Video Games and Mental Health: Between Escapism and Intervention

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ABSTRACT

Video games have become a pervasive part of global youth culture, with emerging evidence suggesting their potential utility in mental health interventions. Despite historical moral panic and concerns regarding addiction and aggression, video games are increasingly recognized for their capacity to engage therapeutic mechanisms relevant to anxiety, schizophrenia, and emotion regulation. This review explores their dual role as tools for both escapism and structured intervention.

(Keywords: video games, mental health, addiction, anxiety, schizophrenia, escapism, intervention)

INTRODUCTION

Anxiety disorders remain the most prevalent category of mental health conditions worldwide, with a particularly steep rise in incidence among adolescents and young adults over the past decade (Bandelow and Michaelis, 2015; WHO, 2023). At the same time, barriers such as stigma, long wait times, and disengagement from conventional care models have driven demand for more accessible and culturally resonant interventions. One emerging avenue, once stigmatized but now gaining serious academic attention, is the use of video games as mental health tools.

Video games have evolved beyond mere entertainment to become a dominant cultural and technological force, with approximately 3.4 billion users globally (Newzoo, 2023). Despite historical concerns linking gaming to aggression, addiction, or social withdrawal, a growing body of interdisciplinary research has challenged these narratives. Instead, video games are increasingly recognized for their capacity to support psychological well-being through mechanisms such as attentional distraction, emotional engagement, social connectedness, and behavioral activation (Colder Carras, *et al*., 2018; Pallavicini, *et al.*, 2021; Russoniello, *et al*., 2009).

Crucially, the immersive, interactive, and reward-based nature of games allows them to mirror core components of established psychotherapeutic approaches including cognitive-behavioral therapy (CBT), exposure therapy, and emotion-focused interventions. These overlaps are particularly promising in the treatment of anxiety, a condition marked by excessive rumination, avoidance, and dysregulated arousal. Moreover, emerging evidence suggests that gaming may offer novel pathways to support individuals with more complex psychiatric conditions, such as schizophrenia, through engagement, cognitive stimulation, and social scaffolding (Quiles and Verdoux, 2023).

This review highlights the emerging role of electroencephalography (EEG) as a research tool to quantify neural responses during gameplay. These insights offer a window into the cognitive and emotional processes underlying player engagement, particularly among individuals with schizophrenia. By identifying neural markers of affective regulation and attentional control, EEG research can inform the design of personalized, adaptive game-based interventions that are grounded in measurable brain activity.

This literature review critically evaluates the therapeutic potential of video games, with a focus on anxiety, schizophrenia, and EEG-based research to inform intervention. We begin by contextualizing the legacy of moral panic and pathologization in gaming discourse, then explore the cognitive-emotional and neurobiological mechanisms through which games may offer therapeutic benefits. Drawing from clinical trials, EEG studies, and real-world applications, we examine how different genres—including commercial off-the-shelf (COTS) games and virtual reality environments—may reduce anxiety symptoms and promote adaptive functioning. Finally, we address research gaps and advocate for interdisciplinary, user-centered approaches to ethically integrate video games into modern mental health care.

Far from being a binary of escapism or intervention, we propose that video games exist on a therapeutic spectrum, capable of either avoidance or empowerment depending on context, intention, and design. Recognizing this complexity is essential for reframing games not as distractions, but as culturally embedded tools with untapped potential for healing, inclusion, and cognitive restoration, particularly in the context of conditions like schizophrenia, where traditional therapeutic engagement remains limited.

METHODOLOGY

We performed a narrative literature review to synthesize findings across disciplines. We searched PubMed, PsycINFO, and Scopus for English-language articles published between 2000 and 2024. Our search used terms spanning video games, mental health, anxiety, schizophrenia, EEG (electroencephalogram), and therapy.

We selected peer-reviewed studies focusing on anxiety disorders and schizophrenia in the context of video game play, including both commercial video games and purpose-built therapeutic games. Studies leveraging EEG or other neurofeedback during gameplay were also included to incorporate neurophysiological evidence. Inclusion criteria required that studies report psychological or clinical outcomes (e.g. anxiety level, cognitive function, social engagement). Exclusion criteria included studies with no empirical data or those unrelated to mental health outcomes. In total, literature sources were reviewed for this article. Each was evaluated for relevance, recency, and methodological quality. We extracted key results and insights to inform an interdisciplinary discussion spanning psychological effects, neural correlates, and design principles.

