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ORIGINAL ARTICLE

Video game–based interventions for depressive symptoms in adults: A systematic review and qualitative synthesis

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ABSTRACT

Background: Depression is one of the most prevalent mental health disorders worldwide, and conventional treatments may face limitations related to accessibility, stigma, adherence, and variable response. Video game–based interventions, including serious games and commercially available off-the-shelf games, have emerged as potentially accessible and engaging tools for supporting mental health care.

Objective: This systematic review aimed to evaluate the reported therapeutic effects of video game–based interventions on depressive symptoms in adults through a structured qualitative synthesis of the available evidence.

Methods: A comprehensive search was conducted in PubMed, PsycINFO, Cochrane Library, Web of Science, and IEEE Xplore for studies published from January 2018 to January 2024, following PRISMA guidelines and a protocol registered in PROSPERO (CRD420251107133). Eligible studies included adult participants with a clinical diagnosis of depression or elevated depressive symptoms, evaluated video game–based interventions, and reported depressive symptom outcomes using validated or clearly defined psychological measures. Randomized controlled trials and non-randomized interventional studies were included. Risk of bias (RoB) was assessed using RoB 2 for randomized trials and ROBINS-I for non-randomized studies.

Results: Of 2,038 records identified, 13 studies met the inclusion criteria. The included studies varied substantially in design, population, intervention type, platform, duration, comparator condition, and outcome measurement. Video game–based interventions were generally associated with improvements in depressive symptoms, while secondary outcomes included anxiety, emotional regulation, cognitive function, sleep quality, self-efficacy, and psychological well-being when reported. Common intervention types included casual games, exergames, role-playing games, mobile applications, and online games. However, methodological heterogeneity, small sample sizes in several studies, variable

risk of bias, and limited follow-up reduced the comparability of findings and precluded quantitative synthesis.

Conclusion: The available evidence suggests that video game-based interventions may be associated with improvements in depressive symptoms in adults. However, due to methodological heterogeneity, variable risk of bias, and the absence of meta-analysis, these findings should be interpreted with caution. Further adequately powered randomized controlled trials with standardized intervention reporting, validated depression outcomes, appropriate comparator groups, and long-term follow-up are needed to clarify their therapeutic role.

Keywords: video games, depression, mental health, serious games, commercial video games, systematic review.

INTRODUCTION

Mental disorders, such as depression, anxiety, and stress, represent a global challenge with a high epidemiological burden. Despite advances in conventional treatments, such as pharmacological and psychological therapy, many people still face barriers to access, social stigma, and limitations in the effectiveness of these interventions. Given this situation, it is crucial to explore more accessible complementary therapies for mental health (Abd-Alrazaq et al., 2022; Bocci et al., 2023; Fleming et al., 2017; Granic et al., 2014).

Serious games, video games designed with a purpose beyond entertainment, have emerged as a promising tool in the treatment of mental disorders. Their positive impact may be explained through neurobiological, psychological, and social mechanisms, including the stimulation of neurotransmitters associated with well-being, the improvement of emotional regulation, and the promotion of social interaction (Abd-Alrazaq et al., 2022; Bocci et al., 2023; Fleming et al., 2017). Additionally, they offer advantages such as accessibility and lower cost compared to conventional therapies. However, their implementation faces challenges, such as the need for rigorous studies to validate their effectiveness in different therapeutic contexts (Abd-Alrazaq et al., 2022; Granic et al., 2014).

Interest in serious games, exergames, commercial video games, and gamified digital interventions for mental health has increased substantially in recent years. Previous systematic reviews and meta-analyses have suggested that game-based interventions may reduce depressive symptoms, anxiety, or stress, particularly when they incorporate cognitive-behavioral, behavioral activation, physical activity, or engagement-enhancing components. However, the available literature remains heterogeneous in terms of study design, age group, clinical population, intervention type, comparator condition, outcome measurement, and follow-up duration.

