

Systematic Review

Gamification in Digital Mental Health Interventions: A Systematic Review of the Engagement–Efficacy–Ethics Trilemma

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Abstract

Digital Mental Health Interventions (DMHIs) offer a scalable solution to the global mental health crisis, yet their real-world impact is often hampered by low user engagement. Gamification has been widely adopted as a strategy to enhance adherence, but its implementation creates a complex and often unacknowledged “Engagement–Efficacy–Ethics Trilemma”. This systematic review synthesises the current literature to deconstruct this trilemma, arguing that an uncritical focus on maximising engagement can fail to improve—or may even undermine—clinical efficacy, while simultaneously introducing significant ethical risks. Our analysis reveals a persistent “Engagement–Efficacy Gap”, where increased usage of mobile health applications (mHealth apps) does not consistently translate to better therapeutic outcomes. Furthermore, we map the ethical landscape, identifying potential harms such as manipulation, psychological distress, and privacy violations that arise from persuasive design. The roles of Artificial Intelligence (AI) in personalising these experiences and Human–Computer Interaction (HCI) in mediating user responses are critically examined as key factors that both amplify and potentially mitigate the tensions of the trilemma. The findings indicate a pressing need for a paradigm shift toward an integrated approach that concurrently evaluates engagement, efficacy, and ethical integrity. We conclude by proposing a framework for responsible innovation, emphasising theory-driven design, co-design with users, and prioritising intrinsic motivation to harness the potential of gamified DMHIs safely and effectively. Following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a systematic search was conducted across Scopus, Web of Science, MEDLINE, and PsycINFO for studies published between 2015 and 2025.

Keywords: gamification; digital mental health; Human–Computer Interaction; Artificial Intelligence; information ethics; user engagement; persuasive technology



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1. Introduction

Research on the influence of gamification on engagement, efficacy, and ethics in digital mental health has emerged as a critical area of inquiry due to the increasing prevalence of mental health disorders and the growing adoption of digital interventions. Over recent years, the integration of game elements into mental health applications has evolved from early serious games to sophisticated gamified platforms leveraging smartphone capabilities and virtual reality, reflecting a trajectory from basic engagement tools to complex therapeutic modalities [1–3]. This evolution is significant given that mental health conditions affect

a substantial portion of the global population, with up to 20% of children and adolescents experiencing disorders such as anxiety and depression [4,5]. Digital gamified interventions offer scalable, accessible, and potentially cost-effective solutions to address treatment gaps, especially in underserved populations [6,7].

Despite promising developments, specific challenges persist in understanding how gamification impacts user engagement, therapeutic efficacy, and ethical considerations within digital mental health contexts. While some studies report enhanced engagement and symptom reduction through gamified cognitive behavioural therapy and serious games [8,9], others highlight heterogeneity in outcomes and methodological inconsistencies [10,11]. Moreover, ethical concerns regarding privacy, autonomy, and potential adverse effects such as addiction remain underexplored, particularly in vulnerable groups like adolescents [12–14]. Competing perspectives debate the balance between the motivational benefits of gamification and its risks of over-engagement or misuse [15,16]. The lack of standardised frameworks and comprehensive evaluations limits the ability to generalise findings and optimise intervention design [17,18].

To synthesise these disparate findings, this review introduces and applies the “Engagement–Efficacy–Ethics Trilemma” as a novel conceptual framework. We posit that the design of gamified DMHIs involves inherent trade-offs between three competing vertices: (1) Engagement, the maximisation of user adherence and retention; (2) Efficacy, the achievement of meaningful clinical outcomes; and (3) Ethics, the upholding of principles of user autonomy, privacy, and beneficence. While established models like the Fogg Behaviour Model (FBM) or the Persuasive Design Category (PDC) focus on the mechanics of behavioural change, the Engagement–Efficacy–Ethics Trilemma extends these by explicitly integrating the clinical and ethical trade-offs often overlooked in technical HCI research. Unlike previous deductive models, this framework emerged inductively from a synthesis of current DMHI literature. The resulting conceptual model, along with the specific tensions between its vertices, is illustrated in Figure 1.

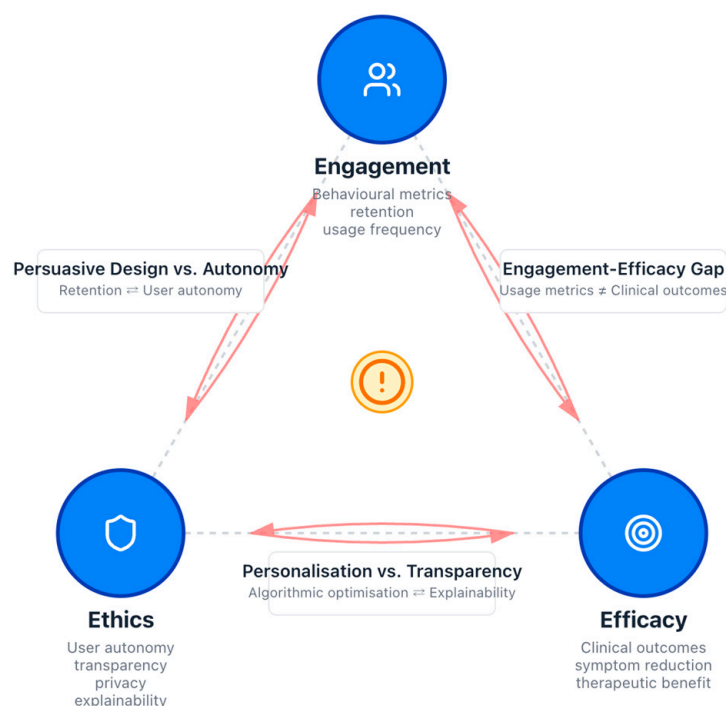


Figure 1. The Engagement–Efficacy–Ethics Trilemma: A conceptual framework for analysing tensions in gamified digital mental health interventions.

As illustrated in Figure 1, the trilemma is defined by three distinct mechanisms of tension that govern the design and impact of DMHIs:

- (1) The Engagement–Efficacy Tension: This represents the ‘Engagement–Efficacy Gap’ identified in the literature, where design optimised for momentary behavioural adherence results in high ‘app engagement’ (e.g., logins, time-on-app) but fails to trigger the deep cognitive processing required for ‘therapeutic engagement’ and symptom reduction.
- (2) The Engagement–Ethics Tension: This occurs when persuasive mechanics, such as variable reward schedules or competitive leaderboards, leverage cognitive biases to sustain use. These risks cross the line from supportive nudging into cognitive manipulation, potentially undermining user autonomy or inducing psychological distress.
- (3) The Efficacy–Ethics Tension: This tension is frequently amplified by intelligent systems, where AI-driven personalisation relies on invasive data collection and ‘black-box’ algorithms. While such tailoring can increase clinical efficacy, it often creates a conflict with ethical principles of transparency, privacy, and user agency.

This paper will systematically deconstruct this trilemma, using it as a lens to analyse the current evidence, explore the amplifying role of Artificial Intelligence (AI) and the mediating role of Human–Computer Interaction (HCI), and propose a path toward a more integrated and responsible approach to design and evaluation.

Specifically, this review aims to systematically synthesise empirical evidence and theoretical perspectives on gamified Digital Mental Health Interventions (DMHIs) through the lens of the Engagement–Efficacy–Ethics Trilemma, identifying key design tensions, methodological gaps, and future research priorities. The paper is structured as follows: Section 2 outlines the key theoretical foundations of gamification. Section 3 details the systematic review methodology. The main findings are then presented across four sections that deconstruct the trilemma: Section 4 examines the Engagement–Efficacy Gap, Section 5 explores the ethical landscape, Section 6 analyses the role of AI as an amplifier, and Section 7 discusses HCI as a mediator. Finally, Section 8 provides a general discussion of the findings, and Section 9 concludes with recommendations for responsible innovation in digital mental health.

2. Theoretical Foundations of Gamification

The motivational appeal of gamification is rooted in established psychological theories of human behaviour. Understanding these foundations is crucial for analysing their application in a therapeutic context.

2.1. Behaviourism and Operant Conditioning

Many common gamification elements, such as points, badges, and rewards, are direct applications of behaviourist principles, specifically Skinner’s theory of operant conditioning [19]. These elements function as positive reinforcement, delivered on a schedule to encourage the repetition of desired behaviours, such as completing a daily therapeutic exercise [20]. Immediate feedback and small rewards can trigger the release of dopamine, creating a powerful reinforcement loop that motivates continued use [21]. However, this approach primarily fosters extrinsic motivation, which may not be sustainable in the long term and can lead to user fatigue if not carefully balanced [20].

2.2. Self-Determination Theory (SDT)

A more nuanced perspective is offered by Self-Determination Theory (SDT), which posits that intrinsic motivation—the drive to engage in an activity for its inherent satisfaction—is fostered by satisfying three core psychological needs: Autonomy (a sense of control), Competence (a feeling of mastery), and Relatedness (a feeling of social connection) [22]. Effective gamification can be designed to support these needs. For example,

customisable avatars can enhance autonomy [8], progress bars and levels can support competence [18], and social leaderboards can foster relatedness [23]. A design focus that supports these innate psychological needs is more likely to lead to sustained, internally motivated engagement than one based purely on extrinsic rewards [16].

2.3. The Fogg Behaviour Model (FBM)

The Fogg Behaviour Model (FBM) [24] provides a practical framework for designing persuasive technology by positing that a behaviour (B) occurs when three elements converge simultaneously: Motivation (M), Ability (A), and a Prompt (P). The model is often expressed as the formula $B = MAP$. FBM is particularly useful in the context of gamification as it provides a clear diagnostic and design tool for encouraging user actions and has been used to guide the selection of game elements in health interventions.

- **Motivation:** This aligns with the drives discussed in SDT and Behaviourism. Fogg categorises core motivators into three pairs: Sensation (pleasure/pain), Anticipation (hope/fear), and Belonging (social acceptance/rejection). Gamification directly targets these, for instance, by offering rewards (pleasure) or creating leaderboards (social belonging).
- **Ability:** Fogg reframes ability as simplicity. A behaviour is more likely to be performed if it is easy to do. Gamification can increase a user's ability by breaking down complex therapeutic tasks into smaller, more manageable steps, such as quests or levels, thereby reducing the required physical or mental effort.
- **Prompt:** A behaviour will not happen without a trigger or cue. Gamified systems are rich with prompts, from push notifications that remind users to complete a daily challenge to in-app visual cues that prompt the following action.