RESULTS AND DISCUSSION

Video games influence mental health through multiple pathways. They can act as cognitive and emotional regulators, providing distraction from negative thoughts and opportunities for emotion processing. At the same time, games can engage neurobiological systems implicated in mood and anxiety. Below, we detail these mechanisms and then examine evidence from clinical studies, the contributions of commercial games, and special considerations for severe mental illness.

Reframing the Narrative: From Moral Panic to Clinical Potential

Public discourse on video games has long been shaped by narratives of risk, often framed through the lens of moral panic. Since the 1990s, games have been blamed for a range of societal concerns, including aggression, social withdrawal, and diminished cognitive capacity. These concerns, while culturally resonant, have lacked consistent empirical support and have at times overshadowed the nuanced psychological effects of gameplay.

Among the most persistent misconceptions is the belief that video games promote real-world violence. However, meta-analytic and longitudinal research increasingly challenges this notion. For instance, the American Psychological Association's 2020 review found that violent video games may be associated with minor, short-term increases in aggressive behavior, but not with serious or criminal violence. Contextual factors, such as personality traits and environmental stressors, appear to mediate these effects. Furthermore, large-scale studies have found no meaningful association between typical gameplay and long-term antisocial outcomes (APA, 2020; Przybylski and Weinstein, 2019).

The inclusion of Gaming Disorder in the ICD-11 by the World Health Organization reignited these concerns, prompting critique from over 30 international scholars. Critics argued that the classification lacked a robust empirical foundation and risked pathologizing normative gaming behavior, especially among adolescents and neurodivergent individuals (Aarseth, *et al*., 2017). Such perspectives warn against premature diagnostic categories that may amplify stigma and undermine legitimate use cases for digital games in healthcare contexts.

Despite these controversies, emerging evidence suggests that many behaviors once interpreted as pathological—such as immersive play or emotional investment in online environments—may be adaptive under the right conditions. Gaming can foster emotional self-regulation, enhance social connectedness, and provide structured opportunities for mastery and reflection.

The current scientific landscape supports a shift away from deficit models of media use toward a more nuanced framework: one that differentiates between maladaptive overuse and intentional, therapeutic engagement. By acknowledging the therapeutic spectrum of gameplay, we open the door to more inclusive, evidence-based approaches to integrating video games into digital mental health care.

Mechanisms of Action in Game-Based Mental Health Interventions

Video games engage users in highly immersive, emotionally charged, and cognitively demanding environments. These elements established parallel therapeutic modalities such as cognitive-behavioral therapy (CBT), exposure-based interventions, and emotion-focused approaches. In this section, we examine the cognitive, emotional, and neurobiological mechanisms through which games may exert therapeutic effects, particularly in relation to anxiety and schizophrenia.

Cognitive and Emotional Pathways

At the cognitive level, games often serve as structured distractions that interrupt ruminative thought patterns central to anxiety disorders. Casual and puzzle-based games, for example, offer low-stakes goals and attentional absorption that can reduce physiological and subjective stress (Russoniello, *et al.*, 2009). These mechanics mirror CBT elements such as cognitive restructuring, activity scheduling, and exposure to emotionally evocative stimuli in a safe context.

Narrative-driven or cooperative games also promote emotional engagement and behavioral activation. These games can foster psychological resilience by encouraging reflection, social support, and mastery through narrative arcs and skill progression (Granic, *et al.*, 2014). Many players report emotional catharsis through game narratives that address loss, adversity, or personal growth. Such reflective engagement aligns with emotion-focused therapy principles, where emotional insight and processing are central to healing.

Additionally, games often induce flow states, which are episodes of deep, goal-oriented immersion characterized by a balance of challenge and skill. Flow has been associated with diminished self-referential processing, reduced negative effects, and heightened intrinsic motivation (Csikszentmihalyi, 1990). These features may be especially beneficial for individuals with anxiety, who often experience persistent worry and attentional fragmentation.

In populations with schizophrenia, structured game mechanics can bypass motivational deficits and cognitive barriers that limit participation in traditional interventions. Gamified tasks that target working memory, sustained attention, and executive function provide an engaging format for cognitive remediation. Early findings suggest that such approaches may enhance cognitive performance, especially when grounded in adaptive difficulty systems and clear feedback mechanisms (Quiles and Verdoux, 2023).

