Internet Interventions 2 (2015) 382–391

Contents lists available at ScienceDirect

Internet Interventions

journal homepage: www.invent-journal.com/

The challenger app for social anxiety disorder: New advances in mobile psychological treatment

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ARTICLE INFO

Article history:
Received 5 June 2015
Received in revised form 20 August 2015
Accepted 20 August 2015
Available online 31 August 2015

Keywords:
Smartphones
Cognitive–behavioral therapy
Mental health
Social anxiety disorder
Internet
Mobile applications

ABSTRACT

Social anxiety disorder (SAD) is a common debilitating mental illness with large negative effects on quality of life and economic productivity. Modern psychotherapy treatments utilizing cognitive–behavioral theory are increasingly delivered over the Internet and more recently using smartphone applications. The Challenger App written natively for the Apple iPhone was developed at the Stockholm University Department of Psychology for the treatment of SAD and uses a number of advanced features not previously seen in past mental health applications; these include real-time location awareness, notifications, anonymous social interaction between users, a high-degree of personalization and use of gamification techniques. This paper explores design considerations for the various components of the app, their theoretical and evidence base, and research opportunities that exist for apps making use of these novel features.

1. Introduction

Social anxiety disorder (SAD) is characterized by a pervasive and often disabling fear of social performance, the scrutiny of others, and a commensurate withdrawal from interpersonal encounters. Its lifetime prevalence in Europe and North America is one of the highest among mental health disorders at between 6.6 and 13.3% (Fehm et al., 2005; Kessler et al., 2012), with international lifetime prevalence rates in the vicinity of 3.6% (Somers et al., 2006). SAD has a high personal cost as well as serious economic implications for society (Bruch et al., 2003; Stein, 2000; Patel et al., 2002).

Individual cognitive–behavioral therapy (CBT) is considered the best intervention for the initial treatment of SAD and consistently shows large effect sizes (Mayo-Wilson et al., 2014). However, those accessing care for SAD are in the minority with only 50% consulting a medical professional after 16 years of suffering and just 3.4% in the year of onset (Wang et al., 2005).

Alternative methods for providing care for individuals with SAD have since the early 2000s included interventions such as Internet-based cognitive–behavioral therapy (ICBT; Tillfors et al., in press). ICBT interventions for SAD, as compared to other mental health issues, are especially well studied (Boettcher et al., 2013). A recent Cochrane Review found that ICBT for anxiety was more effective than wait-list and not different from face-to-face treatment in improving anxiety and reducing symptoms (Olthuis et al., 2015). Another meta-analysis (Andersson et al., 2014) has also noted the equivalence between ICBT and face-to-face treatment for anxiety and other disorders. A systematic review of ICBT applications for the treatment of SAD, with 1801 socially anxious individuals in 21 separate studies evaluating 4 computer applications (Boettcher et al., 2013) concluded that effect sizes for these applications were generally strong. Large effect sizes ($d > 0.80$) were obtained in 15 studies, and in 2 unguided programs, small to medium effect sizes were noted.

The natural evolution of computer-based applications is towards mobile apps that can be used on a smartphone (Danaher et al., 2015). Smartphone-based mental health apps (mobile ICBT) may include many of the benefits of ICBT, such as cost-effectiveness (Musiat and Tarrier, 2014), plus they are always online, almost always with the individual and can collect location and other data through their integrated sensors (Chen et al., 2014). Many populations outside the West that would not otherwise own a computer are beginning to own smartphones. In China, for example, the proportion of users accessing the Internet with a mobile device by the end of 2013 surpassed those doing so with a PC (83 vs. 81%; Carsten, 2014). Text-based bibliotherapy can be readily translated to other languages (Choi et al., 2012), providing the ability to introduce new populations to mental health services (Andersson et al., 2013).

Mental health and healthy eating apps comprise over 30% of all health apps on the Apple App Store (West et al., 2012), however few have completed evaluations of clinical effectiveness (Powell et al., 2014). Donker et al. (2013) identified 8 studies ($N = 227$) describing 5 apps from a pool of 5464 abstracts that fit inclusion criteria. These apps targeting depression, anxiety and substance abuse had significant

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http://dx.doi.org/10.1016/j.invent.2015.08.001

within-group effect sizes ranging from Cohen's d = 0.29 to 2.28 post-test and follow-up. Torous and Powell (2015) identified 14 studies of smartphone apps for major depression and bipolar disorder that fit inclusion criteria. While few of the studies drew clinical conclusions, evidence for the feasibility of using apps for collecting diagnostics information (actively and passively) and providing interventions (such as psychoeducation and medicine management) is encouraging. Further evidence for the potential impact of mobile ICBT is found in the interest levels of those asked whether they would use such software on their mobile phones. In Australia, a survey of the general public indicated that 76% would be interested in mobile apps for mental health monitoring and self-management if the service was free (Proudfoot et al., 2010). A geographically and socio-economically diverse group of American psychiatric outpatients responded to a questionnaire indicating that 70.6% would be interested in monitoring their symptoms using smartphones (Torous et al., 2014).

