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ORIGINAL ARTICLE

The Association Between Internet Gaming Disorder and Resilience: A Meta-Analysis

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Abstract
Internet gaming disorder (IGD) represents a growing public health concern, particularly among adolescents and young adults. Although resilience has been proposed as a protective factor against addictive behaviours more broadly, no quantitative synthesis has yet specifically examined its relationship with IGD. This meta-analysis aimed to assess the magnitude and direction of the association between IGD and resilience, as well as to explore potential moderating variables. Following PRISMA guidelines, a systematic search was conducted in February 2026 across PsycINFO, Scopus, PubMed, and Web of Science Core Collection. Ultimately, 14 studies (15 independent samples) with a total of 79,760 participants were included. Effect sizes were calculated based on Pearson's correlations transformed into Fisher's Z scores through the application of a random-effects model. The results revealed a statistically significant, moderately negative correlation between resilience and IGD ($r = -.24$, 95% CI $[-.29, -.20]$), indicating that higher levels of resilience are associated with lower IGD symptomatology. Substantial heterogeneity was observed ($I^2 = 95.20\%$), but sensitivity analyses confirmed the robustness of the findings. No evidence of publication bias was detected. Among the examined moderators, only the resilience measurement instrument was significant, explaining 56.23% of the variance. These findings highlight the relevance of incorporating resilience-enhancing strategies into prevention programmes and interventions targeting vulnerable populations, particularly adolescents and young adults. Furthermore, they underscore the need for future longitudinal research to clarify causal relationships.

Keywords Internet gaming disorder · Internet gaming addiction · Resilience · Meta-analysis

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The impact of digital technologies on everyday life has risen exponentially in recent decades, profoundly transforming human patterns of social interaction, leisure, and information access. Among these technologies, video games have become one of the most influential, with billions of users worldwide and particularly strong penetration among adolescents and young people (Stevens et al., 2021). Although digital gaming represents a healthy recreational activity for the majority of users, a substantial proportion of individuals may develop excessive, dysregulated, and persistent usage patterns that give way to clinically meaningful impairment. This concern has led to the American Psychiatric Association's identification of internet gaming disorder (IGD) as a condition that warrants further study in the DSM-5 (American Psychiatric Association, DSM-5 Task Force, 2013), as well as its recognition as a formal diagnosis under the category of gaming disorder (GD) in the ICD-11 (World Health Organization, 2019). IGD has been associated with a wide range of negative outcomes, including depression (Zheng et al., 2025), loneliness (Mestre-Bach et al., 2025), poor academic performance (Chew et al., 2026), impulsivity (Nuske et al., 2025), and poor sleep quality (Kristensen et al., 2021).

Available meta-analytic evidence indicates that the global prevalence of IGD generally falls within moderate ranges, though it is highly variable based on methodological and population-related factors. In the general population, estimates of the disorder's prominence typically range from approximately 2% to 4% (Kim et al., 2022; Stevens et al., 2021). However, these figures are particularly high in specific populations, namely adolescents and young adults, where prevalence rates of 4–10% or higher have been reported, especially in samples composed exclusively of gamers (Gao et al., 2022; Gisbert-Pérez et al., 2025). Additionally, certain geographical contexts, such as East Asia, tend to exhibit higher rates, with estimates around 6% or higher (Liao et al., 2022). Overall, the literature reveals substantial cross-study heterogeneity, which is largely attributable to differences in assessment instruments, cutoff points, diagnostic criteria, sample characteristics, and methodological quality, underscoring the need for greater standardisation in pursuit of more precise and comparable estimates (Kim et al., 2022; Stevens et al., 2021).

In this context, the identification of psychological factors that modulate vulnerability to IGD is of particular importance. Among these, resilience stands out as a central construct in the prevention of maladaptive behaviours. Defined as the capacity to maintain or regain psychological equilibrium in the face of adversity (Fletcher & Sarkar, 2013; Luthar et al., 2000), resilience has demonstrated a protective role across various patterns of addictive behaviour, including problematic internet use and substance abuse (Canale et al., 2019; Wu et al., 2018). Within the domain of IGD, multiple studies have shown that higher levels of resilience are associated not only with a lower likelihood of developing addictive symptomatology but also with more adaptive coping strategies in response to stress, depression, and emotional difficulties (Lin et al., 2021). Furthermore, resilience has been identified as both a mediator and moderator in the relationship between early adversity, emotional distress, and the onset of IGD in young populations (Filipovič & Dědová, 2024; Pauš et al., 2024), reinforcing its role as a preventive mechanism during sensitive developmental stages.