Despite these contributions, important gaps remain. Existing reviews often combine multiple psychiatric conditions, heterogeneous age groups, and diverse digital interventions, making it difficult to isolate the specific contribution of video game-based interventions for depressive symptoms in adults. In addition, serious games and commercially available off-the-shelf games are frequently discussed despite differences in therapeutic intent, design principles, accessibility, and mechanisms of engagement. This limits the specificity of conclusions regarding depressive symptoms and highlights the need for a focused systematic review that critically synthesizes the available evidence on video game-based interventions for depression in adult populations.

Therefore, this systematic review aimed to evaluate the re-

ported therapeutic effects of video game-based interventions, including serious games and commercially available off-the-shelf games, on depressive symptoms in adults through a structured qualitative synthesis of the available evidence. The review was guided by the following research question: What are the therapeutic effects of video game-based interventions on depressive symptoms in adults?

METHODS

Study Design and Registration

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The protocol was registered in PROSPERO (CRD420251107133). The study was designed as a systematic review rather than a scoping review because it addressed a focused evaluative question, used predefined eligibility criteria, applied a structured PICO framework, involved independent study selection, and included a formal risk-of-bias assessment using validated tools.

The objective was to evaluate the therapeutic impact of video game-based interventions on depressive symptoms in adults. Anxiety, emotional regulation, cognitive function, sleep quality, social interaction, self-efficacy, and psychological well-being were considered secondary outcomes when reported by the included studies.

The review question was structured using the PICO framework as follows: Population: adults aged 18 years or older with a clinical diagnosis of depression or elevated depressive symptoms; Intervention: video game-based interventions, including serious games and commercially available off-the-shelf video games; Comparator: usual care, waitlist, non-gaming control conditions, alternative digital or non-digital activities, or no comparator when studies used single-arm designs; Outcome: change in depressive symptom severity measured using validated instruments. Secondary outcomes included anxiety, cognitive function, emotional regulation, sleep quality, social interaction, self-efficacy, and psychological well-being.

Although the included studies were heterogeneous in design, intervention format, and outcome measurement, the review maintained a focused evaluative objective and incorporated a formal risk-of-bias assessment. Therefore, findings were synthesized qualitatively rather than statistically pooled.

Search Strategy and Databases

We designed a comprehensive search strategy to identify relevant literature published between January 2018 and January 2024 to capture the most recent applications. The search was performed in five electronic databases: PubMed, PsycINFO,

Cochrane Library, Web of Science, and IEEE Xplore. The search terms included a combination of Medical Subject Headings (MeSH) and keywords related to “video games,” “depression,” “anxiety,” “mental health,” and “therapeutic interventions.” Boolean operators (AND, OR) were used to refine the results. Additionally, a manual search of the reference lists of the included studies was conducted to identify additional eligible studies. All records were imported into citation management software, and duplicates were removed prior to screening. The complete database-specific search strategies, including MeSH terms, keywords, Boolean operators, filters, search date, and number of records retrieved from each database, are provided in Supplementary Material 2. A completed PRISMA 2020 checklist is provided in Supplementary Material 1. Full-text records excluded after eligibility assessment, together with reasons for exclusion, are provided in Supplementary Material 3.

Eligibility Criteria

Studies were eligible if they met the following criteria: (1) included predominantly adult participants aged 18 years or older with a clinical diagnosis of depression or elevated depressive symptoms; (2) evaluated a video game-based intervention, including serious games specifically designed for therapeutic or health-related purposes and commercially available off-the-shelf games originally developed for entertainment and publicly accessible through standard distribution platforms, regardless of whether they were paid, free, or open access; (3) reported depressive symptom severity using validated instruments or clearly defined psychological outcome measures; (4) were published as full-text peer-reviewed articles or preprints; and (5) used an interventional or quasi-interventional design, including randomized controlled trials, quasi-experimental studies, single-arm trials, longitudinal intervention studies, or experimental designs.

Eligible gaming platforms included consoles, personal computers, mobile devices, online platforms, virtual reality systems, and motion-based exergaming systems. Depression was considered the primary outcome of interest. Anxiety, cognitive function, emotional regulation, sleep quality, social interaction, self-efficacy, and psychological well-being were considered secondary outcomes because they may represent psychological, behavioral, or functional domains related to depressive symptom change.

