; perceived stress strengthened links between gaming behaviors and adverse outcomes; obsessive engagement explained adverse outcomes	✓	✓	
Arif Roslan et al. (2021)	Malaysia	Cross-sectional; undergraduate students	Game addiction was associated with psychosocial effects but not with academic performance	✓	✓	
Gros et al. (2020)	Belgium	Laboratory-based mixed design; addicted vs non-addicted gamers	Addicted gamers tended to confuse short-term pleasure with happiness when describing their emotional states	✓		✓
Kim & Lee (2021)	South Korea	Repeated cross-sectional; adolescents (n = 3,040 in 2018; n = 2,906 in 2020)	Four gaming profiles identified; addictive profile 3.5% (2018) and 2.3% (2020); only the addictive profile increased gaming time after the onset of COVID-19; males over-represented in higher-risk profiles	✓		
Miezah et al. (2020)	Ghana	Cross-sectional; university students (n = 263)	Addiction prevalence 12.2% (monothetic) and 31.2% (polythetic); addiction related to more gaming time, more depression and lower self-esteem; higher among males	✓		✓
Van Den Eijnden et al. (2018)	Netherlands	Longitudinal (3 waves); adolescents aged 12–15 (n = 538)	Disordered gaming predicted lower life satisfaction and lower perceived social competence; heavy non-disordered gaming predicted higher social competence	✓	✓	✓
Li et al. (2021)	Canada	Longitudinal cohort; children and youth aged 2–18 (n = 2,026)	In older children, more video game time was associated with more depression, irritability, inattention and hyperactivity	✓		✓
Sibilla et al. (2021)	International	Longitudinal (3 waves); adult MMORPG players (n = 147)	Low self-esteem and low meaningful life predicted later obsessive involvement in gaming			✓
Heidarimoghadam et al. (2020)	Iran	Cross-sectional; university students (n = 665)	Online game and social network addiction associated with a higher risk of neck disorders (weak predictive ability, AUC = 0.58)			✓
Moge & Romano (2020)	United Kingdom	Cross-sectional; gamers (n = 135)	Withdrawal/resignation coping mediated links between addiction and depression, anxiety and stress; offline social support partially mediated the link with depression		✓	✓
Krossbakken et al. (2018)	Norway	Longitudinal (3 waves); adolescents and young adults (n = 2,059 at baseline)	Depression and loneliness were reciprocally related to pathological gaming; anxiety was a consequence of pathological gaming		✓	✓

Note. B = behavioral outcomes; S = social outcomes; H = health outcomes. All included studies obtained the maximum quality assessment score (4 of 4).

https://doi.org/10.59923/joinme.v3i2.441
Vol. 3, No. 2, 2025

Behavioral Outcomes

The behavioral evidence indicates that addictive gaming is closely tied to the motivations and emotional regulation processes underlying play. Wang et al. (2021) found that achievement motivation and escapism predicted players' psychological ownership of the virtual world, which in turn was linked to online game addiction. Koban et al. (2022) showed that gaming served a compensatory function: perceived stress strengthened the links between gaming behaviors and adverse outcomes, and obsessive rather than harmonious engagement explained these outcomes. In a laboratory-based comparison, Gros et al. (2020) observed that addicted gamers tended to confuse short-term pleasure with happiness when describing their emotional states. Together, these findings are consistent with the compensatory internet use model (Kardefelt-Winther, 2014) and with the I-PACE model, in which gaming that is initially driven by gratification becomes increasingly driven by the need to escape negative affect (Brand et al., 2019).

The behavioral features reported in the included studies correspond to the core diagnostic components of addictive internet use, namely excessive use, withdrawal, tolerance, and negative repercussions (Block, 2008), which are reflected in the DSM-5 criteria for IGD and the ICD-11 criteria for Gaming Disorder (American Psychiatric Association, 2013; World Health Organization, 2019). Among children and adolescents in outpatient psychotherapy, Kewitz et al. (2021) found that 4.0% of 11–17-year-olds met IGD criteria by self-report and 14.0% by parental report, and that hyperkinetic disorders, followed by anxiety, conduct, mood, and obsessive–compulsive disorders, were the most frequent co-occurring diagnoses. These diagnoses should be understood as comorbidities rather than consequences of gaming. In a community cohort, Li et al. (2021) found that more video game time in older children was associated with more inattention and hyperactivity, but this study measured gaming time rather than addiction. Population-level data from South Korea showed that the proportion of adolescents in the addictive gaming profile was small (3.5% in 2018 and 2.3% in 2020), although only this profile increased its gaming time after the onset of the COVID-19 pandemic (Kim & Lee, 2021). Males consistently showed more gaming time and higher addiction scores (Kim & Lee, 2021; Miezah et al., 2020), which is in line with prevalence meta-analyses (Kim et al., 2022; Stevens et al., 2021).

Findings on academic outcomes were inconsistent. Adžić et al. (2021) reported that high-achieving students spent comparatively more time gaming yet maintained high GPAs, and Arif Roslan et al. (2021) found that game addiction was associated with psychosocial effects but not with academic performance. In the longitudinal study by Van Den Eijnden et al. (2018), lower school performance was predicted by heavy social media use rather than by gaming. These mixed results suggest that the association between video game addiction and academic achievement is weaker and less direct than is often assumed. Two features of the evidence may explain the inconsistency. First, some studies measured gaming time rather than addiction. Second, academic outcomes depend strongly on study time and intellectual ability. Academic difficulties may therefore be both a risk factor for and a consequence of problematic gaming.

