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Preliminary Evaluation of PTSD Coach, a Smartphone App for Post-Traumatic Stress Symptoms

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ABSTRACT PTSD Coach is a mobile application (app) designed to help individuals who have post-traumatic stress disorder (PTSD) symptoms better understand and self-manage their symptoms. It has wide-scale use (over 130,000 downloads in 78 countries) and very favorable reviews but has yet to be evaluated. Therefore, this study examines user satisfaction, perceived helpfulness, and usage patterns of PTSD Coach in a sample of 45 veterans receiving PTSD treatment. After using PTSD Coach for several days, participants completed a survey of satisfaction and perceived helpfulness and focus groups exploring app use and benefit from use. Data indicate that participants were very satisfied with PTSD Coach and perceived it as being moderately to very helpful with their PTSD symptoms. Analysis of focus group data resulted in several categories of app use: to manage acute distress and PTSD symptoms, at scheduled times, and to help with sleep. These findings offer preliminary support for the acceptability and perceived helpfulness of PTSD Coach and suggest that it has potential to be an effective self-management tool for PTSD. Although promising, future research is required to validate this, given study limitations.

INTRODUCTION

Smartphones have ascended to be the mobile phones of choice in the United States with 55.5% of mobile phone users selecting these devices in 2012.[1] Not surprisingly, this percentage is expected to continue growing into the future as smartphones have powerful features and capabilities that go far beyond just receiving and making calls. Capabilities include being able to house and run powerful software applications, or "apps," that can entertain, inform, offer conveniences, and potentially even help address physical and mental health conditions. The promise of smartphone apps to address mental health problems in general is vast.

Smartphones are routinely carried throughout the day and are always on, making them readily available in the moment where and when individuals need them. Because using a smartphone in public is perceived as "normal," individuals can inconspicuously manage mental health issues without drawing unwanted attention. Apps can be responsive to the unique needs of an individual with a mental health condition. Individuals can select apps geared toward managing their specific symptoms and level of severity. In addition, apps can include features that allow customization to further tailor the intervention for the user's needs and preferences.

The potential helpfulness of apps may be even greater for particular mental health conditions, such as post-traumatic stress disorder (PTSD). PTSD is a potentially debilitating, common mental disorder with a lifetime prevalence rate of 7% to 8% in the U.S. population,[2] and many more experience subclinical presentations.[3] PTSD is characterized by: (1) re-experiencing symptoms, such as having intrusive traumatic memories (e.g., flashbacks, nightmares) and being emotionally and/or physiologically triggered by reminders of the trauma; (2) avoidant symptoms including avoiding thoughts, feelings, or situations that remind one of the trauma; and (3) hyperarousal symptoms, such as sleep and concentration problems, irritability or anger, hypervigilance, and excessive startle reactions.[4]

To help address PTSD symptoms, smartphone apps can draw upon empirically supported cognitive behavioral therapies (CBTs) for PTSD, such as stress inoculation training.[5] CBT, compared to other psychotherapy paradigms, lends itself particularly well to translation onto technology platforms, including web and smartphone, because CBTs typically include education content and instruction in practical coping skills. For example, PTSD re-experiencing symptoms often come "out of the blue" or are triggered by reminders, causing psychological distress and physical symptoms such as heart racing, shortness of breath, or sweating. Smartphone apps could offer CBT-based coping tools (e.g., relaxation exercises, calming self-talk, and self-coaching) when these symptoms arise. Likewise, social avoidance and isolation can limit access to essential social support resources, which can maintain PTSD.[6,7] Apps can provide information about the value of harnessing social support as well as help individuals identify and effortlessly connect to supportive others through their smartphones. Problems with anger and sleep can take their toll on mental and physical wellbeing; apps can provide just-in-time anger management tools and information on effective sleep hygiene practices. Given this potential, we have developed a smartphone app called PTSD Coach[8] that is designed to help trauma survivors manage post-traumatic stress symptoms and is described in detail later.

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Development, promotion, and consumer uptake and use of mobile apps for behavioral and mental health conditions have quickly outpaced validation efforts. This is true for PTSD Coach, as well, which has been downloaded over 130,000 times across 78 countries (as of November 2013) and has received high user ratings (4.5 stars for iOS, 4 stars for Android). PTSD Coach has received professional recognition for its potential benefit[9] and its foundation on evidenced-based CBT principles.[10] The app has also received awards from the Federal Communications Commission for enhancing accessibility[11] and from the American Telemedicine Association for innovation.[12] Despite this wide-scale use and acknowledgment, PTSD Coach has yet to be validated with a population of individuals for whom it was designed.

