Promoting Emotional Well-being through Gaming: The Effect of the Goodville Farm Game on Depression Symptoms

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SUMMARY

This article presents a comprehensive review on the influence of the Goodville farm game on depression symptoms, with the aim of evaluating mobile games as effective tools for managing mental health.

Mental health disorders have a significant global impact, yet limited accessibility to treatment and societal stigmas create a treatment gap. The increasing adoption of smartphones and wearable sensors has opened new avenues for mental health management, including the development of mobile applications and video games.

The Goodville farm game incorporates an emotional wellness module that allows players to actively assess and monitor various aspects of their emotional well-being.

A sample of Goodville players from the USA and the UK underwent a 6-week assessment using the Patient Health Questionnaire-8 (PHQ-8) to measure depressive symptoms.

The results of repeated measures ANOVA revealed a significant overall treatment effect of the Goodville mobile game on PHQ8 scores, indicating a progressive improvement in participants' mental well-being over time. Post hoc pairwise comparisons showed significant differences between each time point, indicating a consistent decrease in PHQ8 scores with each subsequent week of gameplay.

These findings support the use of mobile games as innovative and accessible treatments for individuals facing barriers to traditional forms of mental health care. Further research can contribute to the development of destigmatized and effective interventions in the field of mental health.

Key words: Goodville, depression symptoms, treatment, emotional well-being

Mental health disorders continue to have a profound impact on the global population, with a prevalence estimated at around 14%. Alarmingly, these disorders are projected to become leading causes of morbidity and mortality worldwide by 2030. The ongoing global pandemic and economic instability have further heightened the prevalence of mental health disorder symptoms, emphasizing the urgent need for accessible and widespread mental health treatments (Kowal et al., 2021). Depressive and anxiety disorders, in particular, affect a significant number of individuals, with depressive disorders impacting approximately 264 million people globally and anxiety disorders affecting around 284 million individuals. However, it is crucial to acknowledge that these disorders are often underreported due to societal stigmas and limited accessibility to treatment, creating a substantial treatment gap (Kowal et al., 2021).

In recent years, the widespread adoption of smartphones and wearable sensors, especially in low- and middle-income countries, has opened new avenues for mental health management. Mobile applications addressing mental health concerns have been developed, providing valuable resources and strategies for managing mental illness and promoting emotional well-being. Similarly, video and computer games have emerged as potential tools to support mental health and alleviate symptoms of stress (Dias et al., 2018). The engaging and immersive nature of games allows players to assume an active role, providing a sense of mastery, competence, and control over the gaming environment. Additionally, video games offer psychological detachment from everyday stressors, facilitating relaxation and offering individuals an opportunity to escape negative thoughts and emotions (Christoph et al., 2009; Hartmann & Klimmt, 2006).

Despite the common association of video and computer games with increased arousal, users also report experiencing a relaxing effect during gameplay. This apparent contradiction is observed in other stimulating activities, such as sports, where distraction from stress-inducing stimuli contributes to relaxation. Moreover, video and computer games enable users to experience a sense of control over the game's progression and outcomes, fostering feelings of autonomy and effectance. These unique characteristics of video and computer games make them valuable in the recovery process by facilitating psychological detachment and promoting feelings of control during leisure time (Reinecke, 2009).

Neuroscientific research has shown that engaging in interactive digital games activates specific neural circuits associated with incentive motivation. These games

stimulate regions involved in reward processing, while also modulating activity in regions associated with attention and emotion regulation. This activation pattern suggests that video games have the potential to restore the disrupted reward system in depression and alleviate depressive symptoms (Cole et al., 2012).

Building upon the existing knowledge and potential of video games in mental health treatment, this comprehensive review aims to assess the influence of the Goodville Farm Game on depression symptoms. By examining scientific evidence, this study seeks to further validate the use of video games as an effective tool for managing mental health, particularly for individuals facing barriers to traditional forms of care. Understanding the impact of video games on depression symptoms can contribute to the development of innovative, accessible, and destigmatized treatment approaches in the field of mental health.

The Goodville farm game incorporates an emotional wellness module designed to assess and manage various aspects of players' emotional well-being. The term "emotional well-being" refers to an individual's ability to maintain a productive emotional state throughout the day. By integrating the emotional well-being module into the Goodville game, players can actively evaluate and monitor different aspects of their emotional health in a dynamic manner. The assessment covers a range of psychological well-being elements, including the severity of anxiety and depression symptoms, the levels of positive and negative emotions experienced, and the quality and duration of sleep.