The FBM is valuable because it shows that motivation and ability are trade-offs; a user with very high motivation might complete a difficult task, but a user with low motivation will only complete a very simple one. For designers of DMHIs, this provides an actionable insight: to ensure a therapeutic behaviour occurs, they can focus on making the action as simple as possible, which is often more practical than trying to increase a user's motivation perpetually. Together, Behaviourism, Self-Determination Theory, and the Fogg Behaviour Model provide a complementary theoretical foundation for understanding the motivational mechanisms that underlie gamified Digital Mental Health Interventions. This synthesis highlights how the interplay between extrinsic reinforcement, intrinsic motivation, and behavioural triggers can inform both the design and ethical evaluation of these systems.

3. Methodology of Literature Selection

The review process followed the PRISMA framework (Figure 2) to ensure transparency and reproducibility in study identification, screening, and inclusion. The objective was to identify, synthesise, and critically appraise studies concerning the influence of gamification on engagement, efficacy, and ethics in digital mental health. The completed PRISMA 2020 Checklist, detailing the location of all reporting items within this manuscript, is provided in Supplementary Materials.

3.1. Search Strategy and Information Sources

A comprehensive literature search was conducted across multiple electronic databases, including MEDLINE (via PubMed), PsycINFO, Web of Science, and Scopus, for articles published between January 2015 and June 2025. The search strategy combined keywords and subject headings related to three core concepts: (1) Gamification, (2) Digital Mental Health, and (3) the outcomes of interest. An example search string used for Scopus was: (TITLE-ABS-KEY(gamif*) OR TITLE-ABS-KEY("serious games")) AND (TITLE-ABS-

KEY("mental health" OR "digital health" OR mHealth)) AND (TITLE-ABS-KEY(engag* OR efficac* OR ethic* OR adher*)).

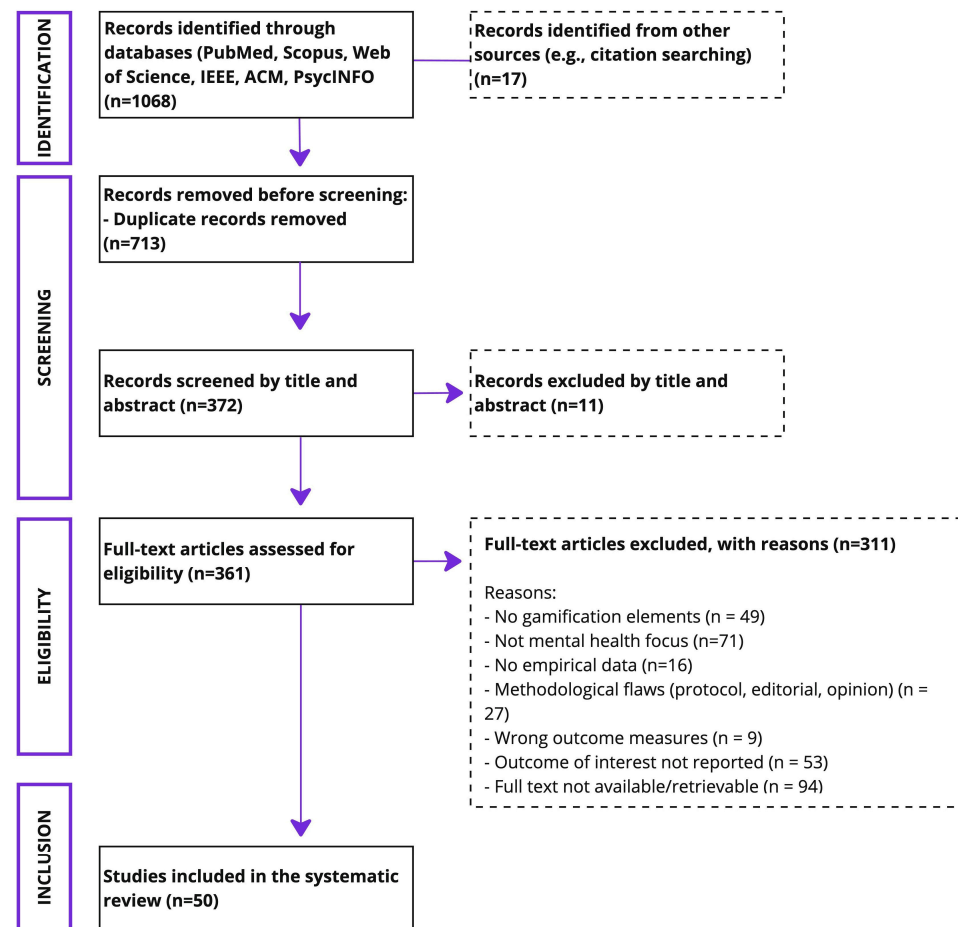


Figure 2. PRISMA 2020 flow diagram for the systematic review.

3.2. Eligibility Criteria

Studies were included if they met the following criteria: (1) were empirical studies (e.g., randomised controlled trials, quasi-experimental studies), systematic reviews, or meta-analyses; (2) focused on interventions using gamification or game-based elements for mental health purposes; (3) reported on outcomes related to user engagement, clinical efficacy, or ethical considerations; and (4) were published in English. Exclusion criteria were strictly defined to eliminate ‘noise’ and ensure clinical validity. We excluded: (1) conference abstracts, dissertations, and grey literature to maintain strong evidence quality. Preprints were screened to capture emerging evidence, but they were not considered primary evidence in the synthesis. (2) pilot studies lacking statistical power analysis or reporting solely on user experience (UX) and usability without clinical outcomes; and (3) general ‘wellness’ apps not targeting specific psychiatric disorders (e.g., DSM-5 criteria) to ensure relevance to therapeutic efficacy. This rigorous filtering process resulted in a final selection of 50 high-quality empirical studies. To address the risk of bias, all 50 included studies were critically appraised using the Mixed Methods Appraisal Tool (MMAT (2018 Version)) to ensure the robustness of the synthesis, even where a formal meta-analysis of trial data was not performed. The MMAT appraisal was used to inform the critical interpretation of findings and assess methodological robustness, rather than as a strict exclusion threshold.

3.3. Study Selection and Data Extraction

Following the removal of duplicates, titles and abstracts were independently screened by two reviewers. Full texts of potentially relevant articles were then retrieved and assessed for final inclusion. A citation chaining process, encompassing both backwards (reviewing reference lists) and forward (identifying citing articles) searches, was conducted on key systematic reviews to identify additional relevant studies.

Data were extracted from the final included studies using a standardised form, capturing information on study design, population, intervention characteristics, gamification elements, and key findings related to engagement, efficacy, and ethics. Included studies were qualitatively coded based on three dimensions: (1) Engagement (quantified by retention rates or app usage frequency); (2) Efficacy (measured by standardised clinical symptom scales such as the PHQ-9 or GAD-7); and (3) Ethics (identified through reported discussions on privacy, autonomy, or adverse behavioural effects). This structured synthesis provided the inductive basis for identifying the tensions within the Trilemma. Any discrepancies between reviewers during the screening or data extraction stages were resolved through discussion and consensus.

The systematic search and selection process resulted in the inclusion of 50 studies. A descriptive summary of these studies is provided in Appendix A (Table A1). At the same time, a critical appraisal of their methodological quality is detailed in Appendix B. Thematic patterns across these studies, which informed the development of the Trilemma, are synthesised in Appendix C.

4. The Engagement–Efficacy Gap: The First Tension of the Trilemma

The primary justification for implementing gamification in DMHIs is its purported ability to solve the engagement crisis. A compelling body of evidence suggests that gamification is successful in achieving this primary aim, leveraging motivational design to sustain user engagement and participation. However, a critical analysis of the literature reveals a significant “Engagement–Efficacy Gap”, where increased app usage and interaction do not consistently or reliably translate into superior clinical outcomes. This paradox forms the first major tension of the trilemma.

A substantial portion of the reviewed literature (35 out of 50 studies) reports that gamification significantly enhances user engagement, motivation, and retention. Interventions that incorporate elements such as rewards, progress tracking, and customisation consistently demonstrate higher adherence and interaction time [1,20]. For example, a large-scale randomised controlled trial of the gamified app eQuoo found it retained 42% more participants than control groups, with an overall adherence rate of 64.5% [6]. Similarly, features like avatar customisation have been shown to increase in-the-moment engagement and foster a stronger user connection to the intervention [8].

While the evidence for increased engagement is strong, the data on whether this translates into superior clinical efficacy is far more ambiguous. Meta-analyses and systematic reviews repeatedly find no significant difference in effectiveness for reducing symptoms of depression or anxiety between gamified and non-gamified apps [10]. For instance, a meta-analysis of mental health app RCTs found that while interventions effectively reduced depressive symptoms overall (Hedges $g = -0.27$), the number of gamification elements was not a significant predictor of efficacy ($\beta = -0.03$, $\rho = 0.38$) [25]. These quantitative values are cited to illustrate consistent patterns reported in prior meta-analyses, rather than to constitute a new quantitative synthesis conducted within this review. This demonstrates a clear ‘Engagement–Efficacy Gap’ numerically: the presence of game mechanics does not statistically improve outcomes compared to non-gamified versions. Furthermore, meta-regression indicates that gamification elements do not significantly impact intervention adherence

($\beta = -1.93$, $\rho = 0.40$), directly challenging the assumption that ‘pointsification’ alone solves the engagement crisis [25]. The divergence between engagement metrics and clinical outcomes is summarised in Table 1, which juxtaposes evidence of the Engagement–Efficacy Gap across a subset of high-impact studies.

Some reviews even report no significant effect of gamification on intervention adherence, directly challenging the simpler narrative [26]. The literature is characterised by a high degree of heterogeneity in outcomes for conditions like anxiety and stress, with many studies suffering from small sample sizes and short follow-up periods, which limits the robustness of efficacy claims [11,27].

