International Journal on Perceptive and Cognitive Computing (IJPCC) Vol 12, Issue 2 (2026)
https://doi.org/10.31436/ijpcc.v12i2.717

Feasibility and Acceptance of Decision-Based Games for the Assessment of Anxiety and Depression

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(Received: 7th March 2026; Accepted: 15th April, 2026; Published on-line: 30th July, 2026)

Abstract — Traditional mental health assessments for anxiety and depression often face limitations due to their overtly clinical nature and susceptibility to self-report and social desirability biases. To overcome these barriers, this preliminary study explores the feasibility and user acceptance of decision-based games as immersive, early-screening tools specifically targeting university students. Employing a qualitative descriptive design, the research integrated a multimedia production methodology with semi-structured interviews and user acceptance testing (UAT) involving clinical psychologists, academic experts, and student volunteers. The findings indicate that decision-based games can successfully and practically integrate standard psychometric tools, such as the GAD-7 and PHQ-9, yielding high user acceptance. However, experts stressed that to maintain psychological safety and clinical validity, these games must be strictly classified as preliminary screening tools rather than diagnostic instruments, and they must retain the exact original wording of the assessments. Furthermore, targeted design mechanics, including culturally resonant scenarios, minimalist anxiety-sensitive visuals, and brief 5- to 10-minute gameplay sessions, significantly enhance user engagement. Ultimately, well-designed decision-based games offer a viable, engaging, and less stigmatizing alternative to traditional questionnaires for routine mental health screening.

Keywords — Decision-based games, Mental health screening, GAD-7, PHQ-9, University students, Gamification in healthcare

I. Introduction

Anxiety and depression remain among the most prevalent and disabling mental disorders worldwide, placing a substantial burden on individuals, families, and healthcare systems. Accurate, early, and routine assessment of these conditions is critical for timely intervention. However, traditional assessment methods —such as clinician-administered interviews and self-report questionnaires — are often constrained by limited accessibility, high costs, heavy time demands, and susceptibility to response biases or social desirability. These limitations have spurred growing interest in alternative digital approaches that can capture mental health constructs in naturalistic, engaging, and scalable ways [1][2][3].

Serious games and digital interventions have emerged as promising tools for mental health assessment and treatment. By offering immersive environments, game-based approaches lessen the evaluation anxiety and participant burden often triggered by conventional testing, while eliciting more authentic, spontaneous behaviour [2]. Recent research indicates that game-based tools demonstrate acceptable usability, feasibility, and sustained engagement among university students experiencing heightened anxiety and stress [4][5]. Nevertheless, while much of the existing literature evaluates digital games as therapeutic or psychoeducational interventions [6], comparatively less attention has been devoted to their role as objective assessment instruments — particularly those that rely on dynamic, decision-based mechanics to infer underlying affective and cognitive states [3].

Decision-based games, in which players make choices under conditions of uncertainty, risk, or competing goals, can operationalize cognitive and emotional processes central to depression and anxiety, such as threat sensitivity, reward responsiveness, hopelessness, and perseveration. By embedding diagnostic constructs into interactive decision scenarios, game-based assessments capture subtle behavioural markers that static questionnaires struggle to elicit [8]. Despite their theoretical appeal and potential to reduce test-taking anxiety, the real-world feasibility and clinical acceptability of decision-based games remain underexplored [1].

This study addresses this gap by examining the feasibility and acceptance of decision-based games for assessing anxiety and depression in university students. Specifically, we evaluate feasibility across implementation practicality, data quality, and participant adherence, alongside acceptance in terms of perceived usefulness, engagement,

https://doi.org/10.31436/ijpcc.v12i2.717

and trust from both end-users and clinical raters. By synthesizing the perspectives of clinical psychologists and diagnosed individuals, these findings aim to inform the development of scientifically rigorous and practically viable game-based instruments for primary care, digital mental health platforms, and academic environments.

II. Literature Review

A scoping review on the use of video games and virtual reality (VR) for assessing anxiety and depression reveals that emerging evidence is promising but remains limited [9]. Out of ten eligible studies, only two were clinical trials, and three utilized machine-learning techniques to derive assessment metrics [9]. Studies focusing on anxiety disorders predominantly relied on VR, whereas those targeting depression more frequently evaluated video games [9]. While most findings were encouraging — identifying potential digital biomarkers such as risk-taking patterns, persistence, error rates, and response timing — the limited number of studies highlights a need for extensive validation before games or VR can serve as reliable assessment tools [9]. Complementary research on digital mental health tools underscores that while technology will play a pivotal role in future psychiatric care, comprehensive appraisals of screening and diagnostic accuracy are required [10]. This requirement is particularly critical for decision-based games, which seek to infer psychological states from player choices rather than self-report scales [10].

