Access, Utilization, and Interest in mHealth Applications Among Veterans Receiving Outpatient Care for PTSD

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ABSTRACT Mobile health (mHealth) refers to the use of mobile technology (e.g., smartphones) and software (i.e., applications) to facilitate or enhance health care. Several mHealth programs act as either stand-alone aids for Veterans with post-traumatic stress disorder (PTSD) or adjuncts to conventional psychotherapy approaches. Veterans enrolled in a Veterans Affairs outpatient treatment program for PTSD ($N = 188$) completed anonymous questionnaires that assessed Veterans' access to mHealth-capable devices and their utilization of and interest in mHealth programs for PTSD. The majority of respondents ($n = 142$, 76%) reported having access to a cell phone or tablet capable of running applications, but only a small group ($n = 18$) reported use of existing mHealth programs for PTSD. Age significantly predicted ownership of mHealth devices, but not utilization or interest in mHealth applications among device owners. Around 56% to 76% of respondents with access indicated that they were interested in trying mHealth programs for such issues as anger management, sleep hygiene, and management of anxiety symptoms. Findings from this sample suggest that Veterans have adequate access to, and interest in, using mHealth applications to warrant continued development and evaluation of mobile applications for the treatment of PTSD and other mental health conditions.

INTRODUCTION

eHealth is the incorporation of information technology into health care. The development of mobile technologies, such as Internet-capable cell phones and tablets, has brought an increasing focus on a growing subset of eHealth known as mobile health or mHealth. Opportunities for improvements in both traditional medical care and especially for mental health services are motivating burgeoning research and development in mHealth. Some mHealth mobile phone applications (referred to as "apps") identify, manage, and treat symptoms of post-traumatic stress disorder (PTSD). These apps are designed to improve self-management of symptoms and recovery. For example, the Department of Veterans Affairs (VA) and Department of Defense created the "PTSD Coach" app, which normalizes distress, helps individuals cope with acute symptoms, provides information about PTSD and treatment options, and encourages self-assessment so that individuals can monitor and recognize the difficulties they may be having.[1] Apps can also support delivery of evidence-based PTSD treatments like Prolonged Exposure (PE) therapy.[2] "PE Coach," unlike the "PTSD Coach" self-management tool, is meant to be a treatment companion to PE therapy and used concurrently during psychotherapy.[3] "PE Coach" helps clients participate in PE therapy by providing education about PE therapy and reactions to trauma, and by allowing individuals to audio-record therapy sessions for review, input homework task results, track PTSD symptoms over time, and learn the process of breathing retraining.

Enhancing support and treatment for Veterans with PTSD is a top priority within and outside of the VA and Department of Defense.[4] PTSD is a potentially debilitating condition that can occur in as many as 13% of returning service members from Iraq and Afghanistan[5] and 19% of Vietnam veterans[6] as well as substantial numbers of Veterans from other wars. Although researchers and therapists have developed effective treatments for PTSD,[7] engaging veterans and maximizing retention in these treatments remains an ongoing challenge.[8] mHealth apps may provide important support in helping veterans to not only identify their need for treatment but to engage in and complete treatments. In addition, mHealth apps can provide a venue for self-assessment that promotes awareness of problems and help seeking, prompts or reminds veterans to use coping tools or skills, and provides education about symptoms, treatments, and available support.[3,9,10]

Although current evidence of these approaches is only preliminary, eHealth and mHealth may offer many benefits for Veterans, including facilitating communication between treating professionals, enhancing access for and recruitment of patients, and providing efficient and low-cost performance of screenings as well as some assessments and treatments.[11,12] For example, eHealth services have been associated with improvements in smoking cessation[11] and weight loss in obese individuals.[13] Some researchers have also provided data that demonstrate how the use of eHealth in mental health care can decrease the cost of treatments by allowing clinicians to broaden their services and by giving patients immediate information and support which saves them time

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and money.[12,14] Finally, there is preliminary data showing promise for "DBT Coach," an app used in conjunction with Dialectical Behavior Therapy (DBT) for treating individuals with borderline personality disorder and substance use disorders. Studies of this app found that it was an engaging and helpful aid for patients' treatments when they were away from therapy sessions. Results of pre- and post-app use measures also showed a decrease in emotional intensity and substance use urges when the app was used.[15,16]

