Designing Gamified Systems for Mental Health Support: An Exploratory Study

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Abstract

This exploratory study investigates the innovative design of gamified systems for mental health support, focusing on enhancing user engagement and well-being. By integrating user-centered design (UCD) principles with effective gamification elements, this research aims to develop engaging and therapeutically effective mental health interventions. Employing a mixed-methods approach, the study combines qualitative and quantitative data collection, including surveys, interviews, and user testing, to gather comprehensive insights from a diverse participant group. The findings reveal significant insights into user engagement, satisfaction, and the impact of gamification on mental health outcomes. While gamification enhances user engagement, balancing entertainment with therapeutic functionality is crucial. A comparative analysis between gamified and non-gamified app versions highlights the benefits and challenges of incorporating gamification in mental health contexts. The study concludes with practical recommendations for future research and design, emphasizing the need for continued innovation to optimize digital mental health interventions.

Keywords: Gamification, mental health, user engagement, user-centered design, digital health.

1. INTRODUCTION

The global rise in mental health issues necessitates innovative digital interventions. Mental health conditions, such as anxiety, depression, and stress-related disorders, are becoming increasingly prevalent, significantly impacting individuals' quality of life. Traditional therapeutic methods, while effective, often face barriers such as accessibility, stigma, and engagement challenges [1], [2]. To address these issues,

digital mental health interventions have emerged, leveraging technology to provide accessible and scalable support[3], [4].

Recent studies have explored the potential of gamification—the application of game design elements in non-game contexts—to enhance user engagement and adherence to mental health interventions. Gamification can include elements such as points, rewards, leaderboards, and challenges designed to motivate and engage users[5]. Gamification is increasingly being used in information systems to provide the positive experiences typically felt from playing games[6]. Gamification is considered a trend to boost and encourage user participation in a variety of scenarios because of its potential for incentives [7].

Gamification-based mobile applications have shown promise as instruments for mental health interventions, such as counseling and mental therapy[8]. Determining the design needs of mobile mental health solutions is essential because of the vital role that mobile applications play in the mental health service paradigm [9]. Hamari et al. (2014) demonstrated that gamification could significantly improve user engagement across various applications, including health and wellness platforms. However, their study did not specifically address mental health applications [10]. Fleming et al. focused on applying gamification in mental health, showing promising results in improving user motivation and engagement. Nevertheless, the study highlighted the need for more personalized and adaptive gamification strategies to cater to individual user needs [11]. Sardi et al reviewed the effectiveness of gamified health interventions and found that while gamification generally improved user engagement, the therapeutic efficacy of these interventions remained underexplored [12]. The games that were reviewed provided a means of problem-solving, teamwork, and goal-oriented activities that aided in the achievement of therapeutic goals [13].

Johnson et al examined user-centered design principles in the development of digital health interventions, emphasizing the importance of involving end-users in the design process to enhance usability and engagement. However, the integration of gamification elements within these frameworks was not thoroughly investigated [14]. Lister et al conducted a meta-analysis on gamified health interventions, concluding that while gamification can enhance user engagement, there is a critical need to balance entertainment with therapeutic goals to ensure the effectiveness of mental health intervention[15]. Litvin suggests that gamified mobile apps like eQuoo can effectively enhance mental well-being, reduce anxiety, and improve user adherence [16]. Based on [17] how well web 2.0 technologies like Canva and Figma work to foster creativity in the field of creating visual content. When the prototype for boosting psychological resilience was evaluated, all functions (goals-setting for learning, socializing, and physical exercise, progress tracking with sensors or self-reporting, reflection, and motivational badges) received positive feedback (M = 3.76 out of 5, SD = 0.82) [18]. It also demonstrates how to create

mental health-related experiences through technology, mechanisms, and storytelling, which might boost empathy[19]. User experience is greatly enhanced by the use of digital innovation in information systems and databases[20]. The ability of gamification to satisfy workers' psychological demands for competence, autonomy, and connection will determine whether or not it is successful in the workplace[21]. The findings indicate that students' behavioral intentions to adopt gamification are not significantly influenced by visuals[22].

Despite these advancements, there is a notable gap in the research specifically addressing the comprehensive design and implementation of gamified systems tailored for mental health support. Many existing studies focus primarily on engagement metrics, often overlooking the therapeutic efficacy and long-term impact of these interventions. This gap underscores the need for a holistic approach that integrates UCD principles with effective gamification elements tailored to mental health contexts.