Studies were excluded if they were reviews, editorials, letters, case reports, conference abstracts without full text, non-human studies, purely correlational studies without a clear intervention, or studies in which the video game exposure was not clearly described. The restriction to English and Spanish was retained due to feasibility and reviewer language competency and is acknowledged as a limitation.

Study Selection

Two independent reviewers screened all titles and abstracts against the predefined eligibility criteria. The full texts of potentially eligible records were then independently assessed by the same two reviewers. Disagreements at any stage were resolved through discussion and consensus; when consensus could not

be reached, a third reviewer was consulted. Reasons for full-text exclusion were recorded and are provided in Supplementary Material 3. The selection process was documented using a PRISMA flow diagram to ensure transparency and replicability.

Data Extraction

A standardized data extraction form was developed and pilot-tested to ensure consistency. The following data were collected from each included study: first author, publication year, country, study design, sample size, participant demographics (age, sex), game type and platform, intervention duration and frequency, outcome measures used, and main findings related to depressive symptoms or other psychological outcomes. When necessary, corresponding authors were contacted to clarify missing or ambiguous data.

Risk of Bias and Quality Assessment

To ensure methodological rigor, the risk-of-bias assessment was matched to each study design using two validated tools: for randomized controlled trials, the revised Cochrane risk-of-bias tool (RoB 2) was applied (Sterne et al., 2019), while for non-randomized studies, the Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) tool was used (Sterne et al., 2016). Two independent reviewers applied these tools to each study, and discrepancies were resolved by consensus or consultation with a third reviewer. For RoB 2, judgments were classified as low risk, some concerns, or high risk of bias by domain. For ROBINS-I, studies were classified as low, moderate, serious, or critical risk of bias. Due to substantial heterogeneity in study designs, populations, interventions, comparator conditions, outcome measures, and follow-up duration, a structured qualitative synthesis was conducted rather than a quantitative meta-analysis or formal certainty-of-evidence grading. A color-coded traffic light plot was generated to summarize domain-level risk-of-bias judgments across the included studies.

RESULTS

Study Selection

Results are presented with a primary focus on changes in depressive symptoms, followed by secondary psychological and cognitive outcomes. A total of 2,038 records were initially identified through electronic database searches. After removing 1,383 duplicates, 655 records remained for title and abstract screening. Of these, 615 were excluded for not meeting the inclusion criteria. Full-text review was performed for 40 studies, and 27 were excluded for reasons such as ineligible population ($n = 14$), irrelevant outcomes ($n = 7$), or being conference abstracts only ($n = 6$). Ultimately, 13 studies met the eligibility criteria and were included in this systematic review (Figure 1).

General Characteristics of the Studies

The 13 studies included in this review were conducted in a variety of countries, with the highest number of studies from the United States ($n = 4$), followed by England ($n = 3$) and China ($n = 2$). Study designs included randomized controlled trials ($n = 4$), experimental studies ($n = 5$), cross-sectional studies ($n = 2$), longitudinal studies ($n = 1$), and quasi-experimental designs ($n =$