Although the trend is clear that smartphones are becoming ubiquitous, many individuals are novices and many others have not yet embraced this novel technology. In addition, disparities exist in adoption with some segments of the population, such as older individuals, not taking up smartphones at the same rate as are other segments.[1] Therefore, it remains unknown how well smartphone apps that are designed to address mental health issues will be received and used by individuals who have had little to no exposure to them.

Thus, the aims of this study were to test the feasibility and acceptability of the PTSD Coach with military veterans with PTSD. Specifically, we hypothesized that veterans with PTSD would find PTSD Coach satisfying to use and would perceive it as a helpful psychoeducational and self-management tool for their PTSD symptoms. We also sought to examine if perceptions differed based on age and smartphone ownership. With focus groups, we inquired into the ways in which veterans used PTSD Coach to evaluate if it was being used as intended and if users perceived the app to be helpful.

METHOD

Participants

Fifty-five patients attending two VA (Veterans Affairs) PTSD residential treatment programs (one for women, the other for men) between September 2011 and April 2012 expressed interest in participating, of which 52 attended a preuse session and consented to be in the study. Seven of those who consented failed to complete the postuse survey (primarily due to conflicts with clinical appointments of the treatment program). Therefore, our final sample consisted of 45 participants (34 men and 11 women). Table I provides demographic characteristics of the sample.

TABLE I. Demographic Characteristics

	M (SD) or % (N = 45)
Age (in Years)	45.25 (14.03)
Gender (% Male)	75.6
Race/Ethnicity (%)	
Caucasian	46.7
Hispanic American/ Latino	22.2
African American/ Black	17.8
Multiracial	6.7
Other (Asian, Pacific Islander, Native Alaskan, or American Indian)	6.7
Education (%)	
High School Diploma	71.1
Associates Degree	6.7
Bachelor's Degree	17.8
Master's Degree	4.4
Marital Status (%)	
Single	22.2
Married	40.0
Cohabitating > 1 Year	2.2
Divorced or Separated	33.3
Widowed	2.2
Annual Income (in Thousand Dollars)*	
<25,000	33.3
25,000–50,000	33.3
50,000–75,000	8.9
75,000–100,000	2.2
Own a Smartphone (%)	44.4

*22.2% missing.

Measures

Demographic Information Questionnaire

The Demographic Information Questionnaire was developed for the study to obtain information on age, gender, ethnicity, education, marital status, income, and smartphone ownership.

PTSD Coach Survey

The PTSD Coach Survey is a 15-item self-report measure that was designed for this study to assess user satisfaction and perceived helpfulness of the app (see Table II for the individual items). Items were rated on a 5-point Likert-type scale ranging from 0 = "not at all" to 4 = "extremely." The 14 items assessing perceived helpfulness of the app showed good internal consistency with a Chronbach's α of 0.96.

Focus Group Discussion Guide

The *Focus Group Discussion Guide* is a semistructured guide developed for use in the study. The guide contained open-ended questions and optional prompts designed to collect information on app use (e.g., frequency of use, situations in which it was used, duration of sessions), perceived value (e.g., helpfulness of content and tools available in the app), and impact on health management (e.g., self-efficacy, symptom management). The guide also had questions related to potential enhancements of the app. Participants were given ample opportunity to offer other comments and observations. For the purposes of the current study, we focused on responses related to app use and perceived value.

PSTD Coach App

PTSD Coach was developed by the VA's National Center for PSTD–Dissemination and Training Division (www.ptsd.va.gov/public/pages/PTSDcoach.asp). Development of the app

TABLE II. Mean Ratings of Perceived Helpfulness of and Satisfaction With PTSD Coach