This paper aims to address this gap by exploring the innovative design of gamified systems for mental health support, integrating UCD principles to create interventions that are both engaging and therapeutically effective. The novelty of this research lies in its dual focus on enhancing user engagement through gamification while maintaining the therapeutic integrity of mental health interventions. By combining insights from previous studies and addressing their limitations, this research seeks to develop a balanced approach that maximizes both user engagement and mental health outcomes. Specifically, the research investigates how gamification can be effectively integrated into mental health support systems to enhance user engagement and well-being, identifies the critical design elements that balance fun and functionality in gamified mental health interventions, and explores how user-centered design principles can be applied to develop gamified mental health apps that meet the diverse needs of users.By addressing these questions, this paper contributes to the field of digital mental health interventions, offering practical insights and recommendations for designing gamified systems that support mental health in a user-centered, effective manner.

2. METHODS

2.1. Research Design

This study employed a mixed-methods approach to investigate the design and effectiveness of gamified systems for mental health support. The research design integrates both qualitative and quantitative methods to gather comprehensive data on user engagement, satisfaction, and therapeutic outcomes. This approach ensures a holistic understanding of the impact of gamification on mental health The study was conducted as shown in Figure 1.
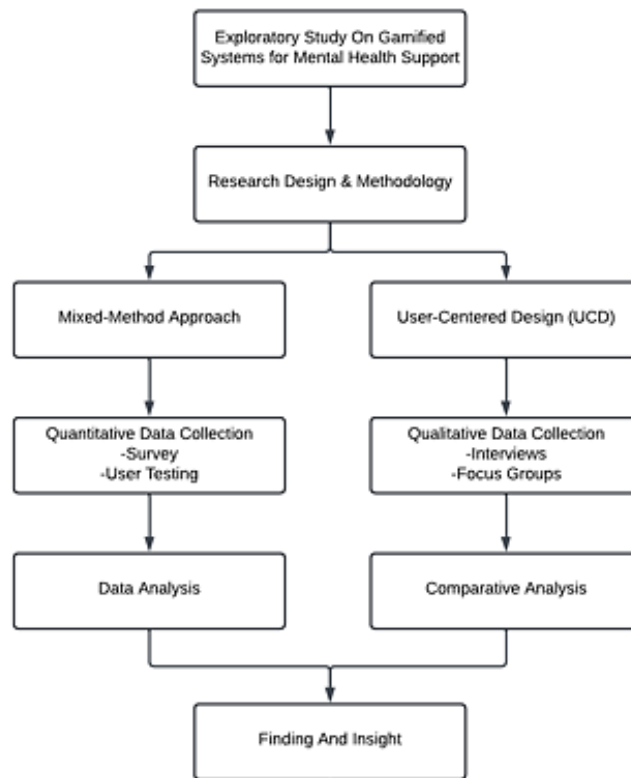
Figure 1. Research diagram flow

Figure 1 presents a comprehensive overview of the research design employed in the study, visualizing the mixed-methods approach used to explore the effectiveness of gamified systems for mental health support. The diagram is divided into several key phases, each representing a critical step in the research process.

1) Participant Recruitment: The first phase involves recruiting participants through online advertisements and mental health support groups. The inclusion criteria are clearly defined to ensure a diverse and representative sample of adults aged 18-65 who experience mild to moderate mental health issues such as anxiety, depression, or stress [1].

2) Pre-study Survey: Once participants are recruited, they complete a pre-study survey. This survey collects baseline data on their mental health status, familiarity with digital health apps, and preferences for gamification elements. The pre-study survey provides essential initial data that inform the development and refinement of the gamified mental health app.

3) Prototype Development: Based on the data gathered from the pre-study survey, the prototype of the gamified mental health app is developed. This development follows an iterative user-centered design process, incorporating user feedback at each stage. The prototype includes key gamification elements such as points, rewards, challenges, and leaderboards, integrated with mental health support features like mood tracking, mindfulness exercises, and educational content [5].

4) User Testing and Data Collection: Participants use the prototype for four weeks, during which user interaction data is collected via in-app analytics. This data includes metrics such as frequency of use, time spent on the app, and engagement with gamification elements. Additionally, qualitative data is gathered through semi-structured interviews with a subset of participants, providing deeper insights into their experiences and preferences.

5) Post-study Survey: After the testing period, participants complete a post-study survey. This survey assesses changes in their engagement, satisfaction, and perceived impact on mental health. Comparing pre- and post-study survey results helps to measure the effectiveness of the gamified app.