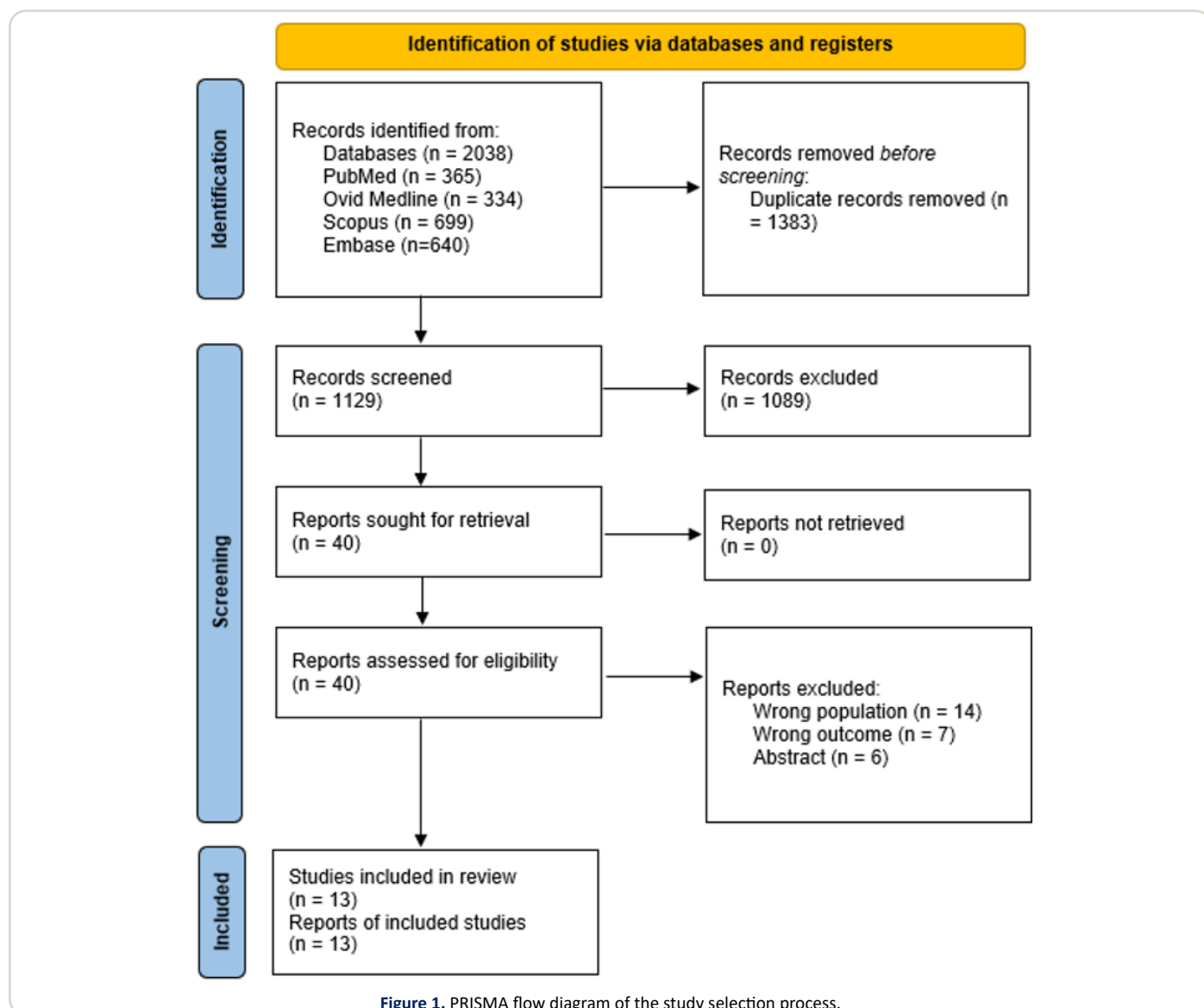
1). Sample sizes varied widely, ranging from 18 to 29,909 participants. The age ranged from 13 to 94 years, although most studies focused on adult populations. Notably, five studies (38.5%) specifically targeted older adults aged 60 years and above. The gender distribution across studies also varied, with some studies including only female or male participants, while others had mixed samples (Table 1).

The included interventions differed substantially in therapeutic intent, game type, platform, duration, and proposed active components. Serious games and therapeutic applications commonly incorporated structured elements such as behavioral activation, psychoeducation, mood monitoring, or engagement-enhancing strategies. Exergames primarily involved physical activation, movement-based interaction, and goal-directed activity. Casual games appeared to involve distraction, reward, short-term mood modulation, and emotional regulation, whereas role-playing and online games were more frequently associated with immersion, escapism, autonomy, competence, and social interaction. However, most studies did not provide

detailed intervention manuals, theoretical frameworks, or standardized descriptions of game mechanics, limiting the interpretation of which components may have contributed to changes in depressive symptoms.

