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Acceptability of mHealth augmentation of Collaborative Care: A mixed methods pilot study

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ABSTRACT

Objective: To assess the feasibility and acceptability of a mobile health platform supporting Collaborative Care.
Method: Collaborative Care patients (n = 17) used a smartphone app to transmit PHQ-9 and GAD-7 scores and sensor data to a dashboard used by one care manager. Patients completed usability and satisfaction surveys and qualitative interviews at 4 weeks and the care manager completed a qualitative interview. Mobile metadata on app usage was obtained.
Results: All patients used the app for 4 weeks, but only 35% (n = 6) sustained use at 8 weeks. Prior to discontinuing use, 88% (n = 15) completed all PHQ-9 and GAD-7 measures, with lower response rates for daily measures. Four themes emerged from interviews: understanding the purpose; care manager's role in supporting use; benefits of daily monitoring; and privacy / security concerns. Two themes were user-specific: patients' desire for personalization; and care manager burden.
Conclusions: The feasibility and acceptability of the mobile platform is supported by the high early response rate, however attrition was steep. Our qualitative findings revealed nuanced participant experiences and uncovered some concerns about mobile health. To encourage retention, attention may need to be directed toward promoting patient understanding and provider engagement, and offering personalized patient experiences.

1. Introduction

Mobile health tools have generated considerable enthusiasm among researchers and clinical leaders, as they offer features that may support a range of activities that contribute to healthcare delivery for chronic health conditions, including common mental disorders [1–4]. However, technology-based interventions deployed as standalone interventions have low uptake and may be less effective than those paired with human support [5–9], and are thus unlikely to fulfill the potential to transform healthcare delivery. To maximize impact on care delivery and patient outcomes, mobile tools need to be embedded into effective clinical care models, such as the Collaborative Care model [10].

Collaborative Care is an approach to delivering care for depressive and anxiety disorders using a team-based care model. This approach, supported by > 80 randomized trials, is twice as effective as usual depression care and has now been widely disseminated [11,12]. Essential principles of Collaborative Care include a patient-centered, population-based approach, and the delivery of measurement-based care [13,14]. Health information technologies that support these principles, such as a patient registry, are integral to the delivery of Collaborative Care, and recently, automated symptom monitoring by interactive voice response systems has been investigated [15]. To date, the technologies typically have consisted of clinician-facing tools [10,16]. Because Collaborative Care is a patient-centered approach that seeks to inform and activate patients to improve self-management, the use of a patient-facing mobile tool is a logical extension of the Collaborative Care model [10,17].

Research on mobile tools to support depression care has occurred in a variety of settings, however little is known about the experiences of patients and care providers using these tools and these studies have not deployed mobile tools within Collaborative Care [8,18,19]. Potential benefits include improving patient engagement through education and

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automated reminders and improving patient satisfaction with a convenient, asynchronous method for patient-provider communication. Patients and providers may benefit from timely remote symptom monitoring to drive measurement-based care, thus improving quality of care. Providers may benefit by reducing time obtaining and documenting symptom measures and reducing time-consuming synchronous telephone outreach. However, new technologies also may be disruptive to clinicians' workflows and could increase clinician cognitive load and time burden from accessing, reviewing and responding to patient-generated data.

We conducted a pilot study of a mobile health system that consisted of a patient-facing smartphone application ("app") that transmitted patient-reported data to a depression care manager via an online dashboard for patients in a Collaborative Care program. The purpose of the study was to assess the feasibility, acceptability, and fit of the mobile health platform with the Collaborative Care workflow.

2. Methods

2.1. Site and participants

The study was conducted in a primary care clinic affiliated with the University of Washington that offers Collaborative Care services for patients with depression and anxiety. The Collaborative Care program, described previously [20], was operational for nearly three years prior to the study. English-speaking adults receiving treatment for a depressive or anxiety disorder from one care manager employed by the University of Washington clinic were eligible for the study. Exclusion criteria included active suicidality or a current diagnosis of dementia, substance dependence, bipolar disorder, or a psychotic disorder.