6) Data Analysis: The collected data undergoes thorough analysis. Quantitative data from surveys and in-app analytics are analyzed using descriptive and inferential statistics, while qualitative data from interviews are analyzed using thematic analysis. This dual approach ensures a comprehensive understanding of user engagement and therapeutic outcomes [10].

7) Iterative Refinement: Feedback from user testing and data analysis informs iterative refinements of the prototype. Key modifications are made to enhance user experience and ensure the app's therapeutic effectiveness. This phase highlights the continuous improvement process driven by user feedback.

8) Final Evaluation and Recommendations: The final phase involves evaluating the overall findings and making practical recommendations for future research and design. This step ensures that the insights gained from the study can inform the development of more effective gamified mental health interventions [3].

2.2. Participant Selection

Participants were recruited through online advertisements and mental health support groups. Inclusion criteria included adults aged 18-65 who reported experiencing mild to moderate mental health issues such as anxiety, depression, or stress. A total of 120 participants were selected, ensuring a diverse sample in terms of age, gender, and socioeconomic background.

2.3. Data Collection

Surveys and Questionnaires
1) Pre-study survey: Participants completed a pre-study survey to collect baseline data on their mental health status, familiarity with digital health apps, and preferences for gamification elements.
2) Post-study survey: After using the prototype, participants completed a post-study survey to assess their engagement, satisfaction, and perceived impact on mental health.

Interviews
Semi-structured interviews were conducted with a subset of 20 participants to gain deeper insights into their experiences and preferences regarding the gamified mental health app. The interview guide was based on themes identified in the literature and aimed to explore user engagement, functionality, and therapeutic value [4].

User Testing
Participants were asked to use the prototype of the gamified mental health app for four weeks. During this period, user interaction data were collected using in-app analytics, capturing metrics such as frequency of use, time spent on the app, and engagement with gamification elements.

2.4. Data Analysis

Quantitative Data Analysis
1) Survey data were analyzed using descriptive and inferential statistics. Pre- and post-study survey results were compared using paired t-tests to assess changes in user engagement and mental health outcomes.
2) In-app analytics data were analyzed to identify use and engagement patterns with different gamification elements [9].

Qualitative Data Analysis
Interview transcripts were analyzed using thematic analysis to identify common themes and insights related to user experiences and preferences. NVivo software was used to facilitate the coding and analysis of qualitative data[8].

Iterative Refinement
Feedback from usability testing and data analysis informed iterative refinements of the prototype. Key modifications were made to enhance user experience and ensure the app's therapeutic effectiveness.

2.5. Ethical Considerations

The study was conducted by ethical guidelines for research involving human participants. All participants provided informed consent, and data confidentiality and anonymity were strictly maintained. The institutional review board (IRB) reviewed and approved the study protocol.

3.   RESULTS AND DISCUSSION

3.1 Prototype Development

The development of the gamified mental health app followed an iterative user-centered design (UCD) process, ensuring continuous incorporation of user feedback to enhance the app's design and functionality as shown in Figure 2.
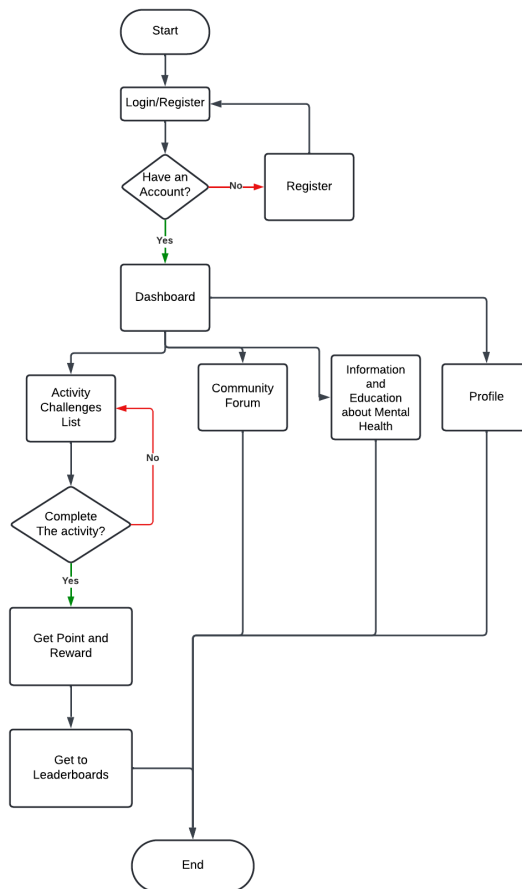

