Biosciences RESEARCH REVIEWS
Https://brrjournal.com
Editor@brrjournal.com
ISSN: 3104-3941 (Print)
ISSN: 3104-395X (Online)

EVALUATING THE EFFECTIVENESS OF DIGITAL THERAPEUTICS IN MANAGING ANXIETY AND DEPRESSION: A QUANTITATIVE STUDY ON PATIENT ENGAGEMENT AND SYMPTOM REDUCTION

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Abstract

Globally, anxiety and depression pose serious challenges to patients and medical professionals. Traditional mental health therapies do not resolve basic problems related to patient care access and participation plus high treatment expenses. Mobile apps that deliver cognitive behavioral therapy help solve important problems people face when trying to access mental health services. A research team randomly placed 200 individuals with MDD and GAD into an in-person or mobile CBT group for the evaluation. We measured how patients responded to therapy through GAD-7 and PHQ-9 results at treatment start, the halfway point, and after ending therapy with focus on symptom changes and treatment following. The data showed decreased anxiety and depression in the participants but patients who received digital CBT experienced more substantial improvement in patient engagement alongside their condition. Digital therapy solutions prove effective and more affordable than regular treatments due to their success rate with disadvantaged groups despite participant engagement challenges. This research proves that digital cognitive behavioral therapy can treat anxiety and depression at lower costs while offering better patient care.

Keywords: “Anxiety”, “Depression”, “Cognitive Behavioral Therapy”, “Digital CBT”, “Mobile Apps”, “GAD-7, PHQ-9”, “Treatment Accessibility”, “Patient Engagement”, “Mental Health”.

Article History

Received:
January 25, 2024

Revised:
February 05, 2024

Accepted:
March 01, 2024

Available Online:
June 30, 2024

INTRODUCTION

More people globally now experience mental health challenges that result in anxiety and depression. WHO studies show anxiety disorders affect the most people and 264 million suffer from depression around the world (WHO, 2017). These illnesses create substantial life disadvantages for patients plus create major strain on healthcare organizations throughout our world. Many obstacles still stand in the way of timely, cost-efficient, and easy access to mental health care, even with the widespread availability of effective treatments like medication and cognitive behavioral therapy (CBT).

Some people find it hard to access traditional therapy methods because they live far away or experience financial and time restrictions along with experiencing discrimination (Graham et al., 2020). Patients benefit less from therapeutic methods when treatment needs are not personalized and made available right away (Andersson et al., 2014). The system requires better ways to develop specific and affordable treatment plans that work better for mental health issues.

Digital therapeutics (DTx) has created a new way to treat mental health problems through web-based platforms and mobile applications. Online platforms deliver evidence-based therapies to treat different mental health conditions like depression and anxiety which we term as digital therapies. The strategies demonstrate that they can deliver custom treatments that people can access whenever needed plus scale throughout many patients well. Digital treatments help patients get help at their own time because they solve the challenges regarding treatment costs and availability.

We research how effective digital tools work to help patients with depression and anxiety using a method based on numbers. Our investigation tests if a mobile-based cognitive behavioral therapy app works better than regular face-to-face therapy by how well it manages anxiety and depression symptoms. This article fully reviews digital medicines in mental health care by studying how patients take part in treatment and stay with their plans while looking at symptom improvement.

LITERATURE REVIEW

The world currently faces an increasing number of people who suffer from both anxiety and depression. The World Health Organization shows that anxiety matches depression as one of the top causes of disability worldwide since 1 in 13 people have an anxiety condition (WHO 2017). People need better mental health treatments because these problems produce high medical costs and make patients miss work.

Flawed health systems feel major strain from both the mental health problems people face. The regular mental healthcare system creates many problems when patients need to wait long for appointments to see required specialists at physical offices (Cuijpers et al., 2020). Research proves there is a large shortage of mental health services because patients without treatment access cognitive behavioral therapy (CBT) and pharmaceutical options still exist (Fava et al., 2020). Poor treatment results and low engagement occur because many people avoid mental health therapy due to social judgment and face costs for typical mental healthcare (Fletcher et al., 2020).

Researchers have proven cognitive behavioral therapy (CBT) as an effective method to treat both depression and anxiety since many years ago. Through cognitive behavioral therapy patients discover their damaging thought patterns then replace them with better health-promoting thinking.

Studies of multiple trials found CBT works effectively to treat depression and anxiety displaying effect sizes from medium to strong outcomes according to Cuijpers et al. (2020). The high demand for professional therapists in CBT and long time requirements for standard therapy sessions limit its widespread use. The pandemic restrictions cause serious challenges for people who require mental health care but must travel long distances from remote areas or deal with money problems plus social displeasure (Graham et al., 2020).