However, resilience is a complex and multifaceted construct that has been conceptualized in different ways across the literature, with important implications for how its association with IGD is interpreted (Fletcher & Sarkar, 2013; Luthar et al., 2000). Broadly, three complementary perspectives can be distinguished. First, resilience has been viewed as a relatively stable personality trait characterized by attributes such as perseverance, emotional stability, and optimism. Second, process-oriented approaches conceptualize resilience as a dynamic and context-dependent process that emerges through ongoing interactions between individuals and their environment. Third, outcome-oriented perspectives define resilience as successful adaptation despite exposure to significant adversity.

These conceptual differences are closely linked to how resilience is measured. Several instruments have been widely used in empirical research, each capturing different aspects of the construct. For instance, the Connor–Davidson Resilience Scale (CD-RISC) conceptualizes resilience as a multidimensional trait reflecting personal competence and tolerance to stress. The Brief Resilience Scale (BRS), in contrast, focuses specifically on the ability to recover or "bounce back" from stressful situations. Other instruments, such as the Resilience Scale (RS) or the Ego-Resiliency Scale, assess dimensions related to personal strength, adaptability, and psychological flexibility. As a result, different instruments may tap into partially distinct components of resilience (Fletcher & Sarkar, 2013).

Consistent with trait-based conceptualizations, meta-analytic evidence suggests that resilience is closely associated with broader personality characteristics. Specifically, Oshio et al. (2018) reported that resilience is strongly related to emotional stability, conscientiousness, and extraversion, supporting the view that resilience may partly reflect a constellation of personality characteristics that enables individuals to persist and adapt effectively when facing adversity. At the same time, process-oriented perspectives emphasize that resilience is also shaped by environmental resources and life experiences, highlighting its dynamic nature.

Taken together, these conceptual and measurement differences highlight the importance of carefully considering how resilience is operationalized when examining its relationship with IGD.

This relationship between vulnerability and protective factors may be understood within the framework of the I-PACE (Interaction of Person–Affect–Cognition–Execution) model, currently one of the most influential theoretical approaches in the study of behavioural addictions (Brand et al., 2019). According to this model, technology-related disorders emerge from the interaction between personal characteristics, dysfunctional affective states, biased cognitive processes, and deficits in executive functioning. Resilience may be conceptualised as a transversal personal resource capable of modulating the impact of affective factors (e.g., stress, anxiety), cognitive processes (e.g., gaming-related beliefs, escape expectations), and executive functions (e.g., inhibitory control), thereby reducing the likelihood that individuals engage in gaming as a means of emotional regulation. This is particularly relevant in adolescents, who exhibit heightened neuropsychological sensitivity to immediate rewards, less mature inhibitory control, and greater exposure to reinforcing digital environments (Steinberg, 2017), all of which help to explain their overrepresentation in epidemiological studies on IGD.

Against this backdrop, the present meta-analysis had two primary objectives: (1) to examine the magnitude and direction of the association between IGD and resilience; and (2) to analyse the role of potential moderating variables that may influence this relationship, including studies' sociodemographic, cultural, and methodological characteristics. Ultimately, the study sought to provide a rigorous quantitative estimate and a more nuanced understanding of the factors that shape this association, thereby contributing to the development of more effective preventive strategies and interventions for vulnerable populations.

Method

Search Strategy

The present meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2022) and

was registered in PROSPERO (CRD420261321861). A systematic search for relevant studies on IGD and resilience was carried out in February 2026 across PsycINFO, Scopus, PubMed, and Web of Science Core Collection databases (Table S1). Three sets of search terms were used: (1) resilience, resiliency, resilient, "bounce back"; (2) gaming, game; and (3) disorder, addiction, problematic, pathological, dependent, compulsive, excessive, overuse.

Studies on the relationship between IGD and resilience were considered for inclusion. Studies needed to meet the following criteria to be eligible: (1) original empirical quantitative research with cross-sectional or longitudinal designs; (2) use of standardised instruments to assess IGD. Studies were included only when they explicitly assessed IGD as the target construct. Studies focusing on general problematic internet use were excluded, unless IGD was clearly operationalised through a gaming-specific adaptation of a validated instrument and the reported effect sizes referred exclusively to gaming-related behaviour; (3) use of standardised instruments to assess resilience; (4) reporting of the Pearson correlation coefficient between IGD and resilience (or sufficient statistical data for its calculation); (5) reporting of sample size; (6) publication in a peer-reviewed scientific journal; and (7) availability of the full text in English or Spanish. No additional date limits were applied beyond the final search date (February 2026), ensuring full temporal coverage of the literature. Studies not published in peer-reviewed journals as well as articles not written in English or Spanish were excluded during the screening phase.