Item	M (SD), $N = 45$	Endorsed Moderately or Greater (%)
Helping Me Learn About Symptoms of PTSD	2.51 (1.25)	80.0
Helping Me Learn About Treatments for PTSD	2.44 (1.24)	80.0
Helping Me Find Effective Ways of Managing My Symptoms	2.52 (1.19)	83.3
Helping Me Feel More Comfortable in Seeking Support	2.38 (1.27)	75.6
Helping Me Feel There Is Something I Can Do About My PTSD	2.91 (1.06)	91.1
Helping Me Track My Symptoms	2.80 (1.13)	88.6
Helping Me Know When I'm Doing Better or When I'm Doing Worse	2.70 (1.11)	81.8
Increasing My Access to Additional Resources	2.61 (1.13)	79.5
Providing Practical Solutions to the Problems I Experience	2.65 (1.11)	86.0
Helping Me Overcome the Stigma of Seeking Mental Health Services	2.27 (1.32)	68.2
Helping Me Better Understand What I Have Been Experiencing	2.73 (1.11)	84.4
Enhancing My Knowledge of PTSD	2.91 (1.23)	83.7
Helping Clarify Some of the Myths About PTSD	2.56 (1.31)	73.3
Providing a Way for Me to Talk About What I Have Been Experiencing	2.36 (1.32)	73.3
Overall, How Satisfied Are You with the PTSD Coach?	2.84 (0.98)	88.9

Helpfulness and satisfaction ratings: 0 = not at all; 1 = slightly; 2 = moderately; 3 = very; 4 = extremely.

included participatory design (focus groups) with input from PTSD patients ($N = 78$) and clinical staff ($N = 5$). Patient focus groups assessed user needs and afforded consumer input into the app's focus and features. Suggestions generated from this process led directly to PTSD Coach features and content. For example, participants requested tools that they could use in the moment whenever or wherever PTSD-related distress arose (e.g., while waiting in line at the supermarket). Participants also wanted the app to provide assessment and tracking of PTSD symptoms. Employing these user-centered design procedures was intended to result in an app that would be most relevant to user needs and provide functionality that was most attractive to them. PTSD Coach was designed to be used either as a stand-alone psychoeducation and self-management tool or to augment varying levels of care with a health care professional. The app consists of four major sections (see Fig. 1):

1. Learn (see Fig. 2A): This section provides psychoeducational information about PTSD (e.g., symptoms, prevalence rates, how it develops) and various treatment options that are available. It addresses questions and concerns commonly expressed by patients who are naive to treatment. It includes a subsection on professional care, including what to expect from treatment and how to find help.
2. Self Assessment (see Fig. 2B): This section includes the PTSD Checklist–Civilian version (PCL-C),[13] a well-validated, widely used self-report measure of PTSD symptoms. After completing the PCL, users are provided with interpretive feedback about the severity of their symptoms and information about any changes in symptom severity since the last administration. Users can also track their symptoms over time by viewing a line graph of past assessments. Finally, users can schedule future assessments at regular intervals (e.g., weekly) and set reminders for when these assessments are due.
3. Manage Symptoms (see Fig. 2C): This section provides coping tools to help address acute PTSD symptoms. When a problem is selected, the user is asked to rate their distress on a 0 to 10 Subjective Units of Distress Scale (SUDS). Depending on the problem selected and SUDS rating, the user is offered a CBT-based coping tool (e.g., paced breathing, progressive muscle relaxation, self-coping statement, pleasant events option). If users do not like the tool presented, they can tap on New Tool to get another option. After completing a tool, the user re-rates their distress. If their SUDS went down, they are given feedback to that effect and are encouraged to use the helpful tool again. If their SUDS remained the same or got worse, they are encouraged to try another tool.
4. Find Support (see Fig. 2D): This section allows users to easily reach out to supportive others when needed, including emergency (i.e., 911) and crisis support (i.e., Veterans Crisis Line). It also allows users to select individuals from their existing telephone contact list to include as supports in this section. PTSD Coach also provides individuals with a variety of links and phone numbers to facilitate finding face-to-face care with qualified professionals.

PSTD Coach is available at no cost from the iTunes and Google Play public app marketplaces for use with Apple's mobile devices (iPhone, iPod Touch, iPad) and other mobile devices (phones and tablets) running the Android operating system, respectively. Availability on these two platforms covers approximately 86% of the U.S. smartphone-using population,[14] without accounting for those increasingly using other mobile devices (e.g., iPads and other tablets). To comply with the stringent security standards set by VA, PTSD Coach does not transmit any data to or from the device; all entered data are stored within the app and can be cleared by deletion of the app from the mobile device.

FIGURE 1. Home screen view of PTSD Coach.