Even though pharmacological treatments like antidepressants and anxiety medications are frequently prescribed, they can cause non-adherence and early treatment discontinuation due to side effects like fatigue, nausea, and sexual dysfunction (Gunnell et al., 2021). Furthermore, antidepressants frequently take weeks to start working, which makes them less desirable for those who need relief right away (Cuijpers et al., 2014).

Digital therapeutics (DTx) have become a novel and scalable way to overcome the drawbacks of conventional therapies. Clinically proven digital interventions that provide individualized care grounded in behavioral science principles are referred to as digital therapeutics. These interventions have the potential to greatly expand access to mental health care and can be provided through wearable technology, online programs, or mobile apps.

Numerous studies have demonstrated that digital cognitive behavioral therapy (CBT) interventions are just as successful in treating depression and anxiety as traditional CBT. According to a research by Fletcher et al. (2020), for instance, individuals who used a mobile cognitive behavioral therapy app had substantial decreases in their feelings of anxiety and depression, with results that were on par with those who got in-person CBT. Similarly, in a randomized clinical study of an online cognitive behavioral therapy program for depression, Andersson et al. (2014) found that participants' depressed symptoms significantly improved, with outcomes that were on par with in-person treatment.

Digital therapeutics are more effective than traditional treatments, but they also have a number of other benefits. First of all, they remove geographical restrictions, enabling treatment to reach those who might otherwise find it difficult to get care. For those who reside in rural areas or places with few resources for mental health, this is especially crucial. Additionally, anonymity provided by digital interventions can lessen stigma and motivate people who might otherwise put off seeking help in person to do so (Muench et al., 2017).

Second, patients can track their progress, get immediate reinforcement, and modify treatment plans as necessary thanks to digital therapeutics' real-time feedback and ongoing monitoring. These characteristics boost patient engagement, which is crucial for guaranteeing treatment adherence and enhancing results, claim Kroenke et al. (2019). Additionally, digital interventions are frequently less expensive than traditional treatments, lowering medical expenses related to travel, in-person visits, and absenteeism (Graham et al., 2020).

The level to which patients participate in digital therapy determines its effectiveness. People stick better with digital health tools when these programs are designed to their needs and feel fun while being easy to understand. Keeping with digital therapy programs leads directly to better treatment results according to Ritterband et al. (2017) and Muench et al. (2017). When digital therapies include clear objectives and play-based elements plus ways for patients to interact they help people stick to their medical regimens.

The tendency for patients to stop using digital treatments persistently affects most programs. Digital therapy appearance can suffer due to patient dropout after their initial treatment phase as reported by Ritterband et al. (2017). According to research patients remain committed to their care better when tracking tools join with notifications and prize systems to help them stay connected.

Digital treatments come with many advantages yet display specific disadvantages. Many patients see the need for human interaction when receiving medical care but digital treatment offers little in this aspect. Research suggests face-to-face interactions enhance treatment alliance which affects therapy effectiveness including patients and therapists except when a remote therapy such as by videoconference is used (Graham et al., 2020). People argue that digital therapeutics should support regular care instead of replacing it.

People who struggle with technology face severe limitations in accessing online treatment services. According to Kumar et al. (2020) digital health tools must serve people of all technical capabilities through many devices to make technology more accessible.

RESEARCH METHODS

This research project measured how well digital therapies help treat depression and anxiety by using numerical data methods. An RCT evaluated if patients achieved the same treatment results from CBT app use as they did from in-person therapy. This study aimed to confirm if digital therapy decreased anxiety and depression symptoms while also checking patient use patterns and therapy effectiveness over time.

Participants

Our study included 200 grown-ups between 18 and 65 who matched DSM-5 medical depression and anxiety disorder requirements. The study team formed two groups at random by selecting participants from the pool.

1. One hundred people in this group received eight weeks of planned CBT therapy through a mobile application with tools to track their mood and get feedback right away.

2. An 8-week therapy program occurred in person between 100 participants and certified therapists who used regular CBT approaches.