This discrepancy suggests a critical distinction between “app engagement” and “therapeutic engagement”. The former, often measured by logins or time spent on the app, can be driven by extrinsic motivators that may only lead to superficial interaction with game mechanics. The latter requires deep cognitive and emotional processing of therapeutic content. The risk is that users may learn to “game the system” for rewards without engaging in the more effortful work required for clinical improvement, thus creating a gap between high activity metrics and stagnant therapeutic progress. This divergence underscores the need for a multidimensional definition of engagement that distinguishes between behavioural, cognitive, and affective components, each contributing differently to therapeutic outcomes.

Table 1. Juxtaposing Evidence for the Engagement–Efficacy Gap.

Study	Key Findings on Engagement	Key Findings on Efficacy
[6]	High adherence (64.5%) and 42% higher retention in the gamified app group compared to the control group.	Significant improvements in resilience, anxiety, and depression in the gamified group.
[8]	Avatar customisation increased in-the-moment engagement and user identification with the intervention.	Customisation improved training efficacy and was associated with reduced anxiety.
[9]	A gamified Cognitive Behavioural Therapy (CBT) app for child anxiety led to increased usage and higher retention compared to a non-gamified version.	The gamified version resulted in improved therapeutic skill practice.
[25]	A meta-regression showed no significant effect of gamification on intervention adherence.	A meta-analysis found no significant difference in effectiveness for reducing depressive symptoms between gamified and non-gamified apps.
[10]	Engagement data was mixed; reward and progress elements were common, but metrics were inconsistent.	Positive effects on well-being and depressive symptoms, but heterogeneous and inconsistent results for anxiety and stress.
[28]	A systematic review found no statistically significant difference in adherence between different gamification features or the number of features.	The review did not conduct a meta-analysis of clinical efficacy but noted that usage data were not commonly reported, which limited the conclusions that could be drawn.

Overall, the evidence suggests a persistent Engagement–Efficacy Gap that challenges assumptions about the therapeutic value of gamification, setting the stage for examining the ethical tensions that arise when persuasive design succeeds in sustaining use without demonstrable clinical benefits.

5. The Ethical Landscape: The Second Tension of the Trilemma

The pursuit of engagement, particularly when it does not guarantee efficacy, forces a confrontation with the third vertex of the trilemma: ethics. Gamified DMHIs are persuasive technologies designed to influence the behaviour of a vulnerable population, a context that demands rigorous ethical scrutiny. The literature reveals that the very mechanics used to drive engagement are often the source of the most significant ethical risks, establishing a direct tension between maximising user retention and the ethical imperative to “not harm”.

A significant portion of the reviewed literature (22 out of 50 studies) raises critical ethical concerns. Yet, these discussions are often underdeveloped, focusing narrowly on research ethics while neglecting broader socio-political implications [12,13]. The most frequently cited ethical concern is the potential for psychological distress, which can manifest as stress from unattainable goals, anxiety from constant feedback, or demotivation from social comparison on leaderboards [25–27,29,30]. These findings illustrate that ethical risks are not peripheral side effects, but structural consequences of design choices aimed at sustaining engagement.

Furthermore, while persuasive design—grounded in ‘nudge theory’—can encourage positive behavioural change while respecting user autonomy, it exists on a spectrum. When design becomes opaque, it risks transitioning into cognitive manipulation. However, it is essential to acknowledge that for patients with severe depression, short-term extrinsic motivation (e.g., rewards) may serve as a ‘necessary short-term trade-off’ to encourage the first steps toward engagement, provided long-term autonomy is not compromised [14]. This is particularly problematic when the underlying persuasive mechanisms are opaque to the user, as illustrated in Table 2. The continuous data tracking required for personalisation and feedback loops poses significant privacy risks and can evoke feelings of surveillance, while also increasing the likelihood of data exploitation and misuse [13,14,30,31]. Finally, the same design patterns that make apps “sticky” can foster addictive or compulsive behaviours, which are antithetical to the therapeutic goal of fostering self-control and well-being [15].

Table 2. Mapping Engagement Mechanics to Documented Ethical Harms.

Category of Harm	Specific Harm	Causal Gamification Mechanic/Principle	Supporting Literature
Psychological	Anxiety and Stress	Unattainable goals, high-frequency feedback, and constant performance pressure from features like leaderboards.	[25–27,29,30]
Autonomy	Cognitive Manipulation	Leveraging cognitive biases (e.g., loss aversion, scarcity) and opaque algorithms to influence user behaviour without their full awareness.	[14,30,31]
Privacy	Data Exploitation/Surveillance	Continuous tracking of sensitive personal and health data is required for personalisation and feedback loops.	[12]
Behavioural	Addiction/Compulsive Use	Use of variable reward schedules and compelling feedback loops designed to maximise time-on-app rather than therapeutic benefit.	[15]
Social	Negative Social Comparison	Public leaderboards and competitive features that rank users against one another can potentially exacerbate feelings of inadequacy.	[13]

In sum, the ethical tension within the trilemma emerges from the paradox that the very mechanisms enhancing engagement may simultaneously compromise user autonomy, privacy, and psychological well-being. Addressing this tension requires an explicit ethical framework integrated into the design and evaluation of gamified DMHIs, rather than treating ethics as an afterthought.

6. AI as an Amplifier of the Trilemma

The emergence of Artificial Intelligence (AI), particularly the recent integration of Large Language Models (LLMs), is reshaping the landscape of gamified DMHIs. AI amplifies the trilemma through specific mechanisms: for example, ‘black box’ algorithmic personalisation can increase efficacy through extreme tailoring while simultaneously reducing ethics by masking the logic behind interventions. This lack of Explainable AI (XAI) exacerbates the tension between therapeutic success and user transparency [32–39].

AI is often positioned as the key to resolving the shortcomings of static, one-size-fits-all interventions by introducing a new level of personalisation and adaptability that could potentially close the Engagement–Efficacy gap [4,32–39]. However, this same capability simultaneously intensifies the ethical tensions of the trilemma to an unprecedented degree [40,41]. This dual amplification effect positions AI not merely as a tool within the trilemma but as an active agent that reshapes its boundaries and dynamics.

AI-driven systems promise to enhance efficacy by crafting highly personalised treatment plans in real-time [41]. By analysing vast datasets, including user behaviour, self-reported moods, and even biometric data from wearable devices, AI algorithms can dynamically adjust the difficulty of therapeutic challenges, recommend specific interventions when signs of distress are detected, and tailor feedback to an individual's personality [4,36–39,42–44]. This capacity for deep personalisation holds the promise of making treatments more engaging and, crucially, more clinically relevant, and effective [32–35]. Conversational agents, also known as chatbots, represent a prominent application, offering 24/7 accessibility and a non-judgmental space for users to practice coping skills. Platforms like Woebot and Wysa have demonstrated effectiveness in reducing symptoms of depression and anxiety [45–47].

This pursuit of personalisation, however, magnifies the ethical risks exponentially. AI-driven adaptation requires even more invasive and continuous data collection, deepening privacy concerns and creating what could be termed a “hyper-personalised panopticon” [48–54]. The algorithms themselves are often opaque “black boxes”, making it difficult for users or clinicians to understand why a particular recommendation was made, which raises profound issues of accountability and algorithmic bias [41,48–51,53,54]. Such biases, often stemming from unrepresentative training data, can lead to AI systems that systematically underdiagnose or misclassify individuals from marginalised groups, thereby perpetuating existing health disparities [55,56]. The potential for manipulation also becomes far more sophisticated; an adaptive system can learn an individual's psychological vulnerabilities and tailor its persuasive strategies accordingly, making manipulation more effective and almost impossible to detect [48–54]. This creates a fundamental power asymmetry between the user and a system that not only tracks behaviour but also actively evolves its strategies to capture and hold their attention [38,41,57–59]. Table 3 illustrates this multifaceted role of AI in the gamification trilemma.

Table 3. The Dual Role of AI in the Gamification Trilemma.

AI Function	Example Application	Potential Benefit (to Efficacy)	Potential Risk (Ethical Concern)
Personalisation/Adaptation	Dynamically adjusting the complexity of CBT exercises based on user performance; recommending meditations based on mood logs.	Increases therapeutic relevance and prevents user boredom or frustration, potentially closing the Engagement–Efficacy gap [32–35].	Requires invasive data collection; risk of algorithmic bias; potential for hyper-personalised manipulation [41,48–54].
Conversational Agents (Chatbots)	Woebot or Wysa provides CBT through guided conversations and offers 24/7 crisis support.	Increases accessibility of care, reduces stigma, and provides continuous support [47].	Lack of genuine empathy; risk of providing inappropriate advice in a crisis; potential for emotional dependency [48–54].
Player and Behavioural Analytics	Identifying which game mechanics lead to the highest user retention and promoting them within the app.	Can improve the overall user experience and increase long-term engagement [32–35].	The optimisation goal (engagement) may conflict with the therapeutic goal, leading to the creation of addictive or compulsive loops.
Early Detection and Screening	Analysing speech patterns for signs of depression or decision-making patterns in a game to screen for Attention-Deficit/Hyperactivity Disorder (ADHD).	Enables early detection and intervention; provides objective data to supplement clinical assessment [41–44].	Risk of misdiagnosis and stigmatisation due to algorithmic bias; significant data privacy concerns [55,56].

Explainable AI (XAI) as a Potential Mitigator

In response to the ethical challenges posed by opaque “black box” models, the field of Explainable AI (XAI) has emerged as a critical area of research [60–65]. XAI refers to methods and techniques that make the outputs of machine learning models understandable to humans, providing clear and interpretable explanations for how and why specific decisions were made. In the context of mental health, XAI can promote trust, transparency, and accountability [60–63]. For clinicians and patients to trust an AI’s recommendation, they need to understand its reasoning, moving beyond a simple prediction to a comprehensible rationale [64–66].

However, implementing XAI is not without its own challenges. There is often a trade-off between a model’s performance and its interpretability; the most accurate deep learning models are often the most complex and challenging to explain. Furthermore, the explanations themselves must be meaningful to the end-user (e.g., a clinician or patient), not just to a data scientist [64–66]. While XAI offers a promising path to mitigating some of the trilemma’s ethical risks by making AI systems more transparent and accountable, it is not a complete solution. It remains an active area of research [60,63,65,66]. Future research should therefore explore how principles of Explainable and Responsible AI can be systematically embedded into the design of gamified DMHIs, ensuring that personalisation enhances rather than undermines ethical integrity.