Study Outcomes

Depressive symptom severity was treated as the primary outcome of this review. Across the included studies, video game-based interventions were generally associated with improvements in depressive symptoms, although the magnitude, measurement instruments, comparator conditions, and statistical reporting varied substantially. Several studies documented reductions in depression scores using validated scales such as the Patient Health Questionnaire-9, Depression Anxiety Stress Scales-21, Quick Inventory of Depressive Symptomatology, Beck Depression Inventory-II, and Center for Epidemiologic Studies Depression Scale. Anxiety, emotional regulation, cognitive performance, sleep quality, self-efficacy, social interaction, and psychological well-being were interpreted as secondary outcomes



when reported and were not considered equivalent to depressive symptom reduction.

The most common game genres used as interventions were casual games ($n = 5$), exergames ($n = 3$), and role-playing games (RPGs; $n = 2$). Platforms used to deliver the interventions included consoles ($n = 8$), personal computers ($n = 2$), mobile apps ($n = 1$), and unspecified online games ($n = 1$). The duration of individual gaming sessions ranged from 15 to 60 minutes, with intervention periods lasting between 4 and 12 weeks, depending on the study.

Several evidence gaps were identified. These included small sample sizes in clinical trials, limited long-term follow-up, heterogeneous outcome instruments, inconsistent reporting of intervention protocols, limited information on active game components, and insufficient separation between serious games, commercial video games, and exergames. These limitations reduced comparability across studies and precluded quantitative synthesis.

Assessment Tools Used

A range of standardized psychological instruments was used across the studies to measure depression and associated outcomes. The PHQ-9 was used in four studies, while the DASS-21 and QIDS were used in three and two studies, respectively. Other tools included the Beck Depression Inventory (BDI-II), Generalized Anxiety Disorder scale (GAD-7), and the Center for Epidemiologic Studies Depression Scale (CES-D). Cognitive function was assessed using tools such as the Mini-Mental State Examination (MMSE), Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), and Memory Cognitive Evaluation (MCE). Measures of well-being and self-efficacy included the Warwick-Edinburgh Mental Wellbeing Scale, the Flourishing Scale, and the General Self-Efficacy Scale (GSES) (Table 3).

Outcome domains were organized according to their relevance to the review question. Depressive symptom severity was the primary outcome. Secondary outcomes were extracted when reported because they may represent related psychologi-

cal or functional domains associated with depression, including anxiety, cognitive function, emotional regulation, sleep quality, self-efficacy, social interaction, and psychological well-being. These secondary outcomes were analyzed as contextual findings rather than as primary indicators of intervention effectiveness.

Risk of Bias

The risk-of-bias assessment showed variability in methodological quality across the included studies (Figure 2). Among randomized trials, the most frequent concerns involved deviations from intended interventions, missing outcome data, and outcome measurement. Among non-randomized studies, the most frequent concerns involved confounding, participant selection, intervention classification, and incomplete reporting of participant characteristics. Although some studies were rated as having an overall low risk of bias, incomplete reporting of demographic characteristics, such as age or sex, may introduce concerns related to participant selection and should be considered when interpreting the findings. A color-coded traffic light plot was added to summarize risk-of-bias judgments across domains and improve visual interpretation of the methodological quality of the included studies.

Panel A summarizes randomized studies assessed using RoB 2. Panel B summarizes non-randomized studies assessed using ROBINS-I. Green indicates low risk of bias, yellow indicates some concerns, and orange indicates moderate risk of bias. RoB 2 domains included randomization process, deviations from intended interventions, missing outcome data, outcome measurement, selection of reported results, and overall risk of bias. ROBINS-I domains included confounding, selection of participants, classification of interventions, deviations from intended interventions, missing data, measurement of outcomes, selection of reported results, and overall risk of bias. Detailed domain-level judgments for RoB 2 and ROBINS-I are provided in Supplementary Material 4.