Although systematic reviews and meta-analyses demonstrate that gaming interventions can effectively treat depression and anxiety in adolescents and young adults, most existing research focuses on therapeutic outcomes rather than clinical assessment [11]. Nevertheless, these interventions offer valuable precedent by showing that game mechanics can successfully engage users, elicit task performance, and generate behavioural data that correlates with symptom severity [11]. These findings support the feasibility of operationalizing core cognitive and emotional constructs — such as threat sensitivity, hopelessness, avoidance, and perseveration — into interactive assessment indicators [11]. Empirical support for game-based assessments also stems from studies in other domains, such as tablet-based games evaluating cognitive status in older adults and RPG-based behavioural health tools for adolescents, which consistently report high participation rates, strong usability, and positive user engagement [12].

The feasibility of implementing game-based screening depends heavily on the attitudes and acceptance of mental health professionals. Research indicates generally positive yet cautious perspectives among clinicians [13]. For example, a South African study found that while only 16% of therapists were familiar with serious games, 71% considered them a suitable adjunct treatment modality [13]. Earlier survey data similarly revealed that 90% of therapists could envision therapeutic uses for serious games, particularly targeting anxiety and affective disorders [13]. More recent qualitative work with Finnish mental health professionals highlights complex, ambivalent views; practitioners often distinguish between their own recreational gaming and client gaming, viewing the latter with caution regarding ethics, validity, and potential overuse [14]. Nonetheless, clinicians acknowledge that game-based tools can offer approachable, motivating alternatives — especially for youth, digitally fluent individuals, and withdrawn clients — provided ethical and validity concerns are thoroughly addressed [14].

Broader evaluations of serious games in mental health settings consistently report strong feasibility and user acceptability when applications feature intuitive interfaces, coherent narratives, and active service-user involvement [15]. Qualitative feedback confirms that patients are open to engaging with gamified platforms and view them as less intimidating than traditional methods [15]. Despite these encouraging trends, a significant gap remains in research specifically examining the feasibility and acceptability of decision-based games as assessment instruments for anxiety and depression from the direct perspective of practicing psychologists. Existing literature remains heavily skewed toward therapeutic interventions or cognitive assessments.

Collectively, current research indicates that while game-based approaches show preliminary viability for evaluating affective conditions, robust clinical evidence remains scarce [9]. Mental health professionals view these tools as promising adjuncts but express valid concerns regarding psychometric integrity, ethical boundaries, and practical workflow integration [16]. Feasibility and acceptability remain highest when games are well-designed, yet systematic evaluation of game-based assessment tools in clinical settings remains limited [17]. These findings justify a qualitative investigation directly exploring psychologists' perspectives to clarify perceived benefits, implementation barriers, and clinical conditions, ultimately informing the development of scientifically valid and practically viable game-based assessment tools.

III. Methodology

A. Study Design

This study employed a qualitative, descriptive design using semi-structured interviews to explore psychologists' perspectives on the feasibility of using decision-based games as mental health assessment tools for anxiety and depression. The qualitative approach was chosen to capture nuanced views on clinical utility, barriers, and conditions for implementation that are not readily measurable through

https://doi.org/10.31436/ijpcc.v12i2.717

quantitative surveys [18]. Refer to the Figure 1 below for the study design diagram.