Neurobiological Underpinnings

Beyond behavioral outcomes, gameplay influences neural systems associated with emotion regulation, reward processing, and cognitive control. The dopaminergic reward system, particularly the mesolimbic pathway, is activated during gameplay and reinforces engagement through reward anticipation and feedback. This is relevant for psychiatric conditions characterized by anhedonia and reduced motivation, such as schizophrenia or depression (Kirkpatrick, *et al*., 2006).

Video games have also been associated with reductions in physiological stress markers. Decreases in salivary cortisol and improvements in heart rate variability have been observed after gameplay, suggesting enhanced parasympathetic nervous system activity similar to that induced by mindfulness-based therapies (Russoniello, *et al.*, 2009).

Emerging neuroimaging evidence supports the view that gameplay may enhance functional connectivity between limbic structures (e.g., amygdala) and prefrontal regulatory circuits, particularly through repeated exposure to emotionally evocative yet controllable stimuli (Li, *et al*., 2023). These findings align with neural targets of reappraisal-based therapy and may offer a novel route to train affective flexibility and top-down control.

Overall, these neurocognitive and affective mechanisms suggest that well-designed games do not merely entertain, they engage systems central to mental health and recovery. When integrated with intentional design, feedback, and personalization, video games may enhance outcomes traditionally targeted by therapy and pharmacological interventions.

The Role of EEG in Evaluating and Designing Game-Based Interventions

Electroencephalography (EEG) provides a valuable, non-invasive window into the neural processes that underlie cognitive and emotional responses to gameplay. Its high temporal resolution allows researchers to assess real-time shifts in attention, arousal, and emotional engagement—core constructs relevant to both anxiety and schizophrenia. This section explores how EEG contributes to our understanding of therapeutic gaming and informs the design of neuroadaptive interventions.

EEG as a Window into Engagement and Emotional Regulation

EEG is particularly sensitive to patterns of oscillatory brain activity associated with emotional states and cognitive control. Commonly examined metrics include frontal alpha asymmetry (a marker of emotional valence), midline theta (linked to sustained attention), beta suppression (associated with relaxation), and P300 amplitude (an index of stimulus discrimination and executive monitoring). These biomarkers can be measured during gameplay to evaluate user state and response to different game mechanics (Borghini, *et al.*, 2017; Wang, *et al.*, 2022).

Frontal alpha asymmetry, for instance, has been associated with affective regulation. In therapeutic gaming contexts, narrative or emotionally soothing games have been shown to increase left-sided alpha activity, reflecting improved mood and positive engagement. Similarly, rhythm-based or meditative games may enhance midline theta and beta suppression, indicating reduced anxiety and cognitive arousal (Russoniello, *et al.*, 2009).

EEG Applications in Anxiety Intervention

In individuals with anxiety disorders, EEG often reveals heightened beta activity and reduced left frontal alpha—a pattern associated with hypervigilance and dysregulated emotional processing. Therapeutic games that emphasize rhythm, repetition, or meditative pacing may reverse these patterns, suggesting a neural basis for the calming effects of gameplay. Studies have shown that engaging with calming or flow-inducing games can produce shifts toward more symmetrical frontal alpha and increased coherence in alpha rhythms, corresponding with relaxation and emotional recovery (Wang, *et al*., 2022).

EEG Insights in Schizophrenia and Cognitive Engagement

EEG studies in schizophrenia populations have identified distinctive patterns such as attenuated P300 amplitude, reduced beta activity, and disrupted fronto-parietal connectivity, reflecting deficits in attentional control and cognitive processing (Uhlhaas and Singer, 2010). By applying EEG during gameplay, researchers can assess how individuals with schizophrenia respond to different genres and mechanics, such as open-ended sandbox games versus structured cognitive training platforms.

These insights inform game selection and design by identifying which experiences best support sustained attention, executive function, and emotional engagement. For example, individuals with blunted neural responsiveness may benefit from games with high visual salience, immediate feedback, and simplified control schemes that accommodate cognitive impairments (Quiles and Verdoux, 2023).