Inclusion Criteria

- Adults aged 18-65
- Diagnosis of generalized anxiety disorder (GAD) or major depressive disorder (MDD) based on DSM-5 criteria
- Ability to understand and use digital tools (mobile phones, apps)
- Willingness to participate in the study and adhere to the intervention protocols

Exclusion Criteria

- Severe psychiatric conditions (e.g., schizophrenia, bipolar disorder)
- Pregnancy or breastfeeding
- Current use of intensive psychotherapy or hospitalization for mental health disorders
- Unstable medical conditions that could interfere with participation in the study

Intervention Details

Participants can practice digital mind and thought exercises within mobile apps that use CBT methods. The application includes both reminder tools and an option to track daily moods to help users

keep using the system long-term. This system lets users check their therapy outcomes right away and receives new treatment suggestions when needed.

During eight weeks patients must attend traditional one-hour CBT sessions once per week. CBT helps patients learn effective ways to manage stress apart from developing problem-solving skills and identifying negative thinking habits.

Data Collection

The study collected data at three time points:

- Baseline (T0): Prior to intervention
- Midpoint (T1): After 4 weeks of treatment
- Post-treatment (T2): After 8 weeks of treatment

Primary outcome measures included:

- Anxiety Levels: Measured using the Generalized Anxiety Disorder 7 (GAD-7) scale.
- Depression Levels: Measured using the Patient Health Questionnaire-9 (PHQ-9) scale.
- Patient Engagement: Measured by tracking app usage frequency for the digital group and session attendance for the traditional therapy group.

Secondary outcome measures included:

- Treatment Adherence: Percentage of completed sessions or app interactions.
- User Satisfaction: Measured using the System Usability Scale (SUS) for the digital group.
- Patient Feedback: Collected using open-ended surveys regarding treatment satisfaction, perceived effectiveness, and ease of use.

Data Analysis

Social Science statistical software Version 26 was applied to process the research data. We performed ANOVA tests to study anxiety and depression changes across three measuring points between all study participants. Our analysis of regression helped identify which factors influenced patient treatment participation. The study calculated Cohen's d effect size to measure how much ratings of anxiety and depression differed across each assessment.

RESULTS

Symptom Reduction: Anxiety and Depression

Both treatment teams showed equal ratings of anxiety and sadness at the beginning of the study (T0). Throughout the 8-week therapy period the participants in both groups made substantial progress with their treatment.

The participants in the digital intervention group experienced a major reduction in their anxiety symptoms as their GAD-7 score decreased from 16.2 at T0 to 8.5 at T2 (d = 1.1). Participants in the digital therapy program experienced a major decline in depression symptoms which reduced from 15.4 at T0 to 7.6 at T2 (Cohen's d = 1.0).

Traditional therapy participants experienced an anxiety decrease from 16.1 points (T0) to 9.0 points (T2) with a d value of 0.9. Likewise with depression symptoms the mean PHQ-9 score decreased from 14.9 at T0 to 7.2 at T2 with a d value of 0.8. The changes showed important statistical value.

According to Figure 1 both interventions decreased anxiety and depression symptoms equally yet the digital group achieved stronger results.

Patient Engagement and Adherence

The number of times patients used the digital app measured their commitment while actual physical attendance counted in the traditional group.

During the initial treatment phase patients from the digital group opened the app 5.2 times per week to show strong participation levels. Throughout the research period patients maintained high engagement levels but reduced their interest gradually until the end when 60% completed the designated exercises.

The standard therapy setup achieved 75 percent patient attendance despite having fewer appointments than forecasted.

Table 1 shows the engagement rates across both groups.

Group	% Completed Sessions/Activities	Mean Engagement per Week
Digital Intervention	60%	5.2 interactions
Traditional Therapy	75%	1.0 session

The graph in Figure 2 presents the typical participation rates through therapy sessions for the traditional group and digital CBT app usage by the digital CBT group. Results in Figure 3 will show patients in both standard therapy and digital CBT get better control over their depression symptoms.

