Uptake and usage of IntelliCare: A publicly available suite of mental health and well-being apps

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A R T I C L E   I N F O

A B S T R A C T

Background: Treatments for depression and anxiety have several behavioral and psychological targets and rely on varied strategies. Digital mental health treatments often employ feature-rich approaches addressing several targets and strategies. These treatments, often optimized for desktop computer use, are at odds with the ways people use smartphone applications. Smartphone use tends to focus on singular functions with easy navigation to desired tools. The IntelliCare suite of apps was developed to address the discrepancy between need for diverse behavioral strategies and constraints imposed by typical app use. Each app focuses on one strategy for a limited subset of clinical aims all pertinent to depression and anxiety. This study presents the uptake and usage of apps from the IntelliCare suite following an open deployment on a large app marketplace.
Methods: Thirteen lightweight apps, including 12 interactive apps and one Hub app that coordinates use across those interactive apps, were developed and made free to download on the Google Play store. De-identified app usage data from the first year of IntelliCare suite deployment were analyzed for this study.
Results: In the first year of public availability, 5210 individuals downloaded one or more of the IntelliCare apps, for a total of 10,131 downloads. Nearly a third of these individuals (31.8%) downloaded more than one of these apps. The modal number of launches for each of the apps was 1, however the mean number of app launches per app ranged from 3.10 to 16.98, reflecting considerable variability in the use of each app.
Conclusions: The use rate of the IntelliCare suite of apps is higher than public deployments of other comparable digital resources. Our findings suggest that people will use multiple apps and provides support for the concept of app suites as a useful strategy for providing diverse behavioral strategies.

1. Introduction

Despite effective treatments, depression and anxiety continue to be highly prevalent mental health issues, with a one-year prevalence rate of major depression estimated at 6.6% (Kessler et al., 2003) and a one-year prevalence rate of anxiety disorders estimated at 18% (Kessler et al., 2005) of the general population. Even more Americans report subclinical symptoms of depression and anxiety that impact their quality of life. Unfortunately, only a third of those in need actually receive services (Kessler et al., 2005), a problem that is in part due to substantial barriers to receiving traditionally delivered face-to-face mental health services (Mohr et al., 2010).

The development and utilization of behavioral intervention technologies (BITs), such as mobile apps, offers the potential to greatly expand the portfolio of available mental health resources (Kazdin and Blase, 2011). While not intended to replace face-to-face therapies,

these modern adaptations have the potential to address the overwhelming need for and barriers to traditional services. Technologies delivered independent of hands-on clinician support may be particularly valuable if the public can appropriately utilize these technologies. As Muñoz (2010) noted, these types of interventions are non-consumable resources in that they can benefit a broad array of individuals without requiring additional therapeutic power. In order to substantially expand the treatment portfolio and serve the greatest number of people, further research must be done on Massive Open Online Interventions (MOOIs; Muñoz et al., 2015) or interventions that are free for anyone in the world to use.

Meta-analytic reviews have demonstrated the efficacy of web-based computer treatment programs for anxiety and depression, which are delivered in a manner that reduces many known barriers to traditionally-delivered, face to face services (Andrews et al., 2010; Richards and Richardson, 2012). Substantially less is known about the use of mobile apps for the treatment of anxiety and depression (Torous & Powell, 2015). The use of smartphones is rapidly increasing around the world with nearly two-thirds of Americans using

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smartphones in early 2015, up from just 35% in early 2011 (Smith, 2015). Furthermore, a growing number of Americans are "smartphone-dependent," such that they rely on their smartphones for accessing online services because they either lack broadband Internet connections at home, or have limited options for Internet access apart from their mobile phones (Smith, 2015). People use their phones for a variety of functions including supporting their health. A recent national survey indicated that more than half of mobile phone users (58.23%) have downloaded at least one health-related mobile app (Krebs and Duncan, 2015). Mental health apps in particular appear to be of high interest among psychiatric outpatient populations (Torous et al., 2014).

Given the increasing acceptance of and capabilities for the delivery of mental health and wellness through mobile apps, many apps have been created to serve this purpose (Torous & Powell, 2015; IMS Institute for Healthcare Informatics, 2015). These apps have the potential to be effective but often lack scientific evidence about their efficacy (Donker et al., 2013). On the other hand, many apps that are presented in scientific journals are not publically available. Apps are generally downloaded directly by consumers through public marketplaces (e.g., Apple's App Store or the Google Play Store). Failure to account for this in empirical investigations decreases the generalizability of findings to likely end users.