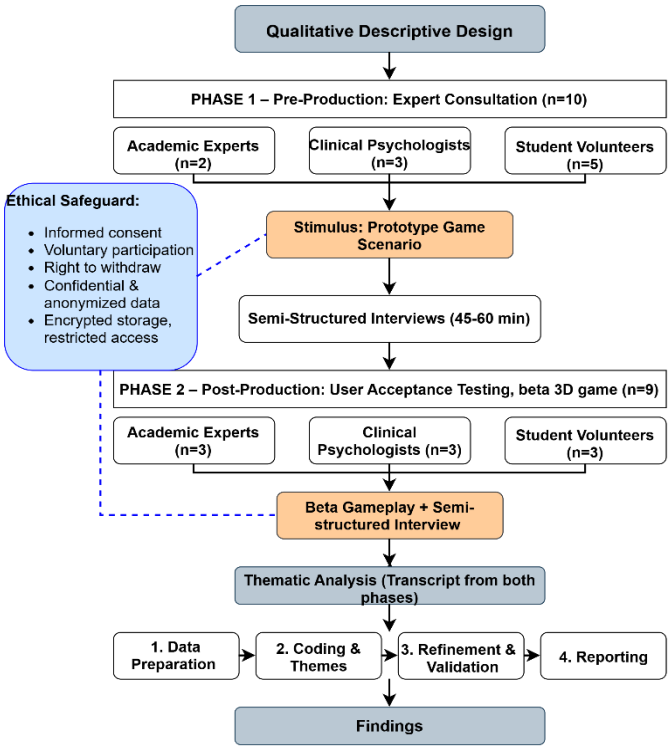

Fig. 1 Study Design Diagram

B. *Participants of Data Collections Across the Studies*

The data collection primarily utilized expert sampling for pre-production of game phase using semi-structured interviews, followed by post-production of game phase for user testing with the target demographic. The participants are detailed below by project:

Pre-production phase, this preliminary study utilized an expert consultation methodology, gathering data from a total of 10 participants divided into four groups.

1) Academic Experts (n=2): Specialists from the International Islamic University Malaysia (IIUM) with over 20 years of experience in fields such as game-based learning and mental health interventions. The experts gave important insights into demographic targeting, ethical considerations, the use of the Likert scale for anxiety detection, and appropriate game design.
2) Clinical Psychologists (n=3): A team of practicing mental health professionals recruited from university counselling centers, possessing over 10 years of experience in clinical psychology, anxiety assessment, and mental health screening.
3) Student Volunteers (n=5): A focus group of university students representing the target demographic. These participants were specifically recruited based on having either a prior anxiety diagnosis or self-reported anxiety symptoms.

Post-production (beta version of 3D game) for User Acceptance Test (UAT),

1) Academic Experts (n=3): Specialists from the International Islamic University Malaysia (IIUM) with over 20 years of experience in fields of mental health interventions.
2) Clinical Psychologists (n=3): A team of practicing mental health professionals recruited from university and private counselling centers, who conducted clinical psychology, anxiety assessment, and mental health screening.
3) University students (n=3), who were diagnosed and undiagnosed with anxiety and depression disorder, were selected from various faculties and academic years at IIUM. They played through the application to evaluate its usability, narrative flow, cultural appropriateness, and emotional impact.

C. *Intervention/Stimulus*

To ground participants' responses in a concrete example, all participants were briefly introduced to a prototype decision-based game scenario (either a short video demonstration, a written scenario, or a brief interactive demo) designed to capture decision patterns relevant to anxiety and depression (e.g., risk-taking, avoidance, persistence, hopelessness). The game was not administered for assessment purposes in this study; rather, it served as a stimulus to elicit discussion about feasibility and clinical relevance.

Descriptions of the game's purpose, mechanics, and intended assessment indicators were provided to ensure participants had a shared understanding of what was being discussed.

D. *Data Collection*

Data were collected through individual semi-structured interviews, conducted either:

1) face-to-face at participants' workplaces or a neutral location, or
2) via secure online video conferencing platforms.

Each interview lasted approximately 45–60 minutes and was conducted by researcher(s) with appropriate training in qualitative methods and mental health contexts. Interviews followed a structured interview protocol that included:

1) Background and context: Professional role, experience in assessment of anxiety/depression, and use of digital tools.
2) Perceived feasibility: Practicality of integrating decision-based games into current assessment

https://doi.org/10.31436/ijpcc.v12i2.717

workflows. Time, training, technical, and organizational requirements.

3) Perceived clinical utility: Relevance of game-derived indicators for anxiety and depression. Potential advantages over traditional questionnaires or interviews.
4) Barriers and concerns: Validity, reliability, interpretability, and ethical considerations (e.g., privacy, consent, security). Suitability across patient groups (e.g., age, cultural background, neurodiversity).
5) Conditions for implementation: Training needs, validation requirements, and partnerships with developers or researchers.

Recommendations: Design features, implementation strategies, and future research directions.

Interviews were audio-recorded with participants' consent. When the recording was not possible, detailed notes were taken immediately after each interview.

