Research Article

Gaming Quantity Versus Problematic Gaming in Adolescents And Young Adults: A Systematic Review of Mental Health and Functional Outcomes

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Abstract

Public debate about gaming-related harm tends to treat time spent playing as the exposure of interest, yet diagnostic frameworks define gaming disorder through impaired control, increasing priority given to gaming, and interference with everyday functioning. This systematic review compared how gaming quantity and problematic or disordered gaming relate to mental health and functional outcomes in adolescents and young adults. We searched PubMed/MEDLINE on 30 August 2026 using three Boolean queries and retrieved the 50 most relevant records returned by each. Screening covered 95 unique records, of which 27 empirical studies met the eligibility criteria. Because extraction was carried out at the level of published abstracts and no formal risk-of-bias appraisal was undertaken, the evidence was synthesized narratively. Of the included studies, 20 were cross-sectional, six were longitudinal or cohort studies, and one was a case-control study. Across outcome domains, validated problematic-gaming and gaming-disorder measures were associated with depression, anxiety, sleep disruption, aggression, suicidality, and poorer academic or social functioning more consistently than gaming duration alone. In the clearest paired analysis, associations were much larger for internet gaming disorder than for excessive leisure screen time. Direction of effect was another matter: some longitudinal studies linked gaming-disorder symptoms with later adverse outcomes, whereas others found that baseline psychopathology predicted later gaming disorder, or reported effects running in both directions. The distinction between quantity and a pattern of impaired control and functional interference therefore appears clinically meaningful. Conclusions nevertheless remain provisional, given retrieval from a single database with relevance-capped records, screening by one reviewer with automated assistance, and the predominance of cross-sectional designs among the included studies.

Keywords: gaming disorder, internet gaming disorder, problematic gaming, gaming quantity, adolescent mental health, systematic review.

Introduction

Gaming Quantity Versus Problematic Gaming in Adolescents and Young Adults: A Systematic Review of Mental Health and Functional Outcomes

For many adolescents and young adults, digital gaming is simply part of ordinary leisure. Concern about its psychological consequences, however, tends to be compressed into a dose question that only looks simple: how many hours of gaming are too many? The appeal of that framing is obvious, since hours are easy to ask about and easy to measure. The difficulty is that it places ordinary high engagement and clinically meaningful impairment on a single continuum before establishing that the two represent the same exposure.

Diagnostic accounts draw the boundary elsewhere. In the International Classification of Diseases, 11th Revision, gaming disorder is characterized by impaired control over gaming, by increasing priority given to gaming over other activities, and by continuation or escalation of play despite negative consequences (Fuchs et al., 2024). Duration may accompany that pattern; it is not the defining criterion. Network analysis spanning several screening instruments points the same way, locating gaming-disorder status at the center of a wider set of diagnostic and functional features even where the instruments were derived from different diagnostic traditions (Martončik et al., 2024). What the construct describes, then, is a pattern of dysregulation and interference rather than a count of hours.

This matters for measurement. Gaming quantity, problematic gaming, internet gaming disorder, gaming disorder, and general screen time are not interchangeable, even where they are reported side by side. Quantity describes duration or frequency. Problematic gaming generally indexes symptom severity or risk, and does not always require a formal diagnosis. Internet gaming disorder and gaming disorder are criterion-based constructs, although the instruments and diagnostic frameworks used across

studies vary. Screen time is broader again and may include activities that involve no gaming at all. Collapsing these measures into a generic category of gaming exposure makes it difficult to determine whether poorer outcomes track time, impaired control, functional interference, or some combination of them.

Longitudinal work adds weight to the question. Amendola et al. (2025) meta-analyzed 30 longitudinal studies, having excluded time-only measures, and reported small-to-medium prospective associations between gaming disorder and several internalizing or well-being outcomes in both directions. Gaming-disorder symptoms predicted later depression and lower life satisfaction in parts of that evidence base; depression, anxiety, loneliness, and related difficulties predicted later gaming disorder in others. Causal language sits awkwardly with so reciprocal a pattern. It also leaves open whether hours of play carry comparable associations, since quantity-only studies fell outside that meta-analysis.

The unresolved issue is therefore comparative rather than merely descriptive. Among adolescents and young adults, are mental health and functional outcomes related more consistently to gaming quantity, or to the impaired-control and interference pattern that problematic-gaming and gaming-disorder measures are designed to capture? To address that question, the present review synthesizes studies that measured gaming duration or frequency, a validated problematic or disordered-gaming construct, or both, together with at least one mental health or functional outcome. Studies that assessed both forms of exposure in the same sample receive particular attention, as does longitudinal evidence bearing on temporal direction.

Method

The review was organized with reference to PRISMA 2020 reporting guidance (Page et al., 2021). How far that guidance could be applied was bounded by the procedures actually undertaken: a single search source, PubMed/MEDLINE; relevance-capped retrieval; screening by one reviewer with automated support; and extraction at abstract level. These features are stated directly below rather than presented as the equivalent of an exhaustive, dual-reviewer systematic review.