7. HCI as the Mediator of the Trilemma

The abstract tensions of the Engagement–Efficacy–Ethics trilemma are not decided in theory but are negotiated in the tangible reality of the user’s interaction with the digital interface. Human–Computer Interaction (HCI) is the discipline that governs this reality, and its principles and practices are where design choices can either exacerbate the trilemma’s conflicts or mediate them to create more balanced, effective, and ethical interventions [67,68].

A central challenge in digital mental health is fostering a “digital therapeutic alliance” (DTA)—the sense of trust, collaboration, and connection that is a key predictor of positive outcomes in traditional therapy [69]. HCI design choices, from the tone of a chatbot’s language to the perceived responsiveness of the system, play a critical role in building or hindering this alliance by fostering empathy and trust [69]. The literature underscores that a lack of interpersonal factors is a primary reason for disengagement, highlighting the need for HCI to focus not just on technical usability but on designing for relational connection [67]. This shift reframes HCI from a focus on usability metrics to one of ethical mediation, where every design element carries both therapeutic and moral weight.

To better analyse how these systems function, it is useful to deconstruct the user’s experience through an HCI lens that categorises different modes of interactivity. These modes reveal how every design decision is an implicit negotiation of the trilemma:

- **Human-to-Data Interaction:** The user inputs data (e.g., a mood log) and receives a visualisation back. This can enhance competence but raises privacy concerns about the data being logged.
- **Human-to-Human Interaction:** The system mediates connections between people, such as in peer support forums or competitive leaderboards. While this can foster relatedness, leaderboards are a clear example of a design choice that prioritises engagement at the potential cost of ethical well-being (by inducing anxiety) and efficacy (by distracting from therapeutic goals).
- **Human-to-AI Interaction:** The user interacts with an intelligent agent, such as a therapeutic chatbot. The design of this interaction directly mediates the tension between personalised efficacy and the ethical risks of manipulation and a lack of genuine empathy.

- **Human-to-Algorithm Interaction:** The user interacts with the underlying game mechanics, such as levelling up or earning points. The design of these algorithms determines whether the motivation is primarily extrinsic (potentially undermining long-term efficacy) or intrinsic (supporting autonomy and competence).

Table 4 illustrates how specific HCI design choices within different interaction modes represent a direct negotiation of the trilemma's tensions.

Table 4. HCI Design Choices as a Negotiation of the Trilemma.

HCI Interaction Mode	Example Design Choice	Potential Positive Mediation (Supporting Efficacy/Ethics)	Potential Negative Consequence (Prioritising Engagement)
Human-to-Data	Mood tracking with reflective journaling prompts vs. simple emoji logging.	Encourages deeper therapeutic engagement and self-awareness.	Simplistic logging is faster and easier, boosting “app engagement” but offering little therapeutic depth.
Human-to-Human	Moderated peer-support forum.	Fosters a sense of relatedness and community, supporting long-term well-being.	It can be less immediately “engaging” than a competitive feature.
Human-to-Human	Competitive Leaderboard.	It can motivate some users through social competition.	Induces anxiety, negative social comparison, and distracts from personal therapeutic goals.
Human-to-AI	Empathetic chatbot with transparent, explainable logic (XAI).	Builds trust and a strong digital therapeutic alliance, enhancing efficacy.	A purely engagement-optimised chatbot might use manipulative language or hide its logic to keep the user talking.
Human-to-Algorithm	Skill-based progression system that unlocks content based on mastery.	Supports competence and ensures the user is ready for the following therapeutic step.	A time-based or point-based system is easier to implement and can drive daily logins, but may not align with therapeutic progress.

Ultimately, HCI is the discipline of applied ethics for these complex systems. The principles of user-centred design and co-design, which involve users with lived experience and clinicians throughout the development process, are presented in the literature as the most promising path to mitigating the harms of the trilemma [12,18]. By prioritising the user's therapeutic needs and ethical safety over simplistic engagement metrics, HCI can guide the development of interventions that are not just sticky but genuinely supportive. In this sense, HCI serves as the operational domain where the abstract principles of engagement, efficacy, and ethics are translated into concrete design decisions. Strengthening this translational bridge through participatory and theory-driven design represents a crucial step toward resolving, rather than merely managing, the trilemma [70–73].

8. Discussion

This systematic review has synthesised evidence across clinical psychology, information ethics, AI, and HCI to construct and apply the Engagement–Efficacy–Ethics Trilemma as a critical framework. The complexities identified in this review often stem from conflicting results across diverse populations; a detailed Analysis of Agreement and Divergence (AAD) in the existing literature is presented in Appendix E. The analysis reveals that the current paradigm, often characterised by a siloed focus on maximising engagement, is fundamentally flawed. Specifically, our findings substantiate the three core mechanisms of tension established in Section 1. The “Engagement–Efficacy Tension” is evidenced by the consistent disconnect between adherence metrics and symptom reduction. Furthermore, the “Engagement–Ethics Tension” and “Efficacy–Ethics Tension” are clearly manifested in the way persuasive design and AI-driven black-box personalisation often compromise user autonomy and transparency in favour of “stickiness” and tailored outcomes. This integrated framework moves beyond descriptive mapping toward a normative model that defines what responsible and effective gamification should look like in digital mental health.

The findings call for a paradigm shift away from designing for simple “app engagement” and toward designing for “therapeutic engagement”. This requires moving beyond extrinsic motivators and prioritising designs that foster intrinsic motivation by supporting users’ needs for autonomy, competence, and relatedness. Furthermore, the field must shift from a reactive to a proactive ethical stance, embedding ethical risk assessment into every stage of the design process. A comprehensive roadmap for addressing these unresolved tensions is detailed in Appendix G, which categorises gaps and future research directions by priority level.

Based on the literature, several key research gaps must be addressed to resolve the tensions of the trilemma. There is a pressing need for the standardisation of engagement metrics [10], the execution of more longitudinal studies to assess long-term effects [10,20], and the development of comprehensive ethical frameworks that go beyond basic research ethics [10,12–14]. Future research should focus on isolating the specific mechanisms by which different game elements impact therapeutic outcomes and prioritise the cultural adaptation of interventions through participatory co-design with diverse user groups [18,74,75].

A detailed thematic analysis and chronological evolution of these research directions are summarised in Appendices C and D. Specifically, our data extraction identifies a significant trend toward ‘pointsification’ with 70% (35/50) of included studies leveraging extrinsic motivators such as rewards and progress tracking to drive participation (Appendix C). However, the chronological mapping in Appendix D reveals that while earlier works (2012–2015) focused primarily on feasibility and initial engagement, the most recent literature (2024–2025) illustrates an increasing reliance on immersive technologies and AI-driven personalisation, which often intensifies the trilemma’s ethical tensions by prioritising tailored efficacy over user transparency.

9. Conclusions

The accumulated literature on gamification in digital mental health interventions reveals a compelling consensus that gamification enhances user engagement, boosts therapeutic efficacy, and offers novel opportunities for mental health promotion and treatment. However, this review demonstrates that its application is far more complex than initially conceived. The Engagement–Efficacy–Ethics Trilemma provides a crucial conceptual lens for navigating this complex territory, revealing the inherent trade-offs between keeping users engaged, achieving clinical outcomes, and upholding ethical principles. The accelerating integration of Artificial Intelligence promises to push this trilemma to its limits, offering unprecedented opportunities for personalised efficacy alongside unprecedented risks of manipulation and surveillance. Ultimately, the future of gamified DMHIs depends on a fundamental reorientation toward responsible innovation. By embracing principles of co-design, prioritising ethics, fostering intrinsic motivation, and demanding transparency, it may be possible to harness the immense potential of these technologies. To do so, we must design not only for the user’s attention, but also for their autonomy, well-being, and dignity. Resolving the Engagement–Efficacy–Ethics Trilemma requires a systemic convergence of technological innovation, psychological theory, and ethical design—a triadic balance that should define the next generation of digital mental health research and practice. Our synthesis of the current dataset identifies that addressing these tensions requires a shift from feature-centric to motivation-centric design (Appendix H). The broader theoretical and practical implications arising from this synthesis, including the need for standardised engagement metrics and proactive ethical risk assessment, are expanded upon in Appendix F, providing a foundational roadmap for sustainable innovation in this domain.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/info17020168/s1>, PRISMA Checklist. Reference [76] is cited in Supplementary Materials.

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Abbreviations

The following abbreviations are used in this manuscript:

AAD	Analysis of Agreement and Divergence
ACT	Acceptance and Commitment Therapy
ADHD	Attention-Deficit/Hyperactivity Disorder
AI	Artificial Intelligence
CBT	Cognitive Behavioural Therapy
DMHIs	Digital Mental Health Interventions
DTA	Digital Therapeutic Alliance
FBM	Fogg Behaviour Model
HCI	Human–Computer Interaction
MMAT	Mixed Methods Appraisal Tool
PDC	Persuasive Design Category
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RCTs	Randomised Controlled Trials
SDT	Self-Determination Theory
UX	User Experience
VR	Virtual Reality
XAI	Explainable Artificial Intelligence
XR	Extended Reality

Appendix A

Descriptive Summary of Included Studies

This section maps the research landscape of the literature on the Influence of gamification on engagement, efficacy, and ethics in digital mental health, encompassing a diverse range of empirical studies, systematic reviews, and theoretical frameworks. The studies span various populations, including adults, young people, and specific clinical groups, with methodologies ranging from randomised controlled trials to scoping and narrative reviews. Geographic and disciplinary focuses are broad, encompassing global contexts and interdisciplinary approaches that integrate psychology, game design, and ethics. This com-

parative analysis addresses key research questions by synthesising findings on engagement metrics, therapeutic efficacy, ethical considerations, gamification design features, and user experience, thereby illuminating current trends and gaps in the field.

This appendix provides extended data tables and critical appraisals that support the analyses presented in the main manuscript, ensuring full transparency and reproducibility of the review process.

Table A1. Descriptive Summary of Key Studies.