Social Outcomes

The social outcomes of video game addiction appear to depend on whether gaming is problematic rather than on how much a person plays. In a three-wave study of Dutch adolescents, disordered gaming symptoms predicted lower perceived social competence, whereas heavy but non-disordered gaming predicted higher social competence (Van Den Eijnden et al., 2018). Loneliness was reciprocally related to pathological gaming over time (Krossbakken et al., 2018), and loneliness and social interaction anxiety moderated the links between gaming behaviors and adverse outcomes (Koban et al., 2022). Social support also played a protective role: offline, but not online, perceived social support partially mediated the association between gaming addiction and depression (Moge & Romano, 2020). These findings support the compensatory model, in which socially isolated or anxious individuals may turn to gaming to meet social needs that are not fulfilled offline, which can in turn reinforce isolation (Kardefelt-Winther, 2014). They are also consistent with a multinational meta-analysis showing that IGD is positively associated with interpersonal problems, although the strength of this association varies across countries (Cheng et al., 2018). None of the included studies examined family functioning or marital outcomes, so conclusions about these outcomes cannot be drawn from the present evidence.

Health Outcomes

Mental health outcomes were the most frequently reported health outcomes. Video game addiction was associated with higher depression and lower self-esteem among university students (Miezah et al., 2020) and with lower life satisfaction among adolescents (Van Den Eijnden et al., 2018). Moge and Romano (2020)

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Vol. 3, No. 2, 2025

found that withdrawal and resignation coping mediated the links between addiction and symptoms of depression, anxiety, and stress. The longitudinal evidence suggests that these relationships are bidirectional. Krossbakken et al. (2018) found that depression and pathological gaming were reciprocally related, whereas anxiety emerged as a consequence of pathological gaming (Figure 3), and Sibilla et al. (2021) showed that low self-esteem and a low sense of meaningful life predicted later obsessive involvement in online role-playing games. This pattern is consistent with the I-PACE model, in which psychological vulnerabilities act both as predisposing factors and as consequences of addictive behavior (Brand et al., 2016, 2019). It is also consistent with previous meta-analyses linking problematic gaming to depression and anxiety (Männikkö et al., 2020; Ostinelli et al., 2021).



Figure 3. Model of the response mechanism of video gaming on depression, loneliness, and pathological gaming (adapted from Krossbakken et al., 2018; published under a CC BY licence)

Evidence on physical health outcomes was limited. Among 665 university students, addiction to online games and social networks was associated with a higher risk of neck disorders, although its ability to predict neck pain was weak (Heidarimoghadam et al., 2020). None of the included studies assessed sleep, physical activity, or visual outcomes. External meta-analytic evidence nevertheless links problematic gaming to shorter sleep and poorer sleep quality (Kristensen et al., 2021), which indicates an important gap for future primary studies.

Limitations

The findings should be interpreted in light of several limitations. With regard to the evidence base, 10 of the 14 studies collected data at a single time point, most relied on self-report measures, the instruments used to assess addiction were heterogeneous, and two studies measured gaming time rather than addiction; the associations reported therefore cannot be interpreted causally. With regard to the review process, only two databases and English-language journal articles were searched, and the search terms did not include the terms *gaming disorder*, *internet gaming disorder*, or *problematic gaming*, which may have reduced the sensitivity of the search. The search covered publications up to June 2023, and the small number of included studies limits the generalizability of the synthesis. Future reviews should use broader search terms and additional databases such as PubMed and APA PsycINFO. In addition, study quality was assessed with four general criteria rather than a validated appraisal tool, so future reviews should apply instruments such as the Mixed Methods Appraisal Tool.

Implications for Education and Practice

The evidence has several implications for educators, parents, and practitioners. Because academic difficulties, stress, loneliness, and low self-esteem may precede as well as follow problematic gaming, school-based prevention should address emotional regulation, coping skills, and offline social support, and not only screen time. Counselors and teachers should distinguish heavy but healthy engagement from addictive gaming,

which is defined by impaired control and functional impairment, so that students are not pathologized unnecessarily. Students who show signs of gaming problems should also be screened for co-occurring conditions such as attention, anxiety, and mood difficulties.

CONCLUSION

This systematic review synthesized 14 quantitative studies to identify the behavioral, social, and health outcomes associated with video game addiction. Behaviorally, addiction was linked to achievement and escapist motivations, compensatory gaming under stress, and co-occurring hyperkinetic and conduct problems, while its association with academic performance was inconsistent. Socially, disordered rather than heavy gaming was associated with lower social competence and was reciprocally related to loneliness, with offline social support acting as a protective factor. In terms of health, addiction was associated with depression, anxiety, lower self-esteem and life satisfaction, and neck pain. Because most of the evidence is cross-sectional and several associations are bidirectional, these outcomes should be understood as correlates rather than proven effects. Prevention efforts by schools and families should therefore target coping, emotional difficulties, and offline social support alongside gaming behavior. Future research should use longitudinal and intervention designs with validated ICD-11-based measures and should examine understudied outcomes such as sleep, physical health, and family functioning.

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