E. Ethical Considerations

Participants were provided with an information sheet describing the study's aims, procedures, and their rights. Informed consent was obtained prior to participation. Participants were informed that:

1) participation was voluntary,
2) they could decline to answer any question,
3) they could withdraw at any time without consequence, and
4) all data would be confidential and anonymized.

Audio recordings and transcripts were stored on encrypted devices, accessible only to the research team.

F. Data Analysis

Interview data were analysed using thematic analysis, following a structured approach consistent with established guidelines [19].

1) *Data preparation:*

- Audio recordings were transcribed verbatim.
- Transcripts were checked for accuracy and anonymized (removing names and identifiable information).

2) *Coding and theme development:*

- Initial familiarization with the data was conducted by reading all transcripts and noting preliminary ideas.
- A coding framework was developed, beginning with broad categories aligned with the study objectives (e.g., feasibility, clinical utility, barriers, implementation conditions).
- Transcripts were coded systematically using NVivo
- Codes were reviewed and refined, and grouped into candidate themes and subthemes.

3) *Theme refinement and validation:*

- Themes were reviewed against the coded extracts and the full dataset to ensure coherence and distinctiveness.
- Where possible, analytic memos and peer debriefing were used to enhance rigor and reduce researcher bias.
- Final themes were named and described, with illustrative quotes selected to represent each theme.

4) *Reporting:*

- Findings were organized around the main themes, with each theme linked to the study objectives.
- Quotes were anonymized and attributed only by participant identifier (e.g., P1, P2).

G. Data Limitations

The study is limited to psychologists' perspectives and does not include data from patients, clinicians from other disciplines, or developers. Findings may be influenced by participants' level of familiarity with digital tools and games. The qualitative design does not permit generalization in a statistical sense, but it provides in-depth insights that can inform future development and validation studies of decision-based games for mental health assessment.

IV. Findings

Based on the interview results across the two phases of pre-production and post-production of the game studies, expert consultations with clinical psychologists, academic experts, and student representatives provide a strong foundation for the feasibility and user acceptance of digital games as mental health screening tools. Refer to Figure 2 for the findings diagram.

A. Pre-Production of Game Criteria

1) *Clinical Feasibility and Integration of Psychometric Tools:* The interviews confirmed that integrating validated clinical assessment tools into decision-based games is highly feasible, provided strict developmental guidelines are followed:

Assessment Tool Validity: Experts strongly supported the integration of standardized tools like the GAD-7 (for anxiety) and PHQ-9 (for depression) within gamified environments. However, clinical psychologists emphasized that to maintain psychometric validity, developers must use the exact original wording and response scales of these tools rather than altering them to fit the game.

Reliability Metrics: When designing custom interactive scenarios or Likert-scale scoring systems, psychology experts advise aiming for a Cronbach's alpha reliability score of at least 0.8.