During gameplay, players engage in self-assessment exercises related to their emotional health. Those who successfully complete the assessments receive feedback in the form of verbal interpretations and visual representations of their emotional well-being status. By regularly engaging with these self-assessment techniques, players can continuously monitor and manage their emotional well-being over time. Each completed test rewards the player with game energy as an incentive for their active involvement in self-assessment. The amount of reward is displayed to the player before taking the test.

Furthermore, the Goodville farm game features a character named Doctor Socool, who periodically appears in the gameplay and provides various recommendations to promote and maintain mental health. Dr. Socool has his own laboratory building within the game, where a collection of recommendations on different aspects of mental health can be accessed.

One of the self-assessment techniques included in the Goodville emotional well-being module is the Patient Health Questionnaire-8 (PHQ-8) (Kroenke et al., 2009), which is a modified version of the widely used 9-item Patient Health Questionnaire (PHQ-9). The PHQ-8 is a self-report questionnaire that involves matching symptoms to diagnostic criteria and is commonly employed to identify individuals with depression based on their symptoms. In the PHQ-8, item 9 from the PHQ-9 is omitted to avoid the potential risk of providing inaccurate suicide risk assessment. Within the emotional well-being module of Goodville, participants are presented with eight possible problems or symptoms and asked to indicate how often they have been bothered by each over the past week. These problems or symptoms include items such as "feeling down, depressed, or hopeless," "feeling tired or having little energy," and "feeling bad about yourself, or that you are a failure, or have let yourself or your family down." Each item is rated on a scale from 0 (never) to 3 (almost every day). A scale score is then calculated by summing the responses to each item.

The primary objective of this study was to assess the impact of the Goodville game on depression symptoms among its players. Gaining an understanding of how a mobile game like Goodville can effectively contribute to the enhancement of emotional well-being has the potential to guide the development of targeted interventions that are accessible, engaging, and efficacious for individuals seeking alternative forms of mental health care.

The study recruited a sample of Goodville players from the United States and the United Kingdom. These participants engaged with the game and underwent assessments of depressive symptoms every 7 days over a period of 6 weeks, from June 2021 to April 2022. The assessment of depressive symptoms was carried out using the PHQ-8 questionnaire integrated in the Goodville well-being module. The total number of respondents included in the study was 3,161.

To examine the overall treatment effect, repeated measures ANOVA was utilized, with consideration given to factors such as "Sphericity" and "Method." Post hoc tests, including pairwise comparisons, were conducted to identify any significant differences between specific time points. The statistical significance level was set at $p < 0.05$, and appropriate adjustments were made for multiple comparisons, as necessary.

Figure 1 depicts the distribution of players classified based on the severity of depression as determined by the PHQ-8 cut-off scores, as revealed in the results of the initial assessment.