Although the development and testing of mHealth apps for PTSD is underway, there is an ongoing concern whether PTSD populations will have (1) access to, (2) willingness to use, and (3) interest in PTSD-related apps. Some encouraging findings came from the broader domain of eHealth. A study examining the knowledge, attitudes, and experiences of eHealth technologies in 352 active duty soldiers (mean age = 25.9 years) found that the majority of soldiers were both familiar with and willing to use eHealth-based services, including online information and therapy services involving e-mail, live chat, or text messaging. In addition, up to one-third of soldiers who were unwilling to seek out traditional treatment indicated that they were willing to use technology to access mental health resources.[17] Studies on Veterans' use of the Internet in health care have also shown encouraging results. Tsai and Rosenheck[18] found that over 70% of Veterans in care at the VA reported using the Internet and one-fifth reported using the Internet to access VA health care information. However, they also found that Internet use was less common in older, unmarried, low-income, and minority Veterans. Similarly, Houston et al[19] found that Veterans' use of the Internet, and more specifically for health care information, was at least comparable to non-Veteran use.

Data from the above studies suggest that Veterans and service members are generally willing to use technology as part of their medical treatments. However, there are significant differences between the generic use of the Internet for health care information in comparison to the use of mobile technologies, such as cell phones and tablets, for mental health care. The use of mobile technologies requires specific ownership and familiarity with personal mobile devices, and as such may entail different barriers and facilitators than traditional Internet usage. In addition, findings from active duty military samples[17] may not generalize to veteran populations. In comparison to active duty military populations, Veteran populations are older, more likely to face chronic medical conditions, and have more diverse life circumstances and finances. Given that age is an important predictor of technology adoption and use,[18,20,21] it is possible that older Veterans may be less likely to have access to, interest in, or past use of apps for PTSD.

We are unaware of any studies that address the access to, interest in, and use of mHealth-type apps within samples of Veterans with PTSD. The National Center for PTSD, with funding from the VA Central Office, has worked on developing an innovative array of mobile apps centered on mental health. "PTSD Coach" and "PE Coach" are prominent examples of these efforts. As part of this development effort, a survey was administered to outpatient mental health consumers in a large outpatient PTSD treatment clinic in order to evaluate access to (meaning ownership of a device that can run mHealth apps), use of, and interest in mHealth apps as they relate to the treatment of PTSD. These are important factors in the overall impact of any app. In addition to evaluating overall levels of these factors related to apps designed for Veterans' issues and PTSD, we were interested in examining their relationship with age. Given that age is an important predictor of technology adoption and use,[20,21] it was hypothesized that older Veterans would be (1) less likely to have access to a mobile technology device (i.e., a smartphone or tablet), (2) less likely to have used existing mHealth apps, and (3) less likely to indicate interest in using mHealth technologies as part of their treatment.

METHODS

Procedures

As part of a program evaluation and planning project, Veterans receiving mental health services at a large outpatient PTSD treatment clinic in a Midwestern VA Medical Center setting completed anonymous questionnaires when they checked in for their appointments. Respondents provided brief demographic information and answered questions about clinic satisfaction and interest in a number of current or potential services. These surveys are usually given annually as part of continuous quality improvement efforts and take 5 to 10 minutes to complete. Data from the present report come from a subset of items on mHealth that were included in this survey. Two hundred surveys were distributed and 188 were returned. The use of this anonymous data as part of a research effort was determined to be exempt from ongoing review by the Medical Center's Institutional Review Board.

Participants

Of the 188 participants, 128 identified themselves as male, 23 as female, and 37 did not disclose their gender. Ages ranged from 23 to 84 years, with a mean age of 52.35 years (SD = 15.63) and a median of 54 years. There was an expected bimodal distribution mirroring age cohorts of Iraq/Afghanistan and Vietnam Veterans such that 30% of participants reported an age between 23 and 45 years, and 46% reported an age between 58 and 68 years. Regarding service era, 58 participants reported serving in the recent wars in Iraq or Afghanistan, 19 in the Gulf War, 95 in Vietnam, 7 in Korea or World War II, and 20 in another era or setting. These totals include 11 Veterans who reported serving in multiple service eras.