Table 1. General characteristics of included studies

First Author, Year	Country	Study Design	N° Participants	Age (Mean/Range)	Male (%)
Hazel, 2022	England	Cross-sectional	2107	13-34 years (81.8%)	69,5%
Heinbach, 2021	England	Cross-sectional	52	59.2 years (49-71)	61,5%
Vanderkruik, 2024	Canada	Single-arm trial	18	34.3 years	0,0%
Dos Santos, 2023	USA	Experimental study	22	70.6 $\pm$ 7.7 (60-90)	0,0%
Ximeng, 2022	China	Randomized controlled trial	33	18-26 years	21,2%
Larche, 2021	Canada	Two experiments	124	NR	NR
Jahouh, 2021	Spain	Longitudinal (Experimental & Control)	80	Control: 83.25 $\pm$ 8.78, Experimental: 85.05 $\pm$ 8.63	43,8%
Russoniello, 2019	USA	Randomized controlled trial	49	PvZ: 41 $\pm$ 13.3, sAD: 45 $\pm$ 12.2	18,4%
Jinhui, 2017	Singapore	Experimental study	102	71.4 $\pm$ 7.87	36,3%
Fan, 2022	China	Quasi-experimental (DID method)	29909	61.09 $\pm$ 9.52	48,5%
Farahiyah, 2020	USA	Pilot RCT	36	NR	NR
Li, 2016	USA	Randomized controlled trial	49	71.12 $\pm$ 8.67	40,8%
Rosemberg, 2010	England	Small uncontrolled trial	19	78.7 (63-94)	31,6%

Note: NR: not report. PvZ: *Plants vs. Zombies™*. sAD: *second antidepressant*

Table 2. Study outcomes and depression symptom improvements.

First Author, Year	Depression & Symptoms Improvement	Other Psychological Outcomes	Game Genre	Gaming Platform	Time Spent Playing
Hazel, 2022	Yes	Improved mental well-being	RPG, MOBA, Music, Survival Horror	NR	1-6h/week (21.9%), 7-10h/week (29.1%), >10h/week (48.5%)
Heinbach, 2021	Yes	PROMIS score reduction	Exergames	Console	50 min, 3x/week, 10 weeks
Vanderkruik, 2024	Yes	Increased app engagement	Behavioral Activation Mobile App	Mobile	10 weeks
Dos Santos, 2023	Yes	Improved mood (POMS)	Dance Central	Console	12 weeks, 2x/week, 50 min/session
Ximeng, 2022	Yes	Improved anxiety, stress, emotional regulation	Casual (Music-based)	PC	4 weeks, 5x/week, ≥20 min/session
Larche, 2021	Yes	Escapism motivation linked to depression (RPG)	RPG (Skyrim), Arcade	PC / Mac	Skyrim: 15 min/session, 2 blocks; Winterbells: 5 min/session, 2 blocks
Jahouh, 2021	Yes	Improved cognition, attention, memory, ADLs	Casual (Wii Fit)	Console	8 weeks, 20 sessions (40-45 min), 2-3x/week
Russoniello, 2019	Yes	16 participants no longer clinically depressed	Casual (Plants vs. Zombies)	Multiplatform	4 weeks, 16 sessions (30-45 min), 4x/week
Jinhui, 2017	Yes	Positive emotions	Exergames	Console	6 weeks, 1x/week (60 min)
Fan, 2022	Yes	Video games > Videos/News for Online games depression reduction		NR	Time not specified
Farahiyah, 2020	Yes	Improved sleep & psychological health	Exergames (Xbox Kinect)	Console	6 weeks, 3x/week, 30 min/session
Li, 2016	Yes	Positive emotions, self-efficacy	Sports (Wii)	Console	1h/week, consecutive weeks
Rosemberg, 2010	Yes	Improved QIDS, SF-36, RBANS	Sports (Wii)	Console	12 weeks

Note: NR: not report

Table 3. Assessment tools used in included studies.

First Author, Year	Depression & Psychological Assessment	Cognitive Assessment	Self-Esteem & Well-being
Hazel, 2022	Warwick-Edinburgh Mental Wellbeing Scale, Flourishing Scale	NR	Basic Psychological Needs Scale (Autonomy)
Heinbach, 2021	PROMIS, SANS	NR	NR
Vanderkruik, 2024	PHQ-9, GAD-7	NR	NR
Dos Santos, 2023	POMS	MMSE	NR
Ximeng, 2022	BDI-II, DASS-21	Not directly assessed	General Self-Efficacy Scale (GSES)
Larche, 2021	DASS-21 (outside gaming context)	Not assessed	MAAS (attention in daily life)
Jahouh, 2021	EDG-15 (Yesavage Geriatric Depression Scale)	MCE	Katz Index of Independence in ADLs
Russoniello, 2019	QIDS, PHQ-9	NR	NR
Jinhui, 2017	PHQ-9	NR	NR
Fan, 2022	CES-D	NR	NR
Farahiyah, 2020	DASS-21	NR	Feasibility Questionnaire
Li, 2016	PHQ-9, PANAS	NR	General Self-Efficacy Scale (short version)
Rosemberg, 2010	QIDS, MOS SF-36	RBANS	NR