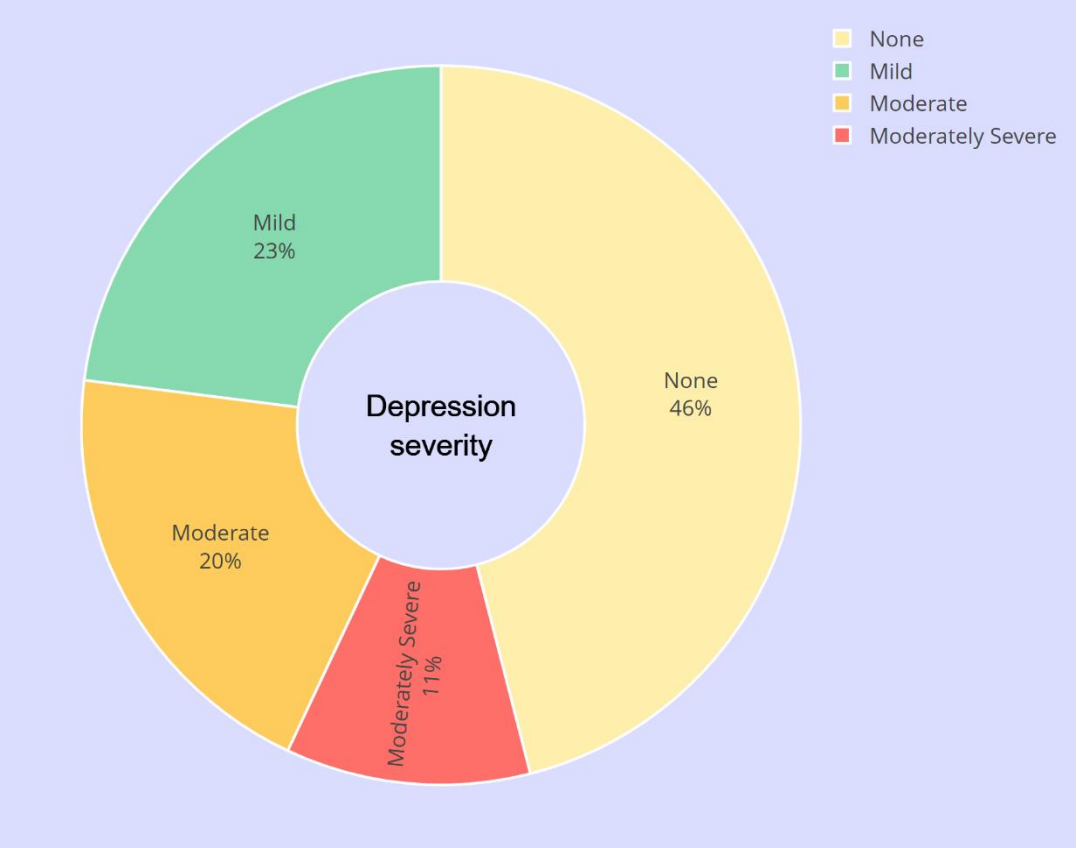

Figure 1. Distribution of Goodville players by severity of depression according to the results of the initial PHQ-8 assessment

The histogram analysis demonstrates that nearly half of the players (46%) exhibited no significant symptoms of depression. Conversely, more than half of the players indicated the presence of mild (23%), moderate (21%), or moderately severe (11%) symptoms of depression during the first examination.

It is important to note that participants without depression symptoms, as indicated by a PHQ-8 score below 5, were excluded from the ANOVA analysis. This exclusion was done to focus specifically on the treatment effect of the Goodville mobile game in individuals experiencing depressive symptoms. Consequently, the remaining sample for the ANOVA analysis consisted of 1717 respondents who exhibited varying levels of depression at the beginning of the study.

The results of the repeated measures ANOVA demonstrated a significant overall treatment effect ($F = 248.57$, $p < 0.001$) of the Goodville mobile game on PHQ-8 scores. Sphericity assumptions were assumed for the analysis, and corrections using Greenhouse-Geisser ($\varepsilon = 0.809$) and Huynh-Feldt ($\varepsilon = 0.811$) were applied.

The within-subjects factor, representing the time points of assessment, accounted for a significant portion of variance in the PHQ-8 scores (sum of squares = 16843.630,

df = 6, mean square = 2807.272, F = 248.57, p < 0.001). Trend analysis further demonstrated significant linear (t = -27.6679, df = 1716, p < 0.0001) and cubic trends (t = -4.8416, df = 1716, p < 0.0001), indicating consistent improvement over time with some fluctuations.

Evaluation of the change dynamics revealed a progressive decrease in the average PHQ-8 score from 10.97 at baseline to 7.16 after 6 weeks of using Goodville (Figure 2).