https://doi.org/10.31436/ijpcc.v12i2.717

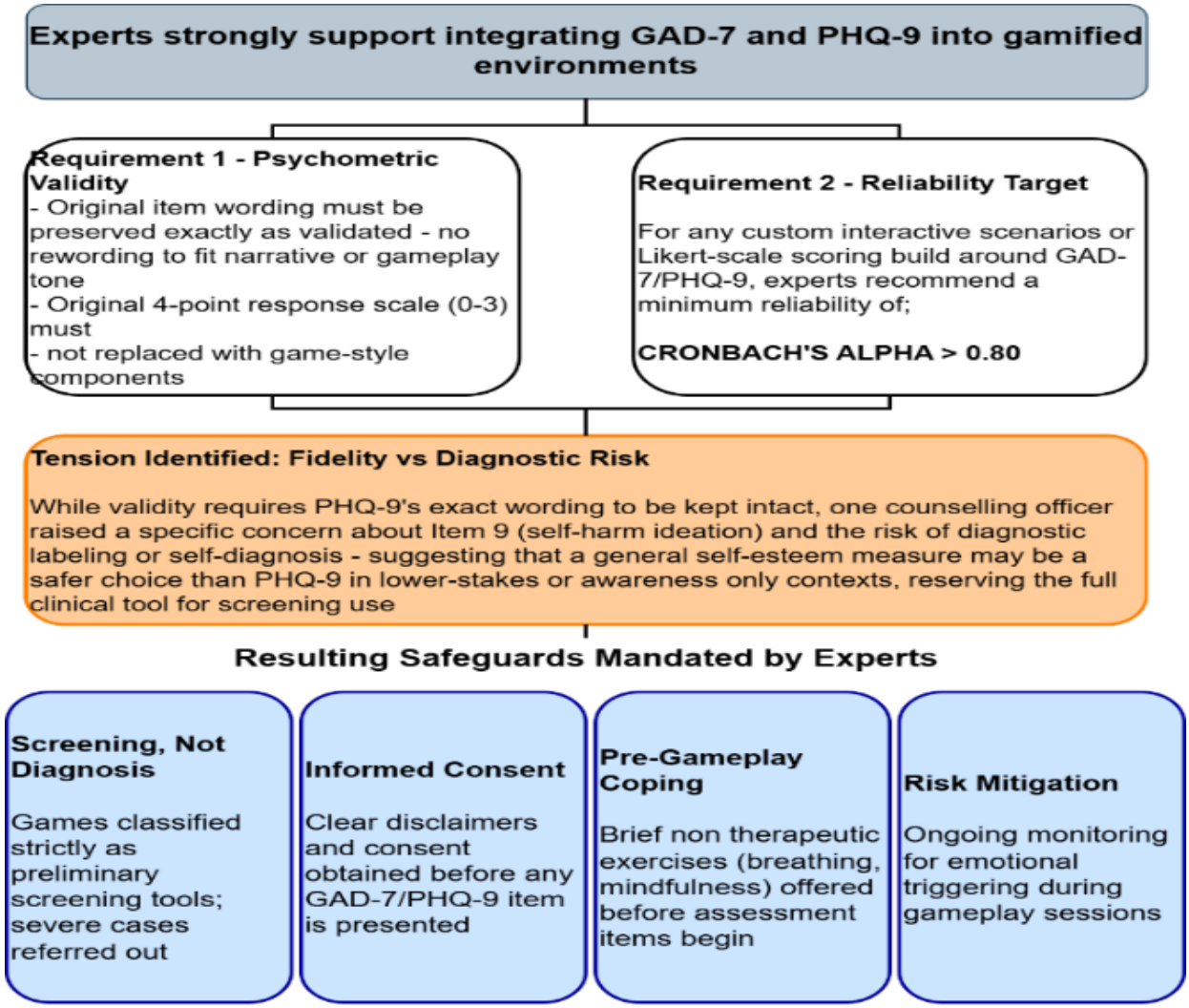

Fig. 2 Findings Diagram

2) Ethical Boundaries and Clinical Safety: The feasibility of these games relies heavily on maintaining strict ethical boundaries to ensure psychological safety:

Screening vs. Diagnosis: Experts unanimously agreed that decision-based games must be strictly classified as preliminary screening and awareness tools, not comprehensive diagnostic instruments. Extreme or severe cases detected by the game must be systematically referred to professional mental health services to avoid misdiagnosis.

Risk Mitigation: Clinical professionals highlighted the ethical risks of emotional triggering and self-diagnosis. In one instance, a counselling officer suggested that measuring general self-esteem might be safer than using clinical tools like the PHQ-9 to avoid diagnostic labelling. To mitigate risks, experts mandated the inclusion of clear disclaimers, informed consent, and non-therapeutic coping strategies, such as basic breathing or mindfulness exercises, prior to gameplay.

B. Post-production of game test

1) User Acceptance and Target Demographics: Interview data revealed strong user acceptance, particularly when the game is tailored to specific populations:

Focus on University Students: Experts advised exclusively targeting tertiary or university students rather than younger minors. This recommendation was based on both the distinct developmental behaviours of young adults and the legal/ethical restrictions regarding consent for minors.

Preference Over Traditional Methods: Student interviewees expressed a clear preference for digital gaming platforms over traditional pen-and-paper clinical questionnaires, noting that games are "unique, convenient,

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and more enjoyable," which helps bypass the stigma typically associated with mental health screening.

2) Design Mechanics for Enhanced Acceptance: Experts provided specific design requirements to maximize user acceptance and prevent the games from causing undue distress:

Anxiety-Sensitive Visuals: Multiple experts highlighted the necessity of using minimalist colour palettes to avoid sensory overstimulation, keeping players focused on the narrative without triggering anxiety symptoms.

Cultural and Narrative Resonance: To boost user acceptability, the games must embed local cultural contexts (such as Malaysian university scenarios) and familiar academic stressors. The tone of the game should prioritize positive reinforcement and a therapeutic feel, actively avoiding a patronizing or overly "clinical" atmosphere.