Data Extraction and Quality Assessment

An Excel spreadsheet was developed for data extraction, coding the following information from each study: author(s), year of publication, country in which the study was conducted, region, study design, sample size, mean age of participants, sex (coded as the percentage of females in the sample), instrument used to assess IGD, instrument used to assess resilience, risk of individual bias, and correlation between IGD and resilience. When data were missing, corresponding authors were contacted up to two times. When the missing data concerned the correlation between IGD and resilience, the study was excluded from the main meta-analysis, as the effect size could not be calculated. When the mean age of participants was not reported, the median age was used if available; otherwise, the value was coded as missing.

The methodological quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT; Hong et al., 2018), which is designed to appraise empirical studies with diverse methodological designs, including quantitative, qualitative, and mixed-methods approaches. The MMAT evaluates study quality across five design-specific domains following two initial screening questions. Responding "No" or "Can't tell" to one or both screening questions may indicate that the paper is not an empirical study and therefore cannot be appraised using the MMAT; however, given that the inclusion criteria of the present review were restricted to empirical studies, these screening questions were not used as exclusion criteria. Each methodological criterion was subsequently rated as "Yes", "No", or "Can't tell" based on the information reported in each study. For the moderator analyses, studies were classified into two methodological quality categories based on the number of MMAT criteria met. As the MMAT does not provide validated cut-offs or recommend the calculation of an overall quality score (Hong et al., 2018), this categorization was adopted solely for analytical purposes, following approaches used in previous

meta-analyses and systematic reviews. Studies meeting at least three of the five criteria were classified as having higher methodological quality and lower risk of bias, whereas those meeting fewer than three criteria were classified as having lower methodological quality and higher risk of bias.

Data coding and quality assessment were conducted independently by two researchers, with any discrepancies resolved through consensus.

Statistical Analyses

A meta-analysis was conducted to examine the relationship between IGD and resilience, with Pearson's correlation coefficients serving as the effect size metric. To normalise sampling distributions, these correlations were transformed into Fisher's Z scores in line with the recommendations of Hedges and Olkin (2014). After completing the analyses, both the pooled effect size and its confidence interval were back-transformed into Pearson's correlation coefficients to facilitate interpretation (Borenstein et al., 2021). Considering the expected heterogeneity across studies, a random-effects model was used to account for variability in true effect sizes and to support broader inferences beyond the specific samples included in the meta-analysis. Model parameters were estimated using restricted maximum likelihood (Viechtbauer, 2005). In addition, the Knapp and Hartung (2003) adjustment was applied to obtain more conservative confidence intervals, an approach particularly recommended for cases in which the number of included studies is small or heterogeneity is substantial. In line with Gignac and Szodorai (2016), correlation values of .10, .20, and .30 were interpreted as small, moderate, and large effects, respectively.

Between-study heterogeneity was assessed using Cochran's Q statistic, the I^2 index, and prediction intervals. A significant Q statistic indicates that observed variability in effect sizes exceeds that expected by chance, whereas I^2 represents the proportion of total variability not attributable to sampling error. According to Higgins and Thompson (2002), I^2 values of approximately 25%, 50%, and 75% were interpreted as indicating low, moderate, and high heterogeneity, respectively. Prediction intervals were also calculated to estimate the range within which true effects are expected to fall in future studies, taking into account observed heterogeneity (Borenstein, 2023).

Following the methodological recommendations of Botella and Sánchez-Meca (2015), publication bias was assessed using a multimethod approach, including visual inspection of funnel plot, Egger's regression test, and the Begg and Mazumdar rank correlation test. In the absence of publication bias, funnel plot is expected to show a symmetrical distribution around the pooled effect size, and both statistical tests are expected to be non-significant.

Moderator analyses were conducted to examine whether different variables influenced the relationship between IGD and resilience. Continuous variables were analysed using meta-regression models, whereas categorical variables were examined using meta-analyses of variance (meta-ANOVA), comparing mean effect sizes across groups. In both approaches, F-statistics were computed using the improved Knapp and Hartung (2003) method, which adjusts coefficient variance and provides more accurate confidence intervals, particularly amid a limited number of studies or high heterogeneity. In addition, R^2 was used to estimate the proportion of heterogeneity explained by moderators, reflecting the amount of between-study variability attributable to each variable. For meta-ANOVA analyses, in line with Fu et al. (2011), a minimum of four effect sizes per category was required. When this threshold could not be met due to an insufficient

number of studies, remaining effect sizes were combined into a residual "other" category, provided that this grouping still contained at least four effect sizes in total.