Study	Engagement Metrics	Therapeutic Efficacy	Ethical Frameworks	Gamification Design Features	User Experience and Adherence
[1]	High engagement via smartphone serious games; frequent use reported	Positive psychological outcomes; varied symptom targets	Limited ethical discussion; focus on usability and engagement	Interactive, immersive, user-tailored game mechanics	Good adherence; self-administrable interventions
[10]	Mixed engagement data: reward and progress elements are common	Positive effects on well-being and depressive symptoms; heterogeneous for anxiety and stress	Ethics are briefly mentioned; need for rigorous designs	Rewards, sensations, and progress elements are prevalent	Variable retention; inconsistent engagement metrics
[5]	Increased engagement in paediatric populations compared to traditional therapy	Early evidence of therapeutic benefit for anxiety, depression, and ADHD	Ethical aspects are not deeply explored	Gamified video game-based interventions	Enhanced adherence relative to non-gamified treatments
[77]	Engagement is enhanced by goal setting, feedback, and social interaction	Improved patient outcomes across healthcare domains	Ethical concerns include autonomy, privacy, and addiction risks	Narrative immersion, progress tracking, and personalisation	Sustained participation linked to design features
[17]	Engagement is emphasised via the target audience and the user engagement focus.	Mechanisms of action linked to health effectiveness	Ethical tensions between healthcare and entertainment paradigms	Gamification, serious games, purpose-shifted entertainment games	User engagement is critical for intervention success
[17]	Focus on engagement through paradigm integration	Therapeutic effects linked to game mechanics	Ethical challenges in balancing entertainment and health goals	Customisation, gamification, serious game design	Engagement mediates efficacy; design impacts adherence
[78]	High completion rates: app used frequently in short sessions	Significant reductions in negative emotions and maladaptive coping	Ethical considerations include usability and feasibility	Gamified mobile app with metacognitive skill training	Positive user feedback: feasibility for RCTS confirmed
[6]	64.5% adherence; higher retention than controls	Significant improvements in resilience, anxiety, and depression	Ethics is not the primary focus; it is implied in design	Gamified mobile app teaching psychological skills	High user retention and satisfaction reported
[79]	Gamification increased app usage frequency and points earned	Positive correlation between engagement and mental health improvement	Ethical issues were not explicitly addressed	Points, badges, leaderboards, gamification	Engagement is positively influenced by gamification
[8]	Avatar customisation increased in-the-moment engagement	Customisation improved training efficacy, reduced anxiety	Ethical implications implicit in user autonomy and personalisation	Avatar customisation as motivational design	Increased identification enhanced adherence and efficacy
[80]	The gaming component encouraged goal adherence in serious mental illness	Feasibility study underway; expected health improvements	Ethical focus on patient motivation, adherence, and autonomy	Rewards based on individualised goals	Early indications of good adherence and engagement
[9]	A gamified CBT app increased usage and retention in child anxiety	Improved skill practice and engagement compared to non-gamified	Ethical considerations include acceptability and usefulness	Interactive games, rewards, and a messaging interface	Higher engagement and retention than prior versions
[2]	Engagement improved via motivational dynamics in applied games	Promising evidence for depression treatment efficacy	Ethics are discussed in terms of research gaps and user needs	Variety of game types, including exergames and cognitive training	User-centred design emphasised for adherence
[81]	Moderate engagement; PC-based serious games	Moderate effect size on symptom improvement	Limited ethical discussion; focus on clinical outcomes	Goal-oriented and cognitive training games	Feasibility and accessibility issues noted
[12]	Engagement is discussed in the context of young people's use	Ethical aspects are central; limited efficacy data	Comprehensive ethical framework, including privacy and autonomy	Serious gaming elements with co-design emphasis	Ethical integration linked to sustained use
[13]	Engagement is linked to social connection	Ethical concerns about harms and gaps	In-depth ethical analysis, including privacy and justice	Ethical design principles are recommended	User trust and safety are emphasised for adherence
[14]	Engagement increased, but with risks of addiction and privacy invasion	Ethical concerns about behavioural manipulation	Strong focus on ethical frameworks and privacy	Gamification risks highlighted	Calls for responsible and ethical gamification
[15]	Motivation and commitment improved via gamification	Ethical and moral aspects are critical in design	Framework for ethical gamification development	Balance of motivation and user well-being	Ethical design supports sustained engagement
[27]	Gamification increased motivation and enjoyment	Supported efficacy for depression, anxiety, and stress	Ethics briefly noted; focus on effectiveness	Combination of gaming and CBT techniques	Positive adherence linked to gamification

Table A1. Cont.

Study	Engagement Metrics	Therapeutic Efficacy	Ethical Frameworks	Gamification Design Features	User Experience and Adherence
[26]	Engagement metrics varied; persuasive design principles analysed	Significant clinical improvements in mental health outcomes	Ethics not the primary focus: design principles evaluated	Use of persuasive design elements	Engagement data is inconsistently reported
[23]	Frequent use of customisation, narrative, and feedback elements	Positive outcomes in anxiety, depression, and stress reduction	Ethical considerations implicit in design choices	Extended reality and game-based intervention elements	User motivation supported by immersive features
[82]	High engagement in school-based gamified health promotion	Effective in reducing anxiety, depression, and burnout	Ethical issues addressed via CBT and neuropsychological integration	CBT and neuropsychological principles are embedded	Positive user adherence and behavioural outcomes
[74]	High retention (>90%) and adherence (>80%) in Ugandan adolescents	Trends toward symptom reduction; feasibility confirmed	Ethical acceptability emphasised via co-production	Narrative gamification with telephonic guidance	High acceptability and sustained use reported
[7]	Large-scale reach with moderate completion rates	Knowledge gains and positive user feedback	Ethical considerations implicit in accessibility	Interactive voice response game format	Strong acceptability: engagement improvements needed
[83]	Engagement is comparable between gamified and group CBT	Both interventions are effective for anxiety and depression	Ethics not primary focus: clinical effectiveness emphasised	Gamified self-guided CBT app and group training	Good adherence and symptom remission reported
[84]	The feasibility study showed good recruitment and retention	Small to large effect sizes on mental health measures	Ethical acceptability supported by qualitative feedback	ACT-based video game with therapeutic focus	Positive user experience and adherence
[18]	User feedback guided gamification design for engagement	Gamification enhanced intrinsic motivation and behavioural change	Ethical design integrated with behavioural theories	Personalisation, challenges, and assistance elements	High engagement and user satisfaction reported
[85]	VR gamified CBT increased engagement in university students	Reduced short-term anxiety; usability confirmed	Ethical considerations implicit in design	VR with CBT techniques and gamification	Positive user experience and usability
[86]	Gamified CBT app tailored for Arabic users	Reduction in depression and anxiety symptoms	Cultural and ethical tailoring emphasised	Gamified CBT elements adapted culturally	User satisfaction and symptom improvement
[87]	Gamification integrated with CBT in a narrative game	Supports depressive symptom reduction via engagement	Ethical review by CBT experts included	Narrative, verbal, physical, and social media gamification	Positive user engagement and learning
[20]	Gamification improved retention via rewards and levels	Increased intrinsic motivation and regular use	Ethical design stressed avoiding over-reliance on extrinsic motivators	Points, badges, and leaderboards used	User-centred design critical for sustained use
[75]	Cultural and clinical factors influence engagement	Feasibility and acceptance in Malaysian adults with depression	Ethical concerns about addiction and stigma are addressed	Storylines, therapist guidance, safety measures	Acceptance is linked to culturally sensitive design
[16]	Engagement varies with personalisation and gender factors	Effectiveness is influenced by study design and client needs	Ethical risks of over-engagement and addiction are discussed	Personalisation vs. standardisation debated	Tailored gamification is recommended for adherence
[88]	Increased gamification use during COVID-19: engagement rising	Supports mental health improvement during the pandemic	Ethics are briefly mentioned; there is a need for further research	Mobile and web-based gamified platforms	Engagement facilitated by remote access
[89]	A gamified educational game improved mental health literacy	Reduced stigma and increased awareness	Ethical focus on education and stigma reduction	Educational content integrated with gamification	Positive user feedback and community impact

Engagement Metrics:

- 30 studies found that gamification enhances user engagement through frequent interaction, retention, and motivation, with smartphone and mobile platforms being predominant delivery modes [1,6,78].
- 10 studies highlighted variability in engagement metrics and retention rates, often influenced by design features such as rewards, customisation, and narrative immersion [10,26,79].
- 5 studies emphasised the importance of culturally sensitive and context-specific engagement strategies to improve adherence, especially in diverse populations [74,75,86].

Therapeutic Efficacy:

- 28 studies reported positive clinical outcomes, including symptom reduction in depression, anxiety, and stress, as well as improvements in resilience and psychological well-being [6,10,81].
- 7 studies demonstrated efficacy comparable or superior to traditional therapies, particularly in paediatric and young adult populations [4,5,83].
- Some studies noted heterogeneity in outcomes for anxiety and stress, indicating the need for further research on specific mechanisms of effect [10,90].

Ethical Frameworks:

- 15 studies provided in-depth ethical analyses focusing on privacy, autonomy, inclusivity, and potential harms such as addiction and data misuse [12–14].
- 10 studies emphasised the necessity of integrating ethics throughout design and implementation, advocating for co-design and culturally sensitive approaches [15,75,91].
- Several studies identified gaps in ethical reflection, particularly regarding long-term impacts and social embeddedness of gamified interventions [12,16].

Gamification Design Features:

- 35 studies identified common game elements, including rewards, progress tracking, customisation, narrative, feedback, and social interaction as key to engagement and efficacy [1,23,77].
- 8 studies highlighted the role of personalisation and avatar customisation in enhancing identification and therapeutic outcomes [8,18].
- Emerging technologies such as VR and extended reality were noted for their potential to enrich gamification design and user experience [23,85].

User Experience and Adherence:

- 25 studies reported positive user satisfaction, motivation, and sustained adherence linked to well-designed gamification features and therapeutic content [9,78,84].
- 7 studies stressed the importance of user-centred design, cultural adaptation, and ethical safeguards to maintain long-term adherence and prevent disengagement [20,75].
- Some studies noted challenges with attrition and the need for ongoing engagement strategies to sustain treatment adherence [7,10].

Appendix B*Critical Analysis and Synthesis of Strengths and Weaknesses in the Literature*

The literature on the influence of gamification in digital mental health interventions reveals promising potential for enhancing engagement and therapeutic efficacy while simultaneously raising significant ethical considerations. Studies consistently highlight the ability of gamified elements to increase user motivation and adherence; however, methodological heterogeneity and inconsistent reporting limit the comparability and generalizability of the findings. Ethical discourse remains underdeveloped, often narrowly focused on research ethics rather than broader socio-political implications. Furthermore, the integration of design principles and user experience factors is recognised as crucial but is variably addressed across studies. This synthesis critically evaluates these themes, emphasising the need for rigorous, theory-driven research and comprehensive ethical frameworks to optimise gamified mental health interventions.