Toward Neuroadaptive Game Design

As EEG research continues to evolve, it offers a promising foundation for neuroadaptive interventions—game environments that dynamically adjust difficulty, pacing, or narrative based on real-time neurophysiological feedback. While such systems are still in early development, post-hoc EEG analysis is already being used to refine game design and tailor interventions to user states.

For instance, adaptive systems could detect declines in engagement or increases in arousal and automatically trigger supportive game elements, such as visual cues, auditory feedback, or social prompts. These features could be particularly beneficial for users with fluctuating attention or emotional states, including those with generalized anxiety disorder or negative symptom schizophrenia. Table 1 below summarizes representative EEG markers and their mental health relevance.

Clinical Applications: Evidence from Trials and Experimental Studies

Over the past decade, the study of video games as therapeutic tools has progressed from theoretical exploration to empirical validation. Numerous randomized controlled trials (RCTs) and quasi-experimental studies have demonstrated that both custom-built and COTS games can reduce symptoms of anxiety, enhance emotion regulation, and promote cognitive functioning. This growing body of work underscores the potential of games as scalable, accessible, and low-stigma interventions—especially for populations disengaged from traditional clinical services.

Therapeutic Outcomes in Anxiety

Early work by Russoniello, *et al*. (2009) showed that 20 minutes of casual gameplay with Bejeweled II significantly reduced salivary cortisol and heart rate, suggesting immediate physiological stress recovery. Pallavicini, *et al*. (2021), in a meta-review of 26 studies, found that both action-based and casual games improved mood and reduced anxiety symptoms in clinical and non-clinical populations. These findings are particularly relevant for adolescents and young adults, where gaming is already culturally embedded and stigma toward conventional therapy remains high.

Games such as SPARX and MindLight—designed with embedded cognitive-behavioral principles and biofeedback—have shown positive results in reducing anxiety symptoms among youth. These games simulate therapeutic environments where players learn to recognize, confront, and reframe anxious thoughts while engaging in immersive gameplay. Importantly, these interventions leverage game mechanics not only for entertainment but also to train emotional and attentional regulation through interactive feedback.

Early Evidence in Schizophrenia

More recently, therapeutic gaming has been explored for more complex psychiatric conditions such as schizophrenia. A 2024 randomized controlled trial published in Translational Psychiatry assessed the life-simulation game Komori Life in adults with schizophrenia. While the intervention group did not show significant changes in executive functioning or negative symptom scores, they demonstrated modest improvements in attentional bias toward positive cues—an encouraging signal for cognitive-affective intervention in this population (Wang, *et al*., 2024).

Although still preliminary, such findings suggest that game-based interventions may serve as viable adjuncts or alternatives for individuals who are resistant to or underserved by conventional therapeutic modalities. Crucially, these outcomes provide insights into design strategies that maximize therapeutic potential—such as narrative scaffolding, graded exposure, skill rehearsal, and real-time physiological feedback

Summary of EEG Metrics and Associated Therapeutic Effects

Below is a synthesized table outlining key EEG markers used in game-based research, the neural indicators they represent, gameplay mechanics that modulate them, and their associated mental health implications.

Table 1: Representative EEG Markers Relevant to Gameplay and their Potential Mental Health Implications.

EEG Metric	Neural Indicator	Associated Gameplay Effect	Mental Health Implication
Frontal Alpha Asymmetry	Emotional Regulation	Narrative or relaxing games	Affective engagement, mood repair
Midline theta	Focused attention	Puzzle or strategy games	Improved cognitive control
Beta suppression	Reduced arousal/anxiety	Meditation or rhythm games	Stress recovery
P300 amplitude	Stimulus discrimination	Goal-directed tasks	Executive function monitoring
Alpha coherence	Neural synchronization	Cooperative or social games	Enhanced social cognition

Commercial Games and Incidental Mental Health Benefits

While much research has focused on purpose-built therapeutic games, an increasing body of evidence points to the mental health benefits of COTS games—those designed for entertainment rather than explicit clinical use. These titles span genres including narrative adventures, puzzles, simulations, and cooperative multiplayer platforms. Despite lacking formal therapeutic framing, they often elicit emotional engagement, foster social connection, and promote reflective thought—qualities central to psychological well-being.