Finally, to assess the robustness of the findings and determine the influence of individual studies on the pooled effect size, a leave-one-out sensitivity analysis was performed. This procedure involves iteratively re-running the meta-analysis while excluding one study at a time, allowing for the identification of studies with disproportionate influence on the overall estimate.

All analyses were conducted using the metafor package in RStudio (Viechtbauer, 2010).

Results

Study Selection

Figure 1 presents a flow diagram of the literature search process. A total of 831 records were initially identified and subsequently underwent several stages of screening and selection. First, duplicates were removed, after which titles and abstracts were screened to exclude studies not directly related to the objectives of the meta-analysis. Articles that passed this stage were then assessed through full-text review to determine their final eligibility. In addition, a manual search of the reference lists of the included studies was conducted, giving way to the identification of three additional studies that met the predefined inclusion criteria. These studies were subsequently incorporated into the analysis.

Study Characteristics

The 14 studies included in the meta-analysis were published between 2019 and 2025 and exclusively employed cross-sectional designs. Overall, the total sample comprised 79,760 participants, with sample sizes ranging considerably from 71 to 50,855 individuals. In terms of geographical distribution, most studies were conducted in Asia (57.14%), followed by Middle Eastern countries (28.57%) and Europe (14.29%). The mean age of participants ranged from 12.84 to 25.57 years, indicating that adolescents and young adults were clearly predominant across the entire sample. In terms of sex distribution, the percentage of female participants varied widely across studies, from 0% to 79.1%, reflecting substantial heterogeneity in sample composition. With respect to IGD assessment, the most frequently used instrument was the Internet Gaming Disorder Scale–Short Form (IGDS9-SF), whereas the most commonly used measures of resilience were the Connor-Davidson Resilience Scale (CD-RISC) and the Brief Resilience Scale (BRS). Finally, methodological quality assessment classified nine studies as high-quality with a low risk of bias and five studies as low-quality with a high risk of bias (Table S2) (Table 1).

Effect Size and Heterogeneity

The results of the random-effects model revealed a correlation coefficient of -.24 (95% CI [-.29, -.20], $p < .001$), indicating a moderate negative association between IGD and