Eligibility Criteria

Studies were eligible if they were peer-reviewed, empirical, published in English, and reported (a) a quantifiable gaming exposure, defined as gaming duration or frequency, high engagement, or a validated problematic-gaming or gaming-disorder measure; (b) at least one mental health or functional outcome; and (c) an adolescent or young-adult sample with a stated or inferable mean age of approximately 12–28 years. Depression, anxiety, psychological distress, well-being, sleep, aggression, suicide-related ideation or behavior, academic functioning, and social or family functioning all counted as eligible outcomes. Case reports, editorials, conference abstracts, theoretical or narrative articles without original data, and treatment or intervention trials were excluded. Also excluded were studies of general internet or technology use without a gaming-specific exposure, and studies in which gaming disorder itself was the only outcome rather than the exposure of interest.

Information Sources and Search Strategy

We searched PubMed/MEDLINE on 30 August 2026 and placed no restriction on publication year. Three complementary Boolean queries combined gaming-related terms with population terms and outcome terms, and PubMed automatic term mapping was permitted. The search strings were as follows:

Query A (mental health outcomes): (gaming disorder OR problematic gaming OR gaming addiction OR internet gaming disorder OR excessive gaming) AND (adolescent OR young adult) AND (depression OR anxiety OR distress OR wellbeing OR sleep OR academic OR aggression)

Query B (social and academic outcomes): (gaming disorder OR problematic gaming OR gaming addiction OR internet gaming disorder OR excessive gaming) AND (adolescent OR young adult) AND (loneliness OR life satisfaction OR social functioning OR family functioning OR school)

Query C (comparative or paired exposure): (gaming disorder OR problematic gaming OR gaming addiction OR internet gaming disorder) AND (gaming time OR time spent gaming OR hours gaming OR gaming duration OR gaming frequency OR high engagement OR gaming intensity)

Match counts for the three queries ranged from 2,858 to 5,524. For each query we retrieved the 50 records that PubMed ranked as most relevant, which produced 150 records before deduplication. Retrieval was thus relevance-capped rather than exhaustive. The resulting set is best read as a focused sample of the highest-ranked PubMed records, not as complete coverage of all eligible literature.

Selection Process

Deduplication left 95 unique records. An automated keyword-coding pass flagged the apparent exposure type, outcome domain, design signals, and age-group information for each record and assigned a preliminary screening category. The reviewer then read the complete title and abstract of every record considered potentially eligible and checked it against the prespecified criteria. Automated coding served an organizing function; eligibility itself was decided through reviewer assessment. Because one reviewer rather than an independent pair carried out screening, interrater agreement was not estimable.

Data Extraction and Evidence Synthesis

For each included study, the reviewer recorded the author and year, country where the abstract stated it, design, sample size and age information, gaming exposure, outcome domains, and key findings. Extraction drew only on information available in the published abstracts. Findings were then compared narratively across exposure type, outcome domain, and design. Standardized effect sizes were not extracted from full texts, and no pooled estimate, heterogeneity statistic, subgroup analysis, or sensitivity analysis was performed. The synthesis is consequently a narrative systematic review rather than a meta-analysis.

Risk of Bias and Quality Appraisal

No formal standardized risk-of-bias or methodological-quality appraisal was conducted during this review cycle. Study design is reported for every included study as a limited transparency indicator, but a design label is not a substitute for a domain-based appraisal. One consequence of the absence of formal appraisal is that no study was excluded or weighted according to methodological quality.