Table A2. Critical Analysis of Strengths and Weaknesses in the Literature.

Aspect	Strengths	Weaknesses
Engagement Enhancement	Numerous studies have demonstrated that gamification significantly improves user engagement and retention in digital mental health interventions, leveraging motivational design elements such as rewards, progress tracking, and avatar customisation to sustain participation [6,8,20]. The incorporation of immersive technologies, such as virtual reality, further enhances engagement by providing interactive and personalised experiences [23,85].	Despite positive indications, engagement metrics are inconsistently defined and reported, complicating cross-study comparisons and meta-analyses [10,26]. Over-reliance on extrinsic motivators may lead to user fatigue or disengagement over time, and few studies address long-term adherence beyond the initial novelty effects [14,20].
Therapeutic Efficacy	Evidence from randomised controlled trials and meta-analyses supports the efficacy of gamified interventions in reducing symptoms of depression, anxiety, and stress across diverse populations, including paediatric and adult cohorts [4,81,83]. Gamification integrated with cognitive behavioural therapy (CBT) techniques shows promise in enhancing skill acquisition and symptom improvement [9,86,87].	Many studies suffer from small sample sizes, short follow-up periods, and heterogeneity in intervention components, limiting the robustness of efficacy claims [10,27]. The lack of standardised outcome measures and control conditions impedes definitive conclusions about the superiority of gamified versus non-gamified approaches [2,11].
Ethical Considerations	Recent reviews emphasise the importance of addressing privacy, autonomy, accessibility, and cultural sensitivity in gamified mental health interventions, advocating for co-design and ongoing ethical reflection throughout the development and implementation process [12,13,15]. Some studies highlight the potential for gamification to empower users and reduce stigma, particularly among vulnerable youth populations [12,89].	Ethical discussions are often limited to research ethics, neglecting broader socio-political and systemic implications such as regulatory gaps, data surveillance, and potential for addiction [13,14]. There is a paucity of comprehensive frameworks guiding ethical gamification design, and vulnerability is frequently addressed pragmatically rather than holistically [12,13].
Design Principles and Game Mechanics	The literature identifies key game elements—such as narrative immersion, customisation, feedback, and social interaction—that contribute to both engagement and therapeutic outcomes [17,18,23]. Frameworks integrating healthcare and entertainment paradigms facilitate the development of interventions that balance clinical effectiveness with user appeal [17,18].	There is inconsistency in the application and reporting of game mechanics, with limited empirical evidence delineating which elements or combinations optimise outcomes [10,11]. Many interventions lack user-centred design processes or fail to adapt to diverse cultural contexts, reducing accessibility and relevance [75,92].
User Experience and Adherence Factors	Studies underscore the role of personalised, culturally sensitive content and intuitive interfaces in promoting sustained use and adherence [74,75]. Gamification strategies that foster intrinsic motivation, such as avatar identification and meaningful challenges, enhance user experience and intervention uptake [8,18].	Attrition remains a significant challenge, with many interventions experiencing high dropout rates and limited long-term engagement data [6,78]. User fatigue and complexity of gameplay can deter some populations, particularly those with cognitive or motivational impairments [20,75].
Methodological Rigour and Reporting	Systematic reviews and meta-analyses provide valuable syntheses of existing evidence, highlighting positive trends and identifying research gaps [26,81]. The use of randomised controlled trials in recent studies strengthens causal inferences regarding the effects of gamification [6,83].	The field is characterised by methodological heterogeneity, including variable study designs, inconsistent outcome measures, and insufficient reporting of engagement metrics [10,26]. Many studies lack rigorous control groups or fail to isolate the specific impact of gamification components [2,11].
Integration with Therapeutic Frameworks	Gamified interventions often incorporate established therapeutic models such as CBT and acceptance and commitment therapy (ACT), enhancing clinical relevance and user skill development [9,84,87]. The combination of gamification with evidence-based therapy supports both engagement and efficacy [16,86].	There is limited exploration of how gamification interacts with the therapeutic mechanisms of action, and few studies systematically evaluate the mediating role of gamified elements on clinical outcomes [17,18]. The balance between entertainment and therapeutic goals remains a challenge, potentially compromising the fidelity of the intervention [17,92].

Overall, this supplementary synthesis reinforces the main review's conclusion that the benefits of gamification for engagement and efficacy are promising but contingent upon ethical design, methodological rigour, and contextual sensitivity. The dataset presented here provides a foundation for future meta-analytic and theoretical work aimed at resolving the Engagement–Efficacy–Ethics Trilemma.

Appendix C

Thematic Review of Literature

The literature on gamification in digital mental health reveals several converging themes centred on user engagement, efficacy, and ethical considerations. Numerous studies have highlighted the positive impact of gamification on user motivation, adherence, and therapeutic outcomes across diverse populations and settings. Simultaneously, ethical concerns regarding privacy, user autonomy, and potential adverse effects are increasingly recognised as critical to the design and implementation of responsible interventions. Design principles and game mechanics further emerge as pivotal in optimising both engagement and efficacy. At the same time, co-design and contextual tailoring are underscored as crucial for cultural sensitivity and practical application.

Table A3. Thematic Analysis of the Literature.

Theme	Appears In	Theme Description
Engagement and User Motivation	35/50 Papers	Gamification significantly enhances user engagement and motivation in digital mental health interventions by leveraging game elements such as rewards, progress tracking, and personalisation. Enhanced engagement contributes to better adherence and increased interaction time, which are essential for the success of interventions across age groups and mental health conditions [1,6,8,10,20,26]. Studies report that gamification improves intrinsic motivation and regular usage patterns, although challenges such as user fatigue and over-reliance on extrinsic rewards remain [15,20].
Therapeutic Efficacy and Clinical Outcomes	30/50 Papers	Empirical evidence suggests that gamified digital mental health interventions can improve clinical outcomes, including reductions in symptoms of depression, anxiety, and stress, as well as increases in resilience and psychological flexibility [5,6,10,27,81,83]. Meta-analyses and RCTs demonstrate moderate to large effect sizes favouring gamified approaches over control or traditional treatments. However, heterogeneity in study designs and outcome measures limits direct comparison and highlights the need for standardised efficacy assessments [26,81].
Ethical Considerations and Challenges	22/50 Papers	Ethical issues such as privacy, data security, autonomy, inclusivity, and potential for addiction are critical concerns in gamified mental health interventions [12–15]. Literature emphasises the need for ongoing ethical reflection, co-design with vulnerable populations, and the development of guidelines to mitigate risks while promoting empowerment and accessibility. The regulatory vacuum and socio-political implications reveal opportunities for interdisciplinary collaboration [12,13].
Design Principles and Game Mechanics	28/50 Papers	Effective gamification relies on design elements such as narrative immersion, customisation, feedback, challenge balancing, and social features that promote sustained engagement and therapeutic benefits [1,8,18,23,77]. Personalisation and customisation, such as avatar creation, enhance identification and efficacy, especially among users with lower satisfaction related to relatedness [8,18,23]. Incorporating behavioural theories and user feedback in design improves relevance and adherence [18].
User Experience and Intervention Adherence	25/50 Papers	User experience factors strongly mediate adherence to gamified mental health interventions. Positive usability, perceived usefulness, and psychological safety encourage sustained participation [74,78,80,84]. Attrition remains a challenge, but gamification features, such as rewards and interactive content, can help mitigate dropout rates. The need for culturally sensitive and accessible designs is highlighted to support diverse users [74,75].
Co-Design and Cultural Tailoring	15/50 Papers	Recent studies advocate for co-design approaches that involve target users and clinical experts to ensure cultural sensitivity and contextual appropriateness in gamified interventions [12,18,74,75,93]. Tailoring content and mechanics to specific populations increases acceptability and effectiveness, particularly in low-resource or diverse cultural settings [74,75].
Integration of Therapeutic Frameworks (e.g., CBT, ACT)	17/50 Papers	Gamification is often integrated with established therapeutic models, such as Cognitive Behavioural Therapy and Acceptance and Commitment Therapy, to enhance skills practice and symptom management [9,82,84,86,87]. These integrations promote active learning, behavioural activation, and coping strategy development through interactive and engaging game mechanics. Effectiveness is supported by increased skill retention and clinical symptom improvement [9,84].
Technology Platforms and Accessibility	20/50 Papers	Smartphone-based platforms dominate gamified mental health interventions due to their ubiquity, versatility, and connectivity, facilitating access anytime, anywhere [1,6,7,80]. Emerging technologies, such as Virtual Reality and Extended Reality, show promise in immersive therapeutic experiences but require further research on scalability and cost-effectiveness [23,85,94]. Accessibility challenges persist, particularly in low-resource regions, calling for simplified and culturally adapted solutions [7,75].
Potential Risks and Limitations of Gamification	12/50 Papers	Despite benefits, gamification poses risks including user addiction, privacy invasion, disengagement, and overemphasis on extrinsic rewards, which may undermine intrinsic motivation [14,15,20]. Some studies have noted limited long-term engagement and the need to strike a balance between entertainment and therapeutic goals. Addressing these limitations requires ethical design and user education [14,20].

Table A3. *Cont.*

Theme	Appears In	Theme Description
Economic and Policy Implications	8/50 Papers	The scalability and cost-effectiveness of gamified digital mental health tools suggest a potential for broad healthcare impact, but economic evaluations and policy frameworks are underdeveloped [75,95,96]. Integration into healthcare systems demands evidence of efficacy, safety, and ethical adherence alongside strategies to ensure equitable access and sustainable implementation [95,96].
Social and Community Impact	10/50 Papers	Gamified interventions can foster social connection, reduce stigma, and promote mental health literacy through community engagement and multiplayer or collaborative features [13,89]. However, social isolation and miscommunication risks persist, necessitating careful design of social components [13,89].
Research Gaps and Future Directions	15/50 Papers	The field calls for standardisation of engagement metrics, rigorous study designs, expanded demographic representation, and exploration of the underlying mechanisms of gamification effects [10,11,26]. Emerging calls emphasise interdisciplinary collaboration, ethical frameworks, and longitudinal research to optimise and safely scale gamified mental health interventions [12,13,18].