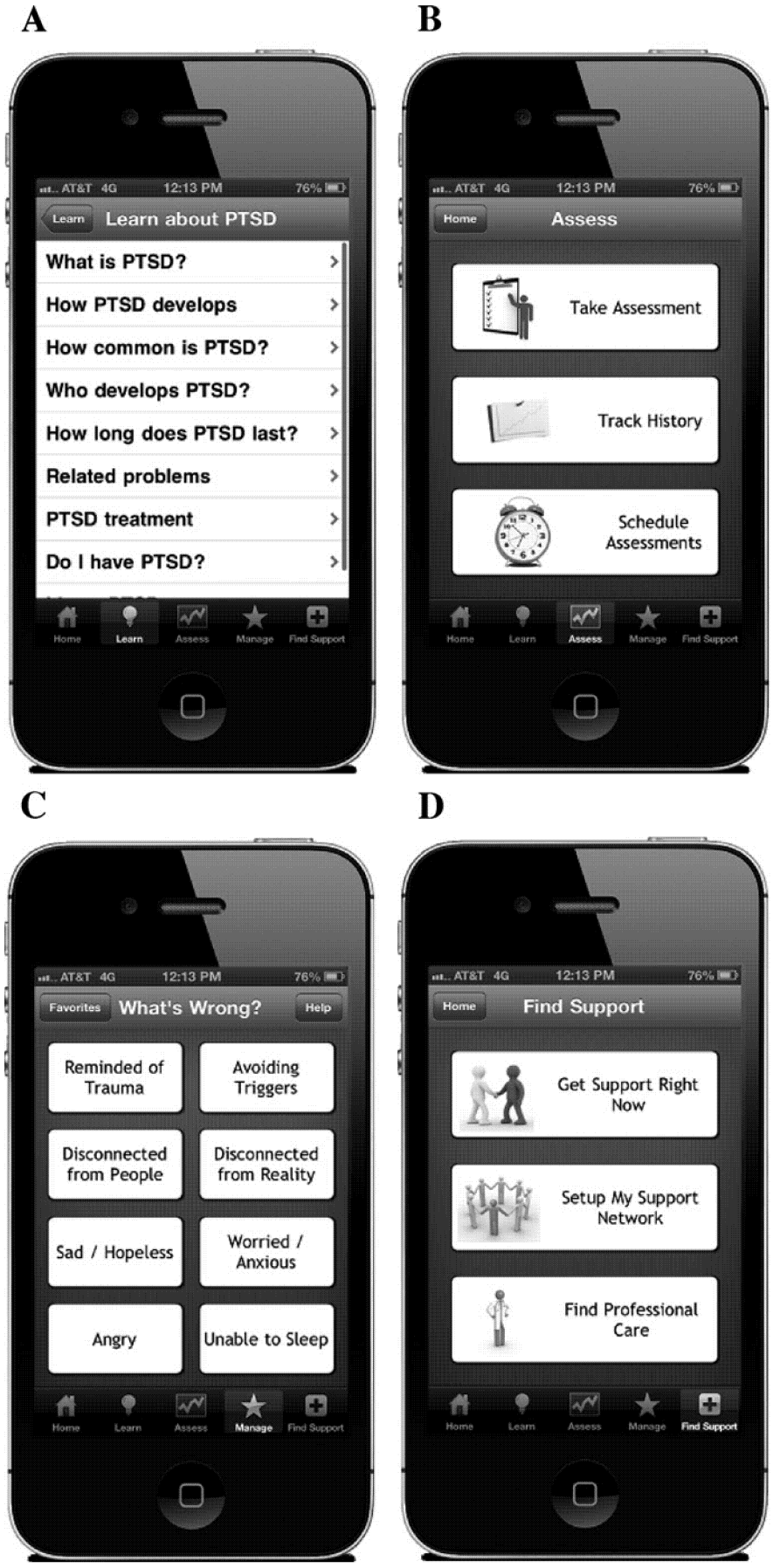

FIGURE 2. (A) Learn screen view; (B) Self Assessment screen view; (C) Manage Symptoms screen view; and (D) Find Support screen view of PTSD Coach.

Procedure

All study procedures were approved by the Department of Veterans Affairs Palo Alto Healthcare System's research and development committee and Stanford University's institutional review board. Participants were recruited through announcements made by the clinical staff in two residential PTSD treatment programs. Patients interested in participating attended a group session on a Friday afternoon, during which they were given information about participation and provided informed consent. Subsequently, they completed the Demographic Questionnaire and were loaned an iPod Touch with the PTSD Coach app installed on it. Participants who owned an iPhone or Android-based smartphone were given the option of using their own phone instead of borrowing a study iPod Touch. During this introductory session, participants were provided with basic instructions on how to use the iPod Touch and how to start using the PTSD Coach app. Participants were given a list of several tasks to complete on the app over the ensuing 3 days. These tasks helped ensure that

participants would be exposed to core features of the app, such as taking the self-assessment and reading the psychoeducational materials. Participants were encouraged to use the app as much as they wanted to in addition to the required tasks. On the following Monday or Tuesday, participants met with project staff and completed the postuse survey and participated in a 60-minute focus group. Focus groups included a doctoral-level facilitator and a note taker. At the completion of this session, participants returned the iPod Touches, if borrowed, and received a $25 retail store gift card of their choice (for Target, Walmart, or Safeway).