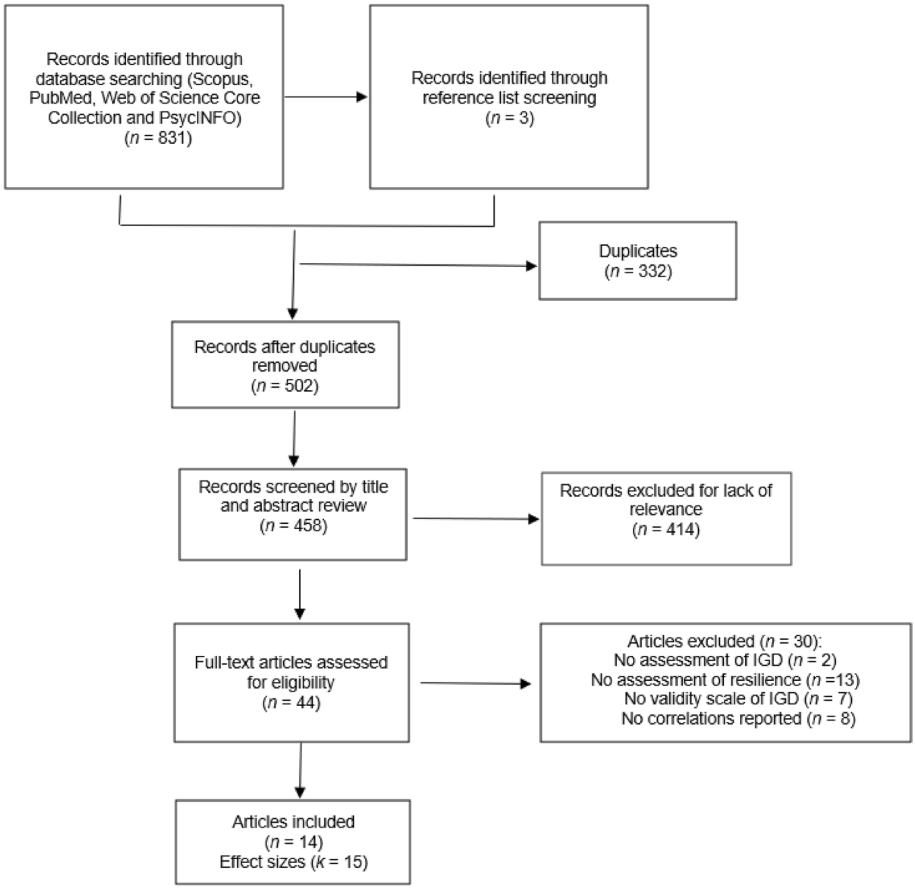

Fig. 1 Flow diagram of the search and selection process

resilience. Regarding the IGD–resilience relationship (Fig. 2), all studies reported negative correlations, with values ranging from -.11 to -.46, pointing to a consistent pattern whereby higher levels of resilience are associated with lower levels of IGD. Cochran's Q test yielded a value of $Q = 144.09$ ($p < .001$), indicating significant variability among effect sizes, which supports the use of a random-effects model and points to the potential presence of moderating variables. Likewise, an I^2 value of 95.20% was obtained, indicating substantial heterogeneity according to the criteria proposed by Higgins et al. (2003). Finally, the prediction interval ranged from -.40 to -.07, suggesting that, in a new study with characteristics similar to those included in this meta-analysis, the observed effect would likely fall within this range.

Moderator Analyses

Table 2 presents the results of the simple meta-regressions conducted on continuous moderators. None of the examined moderators exhibited a statistically significant association ($p < .05$) with the correlations between IGD and resilience.

Table 1 Characteristics of the included studies

Study	Country	Region	Sample size	Mean age	Sex	IGD	Resilience	Risk of bias
Aslan et al. (2025)	Turkey	Middle East	316	12.84	47.5	DGAS-7	CYRM-12	High
Canale et al. (2019)	Italy	Europe	605	24.01	18	IGDS9-SF	RS-10	Low
Chen et al. (2025)	China	Asia	5,075	18	79.1	IGDS9-SF	CD-RISC	Low
Hong and Do (2020)	South Korea	Asia	381	N.R	54.9	OGAS	ER Scale	Low
Hosseini et al. (2019)	Iran	Middle East	280	17.22	0	VAT	CD-RISC	High
Li et al. (2024)	China	Asia	1,364	19.66	44.21	GDT	BRS	Low
Liu et al. (2024)	China	Asia	8,579	N.R	64.2	IGDS9-SF	CD-RISC-10	Low
Ma et al. (2024)	China	Asia	9,349	N.R	68.08	IGD Scale	RS-14	Low
Özsavran and Ayyıldız (2024)	Turkey	Middle East	1,017	21.19	45.9	DGAS-U	BRS	Low
Pauš et al. (2024)	Czech Republic	Europe	1,240	12.85	52.98	IGDS9-SF	CYRM-R	Low
Shin et al. (2019) (1)	South Korea	Asia	71	25.56	0	IAT	CD-RISC	High
Shin et al. (2019) (2)	South Korea	Asia	79	25.57	0	IAT	CD-RISC	High
Taş et al. (2025)	Turkey	Middle East	320	22.22	68.8	IGDS9-SF	BRS	High
Wang et al. (2023)	China	Asia	229	24.42	63.8	IGDS9-SF	BRS	High
Zhang et al. (2022)	China	Asia	50,855	14.45	50.3	IGDS9-SF	CD-RISC-10	Low