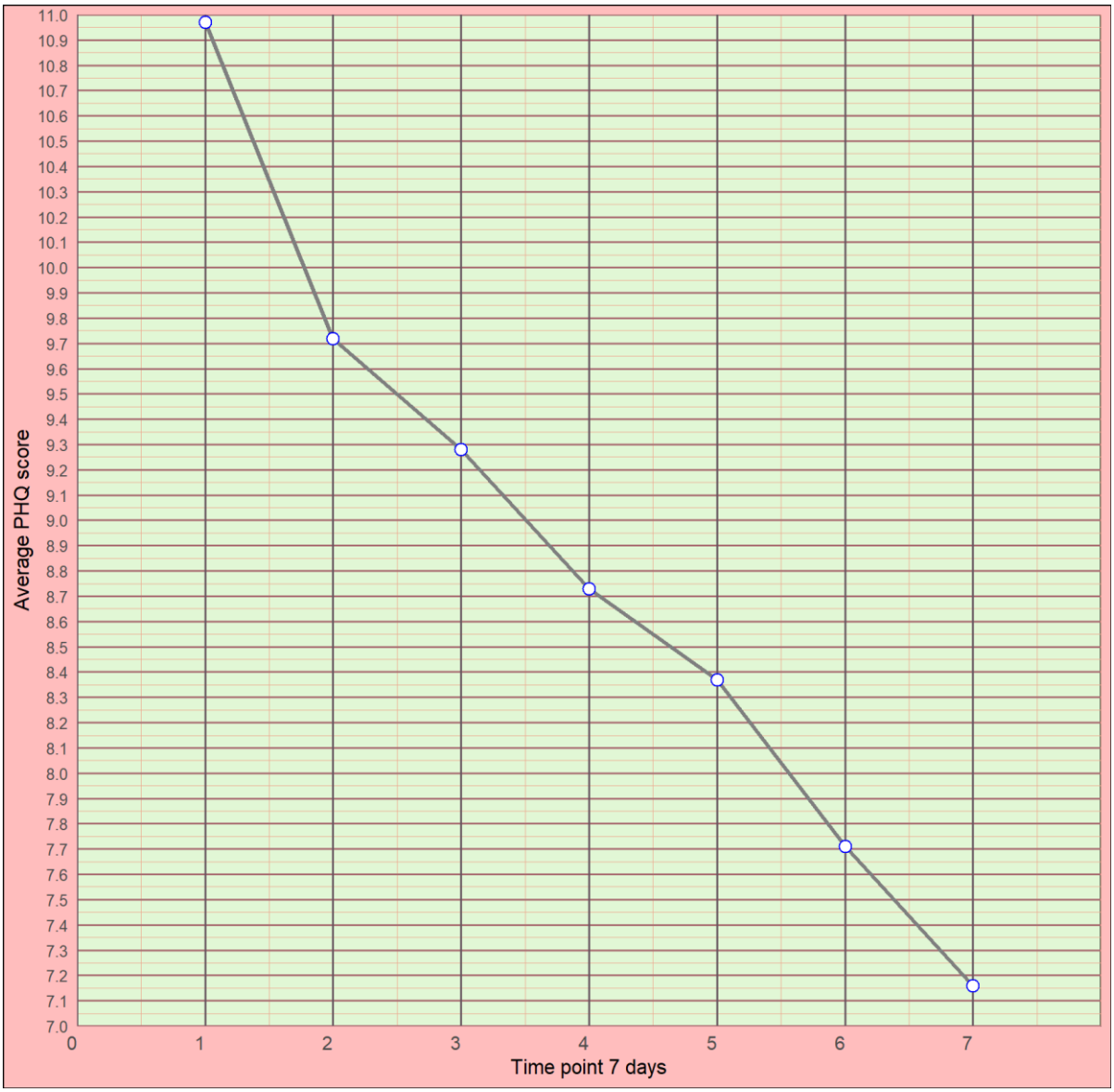

Figure 2. Temporal dynamics of average PHQ-8 scores during 6 weeks of Goodville gameplay

Post hoc pairwise comparisons revealed significant differences between all time points (p < 0.0001) (Table 1). These comparisons indicated that each subsequent week of playing the mobile game resulted in lower PHQ-8 scores compared to the previous

week. The table presents the mean differences and 95% confidence intervals between time points. The significant differences observed in pairwise comparisons highlight specific time points during the 6-week period when significant improvements in PHQ-8 scores occurred.

Table. Posthoc pairwise mean differences in PHQ8 scores between time points

Time points		Mean difference	Std. Error	P	95% CI
Point 1	Point 2	1.253	0.104	<0.0001	0.935 to 1.570
	Point 3	1.692	0.110	<0.0001	1.358 to 2.027
	Point 4	2.236	0.118	<0.0001	1.876 to 2.597
	Point 5	2.595	0.123	<0.0001	2.222 to 2.969
	Point 6	3.262	0.126	<0.0001	2.879 to 3.645
	Point 7	3.804	0.128	<0.0001	3.415 to 4.194
Point 2	Point 3	0.440	0.0994	0.0002	0.137 to 0.742
	Point 4	0.984	0.111	<0.0001	0.646 to 1.321
	Point 5	1.342	0.120	<0.0001	0.979 to 1.706
	Point 6	2.009	0.129	<0.0001	1.616 to 2.403
	Point 7	2.552	0.133	<0.0001	2.145 to 2.958
Point 3	Point 4	0.544	0.0987	<0.0001	0.244 to 0.844
	Point 5	0.903	0.109	<0.0001	0.572 to 1.233
	Point 6	1.570	0.120	<0.0001	1.205 to 1.934
	Point 7	2.112	0.127	<0.0001	1.727 to 2.497
Point 4	Point 5	0.359	0.0996	0.0069	0.0556 to 0.662
	Point 6	1.026	0.114	<0.0001	0.678 to 1.374
	Point 7	1.568	0.124	<0.0001	1.191 to 1.944
Point 5	Point 6	0.667	0.0965	<0.0001	0.373 to 0.960
	Point 7	1.209	0.113	<0.0001	0.866 to 1.552
Point 6	Point 7	0.542	0.0931	<0.0001	0.259 to 0.826

Overall, the repeated measures ANOVA and post hoc analyses provide robust evidence for the treatment effect of the Goodville mobile game on PHQ-8 scores. The observed trends and significant differences between time points underscore the temporal

dynamics of the treatment and indicate progressive improvement in participants' mental well-being throughout the 6-week period of playing the game.