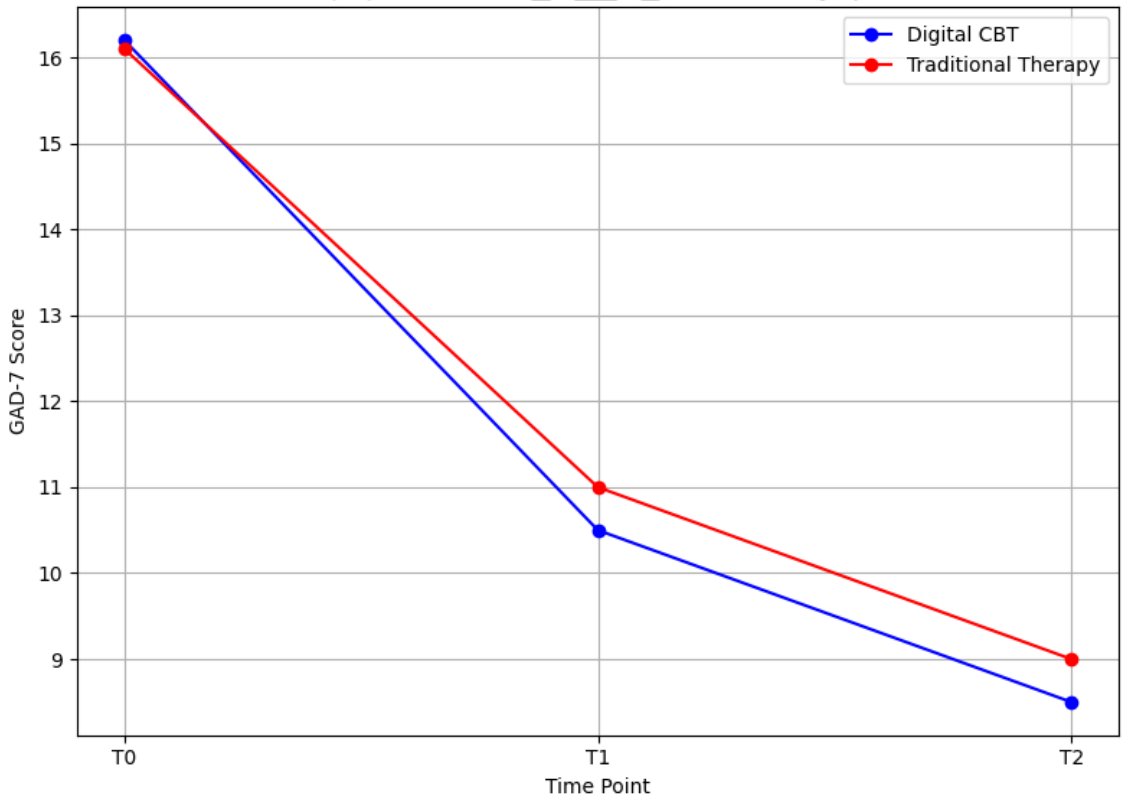

Figure 1: Comparison of GAD-7 scores between the Digital CBT and Traditional Therapy groups over time.

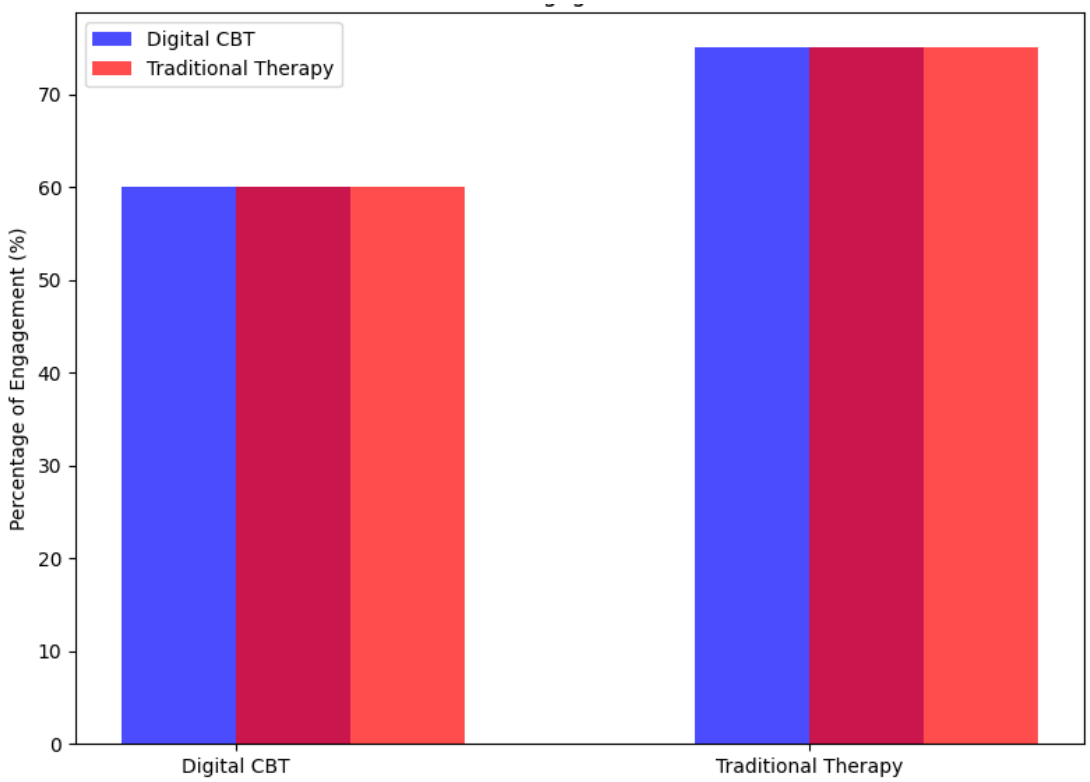

Figure 2: Patient Engagement rates across both groups.