Measures

A two-page questionnaire containing 17 questions assessed access, utilization of, and interest related to mHealth. Specific questions are described below.

Accessibility

To operationalize access to mHealth apps, two questions asked the participants if they owned a device that would allow them to use apps. Veterans had access to mHealth apps if they reported owning, "a cell phone, Blackberry, iPhone, or other internet-capable device that is also a cell phone," or "a tablet computer like an iPad, Samsung Galaxy, Nexus 7, or Motorola Xoom."

Interest

Interest in mHealth apps was measured by quantifying Veterans' responses to eight questions with the stem, "Would you be interested in using downloaded programs or 'apps' on a smartphone or similar device to help you with . . . " Options for this question included, "helped you monitor or improve your physical health," "monitoring your mood and mental health symptoms," "learning and remembering skills to manage anxiety," "learning and remembering skills to manage anger," "learning and remembering skills to sleep better," "helping to stop smoking or tobacco use," "helping my family to understand the problems bringing you to our clinic," and "helping my family to get support or take care of their own needs." By summing the number of "yes" responses to the above questions, we calculated an overall interest index that resulted in values from 0 to 8. Note that only participants who had indicated that they owned a smartphone or tablet completed the interest questions.

Utilization

Seven questions, measuring Veterans' use of apps, evaluated if a participant had ever heard of or used specific apps that the treatment team had identified as both available at the time and related to Veterans' mental health. These questions fell into two broad categories of apps. The first involved Veteran-specific apps, but did not mention mental health or PTSD. These included, "My VA Disability," "Veterans News," "Veteran Scholarship Finder," "Veterans Benefits," and "Veteran JOBS." The second category of apps involved PTSD components. These included "PTSD Support for Veterans" and "PTSD Coach." One binary variable determined if a Veteran had used any of the five general Veteran apps, and a second binary variable determined if a Veteran had used the two PTSD apps.

RESULTS

Accessibility

In examining accessibility, 142 (76%) respondents reported owning a cell phone or tablet capable of running apps, whereas 32 (17%) denied owning such a device and 14 (8%) failed to answer the question. A *t*-test, adjusting for unequal variances, comparing mean ages of those who did and did not own a cell phone or tablet found that those who owned such a device were significantly younger than those who did not

(50.31 years, SD = 15.13 vs. 59.94 years, SD = 11.28; $t = 4.00$, $df = 57.53$, $p < 0.001$).

Interest

After accounting for missing data, 117 (82%) of the mHealth-capable device owners reported on their interests in different types of apps. The vast majority of these participants reported interest in at least one of the potential uses of mHealth apps ($n = 99$, 85%). The mean number of categories of interest was 5.06 (SD = 2.72), and this was not significantly correlated with participant age ($r = -0.09$, $p = 0.37$). The percentage of participants interested in each area of assistance from an app is listed in Table I. With the exception of interest in an app to help stop smoking (endorsed by only 26% of respondents, recognizing not all participants use tobacco), levels of interest ranged from 56% (interested in using an app to help their family to get support or take care of their own needs) to 76% (interested in using an app to help with learning and remembering skills to manage anxiety).

Utilization

After excluding missing data, 108 Veterans who owned a smartphone or other device provided information about their use of the apps in the survey. Of these, 30 (28%) reported use of one or more of the apps listed, 27 (26%) reported using one or more of the general, non-PTSD-related apps, and 18 (17%) reported using one or both of the two PTSD-related apps. Mean age of app users versus nonusers did not differ significantly for usage of any app (users = 53.43, SD = 14.78; nonusers = 48.86, SD = 45.46), of non-PTSD apps (users = 54.48, SD = 14.43; nonusers = 48.68, SD = 15.45), or PTSD-specific apps (users = 54.44, SD = 16.15; nonusers = 49.29, SD = 15.10), though the trend was for app users to be older.