The aim of this study was to evaluate the influence of the Goodville farm game on depression symptoms, with a focus on individuals facing barriers to traditional forms of mental health care. The findings of this comprehensive review contribute to the existing knowledge and potential of video games as an effective tool for managing mental health.

The results of the study provide valuable insights into the distribution of players based on the severity of depression as determined by the PHQ-8 cut-off scores. Figure 1 illustrates that almost half of the players (46%) exhibited no significant symptoms of depression, while the remaining players reported varying levels of depressive symptoms. These findings highlight the importance of considering the mental health status of players before analyzing the impact of the Goodville game on depression symptoms. To ensure a focused analysis, participants without depression symptoms were excluded from the ANOVA analysis. This step aimed to specifically examine the treatment effect of the Goodville game in individuals experiencing depressive symptoms. The remaining sample consisted of 1717 respondents who exhibited varying levels of depression at the beginning of the study, providing a suitable cohort for assessing the impact of the game on depressive symptoms.

The repeated measures ANOVA revealed a significant overall treatment effect of the Goodville mobile game on PHQ-8 scores. This finding suggests that engagement with the game had a positive influence on depression symptoms among the participants. The analysis accounted for the time points of assessment, indicating a significant amount of variance in the PHQ-8 scores over the study period. The trend analysis further demonstrated significant linear and cubic trends, indicating consistent improvement over time with some fluctuations. These results highlight the temporal dynamics of the treatment and suggest a progressive enhancement of participants' mental well-being throughout the 6-week period of playing the game.

The progressive decrease in the average PHQ-8 score from baseline to the end of the 6-week period provides additional evidence of the positive impact of the Goodville game on depression symptoms. The significant differences observed in pairwise comparisons between all time points further reinforce the notion that each subsequent week of gameplay led to lower PHQ-8 scores compared to the previous week. This indicates a cumulative effect of the game on improving depression symptoms over time.

The findings of this study are consistent with prior research highlighting the potential benefits of video games in promoting mental health. The Goodville farm game, with its immersive and engaging nature, offers players a unique opportunity to experience a sense of control, mastery, and psychological detachment from stressors. These aspects are crucial in facilitating positive effects on mental well-being and can provide insights into the observed improvements in depression symptoms.

The integration of the emotional well-being module within Goodville further enhances its potential as a mental health intervention. By actively engaging in self-assessment exercises and receiving personalized feedback, players are empowered to monitor and manage various aspects of their emotional health in real-time. This active involvement in self-assessment, coupled with the rewarding system within the game, encourages continuous engagement and a proactive approach towards emotional well-being. The emotional well-being module, together with the immersive gameplay, may foster a sense of autonomy, mastery, and control over one's emotional state. By providing players with tools and resources to evaluate and regulate their emotional well-being, the game offers a supportive environment for individuals experiencing depression symptoms. The ability to detach from negative thoughts and emotions while engaging in gameplay may contribute to a more positive emotional state and potentially alleviate depressive symptoms.

Furthermore, the interactive nature of the emotional well-being module in Goodville allows for a personalized and dynamic approach to mental health management. Players have the opportunity to explore different strategies, receive recommendations from Dr. Socool, and adapt their gameplay experience based on their individual needs and progress. This tailored approach contributes to the overall effectiveness of the game in promoting mental well-being and addressing depression symptoms.

The results of this study have important implications for the field of mental health care. They support the use of mobile games, such as the Goodville farm game, as innovative and accessible interventions for managing depression symptoms. By offering an alternative and destigmatized treatment approach, mobile games can bridge the treatment gap and reach individuals who face barriers to traditional forms of care.

In conclusion, this study evaluated the influence of the Goodville farm game on depression symptoms among players. The findings provide strong evidence for the treatment effect of the game, demonstrating significant improvements in PHQ-8 scores over the 6-week study period. The progressive decrease in depression symptoms and

the significant differences observed in pairwise comparisons highlight the temporal dynamics and cumulative impact of the game on participants' mental well-being.

The results of the study contribute to the growing body of research on the use of mobile games as effective tools for managing mental health, particularly for individuals facing barriers to traditional forms of care. The Goodville game, with its emotional wellness module and engaging gameplay, demonstrates the potential for mobile games to promote emotional well-being and effectively alleviate depression symptoms.

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