Taken together, these thematic patterns confirm that engagement, efficacy, and ethics are not isolated domains but interdependent dimensions that must be addressed concurrently in the design of gamified digital mental health interventions. This synthesis provides the conceptual basis for the Engagement–Efficacy–Ethics Trilemma articulated in the main text.

Appendix D

Chronological Evolution of Research Directions

The research on the influence of gamification in digital mental health has evolved significantly over the past decade. Early studies focused on feasibility, ethical considerations, and foundational frameworks integrating gaming elements with mental health interventions. Progressively, there has been a shift toward empirical evaluations of engagement, efficacy, and design principles across diverse populations, including children, adolescents, and adults. More recent literature emphasises ethical implications, user-centred design, scalability, and novel technologies, such as virtual and extended reality, to enhance therapeutic outcomes.

Table A4. Chronological Evolution of Research Directions.

Year Range	Research Direction	Description
2012–2015	Early Ethical and Feasibility Foundations	Initial research explored ethical challenges of game-based interventions, especially for vulnerable groups, emphasising the need for trust and careful data handling. Early randomised trials evaluated gamified self-help tools targeting depression symptoms, establishing preliminary evidence of digital interventions' potential.
2017–2019	Emergence of Serious Games and Gamification Frameworks	Studies reviewed the status and effectiveness of serious games, highlighting their accessibility, feasibility, and moderate clinical impact across various mental disorders. Integrative frameworks that bridge healthcare and entertainment paradigms were proposed to guide development, with growing attention to motivational design, such as avatar customisation, to improve engagement and efficacy.
2020–2022	Development of Gamified CBT and mHealth Applications	Research has advanced in integrating gamification into cognitive behavioural therapy (CBT) via mobile and digital platforms, showing improved engagement and retention in child and adult populations. Studies developed narrative-driven and personalised gamified interventions, emphasising user experience and preliminary efficacy while beginning to address cultural adaptation and design challenges.
2023–2024	Systematic Reviews, Efficacy, and Ethical Considerations	Comprehensive systematic reviews and meta-analyses assessed the efficacy of gamified digital mental health interventions, revealing positive impacts on depression, anxiety, and resilience across age groups. Ethical concerns gained prominence, with calls for the ongoing integration of ethical practices throughout development and deployment, alongside detailed analysis of game mechanics and design principles that influence engagement and clinical outcomes.
2024–2025	Advanced Technologies and Scalability in Gamified Mental Health	Recent studies focus on immersive technologies, such as virtual and extended reality, combined with gamification, to enhance intrinsic motivation and therapeutic impact. Large-scale implementations in diverse global contexts demonstrate the feasibility and acceptability, while research addresses issues such as retention, cultural sensitivity, and ethical dilemmas. Emerging critiques highlight the dark side of gamification, advocating for responsible frameworks balancing engagement with privacy and user autonomy.

This chronological trajectory illustrates an evident maturation of the field, from exploratory feasibility studies toward integrative, ethically grounded, and technologically advanced interventions, culminating in the contemporary recognition of the Engagement–Efficacy–Ethics Trilemma as a defining challenge for future research.

Appendix E

Analysis of Agreement and Divergence in the Literature

Most studies agree that gamification enhances engagement and can improve therapeutic outcomes in digital mental health interventions, particularly by using rewards, customisation, and narrative elements. There is consensus on the need for ethical considerations, especially concerning user autonomy, privacy, and vulnerability; however, the depth and scope of ethical frameworks vary widely across studies. While efficacy is positive, some studies highlight heterogeneity in outcomes depending on the population, intervention design, and measurement tools. Divergences often arise due to differences in target groups (e.g., paediatric vs. adult), cultural contexts, and intervention modalities (e.g., VR, mobile apps, cognitive training).

Table A5. Analysis of Agreement and Divergence in the Literature.

Comparison Criterion	Studies in Agreement	Studies in Divergence	Potential Explanations
Engagement Metrics	Gamification consistently increases user engagement, retention, and adherence across diverse digital mental health platforms, using mechanisms such as rewards, points, badges, and narrative immersion [1,6,8,20,26]. Customisation and personalisation, especially, boost momentary engagement and sustained use [8,18].	Some studies have noted challenges with long-term engagement and user fatigue, highlighting the risk of overreliance on extrinsic motivators [14,20]. Differences in engagement measurement and reporting complicate comparisons, as some studies report no significant association between persuasive design elements and engagement [26]. Limited data exist on engagement for specific vulnerable groups or low-resource settings [7].	Variability in study design, metrics used, population differences, and intervention duration contributes to mixed findings. Longer trials and standardised engagement metrics are lacking.
Therapeutic Efficacy	Positive therapeutic outcomes, including symptom reduction and improvements in resilience, are commonly reported for gamified digital mental health interventions across various age groups and settings [4–6,10,27,81,84]. Gamified CBT and serious games show efficacy in depression and anxiety management [9,86,87].	Efficacy results are heterogeneous for some outcomes, like anxiety, stress, and life satisfaction [10,11], and vary by mental health condition and population. Some studies report moderate effects, while others indicate small or preliminary effects, often due to the constraints of small samples or pilot designs [4,8,84]. Comparisons with non-gamified or traditional interventions yield mixed results [83].	Differences in sample size, study design (RCT vs. pilot), age groups, and intervention content explain variability. Lack of standardised outcome measures is a factor.
Ethical Frameworks	There is broad recognition of the importance of ethical considerations, such as privacy, autonomy, inclusivity, and vulnerability, in gamified mental health interventions [12,13,15,75]. Calls for co-design, ongoing ethical reflection, and integration of ethics throughout development are common [12,91].	The depth and focus of ethical discussions vary. Some reviews focus on research ethics and privacy [12], while others critique insufficient attention to socio-political contexts and long-term ethical risks such as addiction and surveillance [13–15]. Practical guidance and regulatory frameworks remain underdeveloped [13,15]. Ethical issues are often addressed pragmatically rather than theoretically [12].	Differences arise due to disciplinary perspectives (e.g., technical vs. humanities), regional regulatory environments, and research priorities emphasising feasibility over ethics.
Gamification Design Features	Reward systems, progress tracking, customisation, narrative immersion, and feedback loops are commonly identified as effective game mechanics that promote engagement and efficacy [1,8,17,18,23]. The integration of cognitive and behavioural therapy elements with gamification enhances the utility of interventions [9,87].	Some studies emphasise the tension between healthcare and entertainment paradigms, which can complicate design and limit commercial adoption [7]. There is debate on the optimal quantity and combination of game elements, with no consensus on which features best balance engagement and efficacy [10,11]. Social and multiplayer elements are underutilised despite their potential benefits [23]. Complexity and accessibility concerns affect design choices in some cultural contexts [75].	Divergences arise from the needs of the target population, cultural factors, technological constraints, and differing theoretical frameworks that guide design.
User Experience and Adherence	Positive user experience, motivation, and adherence are reported in gamified interventions, which are aided by personalisation, ease of use, and the relevance of content [20,78,79,84]. Co-design approaches enhance acceptability and user satisfaction, particularly among vulnerable populations [93].	Attrition and asymmetric dropout are common challenges, particularly in randomised controlled trials and longer interventions [6,78]. Some studies report limited adherence due to complexity, lack of guidance, or cultural mismatch [74,75]. Variability in qualitative assessments and limited reporting standards make cross-study comparisons difficult [20,26].	Differences in intervention duration, population characteristics, cultural adaptation, and the presence of support or guidance influence adherence and experience outcomes.

Appendix F

Theoretical and Practical Implications

Theoretical Implications

- The synthesis of current research supports the theoretical premise that gamification enhances user engagement in digital mental health interventions by leveraging intrinsic motivational dynamics such as reward systems, narrative immersion, and customisation, which align with established behavioural and cognitive theories of motivation and learning [1,8,23]. This confirms that gamification is a viable mechanism for increasing adherence and therapeutic interaction.
- Evidence indicates that specific game mechanics, including avatar customisation and feedback loops, not only improve engagement but also directly contribute to intervention efficacy by fostering identification and emotional investment, particularly among users with lower baseline psychological needs satisfaction [8,18]. These findings nuance existing theories by highlighting the mediating role of user experience factors in therapeutic outcomes.
- The integration of gamification with cognitive behavioural therapy (CBT) and acceptance and commitment therapy (ACT) frameworks demonstrates a promising theoretical convergence, suggesting that gamified elements can effectively operationalise therapeutic techniques in digital formats, thereby enhancing skill acquisition and application [9,84,87].
- The reviewed literature reveals a tension between the healthcare and entertainment paradigms in gamified mental health intervention development, underscoring the need for integrative frameworks that balance clinical efficacy with engaging game design principles [17]. This challenges traditional intervention development models and calls for interdisciplinary theoretical approaches.
- Ethical considerations emerge as a critical theoretical dimension, with current frameworks often limited to research ethics and privacy concerns, while broader socio-political and cultural implications remain underexplored [12,13]. This gap suggests the necessity to expand ethical theories to encompass the social embeddedness and long-term impacts of gamified mental health technologies.
- The role of social dynamics, such as multiplayer and collaborative features, remains underutilised in current gamified interventions, indicating a theoretical opportunity to incorporate social cognitive and community engagement theories to enhance motivation and therapeutic outcomes further [23].

Practical Implications

- For industry practitioners, the findings emphasise the importance of user-centred design that incorporates personalisation, adaptive difficulty, and meaningful reward systems to sustain engagement and improve clinical efficacy in digital mental health products [1,20,26]. This calls for iterative development processes that involve end-user feedback and behavioural data analytics.
- Policymakers and healthcare providers should recognise gamified digital mental health interventions as scalable, cost-effective adjuncts or alternatives to traditional therapies, particularly in low-resource settings and among populations with limited access to conventional care [7,75,83]. Integration into existing care pathways requires attention to cultural sensitivity and clinical oversight to ensure seamless care.
- The evidence underscores the necessity for standardised taxonomies and rigorous evaluation frameworks to assess the specific game elements and mechanisms of action that drive engagement and therapeutic benefit, facilitating comparability and reproducibility across studies [10,11,26].