In the service of app evaluation, we argue that the evaluation of uptake and usage is key to our understanding of public engagement especially using methods reflecting the traditional ways people find apps. As such it is critical to explore uptake and usage reflecting apps available in public app marketplaces. Muñoz et al. (2015) make a similar argument, noting that the relevant metrics for MOOIs are use, cost, and efficacy. Therefore, uptake and use are necessary requirements before exploring effectiveness. Furthermore, use is not a given for healthcare apps. As illustrated by Helander et al. (2014), many individuals who download a commercially developed health management app never use the app. Only 13.6% people who downloaded the app in Helander's study used the core functionality (taking a picture) more than once. Even the largest group of users deemed "semi-active" (11% of total users) only used the app for an average of 9.3 days. These brief interactions suggest that most people discontinue use prior to likely having received any clinically meaningful benefit.

A key question regarding design and engagement, however, is what behavior change principles an app should employ. Years of research have identified a multitude of behavioral and psychological components (including activity, cognition, and emotion regulation) that contribute to depression and anxiety and many effective strategies for treatment and prevention (e.g. activity tracking, cognitive restructuring, seeking social support). Chorpita et al. (2005) have described these diverse strategies found in evidence-based treatments as *practice elements*. In light of the multiple barriers for dissemination of complete evidence-based treatment protocols, they have advocated for distillation to specific practice elements and better examination of what works, what is used, and how this might vary among people and contexts (Chorpita et al., 2007). The desired integration of multiple strategies, or practice elements, into BITs has led to the development of feature-rich applications (Titov et al., 2011; van Straten et al., 2008; Whitton et al., 2015) designed mainly for use on a computer. While responsive websites can be accessed via multiple devices, including smartphones, the feature-rich nature of these sites is often counter to how individuals use apps. Typically, popular apps serve singular purposes, such as searching for restaurants/businesses, managing flights, or posting pictures. This creates a problem for app design for mental health. People respond to different components of treatment and are therefore likely to benefit from exposure to multiple practice elements, but they are accustomed to using apps that focus on singular functions with easy navigation to desired tools.

Based on methods shown to be efficacious at improving symptoms of depression and anxiety, a suite of mobile phone apps was developed by researchers at Northwestern University's Center for Behavioral Intervention Technologies (CBITs). These apps feature different methods of managing mental health and wellness, including practice elements from cognitive-behavioral therapy, positive psychology, and physical activity-based interventions. They feature a variety of types of user-app interactions, such as recording/logging, completing checklists,

Table 1
Descriptions of IntelliCare Apps.

IntelliCare Hub	Manages messages and notifications from the other apps within the IntelliCare collection.
Aspire	Guides user to identify the values that guide one's life and the actions (or "paths") that one does to live that value. Helps keep track of those actions throughout the day and supports the user in living a more purpose-driven and satisfying life.
Day to Day	Delivers a daily stream of tips, tricks, and other information throughout the day to boost the user's mood. Prompts the user to work on a particular theme each day, and every week; learn more about how to effectively cultivate gratitude, activate pleasure, increase connectedness, solve problems, and challenge one's thinking.
Daily Feats	Encourages the user to incorporate worthwhile and productive activities into the day. Users add accomplishments to the Feats calendar, where they can track their positive activity streaks and level up by completing more tasks. Helps motivate users to spend their days in more meaningful, rewarding ways to increase overall satisfaction in life.
Worry Knot	Teaches the user to manage worry with lessons, distractions and a worry management tool. Provides a guided tool to address specific problems that a user can't stop thinking about, and provides written text about how to cope with "tangled thinking." Presents statistics about progress as the user practices coping with worry, gives daily tips and tricks about managing worry, and provides customizable suggestions for ways to distract oneself.
ME Locate	Provides a personal map for finding and saving user's mood-boosting locations. Assists the user in finding and remembering these places to help them make plans, maintain a positive mood, and stay on top of responsibilities.
Social Force	Prompts the user to identify supportive people in their lives, and provides encouragement for the user to get back in touch with those positive people.
My Mantra	Prompts the user to create mantras (or repeatable phrases that highlight personal strengths and values and can motivate one to do and feel good) and construct virtual photo albums to serve as encouragement and reminders of these mantras.
Thought Challenger	Guides the user through an interactive cognitive restructuring tool to examine thoughts that might exaggerate negative experiences, lead one to be overcritical and bring down one's mood. Teaches the user to get into the habit of changing perspective and moving toward a more balanced outlook on life.
iCope	Allows the user to send oneself inspirational messages and reassuring statements, written in their own words, to help the user get through tough spots or challenging situations.
Purple Chill	Provides users with a library of audio recordings to relax and unwind. Teaches a variety of relaxation and mindfulness practices to de-stress and worry less.
MoveMe	Helps the user select exercises to improve mood. Provides access to curated exercise videos and to written lessons about staying motivated to exercise. Allows the user to schedule motivational exercise time for oneself throughout the week.
Slumber Time	Prompts the user to complete sleep diaries to track sleep. Provides a bedtime checklist intended to clear one's mind before going to sleep. Provides audio recordings to facilitate rest and relaxation. Features an alarm clock function.