Results

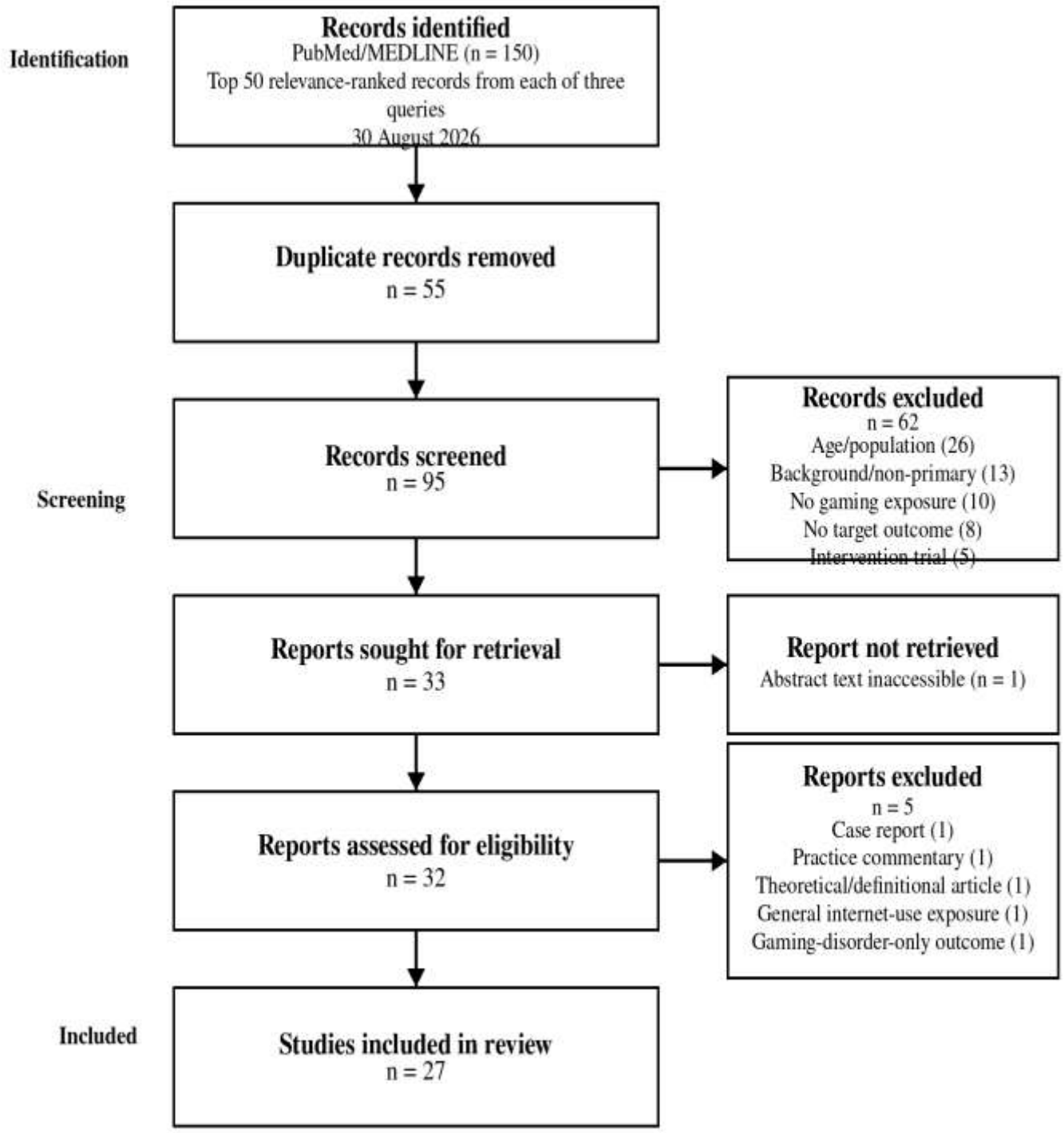
Study Selection

The three searches produced 150 retrieved records, and removing 55 duplicates left 95 unique records for screening. Sixty-two records were excluded during title and abstract screening, leaving 33 reports sought for retrieval. One could not be retrieved because its abstract text was inaccessible. Of the 32 reports assessed for eligibility, five were excluded: a case report, a nonempirical practice commentary, a theoretical or definitional article, a study of general internet use rather than a gaming-specific exposure, and a study in which gaming disorder was the outcome rather than a downstream mental health or functional outcome. That left 27 studies for the final narrative synthesis, with the counts reconciling at each stage (Figure 1).

Study Characteristics

The 27 included studies appeared between 2020 and 2026 (Table 1). A design audit of the included-study table identified 20 cross-sectional studies, six longitudinal or cohort studies, and one case-control study; this distribution corrects the inconsistent design counts in the source narrative. Sample sizes spanned a wide range, from 90 adolescents in a clinical cross-sectional study (İçen et al., 2025) to 94,020 participants at baseline in a population-based longitudinal study (Meng et al., 2024). Nine studies were conducted in East Asia, eight of them in mainland China and one in Japan. Five came from the Middle East and North Africa, six from the Americas, one from Europe, and one from South Asia, while country was not stated in the abstract for five studies. In aggregate the evidence base is large, but it is geographically concentrated and weighted heavily toward cross-sectional designs.

Figure 1 Flow of Records Through Identification, Screening, and Inclusion



Note. For each query, retrieval was restricted to the 50 records ranked most relevant by PubMed. The counts describe a focused single-database review process and should not be interpreted as exhaustive retrieval.