Pacing and Authenticity: To sustain engagement without causing fatigue, experts recommended short gameplay durations of 5 to 10 minutes. Furthermore, the use of professional human voice actors over AI-generated voices was recommended to provide authentic emotional resonance and increase player immersion.

V. Conclusion

This study demonstrates that decision-based games are a highly feasible and widely accepted alternative to traditional mental health assessments for detecting anxiety and depression, particularly among university students. By embedding validated psychometric tools — such as the PHQ-9 and GAD-7 — into immersive narratives, these gamified platforms effectively capture authentic behavioural responses while significantly reducing the social desirability bias, stigma, and intimidation often associated with conventional clinical questionnaires.

The findings emphasize that the viability of these tools depends heavily on specific design and ethical parameters:

1) Ethical and Clinical Boundaries: It is paramount that these games are strictly framed as preliminary screening and awareness tools rather than definitive diagnostic instruments. To ensure psychological safety, developers must integrate robust risk mitigation strategies, including clear disclaimers, informed consent, coping mechanisms, and direct referral pathways for users exhibiting severe symptoms.
2) Methodological Rigor: To maintain clinical validity, the exact wording and response scales of established psychometric tools must be preserved within the gameplay, and custom metrics should aim for high reliability (e.g., a Cronbach's alpha of at least 0.8).
3) Empathetic and Contextual Design: User acceptance is maximized when games incorporate culturally resonant scenarios, short pacing (5 to 10 minutes), professional voice acting, and anxiety-sensitive minimalist visuals that prevent sensory overstimulation.

Ultimately, when developed with a balance of scientific rigor and user-centric design, decision-based games offer a practically viable, scalable, and engaging solution for routine mental health screening. They present a unique opportunity to bridge the gap between vulnerable young adults and mental health services, promoting earlier detection and timely intervention in a naturalistic, non-threatening environment.

VI. Future Study

Future research should prioritize obtaining robust clinical evidence to validate decision-based games as reliable assessment tools. Because current approaches are under-validated in clinically representative samples, comprehensive appraisals of their screening and diagnostic accuracy are required before they can be deployed widely. The current study primarily reflects the perspectives of psychologists and small samples of student volunteers.

Future studies should incorporate data from a wider array of stakeholders, including patients, clinicians from other disciplines, and game developers. This will help account for varying levels of familiarity with digital tools and provide a more holistic view of the games' practical implementation. The qualitative design of the current study provides in-depth insights but does not permit statistical generalization. Therefore, future research should employ quantitative or mixed-methods approaches on larger, clinically representative populations to properly measure and generalize the feasibility, usability, and assessment accuracy of these games.

Mental health professionals still harbor concerns regarding the validity, ethics, and appropriate use of digital games. Future studies should specifically address these barriers to determine how these tools can be securely, ethically, and practically integrated into routine clinical workflows and primary care settings. While a large portion of existing literature evaluates games as therapeutic interventions, there is a notable gap regarding their use for diagnostics. Future research must continue to specifically examine them as assessment instruments that infer psychological states (like anxiety and depression severity) directly from a player's behavioural choices, rather than relying on self-reporting.

Acknowledgment

The authors acknowledge that the decision-based game platform (D3GAD) referenced in this study was developed

with support from the Sultan Ahmad Shah Medical Centre (SASMEC) grant.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS CONTRIBUTION STATEMENT

S. Samsuri led and supervised the study, and was responsible for organizing and writing the compilation of findings from the anxiety and depression data collections. Z.M. Khandaker served as corresponding author and managed manuscript formatting and submission, and also contributed to the D3GAD component of the study. S. Rosli contributed to the development of the D3GAD game and user requirement data collection. M.W. Mohd Ghazali and A.L. Ruhaimi contributed to the adaptation and gamification of the PHQ-9 assessment instrument and to user requirement data collection. All authors read and approved the final version of the manuscript.

DATA AVAILABILITY STATEMENT

The interview transcripts and audio recordings analysed in this study are not publicly available due to participant confidentiality and the sensitive nature of the data. Anonymized data or thematic coding materials may be obtained from the corresponding author upon reasonable request, subject to participant confidentiality agreements.

ETHICS STATEMENT

Participants in this study were provided with an information sheet outlining the study's aims and procedures, and informed consent was obtained prior to participation. Participants were informed that participation was voluntary and that they could withdraw at any time without consequence. Audio recordings and transcripts were anonymized and stored on encrypted devices, accessible only to the research team, to maintain participant confidentiality.

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