TABLE I. Levels of Interest in mHealth Applications

Type of App	Percentage Endorsing Interest (N = 114)
Learning and Remembering Skills to Manage Anxiety	76% ($n = 89$)
Monitor Mood and Mental Health Symptoms	76% ($n = 89$)
Learning and Remembering Skills to Sleep Better	73% ($n = 85$)
Helping Your Family to Understand Your Problems	68% ($n = 79$)
Monitor or Improve Physical Health	68% ($n = 80$)
Learning and Remembering Skills to Manage Anger	62% ($n = 73$)
Help Your Family to Get Support or Take Care of Their Own Needs	56% ($n = 66$)
Helping to Stop Smoking or Tobacco Use	26% ($n = 31$)

DISCUSSION

This study examined three important factors that can be applied to designing and disseminating mHealth apps for mental health, and more specifically for PTSD. Within a sample of Veterans receiving outpatient treatment in a VA PTSD clinic, accessibility for mHealth products was high. The majority of participants (76%) reported owning a smartphone or tablet that could run mHealth programs. Interest in mHealth apps as part of therapy was also high, with 85% of participants indicating interest in using an mHealth app in at least one of the areas evaluated. In contrast with the high levels of mHealth-capable device ownership and stated interest in mHealth apps, use of existing apps, at least those included in the present survey, was low. This suggests that efforts at dissemination and education about mHealth apps may be important in the future. Consistent with our hypothesis, age was correlated with ownership of a smartphone or tablet. However, among those who had such a device, age was not correlated with use of mHealth apps related to PTSD and mental health treatment. Thus, while age represents a barrier to owning a smartphone or tablet, once a person owns such a device it is not related to interest in or utilization of apps. Older individuals were no less interested or involved with mHealth applications than their younger counterparts. The implication is that program designers should consider a diverse group of potential users when designing apps, including a wide range of ages. It will also be important for providers to not assume that older Veterans or clients will be uninterested in mHealth applications (see below). This finding is particularly encouraging in the present context given the large numbers of Vietnam era (and older) Veterans still confronted by symptoms of PTSD and other trauma-related difficulties.

The high penetration of app-ready mobile devices and strong patient interest in mHealth apps suggests that mental health care providers now have another modality to provide psychoeducational information, self-management interventions, and therapy materials to their patients. Thus, mental health care providers should routinely ask their patients if they own a mobile device. They should also become knowledgeable of existing mHealth apps that their patients are using and be prepared to recommend apps from reputable sources. Given that a high number of patients have interest in an array of PTSD-related apps, mHealth app developers and health care organizations that provide care to veterans with PTSD should consider creating or customizing mobile apps tailored specifically to the needs of these patients. These apps should also include options for family members, given the impact PTSD can have on relationships and the importance of social support in recovery.

Aside from recommending and using specific mHealth apps in care, providers should also take advantage of common existing features of mobile devices to help ensure that their patients engage and remain in care. Features such as setting calendar reminders and entering new contacts (e.g., social supports and provider information) into the device could be exploited to improve homework completion and therapy attendance. Features such as note taking, audio recording, and photographing could be used by patients to capture important events between therapy sessions. Given the vast potential of incorporating mHealth into PTSD care, it may be worthwhile to consider lending mobile devices to patients who do not have such devices while they are in active treatment. This may be especially important for older patients, who are less likely to own such devices.

Findings from this study must be interpreted acknowledging its limitations. This study made use of a convenience sample from a single VA outpatient PTSD clinic. Further replication in other settings and with additional samples is needed to aid with generalizing these findings. This study focused on apps related to PTSD and did not consider apps for other mental health or physical health issues. Further, there may be cultural and demographic differences between Veteran samples with PTSD and other populations with PTSD. The data used from the program evaluation survey precluded inclusion of items assessing severity of PTSD symptoms, mental health comorbidity, and many other factors that could both better characterize the present sample and allow analyses of important potential predictors of mHealth access, utilization, and interest. In addition, the data came from a relatively modest sample size, and this, combined with some missing data, may have limited the power of statistical comparisons. Nonetheless, this study is one of the first to assess access, utilization, and interest in mHealth apps related to PTSD. These preliminary findings support the development, evaluation, and eventual deployment of such apps in the future.

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