Table 1 Characteristics of Included Studies

Study and Country	Design and Sample	Gaming Exposure	Outcome Domains	Key Finding
Severo et al. (2020) Brazil	Cross-sectional Approximately 555 secondary/posts econdary students	Gaming hours/free-time gaming; GAS; IGDS9-SF	Depression (BDI); sleep (PSQI); social phobia	IGD symptoms were reported by 38.2%; symptoms were associated with male gender, severe depressive symptoms, poor sleep quality, and more gaming time.
Ohayon and Roberts (2021) United States	Cross-sectional; two survey waves 2,984 university students	At least 15 hr/week plus at least five symptoms (combined IGD definition)	Sleep; depression; social anxiety; daytime functioning	A total of 5.3% met the combined IGD definition; this group reported more suicidality, depression, social anxiety, nonrestorative sleep, and poorer health.
Macur and Pontes (2021) Slovenia	Cross-sectional 1,071 eighth graders (M = 13.44 years)	Gaming frequency; IGD risk classification	Life satisfaction; mental health; self-control	High-risk gamers (4.7%) had lower self-control and poorer parent-child relationships, but life satisfaction and self-reported mental health did not differ significantly by risk group.
Peng et al. (2025) China	Longitudinal cohort; three waves 16,833 adolescents (M = 13.40 years)	Gaming time; IGDS9-SF trajectories (GMM)	Depression; anxiety; sleep; suicidal ideation; conduct; hyperactivity; well-being	Four IGD trajectories were identified. The moderate-risk-increasing group had elevated later risk; the high-risk-decreasing group showed minimal or no adjusted difference from the low-risk-stable group.
Deng et al. (2026) China	Cross-sectional 13,240 adolescents (M = 15.4 years)	Leisure screen time and IGDS9-SF, modeled independently	Psychological distress; depression; paranoia; insomnia; suicidal ideation	Both exposures were associated with poorer mental health, but IGD estimates were much larger (e.g., depression OR = 6.43 for IGD vs. 1.16 for excessive leisure screen time).
Nakayama et al. (2020) Japan	Cross-sectional 549 junior-high students	Age at habitual-gaming onset; IGDT-10	Sleep timing	Problematic gamers had later bedtimes and wake times; habitual gaming before age 5 predicted greater problematic-gaming risk.
Joshi et al. (2022) Nepal	Cross-sectional 417 students (M = 17 years)	IGDS9-SF	Aggression	IGD scores were positively correlated with aggression (r = .239); 2.9% were classified as disordered gamers.
Moreno et al. (2022) United States	Cross-sectional 6,000 young adults (18–25 years)	IGD criteria alongside problematic internet use and social media addiction	Depression; anxiety; sleep; alcohol use	IGD prevalence was 24.3%. The three technology-related conditions had overlapping but distinguishable health correlates.

Study and Country	Design and Sample	Gaming Exposure	Outcome Domains	Key Finding
Liu et al. (2022) China	Cross-sectional 2,533 male college students	IGD symptoms	Depression; family and peer support	Clinically significant symptoms occurred in 11.6%. Depressive symptoms were associated with IGD, while family and peer support attenuated the association.
Deng et al. (2023) China	Cross-sectional 9,306 adolescents	IGD symptoms; casual- and disordered-gamer subgroups	Psychological distress; aggression	Disordered gamers had the highest distress and aggression, whereas casual gamers had the lowest; symptom severity, rather than gaming participation itself, tracked poorer outcomes.
Shouman et al. (2023) Egypt	Cross-sectional 870 university students (18–25 years)	IGDS-SF; gamer subgroup	Psychological well-being	IGD scores correlated negatively with psychological well-being (r = -.303); 6% were classified as disordered gamers.
Yin et al. (2023) China	Longitudinal; two waves 580 adolescents (M = 15.76 years)	IGD	Depression; maladaptive cognition; mindfulness	Depression predicted later IGD; maladaptive cognition mediated the association and mindfulness moderated the indirect pathway.
Sit et al. (2023) China	Cross-sectional network analysis 1,362 adolescents (M = 15.19 years)	IGD symptom network	Depression (DASS-21)	Gaming for escape or mood relief was a bridge symptom linking the IGD and depression networks.
Fekih-Romdhane et al. (2023) Tunisia	Cross-sectional 851 university students (M = 21.26 years)	IGD-20 Test	Insomnia; cyberbullying; psychotic experiences	Insomnia fully mediated the IGD-paranoid-ideation association; cyberbullying partly mediated the association with psychoticism. IGD prevalence was 1.8%.
Alghamdi et al. (2024) Not stated in abstract	Cross-sectional 356 medical students (M = 22.5 years)	GAS-7 gamer subtypes	Sleep quality	Poor sleep was more frequent among engaged, problematic, or addicted gamers than normal gamers (92.0% vs. 80.3%).
Amara et al. (2024) Tunisia	Cross-sectional 1,353 school adolescents	Gaming hours/day; GAS-7	Depression; anxiety	Gaming more than 4 hr/day, anxiety, and male gender independently predicted problematic gaming; problematic gaming was associated with depression and anxiety.
Hammad and Al-Shahrani (2024) Saudi Arabia	Cross-sectional 350 university students (M = 21.3 years)	Gaming hours/week; IGDS9-SF	Aggression; impulsivity	Impulsivity and aggression explained 34.6% of IGD-severity variance; those gaming at least 7 hr/week had higher impulsivity, aggression, and IGD scores.
Hsu et al. (2024) Not stated in abstract	Case-control 60 young adults with GD and 120 matched controls	Structured-interview GD diagnosis	Actigraphic sleep; physical activity; chronotype	The GD group showed more delayed sleep phase syndrome, eveningness, insomnia, and lower physical activity than controls.