Emotional Engagement and Catharsis through Narrative

Narrative-rich games such as Celeste, Gris, and Journey have received widespread acclaim for their capacity to explore themes of resilience, trauma, and emotional growth. These games often use carefully paced storytelling, music, and visual aesthetics to evoke deep emotional responses. For example, Celeste integrates a metaphorical depiction of anxiety and self-doubt into a precision platforming challenge, encouraging perseverance and self-compassion. Players frequently report cathartic experiences and increased emotional insight following play, particularly when narratives align with personal experiences (Liang, 2024; Ortiz, 2021).

While these effects may be incidental, they reflect established mechanisms in psychotherapy, including emotional processing, identification, and narrative coherence. Such alignment raises the possibility that therapeutic outcomes may emerge organically in well-designed games, even without clinical intent.

Social Interaction and Digital Belonging

Many COTS games provide meaningful opportunities for social engagement and community formation. Titles like Minecraft, Stardew Valley, or Animal Crossing facilitate cooperative building, shared objectives, and casual interactions that support social bonding and emotional scaffolding. These dynamics are particularly important for adolescents, individuals with social anxiety, or those facing geographic or economic barriers to in-person connection.

Notably, online multiplayer formats offer low-barrier entry points to digital socialization, making them viable adjuncts for users who may resist or avoid formal therapeutic contexts. By fostering positive social feedback, peer support, and identity exploration, these games can promote emotional resilience and digital inclusion.

Clinical Potential and Integration Challenges

Despite these benefits, COTS games remain underutilized in clinical settings. Concerns often center around their lack of therapeutic supervision, variable outcomes, and the potential for overuse (Pallavicini, *et al.*, 2016). Additionally, clinicians may be unfamiliar with gaming culture or hesitant to endorse interventions not explicitly validated through clinical trials.

Nonetheless, there is increasing interest in incorporating COTS titles into stepped-care models or digital well-being toolkits. In such models, commercial games can serve as accessible first-line supports or complementary interventions—especially for users reluctant to engage in traditional therapy. Their broad accessibility and cultural relevance, particularly among younger populations, make them ideal platforms for low-stigma mental health engagement.

Clinicians and researchers are beginning to explore ways to guide gameplay intentionally, either through psychoeducational framing, structured in-game reflection, or follow-up dialogue. These strategies could enhance the clinical utility of COTS games while preserving the immersive, user-driven nature that makes them effective.

In summary, commercial video games offer more than entertainment—they represent a rich, underexplored reservoir of psychological utility. Recognizing and harnessing this potential may significantly broaden the reach and impact of digital mental health interventions.

Schizophrenia, Inclusion, and Complex Psychiatric Needs

While video games have shown efficacy in supporting emotional regulation and anxiety reduction, their application to more complex psychiatric conditions—such as schizophrenia—remains a vital and underexplored frontier. Schizophrenia is characterized by cognitive fragmentation, negative symptoms (e.g., avolition, anhedonia), and social withdrawal, all of which pose significant challenges for engagement in traditional psychotherapeutic models. This section explores how games, particularly when adapted for accessibility and co-designed with users, may offer meaningful engagement for this population.

Digital Engagement in Schizophrenia

Individuals with schizophrenia often struggle to initiate or sustain participation in conventional interventions due to motivational deficits, executive dysfunction, and stigma. Video games, by contrast, offer a visually stimulating, reward-based, and self-paced environment that may align more closely with users' cognitive and affective capacities. Games provide structured goals, instant feedback, and immersive narratives that can scaffold attention, promote emotional expression, and support a sense of agency.

Preliminary evidence supports this approach. In a pilot study using Minecraft and Animal Crossing, (Quiles and Verdoux, 2023) reported increased social interaction and cognitive engagement among individuals with schizophrenia. Similarly, the randomized trial using Komori Life demonstrated modest but significant improvements in attentional bias toward positive stimuli—suggesting that digital environments can help recalibrate affective processing even in the presence of persistent negative symptoms (Wang, *et al*., 2024).

Neural Tailoring and Accessibility through EEG

As discussed in earlier sections, EEG research provides insight into atypical neural patterns in schizophrenia—such as reduced P300 amplitude and diminished fronto-parietal coherence (Uhlhaas and Singer, 2010). By mapping how individuals respond to specific game types and mechanics, developers can create interventions tailored to users' cognitive profiles. For instance, games that emphasize spatial reasoning, incremental rewards, and reduced cognitive load may better engage users with attentional or memory impairments (Borghini, *et al*., 2017).