N.R. = not reported

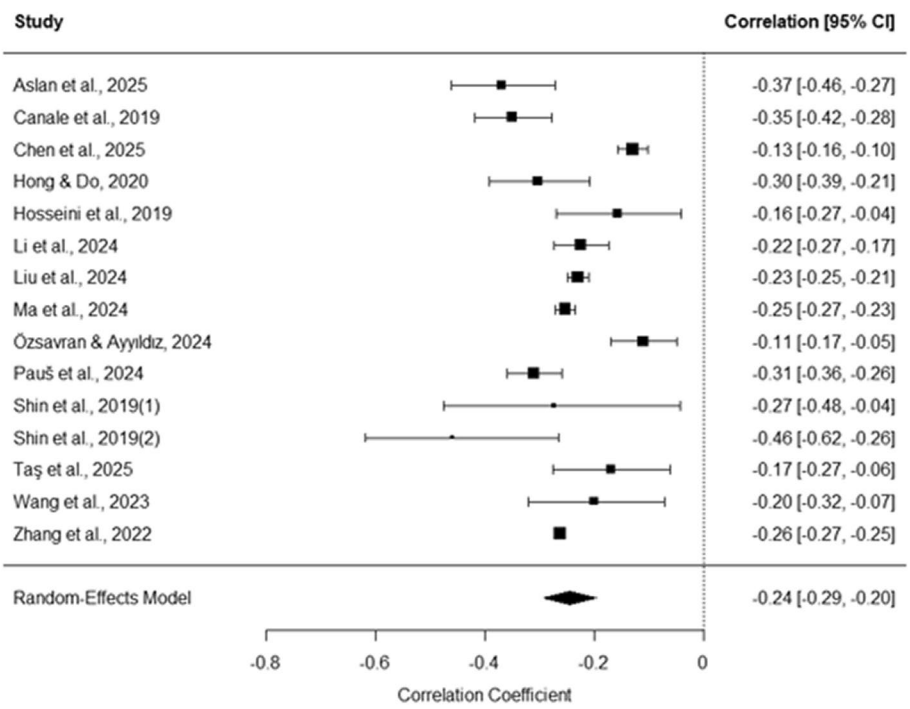

Fig. 2 Forest plot for the relationship between IGD and resilience

For categorical variables—to ensure that each level of the moderator was adequately represented and to improve the reliability of the results—a minimum of four effect sizes per subgroup was required (Fu et al., 2011). Levels with fewer than four effect sizes were either merged into a combined subgroup with other levels meeting this threshold (when they shared similar characteristics) or excluded (when such aggregation was not appropriate). Table 3 presents the results of the meta-ANOVA analyses for categorical moderators. Among the examined categorical moderators, only the instrument used to assess resilience exhibited a statistically significant effect

Table 2 Results of meta-regression analyses on the influence of continuous moderators on the IGD–resilience relationship

Moderator	k	b_j	F	p	Q_E	R^2
Year of publication	15	0.0164	2.398	.146	85.03	N.A
Sex (% female)	15	0.0015	2.011	.180	93.66	N.A
Mean age	12	0.0017	0.050	.828	96.17	N.A
Sample size	15	−0.0000	0.006	.940	110.71	N.A

k = number of effect sizes; b_j = regression coefficient; F = F-statistic (for testing the statistical significance of the moderator); p = probability value; Q_E = residual heterogeneity test; R^2 = percentage of variance explained by the moderator; N.A. = not applicable

on the IGD–resilience relationship ($F = 4.430$, $p = .036$), explaining 56.23% of the variance in this association and, in turn, indicating that this moderator substantially contributes to the differences observed across studies.

Risk of Bias

Although the funnel plot exhibited some degree of asymmetry (see Fig. 3), suggesting the possible presence of publication bias or small-study effects, this visual indication was not supported by the statistical analyses. More precisely, the non-significant results obtained from both Egger's regression test ($p = .246$) and the Begg and Mazumdar rank correlation test ($p = .926$) indicate that there is insufficient evidence to support the presence of publication bias. Overall, these findings allow for a reasonable dismissal of publication bias among the studies included in the meta-analysis.

Sensitivity Analysis

A leave-one-out sensitivity analysis was conducted to assess the individual influence of each included study on the overall pooled effect size. The analysis did not find any study to exert an excessive influence on the results of the meta-analysis. The effect sizes obtained from the successive meta-analyses, each excluding an individual study, ranged narrowly from $r = -.24$ to $r = -.25$, pointing to the robustness of the findings and their low sensitivity to the removal of individual studies. Overall, these results reinforce the stability of the observed effect, suggesting that the conclusions of the meta-analysis are not critically dependent on any single study.

Table 3 Results of the Meta-ANOVA on the influence of categorical moderators on the IGD–resilience relationship

Moderator	*k*	*r*	95% CI	*F*	*p*	R^2
Region				0.667	.432	N.A
Asia	9	-.25	-.31; -.18			
Middle East	4	-.20	-.30; -.10			
IGD instrument				0.076	.787	N.A
IGDS9-SF	7	-.24	-.32; -.17			
Other	8	-.26	-.34; -.18			
Resilience instrument				4.430	.036	56.23%
BRS	4	-.18	-.25; -.09			
CD-RISC	4	-.19	-.29; -.09			
Other	7	-.29	-.35; -.24			
Individual risk of bias				0.121	.734	N.A
Low	9	-.24	-.31; -.18			
High	6	-.26	-.37; -.16			

k = number of effect sizes; *r* = Pearson's correlation coefficient; *F* = F-statistic (for testing the statistical significance of the moderator); *p* = probability value; R^2 = percentage of variance explained by the moderator; N.A. = not applicable