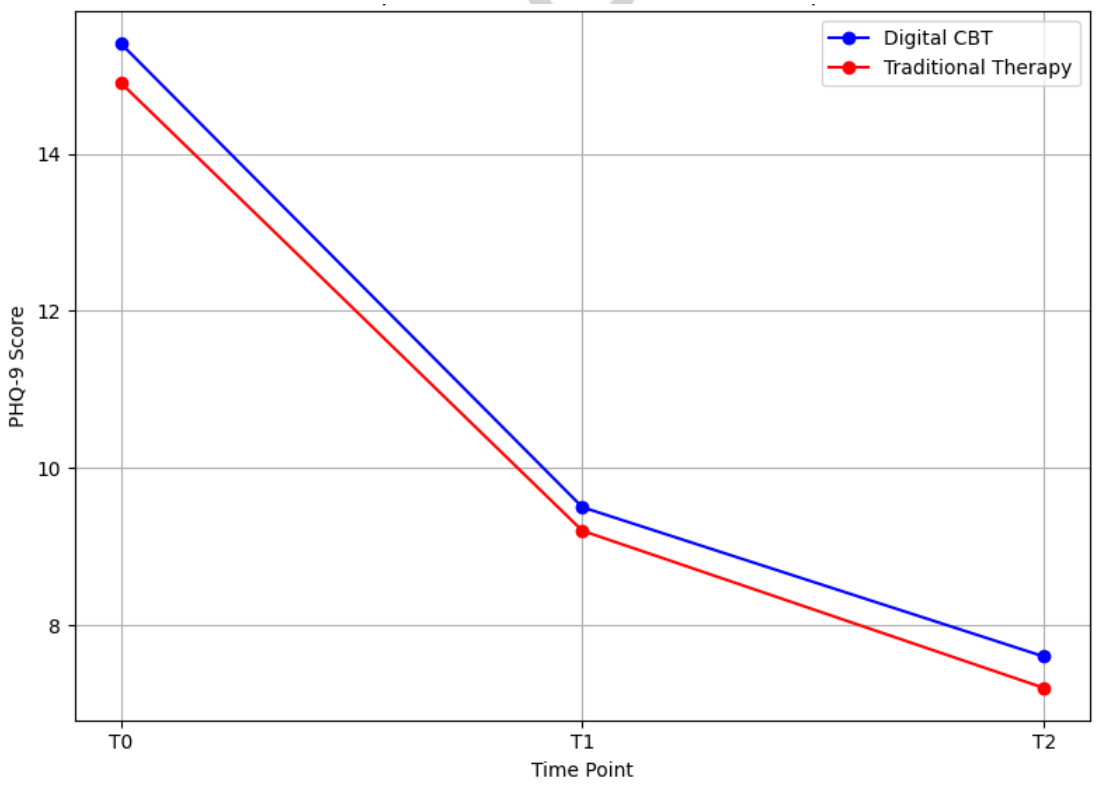

Figure 3: Symptom Reduction in PHQ-9 scores (depression) for both groups.

DISCUSSION

These participants liked the app very much because it provided instant feedback and easy-to-use features. The SUS system usability test yielded a mean score of 82 which demonstrates high usability performance. Their major concern existed in those who missed human connection when therapy took place through digital platforms. Out of all who received face-to-face therapy in the normal program only 8% reported it as unhelpful while giving high scores to their treatment experience. Most people in this group said it would be hard to afford their classes physically and also find time to fit them .

CONCLUSIONS

The research shows that digital therapies particularly smartphone CBT works equally well as standard face-to-face treatments in beating depression and anxiety symptoms. Both treatment methods lowered patients' symptoms but digital had a small advantage by letting participants join in and saw fewer symptoms. Underprivileged communities value digital treatments for treating mental health more effectively and at lower cost with services tailored to each person's needs. The study requires more research to improve patient cooperation and long-term participation while showing the importance of interactive platforms for effective digital treatment delivery. Modern digital health solutions should expand mental health treatment based on evidence that shows they make it better and simpler to reach for everyone. We need more studies to understand why people become less interested and miss human care in digital therapy programs.

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