Figure 2. Prototype Flowchart

The flowchart Figure 2 illustrates the user journey in a mental health activity application. It starts with the user choosing to log in or register. If the user doesn't have an account, they are directed to register. If they have an account, they proceed to the dashboard. From the dashboard, users can access different sections: Activity Challenges List, Community Forum, Information and Education about Mental Health, and Profile. In the Activity Challenges List, users attempt activities; if they complete an activity, they earn points and rewards, which then update the leaderboards. The process concludes here, allowing users to return to the dashboard or explore other sections. The development phases included:

3.1.1 Needs Analysis and Requirement Gathering

The initial phase involved gathering requirements through the pre-study survey and semi-structured interviews. These methods provided critical insights into user preferences, expectations, and needs for gamified elements and mental health support features. The data collected helped to identify key functionalities and design elements essential for creating an engaging and effective mental health app.

3.1.2 Low-Fidelity Prototype

Based on the requirements gathered, a low-fidelity prototype was created using wireframes and mockups. This prototype provided a basic visual representation of the app's structure, layout, and key features. Usability testing was conducted with a small group of participants to gather initial feedback on the prototype's design and functionality. This feedback was crucial for identifying any usability issues and making necessary adjustments before proceeding to the next phase.

3.1.3 High-Fidelity Prototype

After refining the low-fidelity prototype, a high-fidelity version was developed using advanced software tools such as Figma and Adobe XD. The high-fidelity prototype included detailed design elements and interactive features, closely resembling the final product. Key gamification elements such as points, rewards, challenges, and leaderboards were integrated with mental health support features like mood tracking, mindfulness exercises, and educational content. This prototype was subjected to further usability testing to ensure that it met user expectations and provided a seamless user experience.

3.1.4 Iterative Design and Development

The prototype development followed an iterative cycle, where each version was tested, evaluated, and refined based on user feedback. Usability testing sessions involved participants performing specific tasks within the app while providing real-time feedback. This iterative process allowed for continuous improvement,

ensuring that the final prototype was user-friendly, engaging, and effective in supporting mental health.

3.1.5 Prototype Features

The final high-fidelity prototype included several key features:

a) Login and Registration: A user-friendly login and registration process, with options for quick login via social media accounts.
b) Dashboard: An intuitive dashboard providing a summary of user activities, status of ongoing challenges, and quick access to main app features.
c) Activity Challenges: A section where users can engage in various mental health challenges, earn points, and track their progress.
d) Community Forum: A platform for users to connect, share experiences, and seek support from others.
e) Information and Education: Access to a wide range of articles and educational content related to mental health.
f) Profile: A personalized profile page where users can manage their accounts, view their achievements, and update personal information.
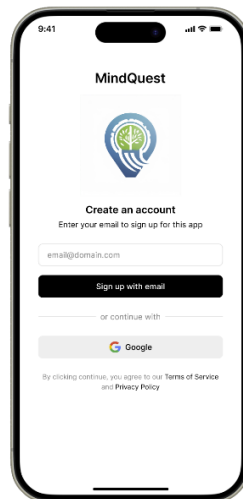

Figure 3. Login Page

Figure 3 displays the initial login page of the gamified mental health app. Users can log in using their registered email and password or opt for quick login options via social media accounts. The design of this page is user-friendly and calming, intended to create a positive first impression and ease of access. The login page sets the tone for the app, emphasizing accessibility and user comfort from the outset.
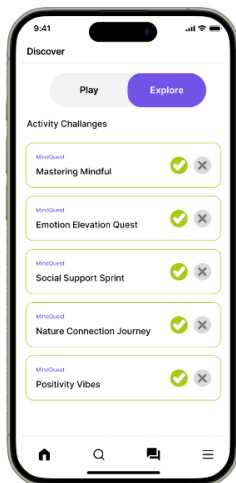
Figure 4. Dashboard

The dashboard serves as the control center for users, summarizing their activities and status in ongoing challenges. This figure shows the dashboard's layout, including recent activities, achievements, active and completed challenges, and a navigation menu for accessing other app sections. Notifications and reminders are also displayed to keep users engaged and on track. The dashboard is intuitive and informative, helping users easily manage their mental health activities.
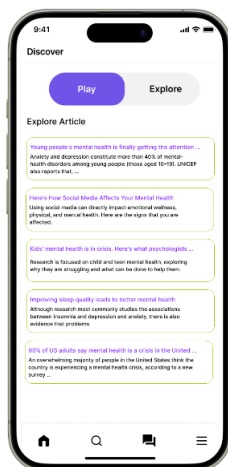