Study and Country	Design and Sample	Gaming Exposure	Outcome Domains	Key Finding
Borges et al. (2024) Mexico	Longitudinal cohort; 1–3 years 2,144 university students	Incident IGD	Ten baseline mental disorders	Any baseline mental disorder was associated with a 2.33-fold higher rate of later IGD; only major depressive and bipolar disorders remained significant after comorbidity adjustment.
Meng et al. (2024) China	Longitudinal; two waves 94,020 at Time 1; 60,551 at Time 2	IGD symptoms; cross-lagged analysis	Anxiety; hyperactivity/inattention	Reciprocal cross-lagged effects linked IGD with anxiety and hyperactivity/inattention; associations were strongest among boys aged 13–15 years.
Orozco et al. (2024) Mexico	Longitudinal cohort 2,586 college students	DSM-5 IGD	Suicidal ideation, plans, and attempts	IGD was associated with an 83% higher adjusted risk of incident suicidal ideation; estimates for plans and attempts were higher but nonsignificant.
Falcione and Weber (2025) United States	Longitudinal ABCD cohort; three waves 4,289 adolescents (11–14 years)	DSM-5-aligned gaming-disorder measure	Depression; ADHD; social problems; anxiety; conduct/aggression	Baseline psychopathology predicted later gaming disorder, whereas gaming disorder did not significantly predict later psychopathology.
İçen et al. (2025) Not stated in abstract	Cross-sectional clinical sample 90 adolescents	Clinician-rated ICD-11 GD; IGDS9-SF	ADHD/SAD comorbidity; self-esteem; self-efficacy	GD with SAD was linked to lower self-esteem and academic, social, and emotional self-efficacy; GD with ADHD was linked to greater impulsivity and poorer emotion regulation.
Fraiwan and Almomani (2025) Not stated in abstract	Cross-sectional 1,040 university students	Problematic Online Gaming Questionnaire	Mental/physical health; academic performance; sleep; social relationships	Higher scores were associated with poorer sleep, musculoskeletal pain, emotional detachment, and weaker family and social relationships.
Jiang et al. (2025) China	Cross-sectional network/LCA study 11,335 high-school students (M = 15.89 years)	GD symptoms	Adverse childhood experiences; academic performance	Poor academic performance was the strongest individual correlate of GD and the bridge node connecting adverse childhood experiences with GD symptoms.
Moshel et al. (2025) Not stated in abstract	Cross-sectional SEM study 1,000 adolescents (12–17 years)	IGD symptoms	Sleep quality; executive dysfunction	Sleep quality partially mediated the IGD-executive-dysfunction association and the reverse pathway; 2.4% met IGD criteria.
Choujaa et al. (2025) Morocco	Cross-sectional 427 high-school students (M = 16.3 years)	Problem Video Gaming Scale; Internet Addiction Test	Academic failure	IGD prevalence was 14.1%; failing at least one grade independently predicted IGD (aOR = 4.54).

Note. ABCD = Adolescent Brain Cognitive Development; ADHD = attention-deficit/hyperactivity disorder; aOR = adjusted odds ratio; BDI = Beck Depression Inventory; DASS-21 = Depression Anxiety Stress Scales-21; GAS = Game Addiction Scale; GD = gaming disorder; GMM = growth mixture modeling; ICD-11 = International Classification of Diseases, 11th Revision; IGD = internet gaming disorder; IGDS9-SF = Nine-Item Internet Gaming Disorder Scale-Short Form; IGDT-10 = Ten-Item Internet Gaming Disorder Test; LCA = latent class analysis; OR = odds ratio; PSQI = Pittsburgh Sleep Quality Index; SAD = social anxiety disorder; SEM = structural equation modeling.

Gaming Quantity Compared With Problematic or Disordered Gaming

Hours and disorder symptoms did not behave as equivalent exposures. The clearest paired analysis came from Deng et al. (2026), who modeled leisure screen time and internet gaming disorder independently in 13,240 Chinese adolescents. Both exposures were associated with poorer mental health, yet the estimates attached to internet gaming disorder were substantially larger across all five outcomes. The odds ratio for depression was 6.43 for internet gaming disorder against 1.16 for excessive leisure screen time; for paranoia the corresponding estimates were 5.77 and 1.22. Adolescents with both exposures had the highest odds of any mental health disorder (OR = 7.35). Impairment-related symptoms thus emerge as the stronger marker, while the analysis still allows a smaller independent association for screen time.

Several other studies captured both quantity and symptom-based risk without setting the two against each other as independent predictors. Ohayon and Roberts (2021) worked with a definition combining at least 15 hr of gaming per week with at least five symptoms; those meeting the combined definition reported more depression, social anxiety, suicidality, nonrestorative sleep, and daytime difficulty. Among Tunisian adolescents, gaming more than 4 hr per day predicted problematic-gaming status, and that status was in turn associated with depression and anxiety (Amara et al., 2024). Higher impulsivity, aggression, and IGD severity likewise clustered among students gaming at least 7 hr per week (Hammad & Al-Shahrani, 2024). Quantity and symptoms clearly travel together in such samples. What these studies do not establish is that duration alone carries the same outcome association as a validated disorder measure.