Real-time EEG-informed design, though in early stages, offers the potential for dynamic difficulty scaling, adaptive pacing, and targeted engagement based on user state. Such neuroadaptive systems could minimize frustration and enhance flow, improving both therapeutic adherence and cognitive performance over time.

Equity, Lived Experience, and Co-Design

Equity in digital mental health must account not only for access and affordability but also for cultural relevance and lived experience. The meaningful inclusion of individuals with schizophrenia in the development of game-based interventions ensures that tools reflect users' realities rather than clinical assumptions. Co-design practices—where developers, clinicians, and users collaborate to build and test interventions—promote usability, respect, and emotional safety.

This review itself exemplifies that integration: co-author Austin Mardon, a prominent scholar and advocate living with schizophrenia, contributes both academic and experiential insights. His involvement reflects a broader ethical imperative in psychiatric innovation—one that centers dignity, autonomy, and user voice as core design principles.

In summary, video games hold untapped

potential to engage individuals with schizophrenia and related conditions. Through adaptive mechanics, inclusive design, and user collaboration, they offer an alternative therapeutic pathway that may overcome long standing engagement barriers in clinical care.

Limitations, Gaps, and Ethical Considerations

Despite promising findings across anxiety and schizophrenia domains, the literature on therapeutic video games remains in an emergent stage. Many of the existing studies—particularly those involving EEG-informed interventions or commercial games—face methodological and conceptual limitations that must be addressed to advance clinical integration.

Methodological Limitations in Existing Research

A common limitation across the literature is the prevalence of small sample sizes and short intervention durations. While several randomized controlled trials (RCTs) show reductions in anxiety symptoms or cognitive gains in schizophrenia, many lack long-term follow-up or fail to evaluate generalizability across diverse populations. The heterogeneity of game genres, study designs, and outcome measures also complicates meta-analytic synthesis and makes it difficult to isolate active therapeutic ingredients. Additionally, the absence of standardized operational definitions for key constructs, such as "engagement," "flow," or "emotion regulation", poses a barrier to reproducibility and replication. While subjective measures (e.g., mood scales, self-reports) are common, they are rarely supplemented by physiological or behavioral metrics, such as EEG, heart rate variability, or real-world functioning. These gaps limit our understanding of mechanistic pathways and undermine clinical translatability.

Underrepresentation and Equity Gaps

There is a notable underrepresentation of certain demographic groups in therapeutic gaming research, particularly older adults, non-Western populations, and individuals with cognitive or sensory impairments. Given that video games are often assumed to be youth-centered media, older users or those unfamiliar with gaming mechanics may be inadvertently excluded from both studies and interventions.

This exclusion underscores the need for inclusive research protocols and multilingual, culturally sensitive game designs that reflect diverse lived experiences. Research should prioritize not only efficacy but also accessibility and adaptability to ensure digital interventions do not replicate existing health disparities.

Ethical Considerations and Risk Mitigation

While the therapeutic use of games shows promise, potential risks must be acknowledged. These include:

- Overuse or compulsive play, particularly among individuals with attention or impulse control disorders
- Data privacy concerns, especially with EEG-integrated platforms or biometric feedback tools
- Unintended adverse effects, such as emotional distress from certain narrative content or exposure-based scenarios

To mitigate these risks, developers and clinicians must adhere to principles of ethical design, including informed consent, data transparency, user control over feedback systems, and clear communication about therapeutic intent versus entertainment. Additionally, interventions should be paired with psychoeducation or guided facilitation when appropriate, especially in high-risk or vulnerable populations.

In summary, while the digital mental health landscape continues to evolve rapidly, it must do so with methodological rigor, inclusivity, and ethical integrity. Addressing these limitations will be essential to realizing the full potential of game-based psychiatric interventions.

Future Directions and Interdisciplinary Collaboration

As the field of digital mental health matures, therapeutic video games are poised to move from experimental novelty to integrated clinical tools. However, this transition will require coordinated advances in research methodology, cross-sector collaboration, user-centered design, and technological innovation. The following priorities offer a roadmap for scaling and sustaining the impact of game-based interventions in psychiatry.