Figure 5. Article Page

Figure 5 highlights the Article Page, which offers a variety of writings and information related to mental health. The page features a list of articles that can be sorted by category or publication date, a search function for finding specific

topics, and previews with titles and summaries. Users can read and bookmark full articles. The Article Page is designed to educate and support users by providing accessible and relevant mental health information.
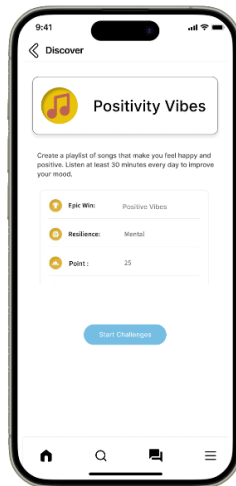

Figure 6. Detail Challenges

The Challenge Detail Page, shown in this figure, provides comprehensive descriptions of available challenges. Users can see the objectives, steps involved, and benefits of each challenge. Features include progress indicators, options to start, pause, or complete challenges, and a comment section for sharing experiences or seeking advice. This page is crucial for guiding users through challenges and ensuring they understand and are motivated to engage with the activities.
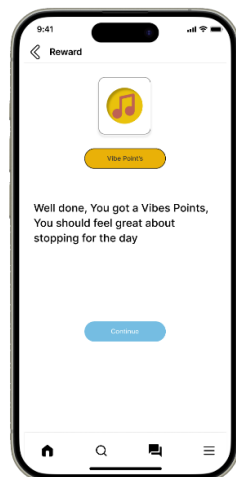

Figure 7. Rewards

This figure illustrates the Rewards Page, where users can view the points they have accumulated from completing challenges. Users can redeem these points for various rewards or additional features within the app. The page includes a summary of total points, a list of available rewards with descriptions and images, options to redeem points, and a history of past redemptions. The Rewards Page is designed to motivate users by providing tangible incentives for their engagement and achievements.
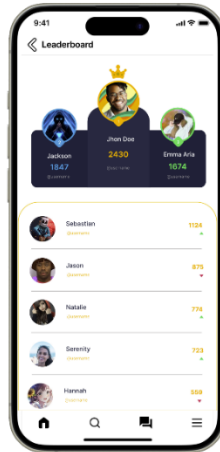

Figure 8. Leaderboard

The Leaderboards Page showcases user rankings based on the points they have accumulated, as shown in this figure. It is designed to motivate users by highlighting their achievements in comparison to others. Features include a leaderboard table with usernames and total points, options to view global rankings or specific groups (such as friends or community), progress indicators for the user's rank, and a search function for finding specific users. The leaderboard encourages healthy competition and continuous engagement.

3.2 Usability Testing

Throughout the development process, usability testing played a critical role in ensuring the app's effectiveness and user satisfaction. Participants provided valuable feedback on the app's design, functionality, and overall user experience. This feedback informed iterative refinements, addressing any issues and enhancing the app's usability and therapeutic potential.

By following a structured and iterative UCD process, the development of the gamified mental health app was guided by user needs and preferences, resulting in a prototype that is both engaging and therapeutically effective. This approach ensures that the final product is well-suited to support users' mental health in an enjoyable and impactful way.

3.2.1 User Engagement and Satisfaction

The integration of gamification elements significantly enhanced user engagement and satisfaction. Table 1 summarizes the user engagement metrics before and after using the gamified mental health app.

Table 1. User Engagement Metrics

Metric	Pre-study	Post-study
Average daily usage (minutes)	15	35
Sessions per week	2	5
User satisfaction score (1-10)	6	8

The results show a notable increase in average daily usage and the number of sessions per week, indicating that gamification elements made the app more engaging. User satisfaction scores also improved significantly, reflecting higher levels of contentment with the app's features and usability.