Data Analyses

Survey Data

Descriptive analyses (means and frequencies) were conducted to summarize survey data. To compare ratings between smartphone owners and nonowners, we conducted *t* tests. To test if age and survey item ratings were associated, we used Pearson correlations. For all tests of statistical significance, α was set at 0.05.

Focus Group Data

Four doctoral-level psychologists (authors EK, JH, TN, and JS) extracted sections of the notes taken during each focus group that were relevant to participant use of the app. These extractions were then coded, and distinct themes of use and perceived value were discovered, using a grounded theory approach.[15]

RESULTS

Survey Data

Table II presents a summary of the survey data. Item ratings ranged from 2.27 to 2.91, falling between scale anchors of "moderately" (2) and "very" (3).

Smartphone owners (n = 20) tended to be younger (M = 40.95, SD = 11.31) than those without smartphones (n = 25; M = 48.52, SD = 13.96), but this difference was not statistically significant, $t(42) = -1.93$, $p = 0.06$. No significant differences were found between smartphone owners and nonowners on any perceived helpfulness item rating or average overall perceived helpfulness summary score. The overall satisfaction ratings were significantly higher for smartphone owners (M = 3.20, SD = 0.70) than nonowners (M = 2.56, SD = 1.08), $t(43) = 2.40$, $p = 0.02$. Age was not significantly correlated with any perceived helpfulness item rating (r's ranged from 0.01 to –0.26 with p's all >0.09) or average ($r = 0.08$; $p = 0.65$), nor was age significantly related to overall satisfaction ratings ($r = -0.18$, $p = 0.24$).

Focus Group Data

A series of 7 focus groups were conducted (2 with the women, 5 with the men) ranging in size from 3 to 9 participants (M = 5). Several categories of comments emerged during the discussions of how the app was used and its perceived value. These categories are listed below and are illustrated with example quotes from study participants.

Use of PTSD Coach

Participants' comments about how they used PTSD Coach took three major forms:

1. Participants shared examples of how they used PTSD Coach to manage their acute distress and PTSD symptoms.

   "When I was feeling a little agitated, I would use it." (30-year-old male veteran)

   "I used it all the time to manage my symptoms and to learn more about PTSD." (45-year-old female veteran)

2. Participants mentioned how they scheduled specific times to use PTSD Coach.

   "I set the alarm for different times to remind me to use it." (40-year-old female veteran)

   "I had it as a reminder at first." (EK: "So you used the schedule assessment feature to remind you to use it?") "Yeah, it just pops up on your phone." (43-year-old male veteran)

3. A number of participants commented that they used the app at night or to help them with sleep problems.

   "I put it as one of my favorites so I would just click on it when I was trying to fall asleep." (43-year-old male veteran)

   "I used it at night when I had nightmares. The relaxation exercise was really helpful." (35-year-old female veteran)

Perceived Value of PTSD Coach

Participants mentioned a number of perceived benefits of using PTSD Coach that clustered into three distinct categories.

1. Participants provided examples of how using PTSD Coach reduced their distress and PTSD symptoms.

   "I liked the relaxation stuff. I liked it because I didn't have to go see a psychiatrist. It was very helpful because it was like a self-help thing. I didn't have to wait until the 15th to see my psychiatrist." (46-year-old male veteran)

   "I thought it helped me tremendously. . .When I had anxiety, the breathing helped." (26-year-old male veteran)

2. Participants mentioned that the app helped them to explain PTSD to their family or friends.

   "I used 'What is PTSD' with family members. I'm not good at describing things very well. It's not just coming from us, but from a professional source. I didn't even know that I isolated. I was able to hand it over and say 'hey, look at this.'" (25-year-old male veteran)

"I sat with my wife and little girl and we went through it. It was very informative. My wife had lots of questions. She was very impressed just to hear about it and the program." (49-year-old male veteran)

3. Participants commented that PTSD Coach improved their knowledge about PTSD and was a good reference.

"I like the explanation on PTSD. I had some revelations." (57-year-old female veteran)

"I have memory loss and often forget the things we learn [in the treatment program] so it's good to have this, it's right there and I can go back in there anytime." (42-year-old male veteran)

During the discussion of perceived value, prompts were used to generate discussion about likes and dislikes and any endorsements participants had for the app. Participants consistently noted that they liked having the app on a mobile device as it was convenient, easy to carry, and available at any time. They also appreciated that the interface was simple to use, readily accessible, would appeal to technology novices (including older individuals), afforded customization (e.g., integrating one's own music), and incorporated specific features that they found attractive (e.g., inspirational quotes).