- Ethical frameworks and regulatory policies must evolve to address privacy, autonomy, and potential adverse effects such as addiction or disengagement, ensuring responsible gamification practices that protect vulnerable users while maximising benefits [13–15].
- The demonstrated efficacy of gamified CBT and ACT interventions suggests practical opportunities for mental health app developers to embed evidence-based therapeutic content within engaging game formats, enhancing treatment adherence and outcomes [9,84].
- Future implementation strategies should prioritise co-design with target populations, including culturally and contextually relevant content, to improve acceptability, reduce stigma, and foster sustained use, particularly among youth and marginalised groups [12,74,93].

Overall, the convergence between theoretical constructs and practical applications reinforces the Engagement–Efficacy–Ethics Trilemma as a unifying framework for understanding both the promises and constraints of gamified digital mental health interventions. Bridging theory and practice through ethically grounded design represents the most viable path toward sustainable innovation in this domain.

Table A6. Limitations of the Literature.

Area of Limitation	Description of Limitation	Papers with Limitations
Small Sample Sizes	Many studies suffer from limited sample sizes, which restricts the statistical power and generalizability of findings. This limitation undermines external validity and may lead to overestimation or underestimation of intervention effects.	[78,79,84]
Heterogeneous Methodologies	The diversity in study designs, outcome measures, and intervention components complicates cross-study comparisons and meta-analyses. This methodological constraint limits the ability to draw consistent conclusions about efficacy and engagement.	[10,11]
Limited Long-Term Data	A lack of longitudinal follow-up data restricts understanding of sustained engagement, efficacy, and ethical implications over time. This gap weakens claims about the durability of the benefits of gamified interventions.	[12,77,81]
Geographic and Cultural Bias	Most research is concentrated in high-income or Western contexts, limiting the applicability of findings to diverse populations. This geographic bias affects the external validity and cultural relevance of gamified mental health interventions.	[7,74]
Insufficient Ethical Considerations	Ethical issues, such as privacy, autonomy, and potential harms, are often underexplored or narrowly interpreted, which limits a comprehensive understanding of the risks and mitigation strategies associated with gamified mental health technologies.	[12–15]
Lack of Standardised Taxonomies	The absence of standardised frameworks or taxonomies for gamification elements and mechanisms hinders systematic evaluation and replication, reducing clarity on which components drive engagement and efficacy.	[10,11]
Overreliance on Self-Report Measures	The predominant use of self-reported data introduces biases and limits the objective assessment of engagement and clinical outcomes, thereby affecting the reliability and validity of the findings.	[27,78,79]
Limited Focus on Social and Multiplayer Features	Many interventions neglect social dynamics and multiplayer elements, which may be critical for engagement and therapeutic impact, thereby limiting the scope of gamification's potential benefits.	[23]
Underrepresentation of Vulnerable Groups	Vulnerable populations, including those with severe mental illness or social exclusion, are often underrepresented, limiting insights into intervention accessibility, acceptability, and ethical challenges for these groups.	[12,91]
Technological Constraints	Emerging technologies, such as VR and mobile platforms, face limitations including hardware discomfort, immersion quality, and accessibility, which can negatively impact user experience and intervention effectiveness.	[3,85,94]

Taken together, these limitations highlight the methodological fragmentation that currently constrains the field. Addressing these weaknesses, through larger, longitudinal, and ethically informed studies, will be essential to produce more reliable evidence and strengthen the theoretical foundations of gamified digital mental health research.

Appendix G

Gaps and Future Research Directions

This appendix provides a detailed overview of the identified research gaps and proposes specific directions for future studies to advance the field.

Table A7. Identified Gaps and Directions for Future Research.

Gap Area	Description	Future Research Directions	Justification	Research Priority
Standardisation of Engagement Metrics	Engagement metrics in gamified digital mental health interventions are inconsistently defined and reported, limiting comparability across studies.	Develop and adopt standardised, validated engagement metrics and reporting guidelines specific to gamified mental health interventions to enable meta-analyses and cross-study comparisons.	Consistent engagement measurement is essential for understanding the true impact of gamification on adherence and therapeutic outcomes [10,26].	High
Long-term Efficacy and Adherence	Most studies focus on short-term outcomes with limited data on sustained engagement, adherence, and clinical efficacy over extended periods.	Conduct longitudinal randomised controlled trials with follow-ups beyond six months to assess the durability of engagement and therapeutic benefits of gamified interventions.	Understanding the long-term effects is critical to evaluating real-world utility and preventing novelty effects from fading [10,20,78].	High
Comprehensive Ethical Frameworks	Ethical discussions are often limited to research ethics, neglecting broader socio-political, privacy, and addiction concerns in gamified mental health tools.	Develop comprehensive, interdisciplinary ethical frameworks integrating privacy, autonomy, addiction risk, cultural sensitivity, and regulatory considerations for gamified mental health interventions.	Ethical oversight is necessary to safeguard vulnerable users and ensure the responsible design and deployment of systems [12–14].	High
Mechanisms of Gamification Impact on Therapeutic Outcomes	The specific mechanisms by which gamification elements influence clinical efficacy and behaviour change remain underexplored.	Employ mixed-methods and mediation analyses to isolate how individual game mechanics (e.g., rewards, customisation) affect psychological processes and symptom improvement.	Clarifying mechanisms will optimise intervention design and maximise therapeutic impact [17,18].	Medium
Cultural Adaptation and Inclusivity	Limited research addresses the cultural tailoring and inclusivity of gamified mental health interventions, which can impact accessibility and relevance across diverse populations.	Design and evaluate culturally adapted, gamified interventions that incorporate participatory co-design and involve diverse user groups, particularly in low-resource settings.	Cultural sensitivity enhances the acceptability, engagement, and equity in mental healthcare delivery [74,75,86].	High
Integration of Emerging Technologies	Emerging technologies like virtual reality (VR) and extended reality (XR) show promise but lack rigorous evaluation and standardised design principles in gamified mental health.	Conduct controlled trials assessing VR/XR gamified interventions, develop best practice guidelines for immersive gamification design, and investigate user experience and clinical outcomes.	VR/XR can enhance immersion and engagement but require validation to ensure efficacy and usability [3,23,85].	Medium
User-Centred and Participatory Design	Many interventions lack systematic user-centred design and co-design processes, limiting personalisation and user motivation.	Implement iterative co-design frameworks that involve end-users and clinicians to tailor gamification features, enhance usability, and address user needs and preferences.	User involvement improves adherence, satisfaction, and ethical acceptability [12,18,93].	High
Balancing Extrinsic and Intrinsic Motivation	Over-reliance on extrinsic motivators (e.g., points, badges) may lead to user fatigue and reduced long-term engagement.	Investigate gamification strategies that foster intrinsic motivation, such as the use of meaningful narratives and avatar identification, and evaluate their impact on sustained engagement.	Enhancing intrinsic motivation is key to preventing disengagement and promoting lasting behaviour change [12,18,20].	Medium
Standardised Taxonomy of Game Elements	A lack of a comprehensive taxonomy categorising game elements and their therapeutic roles hinders systematic research and design.	Develop and validate a taxonomy of gamification components specifically tailored to mental health interventions, linking these elements to relevant psychological constructs and outcomes.	A taxonomy facilitates systematic evaluation, replication, and optimisation of gamified interventions [10,11].	Medium
Addressing Attrition and Dropout	High attrition rates and dropout remain challenges, with insufficient strategies tested to mitigate these issues in gamified mental health apps.	Design and test engagement strategies (e.g., adaptive difficulty, social features) to reduce attrition and analyse predictors of dropout to inform personalised retention approaches.	Reducing attrition is essential for the effectiveness and real-world applicability [6,7,78].	High

Collectively, these gaps underscore the urgent need for a coordinated research agenda that unites behavioural science, ethical theory, and technological innovation. Addressing them systematically will be essential to advance from fragmented empirical evidence toward a coherent, ethically responsible science of gamified digital mental health.

Appendix H

Overall Synthesis and Conclusion

The accumulated literature on gamification in digital mental health interventions reveals a compelling consensus that gamification enhances user engagement, therapeutic efficacy, and offers novel opportunities for mental health promotion and treatment. Gamified elements, such as rewards, progress tracking, customisation, narrative immersion, and social interaction, consistently emerge as key drivers of sustained user participation and motivation across diverse populations and settings. Mobile platforms, particularly smartphone-based applications, dominate the delivery modalities, leveraging accessibility and ubiquitous connectivity to support self-administered and scalable interventions. Evidence supports the positive impact of gamified interventions on clinical outcomes, particularly for depression, anxiety, and stress, with some studies demonstrating comparable or superior efficacy relative to traditional or non-gamified treatments. The synergy of gamification with established therapeutic frameworks such as cognitive behavioural therapy (CBT) and acceptance and commitment therapy (ACT) further strengthens intervention effectiveness and facilitates skill acquisition.

Despite these encouraging findings, the literature highlights significant variability in engagement metrics and therapeutic outcomes, influenced by heterogeneity in study designs, gamification components, and population characteristics. This inconsistency underscores the need for standardised measures and rigorous methodologies to clarify the specific mechanisms by which gamification enhances mental health outcomes. Moreover, while personalisation and cultural sensitivity in design have shown promise in improving adherence and acceptability, these factors remain underexplored and insufficiently integrated across interventions.

Ethical considerations represent a critical but underdeveloped dimension of the field. Current discourse primarily addresses privacy, autonomy, and inclusivity within a limited research ethics framework, often neglecting broader socio-political implications such as data surveillance, regulatory gaps, and potential behavioural harms like addiction. Effective ethical integration requires ongoing, holistic reflection embedded throughout intervention development and deployment, including participatory co-design and attention to vulnerable populations.

In conclusion, the literature advocates for a balanced approach that leverages engaging gamification design principles while rigorously evaluating clinical efficacy and embedding comprehensive ethical safeguards. Addressing methodological heterogeneity, advancing theory-driven research, and fostering interdisciplinary collaboration will be essential to optimise gamified digital mental health interventions. This will enable the development of accessible, effective, and ethically sound solutions that responsibly harness gamification to enhance mental health engagement and outcomes across diverse user groups. This comprehensive synthesis reinforces the Engagement–Efficacy–Ethics Trilemma as the central paradigm for understanding both the potential and the pitfalls of gamified digital mental health interventions, offering a roadmap for responsible innovation and future interdisciplinary inquiry.

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