Macur and Pontes (2021) supply a useful qualification. High-risk and low-risk adolescent gamers did not differ significantly in life satisfaction or self-reported mental health, although the high-risk group did have lower self-control and poorer parent-child relationships. A temporal qualification comes from Peng et al. (2025): adolescents following a moderate-risk-increasing IGD trajectory had elevated later mental health risk, whereas those on a high-risk-decreasing trajectory showed little or no adjusted difference from the low-risk-stable group. Static exposure counts can therefore conceal change. Symptom course, and not only symptom presence or time spent gaming, may matter.

Mental Health and Comorbidity

Depression recurred more often than any other mental health outcome. Cross-sectional associations with gaming-disorder symptoms were reported among male college students in China, school adolescents in Tunisia, and large adolescent or university samples from China and the United States (Amara et al., 2024; Deng et al., 2026; Liu et al., 2022; Ohayon & Roberts, 2021). In Liu et al. (2022), family and peer support attenuated the association between depressive symptoms and IGD symptoms, which suggests that the observed link was not socially context-free. Working at the symptom level, Sit et al. (2023) identified gaming for escape or mood relief as a bridge between the IGD and depression networks. Co-occurrence was thus a consistent finding. Whether gaming symptoms preceded depression, followed it, or developed alongside it is a question the cross-sectional designs could not answer.

Anxiety and broader psychopathology presented a similar mixture of concurrent association and uncertain direction. Anxiety independently predicted problematic gaming in Tunisian adolescents (Amara et al., 2024). In a clinical sample, gaming disorder with social anxiety was associated with lower self-esteem and weaker academic, social, and emotional self-efficacy, whereas comorbid ADHD was characterized by greater impulsivity and poorer emotion regulation (İçen et al., 2025). Moreno et al. (2022) reported that problematic internet use, IGD, and social media addiction had overlapping but distinct associations with depression, anxiety, sleep, and alcohol use, a result that cautions against a single undifferentiated technology-use construct. Psychotic experiences were examined less frequently. In one such study, insomnia fully mediated the association with paranoid ideation and cyberbullying partly mediated the association with psychoticism (Fekih-Romdhane et al., 2023). Psychological well-being also correlated negatively with IGD scores in Egyptian university students (r = -.303; Shouman et al., 2023).

Sleep and Physical Functioning

Among the functional correlates, sleep disturbance was one of the more stable. Poor or nonrestorative sleep accompanied problematic or disordered gaming across several student samples (Alghamdi et al., 2024; Ohayon & Roberts, 2021; Severo et al., 2020). Objective evidence was limited to one case-control study but pointed in the same direction: relative to matched controls,

young adults with gaming disorder showed more delayed sleep phase syndrome, greater eveningness, insomnia, and lower actigraphically measured physical activity (Hsu et al., 2024). A simple consequence-only interpretation is difficult to sustain, however, because Moshel et al. (2025) found that sleep quality partially mediated the association between IGD symptoms and executive dysfunction, with a comparable pathway in the reverse direction. Developmental timing may also matter: habitual gaming before age 5 was associated with later problematic-gaming risk and later sleep timing in Japanese junior-high students (Nakayama et al., 2020).

Aggression and Externalizing Outcomes

Aggression was positively related to IGD symptoms across Nepalese, Chinese, and Saudi Arabian samples. Joshi et al. (2022) reported a modest correlation between IGD and aggression (r = .239). In the larger Chinese study, disordered gamers showed greater aggression and psychological distress than casual gamers, and both symptom severity and exposure to violent game content contributed to aggression (Deng et al., 2023). Impulsivity and aggression together explained 34.6% of the variance in gaming-disorder severity in Hammad and Al-Shahrani (2024). What these results describe is a cluster of co-occurring externalizing characteristics. Whether aggression follows disordered gaming, precedes it as a vulnerability, or forms part of a reciprocal process is not something they can settle.

Academic and Social Functioning

Academic strain surfaced both as an outcome in its own right and as a correlate embedded in wider adversity. In a network study of 11,335 Chinese students, poor academic performance was the strongest individual correlate of gaming-disorder symptoms and the bridge connecting adverse childhood experiences with those symptoms (Jiang et al., 2025). Among Moroccan adolescents, failing at least one grade independently predicted IGD (aOR = 4.54; Choujaa et al., 2025). Higher problematic-online-gaming scores were also associated with poorer academic performance, poorer sleep, emotional detachment, and weaker family and social relationships in a university sample whose country was not stated in the abstract (Fraiwan & Almomani, 2025). The clearest counterpoint again came from Macur and Pontes (2021), whose high-risk gamers reported poorer self-control and parent-child relationships without significantly lower life satisfaction or self-reported mental health. Functional strain and subjective well-being did not always move together.