Note: NR: not report

DISCUSSION

Main Findings

This systematic review synthesized evidence from 13 studies evaluating video game-based interventions, including serious games and commercially available off-the-shelf games, for depressive symptoms in adults. Overall, the included studies reported improvements in depressive symptoms or related psychological outcomes after video game-based interventions. However, these findings should be interpreted cautiously because the evidence base was highly heterogeneous in terms of study design, population, intervention type, comparator condition, intervention dose, outcome measurement, and follow-up duration.

Randomized controlled trials provided stronger internal validity but were generally limited by small sample sizes, short follow-up periods, and variability in outcome measures. Non-randomized, single-arm, and quasi-experimental studies contributed useful information regarding feasibility, acceptability, and real-world implementation but were more vulnerable to confounding, expectancy effects, and selection bias. Therefore, the consistency of positive findings across studies should be considered preliminary rather than definitive evidence of clinical effectiveness.

The mechanisms through which video games may influence depressive symptoms also appeared to differ across intervention types. Exergames may partly act through physical activation and increased engagement in goal-directed activity. Casual games may provide distraction, reward, and short-term mood modulation. Serious games and mobile applications may incor-

porate therapeutic components such as behavioral activation, psychoeducation, or mood monitoring. Role-playing and online games may involve immersion, autonomy, competence, escapism, or social interaction. However, because most studies did not provide detailed descriptions of game mechanics or intervention components, it remains difficult to determine which elements are most strongly associated with depressive symptom improvement.

Comparison with Previous Literature

The findings of this review are consistent with previous systematic reviews and meta-analyses suggesting that serious games, exergames, and gamified digital interventions may reduce depressive symptoms. However, prior reviews have also emphasized important limitations, including small sample sizes, heterogeneous interventions, short-term follow-up, variable comparator conditions, and low or uncertain certainty of evidence. Reviews focused on commercial video games similarly suggest potential benefits for mood, anxiety, stress, social connection, and cognitive engagement, but much of this evidence remains heterogeneous and includes non-clinical populations (Ju, 2022; Li et al., 2020).

Compared with previous reviews, the present study focused specifically on depressive symptoms in adults and included both serious games and commercially available off-the-shelf games. This distinction is important because serious games are typically designed with explicit therapeutic goals, whereas commercial games are primarily designed for entertainment and may exert psychological effects through engagement, immersion, reward,

A. Randomized studies assessed with RoB 2

Study	Randomization	Deviations	Missing data	Outcome measurement	Reported results	Overall
Russoniello et al., 2019	Low	Low	Low	Low	Low	Low
Ximeng et al., 2022	Low	Low	Low	Low	Low	Low
Farahiyah et al., 2020	Low	Some concerns	Some concerns	Some concerns	Low	Some concerns
Jinhui et al., 2017	Low	Some concerns	Some concerns	Some concerns	Low	Some concerns
Rosenberg et al., 2010	Low	Low	Low	Some concerns	Low	Low

B. Non-randomized studies assessed with ROBINS-I

Study	Confounding	Participant selection	Intervention classification	Deviations	Missing data	Outcome measurement	Reported results	Overall
Jahouh et al., 2021	Low	Low	Low	Low	Low	Low	Low	Low
Larche et al., 2021	Low	Low	Low	Low	Low	Low	Low	Low
Li et al., 2016	Moderate	Moderate	Low	Moderate	Low	Moderate	Moderate	Moderate
Vanderkruijk et al., 2024	Low	Low	Low	Low	Low	Low	Low	Low
Dos Santos et al., 2023	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Fan et al., 2022	Low	Low	Low	Low	Low	Low	Low	Low
Heimbach et al., 2021	Low	Low	Low	Low	Low	Low	Low	Low
Hazel et al., 2022	Low	Low	Low	Low	Low	Low	Low	Low

Figure 2. Risk-of-bias traffic light plot included studies.

social interaction, or distraction (Primack et al., 2012; Sterne et al., 2016). The present review also distinguished depressive symptom severity as the primary outcome and interpreted anxiety, cognitive function, emotional regulation, and well-being as secondary contextual outcomes (Sterne et al., 2019).