Toward Robust, Longitudinal Evidence

To establish clinical legitimacy, future studies must adopt larger sample sizes, longitudinal designs, and standardized outcome measures. Randomized controlled trials should evaluate not only short-term symptom reduction but also long-term changes in emotional resilience, cognitive function, and social participation. Incorporating mixed-methods approaches—combining EEG, behavioral tracking, and qualitative interviews—may yield deeper insights into mechanisms of change and intervention tailoring.

The development of open-access intervention toolkits and shared EEG datasets would also enhance replication and comparability across research teams. These infrastructures can help bridge the current fragmentation in the field and support cumulative knowledge building.

Advancing Neuroadaptive Personalization

Real-time neuroadaptive game environments represent a promising frontier. By integrating EEG and other biosensors into gameplay, future interventions could dynamically adjust difficulty, pacing, narrative content, or feedback based on users' cognitive or affective states. Games that emphasize spatial reasoning may better engage users with attentional impairments (Bos, *et al*., 2006), while neurophysiologically informed, real-time adjustments to pacing and challenge have been shown to support cognitive load management and maintain flow (Borghini, *et al*., 2017).

By integrating additional biosensors, such as photoplethysmography-derived heart rate and galvanic skin response, alongside EEG, interventions can capture complementary indices of arousal and stress (Putze, *et al*., 2020). Moreover, leveraging machine-learning algorithms to analyze these multimodal streams enables prediction of moment-to-moment fluctuations in user engagement and informs dynamic adaptation of game parameters (Borghini, *et al*., 2017).

User-Centered, Inclusive Design Practices

Future development must foreground the perspectives of end users, particularly those from marginalized or neurodivergent communities. Co-design approaches—where individuals with lived experience actively shape intervention goals, content, and interface—ensure that digital tools reflect users' needs, cultural contexts, and accessibility requirements.

This also includes the creation of multilingual, device-agnostic, and low-bandwidth game formats to reach global and underserved populations. User engagement metrics should go beyond compliance or frequency of use to include emotional safety, usability, and subjective satisfaction, all hallmarks of effective therapeutic relationships, whether digital or analog.

Building Bridges Across Disciplines

The future of therapeutic gaming lies at the intersection of psychiatry, neuroscience, game development, ethics, and digital sociology. Academic institutions, mental health organizations, and the gaming industry must collaborate to:

- Establish interdisciplinary research centers
- Develop shared ethical frameworks
- Create clinical-academic-industry pipelines for innovation, testing, and dissemination

Funding models should support exploratory, translational work that integrates biological, behavioral, and experiential data and move beyond symptom reduction to promote flourishing, autonomy, and digital equity.

In essence, the next era of therapeutic video games will not be defined solely by new technologies, but by the collaborative systems that govern their development, evaluation, and deployment. Grounded in rigorous science and guided by the lived realities of users, game-based interventions may emerge as powerful tools in the global mental health response.

CONCLUSION

Video games are no longer fringe diversions confined to debates about addiction or distraction. As this review demonstrates, they hold significant promises as scalable, evidence-informed tools for enhancing mental health across diverse populations and clinical presentations. Through mechanisms that span cognitive engagement, emotional regulation, social connection, and neurobiological activation, video games can align with—and in some cases extend—the principles of established therapeutic modalities.

Crucially, this review challenges the binary framing of video games as either escapist or therapeutic. Instead, we propose a spectrum model, where the psychological impact of gameplay depends not solely on content or genre, but on context, intention, user traits, and design choices. Games can enable avoidance or empowerment, fragmentation or focus, depending on how they are framed and integrated.

From casual puzzle apps to immersive narratives and EEG-informed platforms, video games offer an untapped arsenal of intervention tools. Their unique ability to embed feedback, simulate exposure, induce flow, and foster agency makes them especially valuable for hard-to-reach populations, including adolescents, neurodivergent individuals, and people living with schizophrenia, who often face structural and motivational barriers to traditional care.

Looking ahead, the full therapeutic potential of video games will depend on interdisciplinary collaboration, inclusive design, longitudinal evaluation, and ethical accountability. These tools must be developed not only with scientific rigor but also with empathy, humility, and a deep respect for user lived experience.
Video games are not merely digital escapes from reality—they are bridges: to recovery, to resilience, and to a more accessible, engaging, and human-centered model of psychiatric care.

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