Longitudinal Evidence and Directionality

The six longitudinal or cohort studies did not converge on a single temporal pathway. Yin et al. (2023) found that depression predicted later IGD by way of maladaptive cognition, with mindfulness buffering the indirect pathway. Borges et al. (2024) reported a similar ordering: any baseline mental disorder was associated with a 2.33-fold higher rate of later IGD, although only major depressive and bipolar disorders remained significant after adjustment for comorbidity. In the U.S. ABCD cohort, baseline psychopathology predicted later gaming disorder, whereas gaming disorder did not significantly predict later psychopathology (Falcione & Weber, 2025).

Other cohorts pointed in the opposite direction, or in both directions at once. Orozco et al. (2024) found that IGD was associated with an 83% higher adjusted risk of incident suicidal ideation; estimates for plans and attempts were also higher but did not reach significance. Meng et al. (2024) reported reciprocal cross-lagged relations among IGD, anxiety, and hyperactivity/inattention, strongest among boys aged 13–15 years. Trajectory analysis added that increasing, rather than merely elevated, symptom patterns forecast poorer later outcomes (Peng et al., 2025). Taken together, the longitudinal evidence is better described as heterogeneous and possibly reciprocal than as support for a uniform gaming-disorder-to-psychopathology pathway.

Discussion

Principal Findings

At issue was a distinction that public discussion tends to blur: whether poorer outcomes follow the quantity of gaming or the pattern of impaired control and interference. Across the 27 included studies, adverse mental health and functional outcomes were associated more consistently with validated problematic-gaming or gaming-disorder measures than with gaming duration alone. The clearest within-sample comparison showed much larger associations for internet gaming disorder than for excessive leisure screen time across several mental health outcomes (Deng et al., 2026). The wider evidence was compatible with that pattern, if less decisive, because many studies assessed symptoms without estimating a separate duration effect.

Some restraint is warranted in stating the distinction. Gaming time was not irrelevant. Longer duration predicted problematic-gaming status in some samples and accompanied higher symptom severity in others (Amara et al., 2024; Hammad & Al-Shahrani, 2024; Severo et al., 2020). What the evidence resists is a direct substitution of hours for disorder. Quantity may operate as

exposure opportunity, as a correlate of escalating symptoms, or as a marker whose meaning changes according to context. A symptom-based measure adds information about control, priority, and interference that duration does not contain.

Why Quantity and Disorder Diverge

This divergence follows from the diagnostic architecture of gaming disorder. ICD-11 criteria organize the construct around dysregulation and consequences rather than a fixed duration threshold (Fuchs et al., 2024), and network evidence similarly places disorder status near functional and clinical features across instruments (Martončik et al., 2024). Two young people may spend much the same amount of time gaming and still differ sharply in whether gaming displaces sleep, study, relationships, or other valued activities. A duration measure cannot recover that difference by itself.

Symptom trajectory appears to matter as well. Peng et al. (2025) found poorer later outcomes for an increasing-risk trajectory but not, after adjustment, for a high-risk-decreasing one. A static dose account has difficulty accommodating that result. It implies instead that persistence and change in impaired-control symptoms may be more informative than a single observation of gaming time, or even a single symptom score. Repeated measurement of both quantity and disorder features would make that inference more testable.

Directionality and Heterogeneous Pathways

Any claim that gaming disorder simply causes psychopathology runs into the longitudinal findings. Some prospective evidence linked IGD with later suicidal ideation or with broader adverse outcomes (Orozco et al., 2024; Peng et al., 2025). Elsewhere, depression or baseline psychopathology predicted later gaming disorder (Borges et al., 2024; Falcione & Weber, 2025; Yin et al., 2023), and Meng et al. (2024) reported reciprocal effects. The broader longitudinal meta-analysis cited in the Introduction reached a similarly bidirectional interpretation (Amendola et al., 2025).

One plausible reading is that several pathways coexist. For some young people, distress may increase reliance on gaming for escape, which may then interfere with sleep, study, or social functioning. For others, escalating gaming symptoms may precede or amplify distress. Shared vulnerabilities could also generate both. Such a heterogeneous account is compatible with the bridge role of escape or mood-relief symptoms (Sit et al., 2023), the sleep-mediated pathways reported by Fekih-Romdhane et al. (2023) and Moshel et al. (2025), and the recurring links with impulsivity and adversity. Because most of these mechanism studies were cross-sectional, the pathways remain interpretive rather than established causal sequences.

Implications for Assessment and Prevention

Assessment is likely to be more informative when it begins with impaired control and functional interference rather than with an hours-only threshold. Brief validated instruments can identify symptom patterns that raw duration questions miss. Gaming quantity retains descriptive value and may help detect rapid change, yet the current evidence does not support a universal safe-hours boundary. Questions about sleep, academic functioning, relationships, mood regulation, and continued play despite harm sit closer to the outcomes that recurred across studies.

Clinical implications should remain bounded by the evidence. Most included studies were not treatment studies, and the review did not compare interventions. A small uncontrolled program from the SHUT Clinic reported improvement in gaming-disorder severity and quality of life after a multimodal intervention, which on its own cannot establish treatment efficacy (Sharma et al., 2022). A separate review framed problematic gaming as an escapist coping strategy across difficult life situations (Sinha et al., 2024), a framing that aligns conceptually with the bridge symptom identified by Sit et al. (2023). These sources support careful attention to coping function. They do not justify assuming that escapism is the dominant pathway for every young person.