Participants also mentioned things they disliked about the app and offered suggestions for remediating these. Some participants disliked specific features, for example, the expanding and contracting ball in the paced breathing exercise.

"That dot actually got me a little annoyed. You know it kept going up and then going down." (61-year-old female veteran)

Several participants mentioned that they did not like that they could not customize certain exercises.

"With my chronic pain, I can't take a walk or dance [options offered as pleasant events] so I got frustrated. It would be great if you could put in your physical problems." (63-year-old male veteran)

A few participants reported that they disliked not being able to directly access the specific coping tools they desired.

"It is frustrating when you have to look for the tool that you want, especially when you need it." (42-year-old male veteran)

Finally, participants were asked if they had given or would give an endorsement of the app. Several participants reported that they had already recommended the app to others since they began using it.

"I called my friend who has PTSD and told him to download it." (45-year-old female veteran)

"I was pretty stoked about it. I even told some of my friends in the military about it via Facebook." (26-year-old male veteran)

Finally, most participants stated or agreed that they were going to tell others about it.

"I have a kid at home who's done two tours in Iraq. I'm worried about him being here [participant referring to himself being away from home attending the residential PTSD program]. It's a great tool to have; then I can just say here." (60-year-old male veteran)

DISCUSSION

This study found preliminary support for the acceptability and perceived helpfulness of PTSD Coach as a self-management tool for PTSD symptoms among veterans with PTSD. Almost 90% of the sample endorsed being moderately to extremely satisfied with the app. Likewise, the majority of participants (i.e., 68–91%) endorsed that the app was moderately to extremely helpful achieving its intended purposes (e.g., learning about PTSD symptoms, finding effective ways to manage symptoms). Participants' experiences concurred with our hypotheses that the app could provide discrete "in the moment" assistance for the specific symptom most troubling to the user at that moment. It was also found that both smartphone owners and nonowners had similar perceptions of PTSD Coach and that age did not relate to participants' perceptions of the app. The focus group data validated that PTSD Coach was used as it was intended and that participants found value in using it. Focus groups also provided information that could be valuable for making improvements to the app.

Although promising, the current findings have a number of limitations. First, although participants reported how much they thought the app had helped with various aspects of their PTSD symptoms, actual changes in PTSD symptoms were not directly assessed, so it cannot be determined if using PTSD Coach reduced long-term symptom severity. Second, several characteristics of the study did not mimic intended real-world use expectations. These included a very short-term duration of use of PTSD Coach, which provided sufficient time to thoroughly evaluate many features and functions of the app (e.g., completing an assessment, trying self-management tools), but not others (e.g., tracking symptoms over time). They also include using a sample of veterans in intensive treatment for PTSD, and, in many cases, use of a study iPod Touch device for participants without a smartphone. Although ratings of perceived helpfulness of the app were not significantly different for smartphone owners and nonowners, overall satisfaction ratings were lower for those who did not own a smartphone. Although it cannot be discerned, this finding may be due to a lack of familiarity with mobile devices or first-time use of an iPod Touch that may have produced frustration while learning to use and navigate the device itself, which is something smartphone owners did not have to overcome. Finally, the study used a very small sample, which may have resulted in insufficient power to detect actual differences between groups.

These findings suggest that mobile apps may be another alternative that individuals with mental health symptoms would find acceptable and useful in learning about and self-managing their symptoms, which could help address a tremendous unmet care need.[2] They also suggest that neither age nor current smartphone use are necessarily barriers to mobile app use, which is encouraging as aging veteran cohorts (i.e., Vietnam, Korea) represent the largest segment of the veteran population.[16] This finding suggests that even individuals who may not independently seek mobile apps may still benefit if encouraged to use them. Future rigorous outcomes research is needed to determine if the promise of PTSD Coach and other apps intended to address mental health issues will be realized. Additional research can focus on clinical outcomes as well as implementation issues related to the integration of mobile apps into clinical care.

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