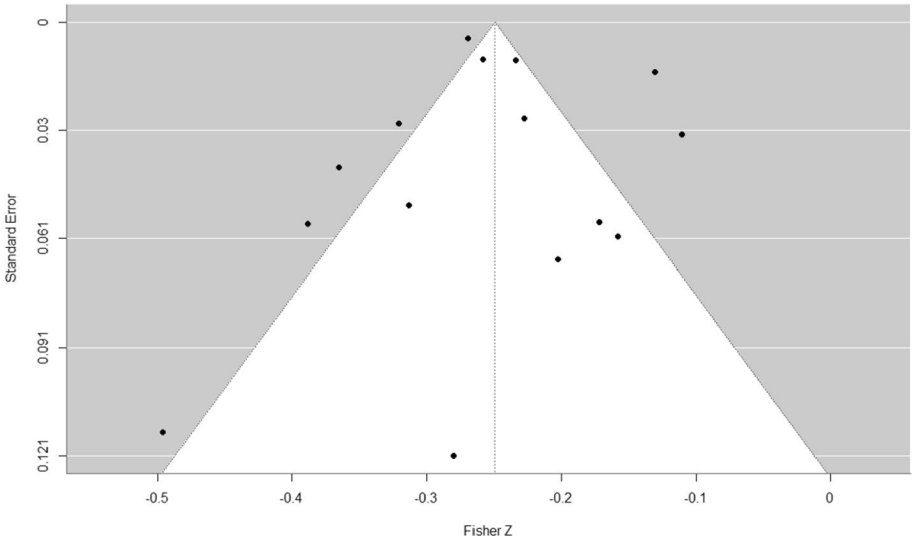

Fig. 3 Funnel plot

Discussion

The present meta-analysis synthesised the empirical evidence on the relationship between IGD and resilience, quantifying the magnitude of the association. Based on 14 studies and 15 independent samples, making up a total sample of 79,760 participants, a significant negative correlation of $r = -.24$ was found between resilience and IGD symptoms, indicating that higher levels of resilience are associated with lower IGD severity. This finding is consistent with previous research highlighting resilience as a protective factor against problematic digital gaming, particularly among adolescents and young adults. Recent studies have shown that individuals with lower levels of resilience exhibit a higher risk of IGD, as well as more severe depressive symptomatology, stress, and difficulties with emotional regulation (Ko et al., 2024; Peng et al., 2025).

From a theoretical perspective, the results align well with the I-PACE model, which posits that technology-related disorders emerge from the interaction between personal characteristics, affective states, cognitive processes, and executive functioning mechanisms. Resilience, understood as the capacity to recover from and adapt to adversity, may influence several of these components: it buffers the emotional impact of stressful situations, modulates cognitive expectations regarding the use of gaming as a coping strategy, and promotes more adaptive executive control. Consequently, the negative association observed in this meta-analysis is consistent not only with this conceptual framework but also with recent studies, suggesting that resilience may act as a mediator or moderator between adverse experiences, emotional symptoms, and the development of IGD, particularly during sensitive developmental stages, such as adolescence (Filipovič & Dědová, 2024; Pauš et al., 2024). From a neuropsychological perspective, Ersche et al. (2020) propose that the relationship between resilience and addictive behaviours, including IGD, may be explained by dysfunction in neural circuits involved in self-regulation. In contrast, individuals with higher levels of resilience may compensate for their reduced inhibitory control. Similarly, the Self-Medication Hypothesis (Khantzian, 1997) provides an additional explanatory lens,

proposing that addictive behaviours may emerge as maladaptive strategies to regulate psychological distress. From this perspective, gaming may serve an emotion-regulation function, particularly in individuals with lower resilience, who may have fewer adaptive coping resources to manage stress or negative affect. Conversely, higher resilience may reduce reliance on gaming as a coping strategy, thereby mitigating risk for IGD symptoms. Although these theoretical models suggest the possibility of bidirectional associations, the present meta-analysis cannot establish directionality, as all included studies were cross-sectional and based on correlational data. Accordingly, the possibility that persistent IGD symptoms may also contribute to reduced resilience through mechanisms such as sleep disruption, social withdrawal, or reduced engagement in adaptive activities, as suggested in previous research (Helvich et al., 2026; Kristensen et al., 2021; Mestre-Bach et al., 2025), should be interpreted as a theoretical extension rather than an empirically supported conclusion.

Importantly, the high heterogeneity observed ($I^2 = 95.20\%$) indicates that, although all included studies consistently reported a negative association between resilience and IGD, the magnitude of this relationship varied substantially across studies. The wide prediction interval further suggests that the strength of the association may differ considerably depending on study characteristics. This variability likely reflects methodological, cultural, and measurement-related differences across studies. Most of the available evidence was derived from adolescents and university students from Asia, the Middle East, and parts of Europe, which further limits the generalisability of the findings. Therefore, the pooled estimate should be interpreted as an average association rather than a uniform effect across populations, and further research involving under-represented cultural settings, clinical populations, older adults, and non-student gamers is needed to strengthen cross-cultural generalisability.