Strengths, Limitations, and Future Directions

The review's principal strength is its conceptual focus. Eligibility and synthesis were both organized around the difference between gaming quantity and validated problematic/disordered-gaming constructs, and studies measuring both exposures were examined closely. The flow from 150 retrieved records to 27 included studies remains traceable, exclusion counts are reported, and study-level statistics are preserved rather than replaced by unsupported pooled estimates. Auditing Table 1 internally also made it possible to correct the inconsistent design and regional counts in the source narrative.

These strengths sit beside substantial methodological limits. Only PubMed/MEDLINE was searched, so relevant psychological and behavioral research indexed in PsycINFO, Scopus, Web of Science, Embase, or other databases may be absent. Retrieval was further capped at the 50 records ranked most relevant for each query, even though each query matched several thousand records. A selection layer therefore operated before formal screening, which is why the evidence base cannot be described as exhaustive.

Screening fell to one reviewer working with automated keyword support rather than to independent reviewer pairs. Automated coding may improve organization, but it does not remove judgment error, and no interrater reliability estimate could

be calculated. Data extraction was limited to abstracts, so details available only in full texts may have been missed: complete sampling procedures, adjusted models, measurement timing, and potentially important null findings. Five studies could not be assigned a country because the abstract did not state it.

No formal risk-of-bias appraisal was performed. The synthesis can describe what studies reported; it cannot determine whether the more consistent associations for gaming-disorder measures partly reflect common-method variance, selective adjustment, measurement overlap with functional outcomes, or other design limitations. Cross-sectional studies dominated the evidence base (20 of 27), so temporal order remains uncertain for most outcomes. Geography imposes a further boundary: nine studies came from East Asia, whereas South Asia, sub-Saharan Africa, and much of Europe were minimally represented or absent. English-language eligibility may have narrowed coverage further.

A future review should search PubMed/MEDLINE, PsycINFO, Scopus, and Web of Science exhaustively; use at least two reviewers for independent screening and extraction; extract data from full texts; and apply a design-appropriate appraisal tool such as the relevant JBI checklist. Where sufficiently comparable effect estimates can be recovered, quantitative synthesis could then examine heterogeneity rather than assume a common effect. On the primary-study side, gaming quantity and validated disorder symptoms should be measured simultaneously, retained as separate predictors, and repeated over time. Longitudinal work outside East Asia and the Middle East and North Africa is especially needed. Steps of this kind would clarify whether quantity has an independent association after impaired control and functional interference are modeled, and whether the observed pathways differ across developmental or cultural contexts.

Conclusion

Across this focused review, problematic and disordered gaming were more consistent markers of adverse mental health and functional outcomes than gaming quantity alone. The strongest paired evidence showed substantially larger associations for internet gaming disorder than for excessive leisure screen time, while several other studies indicated that longer gaming and disorder symptoms cluster together without demonstrating that hours carry the same meaning as impairment. The practical distinction is not between gaming and no gaming. It lies between participation or high engagement and a pattern in which control is reduced and everyday functioning is displaced.

A simple causal pathway is not established by the present evidence. Most studies were cross-sectional, and the longitudinal findings included gaming-disorder-to-outcome, psychopathology-to-gaming-disorder, and reciprocal patterns. Screening and prevention may therefore benefit from attention to impaired control, persistence despite harm, sleep, academic functioning, and mood-related use of gaming, while avoiding universal duration thresholds that the present evidence does not support. Before stronger comparative or causal conclusions can be drawn, a broader multi-database review with independent reviewers, formal appraisal, and full-text effect-size extraction will be needed.

Declarations

Author Contributions

Amal Tomy: Conceptualization, methodology, investigation, data curation, formal analysis and narrative synthesis, visualization, and writing–original draft. Jeshmeen Deb Barman: Supervision, methodology, and writing–review and editing. Jyotika Sharma Supervision, methodology, and writing–review and editing

Funding

This review received no external funding.

Competing Interests

The authors declare no competing interests.

Ethics Statement

This review synthesized published, deidentified, aggregate-level findings. No new human participants were recruited or contacted, and no new identifiable participant data were collected. No new institutional ethics approval was obtained for this secondary review.

Data Availability

No new primary dataset was generated. The search strings, study-characteristics table, and review-flow counts are reported in this manuscript. Additional screening classifications underlying the synthesis are available from the corresponding author on reasonable request.

Use of Artificial Intelligence Assistance

Automated language-model-assisted keyword coding was used to support title and abstract screening, and generative AI assistance was used during manuscript drafting and language revision under the authors' direction. The reviewer assessed eligibility decisions and checked extracted study information, numerical values, citations, and references against the review materials. AI assistance did not replace author responsibility for the content of the manuscript.

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