Strengths and Limitations of Evidence

A strength of this review is its focused evaluation of video game-based interventions for depressive symptoms in adults using a predefined PICO framework, systematic study selection, structured data extraction, and formal risk-of-bias assessment with design-specific tools. The review also considered both serious games and commercially available off-the-shelf games, allowing comparisons across different types of game-based interventions.

However, several limitations should be acknowledged. First, the included studies were highly heterogeneous in design, intervention type, population characteristics, outcome measures, comparator conditions, and follow-up duration. This heterogeneity precluded meta-analysis and limited the ability to estimate pooled effects. Second, several studies had small sample sizes, limited follow-up, or incomplete reporting of intervention components, which reduces confidence in the reproducibility and durability of the reported effects. Third, some non-randomized studies were vulnerable to confounding and selection bias. Fourth, the restriction to English and Spanish may have excluded relevant studies published in other languages. Finally, because several studies did not provide detailed descriptions of game mechanics, therapeutic components, or adherence, it was not possible to determine which intervention features were most strongly associated with depressive symptom improvement.

Implications for Practice and Policy

The findings suggest that video game-based interventions may represent a potentially accessible and engaging adjunctive approach for depressive symptoms. However, current evidence is not sufficient to support broad clinical implementation as a standalone treatment. Instead, video game-based interventions should be considered experimental or complementary tools that require further validation before integration into routine mental health care.

Future implementation should consider clinical supervision, user safety, screen time, privacy, data protection, accessibility, and potential risks related to excessive gaming or problematic use. Collaboration among clinicians, researchers, patients, and game developers may help design interventions that are evidence-informed, engaging, safe, and appropriate for specific populations.

Future Research Directions

Future research should prioritize adequately powered randomized controlled trials with clearly defined comparator groups, standardized depression outcomes, transparent reporting of intervention components, and long-term follow-up. Studies should report game genre, platform, duration, frequency, adherence, theoretical framework, and proposed active components in sufficient detail to allow replication. Future trials

should also examine whether effects differ by age, sex, baseline depression severity, clinical diagnosis, gaming experience, and intervention type. Comparative studies are needed to determine whether serious games, commercial video games, exergames, or mobile game-based applications differ in effectiveness, acceptability, adherence, and safety. Economic evaluations and implementation studies are also needed before these interventions can be recommended for broader clinical use.

Conclusion

This systematic review found that video game-based interventions, including serious games and commercially available off-the-shelf games, were generally associated with improvements in depressive symptoms among adults across the included studies. However, the evidence remains limited by heterogeneity in study design, intervention type, outcome measurement, comparator conditions, and follow-up duration. Because no meta-analysis was conducted and several studies had methodological limitations, the findings should be interpreted cautiously. Future research should prioritize adequately powered randomized controlled trials, standardized reporting of game characteristics and therapeutic components, validated depression outcomes, appropriate comparator conditions, and long-term follow-up to clarify the role of video game-based interventions in depression care.

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AUTHORS' CONTRIBUTION

Fritz Fidel Váscónes-Román: Conceptualization, investigation, writing, review, supervision, and approval of the final version.
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CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in the collection of data, analysis of information, or writing of the manuscript.

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REVIEW PROCESS

This study has been reviewed by two external reviewers in double-blind mode. The editor in charge was Renzo Rivera. The review process is included as supplementary material 5.

DATA AVAILABILITY STATEMENT

Not applicable.

DECLARATION OF THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE

Support technology was used to improve translation and writing in this manuscript. No data was generated in IA. The final version of the manuscript was reviewed and approved by all authors.

DISCLAIMER

The authors are responsible for all statements made in this article.

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