In terms of magnitude, although the observed association is small to moderate in magnitude, such effect sizes are typical for psychological risk and protective factors and may still have meaningful practical implications (Funder & Ozer, 2019; Gignac & Szodorai, 2016). Resilience may reduce reliance on gaming as a strategy for emotional regulation, particularly under conditions of stress, social isolation, or emotional distress, all of which are closely linked to IGD development (Ko et al., 2024; Razum & Glavak Tkalić, 2025).

An important methodological contribution of the present meta-analysis is that the resilience assessment instrument was the only significant moderator, explaining 56.23% of the between-study variance. This finding suggests that the way resilience is conceptualised and operationalised meaningfully influences the observed association with IGD. Specifically, instruments such as the Brief Resilience Scale primarily assess resilience as the capacity to recover or "bounce back" following stress, whereas measures such as the Connor–Davidson Resilience Scale and the Resilience Scale conceptualise resilience more broadly as relatively stable psychological resources, including persistence, adaptability, and personal competence. Consequently, these instruments capture partially distinct aspects of the construct and should not necessarily be considered interchangeable (Table S3). This underscores the importance of aligning measurement choices with the underlying theoretical framework and highlights the need for greater conceptual precision and consistency in resilience assessment in future IGD research. In contrast, no systematic moderation was detected for region, participant sex, mean age, publication year, sample size, or study quality within the available dataset. However, these non-significant findings should not be interpreted as evidence that the association between resilience and IGD is invariant across populations or contexts. Given the relatively small number of available studies and the substantial between-study heterogeneity, the moderator analyses may have had limited statistical power to detect true effects. In addition, measurement error in moderator variables and restricted variability across

studies may have further contributed to these null findings. Therefore, these results should be interpreted as indicating that no systematic moderation was detected in the present dataset, rather than as evidence of the absence of contextual or demographic influences on the resilience-IGD association.

Despite the validity of these findings, this study has several notable limitations that must be considered. First, the use of correlations as effect sizes precluded the establishment of causal relationships between resilience and IGD; therefore, the results must be interpreted as associations rather than directional links. Second, only articles published in English and Spanish were included, potentially introducing selection bias. Third, all included studies relied exclusively on self-report measures of both IGD and resilience. Consequently, the observed associations may have been inflated by common method variance, shared response biases, or social desirability effects. Fourth, the available evidence was heavily concentrated on adolescents and university students, whereas older adults, clinical IGD populations, and non-student gamers were markedly underrepresented. Therefore, caution is warranted when generalising these findings beyond the populations represented in the current evidence base. Fifth, some resilience instruments include dimensions that overlap conceptually with broader indicators of psychological well-being, adaptive functioning, or psychological distress. This conceptual overlap may have contributed, at least in part, to the observed correlations with IGD. Finally, the number of included studies was limited, particularly for subgroup analyses conducted using meta-ANOVA. Such analyses generally require a larger number of studies than primary analyses to achieve sufficient statistical power (Cuijpers et al., 2021). Consequently, subgroup results should be interpreted with caution, as the study may have failed to detect potential differences between categories.

These limitations, in turn, point to several avenues for future research. First, there is a clear need for longitudinal and experimental studies to clarify the temporal and potentially causal relationships between resilience and IGD, as well as to determine whether resilience-enhancing interventions are associated with reductions in IGD symptoms. Second, it is important to explore cultural, demographic, and contextual moderators that may influence the strength of this association, as well as to further examine the underlying emotional and cognitive mechanisms involved, such as emotional regulation, impulsivity, reward sensitivity, and escape expectations. Finally, given the relevance of IGD among adolescents and young adults, future research could focus on the development of school-based and community-based interventions aimed at strengthening resilience and, in turn, preventing the onset and progression of this disorder. In this regard, previous meta-analytic evidence suggests that resilience-enhancing interventions can improve resilience and promote positive mental health and adaptive coping outcomes (Ang et al., 2022; Kadian et al., 2022). However, whether these benefits translate into reductions in IGD symptoms remains an important question for future intervention research.

In conclusion, this meta-analysis provides evidence of a small-to-moderate negative association between resilience and IGD symptomatology. Although all included studies reported negative correlations, substantial between-study heterogeneity indicates that the magnitude of this association varies across samples and contexts. Importantly, the resilience measurement instrument emerged as the only significant moderator, underscoring that the way resilience is conceptualised and operationalised meaningfully influences the observed association with IGD. Overall, these findings support the relevance of resilience as a potentially important protective psychological resource within current theoretical models, while highlighting the need for further longitudinal, cross-cultural, and clinical research before firm conclusions regarding causality and generalisability can be drawn.

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Data Availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics Approval This study did not require ethical approval as it involved analysis of data from previously published studies and did not involve human participants directly.

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