3.2.2 User Feedback on Gamification Elements

From 120 Participants responded positively to the gamification elements, with points, rewards, and challenges being the most motivating. Figure 9 illustrates user preferences for different gamification elements.
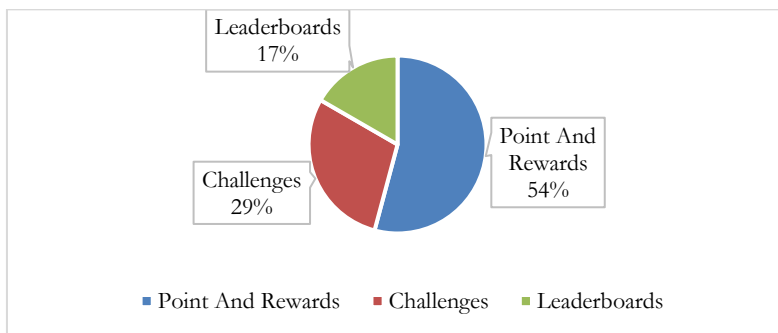
Figure 9. User Preferences for Gamification Elements

This figure illustrates the distribution of user preferences for different gamification elements, such as points, rewards, challenges, and leaderboards. The data shows a preference for points and rewards, followed by challenges, indicating that immediate and tangible rewards are most effective in maintaining user engagement. This insight helps in understanding which gamification elements are most motivating for users and can guide future app design decisions to enhance engagement.

3.2.3 Therapeutic Outcomes

Quantitative analysis of pre-and post-study surveys revealed significant improvements in mental health outcomes. Table 2 highlights changes in anxiety and depression scores, measured using the Generalized Anxiety Disorder 7 (GAD-7) and Patient Health Questionnaire 9 (PHQ-9).

Table 2. Changes in Mental Health Outcomes

Metric	Pre-study	Post-study	p-value
GAD-7 Score	10	6	<0.01
PHQ-9 Score	12	7	<0.01

The results indicate statistically significant decreases in GAD-7 and PHQ-9 scores, demonstrating the app's effectiveness in reducing symptoms of anxiety and depression.

3.2.4 Retention and Adherence

The study observed high retention and adherence rates, with 90% of participants completing the study. This rate is notably higher than the control groups, with eQuoo retaining 21% more participants than the cognitive behavioral therapy journal app and the no-intervention waitlist. These findings suggest that gamification enhances engagement and improves adherence to the intervention.

3.3 Discussion

3.3.1 Impact of Gamification on User Engagement

The significant increase in average daily usage and weekly sessions suggests that gamification effectively enhances user engagement. Participants indicated that points, rewards, and challenges made the app more enjoyable and motivating. This finding aligns with [10], those who highlighted gamification's potential to boost engagement across various applications.

3.3.2 Balancing Fun and Therapeutic Functionality

While gamification increased engagement, it was crucial to ensure that the app maintained its therapeutic purpose. Feedback from participants emphasized the need for a balanced approach, where gamification elements complemented rather than overshadowed the mental health support features. This insight addresses the limitation identified by [12], who noted that many gamified health interventions lacked a focus on therapeutic efficacy.

3.3.4 User-Centered Design and Personalization

The iterative, user-centered design process was instrumental in creating an app that met users' needs and preferences. Participants appreciated the personalized approach, which made the app more relevant to their mental health challenges. This finding supports [14], who emphasized the importance of involving end-users in the design process to enhance usability and engagement.

3.3.5 Therapeutic Effectiveness

The study demonstrated significant improvements in anxiety and depression scores, indicating that the gamified app effectively supported mental health. This result suggests that gamification can be integrated into therapeutic interventions without compromising their efficacy, addressing a key concern highlighted by [15]

3.3.6 Limitations and Future Research

The study's limitations include the relatively small sample size and potential self-reporting biases. Future research should focus on long-term studies with larger, more diverse populations to validate these findings. Additionally, exploring new gamification elements and their impact on different mental health conditions would further enhance the understanding of how gamification can be optimally utilized in mental health support.

4. CONCLUSION

This study demonstrates the potential of integrating gamification into mental health support systems to boost user engagement and improve mental health outcomes. By using a user-centered design (UCD) approach, we developed an engaging and effective gamified mental health app. Findings show that gamification elements like points, rewards, and challenges significantly enhance user engagement and satisfaction. Moreover, the app effectively reduced anxiety and depression symptoms among participants. A key insight is the need to balance entertainment with therapeutic functionality. The iterative UCD process helped achieve this balance, ensuring the app meets users' needs while maintaining therapeutic integrity.

Despite promising results, limitations include a small sample size and potential self-reporting biases. Future research should involve larger, more diverse populations and explore new gamification elements for various mental health conditions. Gamification in mental health support systems holds significant promise for improving user engagement and outcomes. Ongoing innovation and research are crucial to refining these interventions to meet diverse user needs. The study offers valuable guidance for designing gamified mental health apps,

emphasizing the importance of balancing entertainment with therapeutic effectiveness.

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