2.2. Mobile platform

The mobile health platform was furnished by Ginger.io and included a smartphone app (available for iPhone or Android devices) for patients and a web-based provider dashboard. The mobile app provided patients with notifications to complete regular clinical surveys, occasional satisfaction surveys, and health tips approximately 3–4 times per week. The health tips were selected from tips used in a recent trial of depression apps [8,21] and included suggestions for managing depressed mood such as self-care activities (e.g., healthy eating, pleasant activities) or managing challenges (e.g., meditation, finding balance). Table 1 lists the survey schedule for the clinical measures and satisfaction surveys. Smartphone sensor data was collected passively to assess movement (all participants) and communication patterns (Android users only). The provider dashboard offered several views, which included a list of all patients using the app and an individual patient view with all data submitted via the app and a graphing feature to visualize responses to measures over time. The platform flagged participants who were persistently symptomatic based on patient self-report, were isolated based on movement and communication patterns, reported thoughts of self-harm, reported medication concerns or ran out of medications, or requested an outreach call from the care manager.

Table 1
Schedule of surveys.

Administration schedule	Measures
Baseline	Age
	Gender
	Race/ethnicity
	Education
	Employment
Daily	Modified PHQ-2
	Subjective Units of Distress Scale
	Medication use
	Outreach request
Weekly	PHQ-9
	GAD-7
Week 4 [8 or 12][a]	Technology obtrusiveness
Week 4, 8, 12[b]	Developer product feedback survey

[a] This survey was originally scheduled at Week 4 and 12. When the study timeline was truncated, the Week 12 survey was re-scheduled to Week 8.

[b] The Week 12 survey was not administered to participants who had access to the App for fewer than 12 weeks.

2.3. Procedure

All study procedures were conducted remotely. The study was approved by the University of Washington Institutional Review Board. At the start of recruitment, the care manager reviewed all patients on her active caseload to identify patients who were ineligible based on the clinical exclusion criteria described above. Weekly during the 6-week recruitment period, she also reviewed patients newly enrolled in Collaborative Care for potential eligibility. All patients who did not meet clinical exclusion criteria (n = 54) received a letter describing the study and were offered the opportunity to opt out of contact. The opt-out method yields higher enrollment and less sampling bias than an opt-in strategy [22]. Recruitment activities were conducted by the research team who attempted to contact all individuals who did not opt out (n = 53) and were successful in reaching most (n = 38) to inform them about the study, answer questions, and obtain informed consent (Supplementary figure). Interested participants received an email with highlights of the informed consent and once they had agreed to participate, the act of downloading and installing the phone app signified their consent to participate in the project. Due to the remote nature of the study, a waiver of written consent was obtained. Participants received a brief description of the app and contact information for the study team should they experience any technical difficulties. After installing the app, participants completed a brief demographic survey (e.g., age group, gender, race/ethnicity, education, employment). An open-ended semi-structured telephone interview was conducted 4 weeks after the participant installed the app. At that time, participants were encouraged to continue using the app for 8 to 12 weeks total. A semi-structured interview with the care manager was conducted following completion of patient data collection. Interviews assessed participants' general experiences using the mobile system, their perceptions of its contribution to their care, and satisfaction with specific features of the system. No compensation was provided to participants for using the system; however, a $50 gift card was provided following completion of the research interview. After the study was underway, the platform was scheduled to undergo changes in the features on the mobile app and the provider dashboard was reconfigured, thus the follow-up interval was truncated. The earliest enrolled participants had access for 12 weeks, and those who enrolled later had access for 8 to 12 weeks based on enrollment date. Data was also obtained from the University of Washington's Care Management Tracking System, which is a patient registry that tracks individuals' treatment history and includes the dates of all care management contacts and the associated symptom scores on validated measures (the PHQ-9 [23] for depressive symptoms and the GAD-7 [24] for anxiety symptoms). This information was used to characterize the study population by determining how long participants had been engaged in Collaborative Care prior to enrolling in this study and describing the severity of participants' depressive and anxiety symptoms at the initiation of treatment.

2.4. Study outcomes

We employed a concurrent triangulation design comprised of mixed quantitative and qualitative methods to assess patients' use of and experience with the mobile app, as well as the care manager's experience with the system [25]. This method allowed us to compare and integrate