The present study provides an overview of a new mobile ICBT application from the Department of Psychology at Stockholm University called Challenger, that uses a number of advanced features not previously seen in past psychological treatment apps, including real-time location awareness, notifications, anonymous social interaction between users, a high-degree of personalization and use of gamification techniques. We explore design consideration for the various components of the app, their theoretical and evidence base, and research opportunities that exist for apps making use of these advanced features.

1.1. Theoretical design

The Challenger App was designed to help users overcome social anxiety by inviting them to complete increasingly challenging interactions with their environment. For those with severe symptoms the App may be used in conjunction with a psychotherapist as a means of systematic exposure to social situations and independently of a therapist for those with mild-to-moderate SAD symptoms. The following section describes a selection of novel features implemented in the Challenger App, how they function, and their evidence and relevance as therapeutic tools for treating SAD.

1.2. Gamification

The first view a new user has of the Challenger App, following a short instruction guide (Fig. 1), is a game board, in which the objective of moving from one end of the board to the other is implicit (Fig. 2). Users are free to select a unique avatar for their board piece. Each step that a user makes along the board indicates some form of personal achievement, either a new skill learned in the form of a package drop (parachute), or a challenge overcome (star). The more difficult a challenge the user succeeds in, the greater number of squares they move forward (up to 4 squares for the most difficult challenges). At the end of the game board view is a clearly marked yellow box entitled "Add a Reward." After clicking this box, the user has the option of adding a preloaded reward, such as go to a nice restaurant, enjoy some popcorn, take a bubble bath, visit a spa, or the user can create a unique personalized reward.

Serious games and gamification have typically referred to the use of game playing elements such as points and scores used for reasons other than play, normally with the goal of increasing motivation and developing skills (Deterding et al., 2011). Prensky (2005) reviewed some of the reasons why games are such productive learning tools. He noted that they give us: a. enjoyment (they are a form of fun), b. intense involvement (they are a form of play), c. structure (they have rules), d. motivation (they have goals), e. interactivity (they give us an opportunity to "do"), f. flow (they are adaptive), g. outcomes and feedback (they provide us learning), h. ego gratification (they have win states), i. adrenaline (they involve conflict, challenge and competition), j. creativity (they involve problem solving), k. social groups (they involve interaction with others) and l. emotion (they are comprised of characters and a storyline).

In a psychotherapy context, it has been suggested that patients who strive after goals for intrinsic reasons (because of the fun and enjoyment that striving provides) rather than for external reasons (because someone else wants them to do this) have lower levels of psychopathology and more positive session outcomes (Michalak et al., 2004). Meaningful gamification requires designers to make a connection for the user between their natural goals and desires, and the non-game activity (Nicholson, 2012). One example noted, was the addition of piano keys attached to stairs in the Odenplan subway station in Stockholm, Sweden that encouraged 66% more pedestrians than normal to use stairs instead of ride the escalator (Piano Stairs, 2015).

Serious games designed for their psychotherapeutic properties have been used for, among others, the treatment of depression (Merry et al., 2012), impulse-control disorders (Fernández-Aranda et al., 2012), schizophrenia (Bellack et al., 2005), and anxiety disorders (Difede et al., 2007). Horne-Moyer et al. (2014) reviewed the use of electronic games in therapy and found them to be equivalent to, but not superior in efficacy to traditional treatments for a wide-range of medical and mental health issues. Their use may be particularly beneficial to younger populations reticent to seek out mental health services (Giota and Kleftaras, 2014). Challenges identified for serious games in psychotherapy include ensuring that they are appropriately targeted to the user population in respect to culture, gender and socioeconomic status (Goh et al., 2008). Better evidence for improved retention rates or engagement as a result of gamification elements is warranted.

1.3. Self-selected goals

In the Challenger App, a user has the opportunity to select from 27 different skills (goals) they would like to develop. Skills are sorted between "personal skills" such as learning to be kind to oneself, creating a healthy distance from personal thoughts, and being home alone; "social skills" such as learning to talk to strangers, standing out from the crowd, talking to attractive people, or giving compliments; "physical activity" skills such as walking or doing daily exercise; as well as "miscellaneous skills" such as traveling by bus or train. Users that would like to add additional skills can make in-app recommendations that are sent to the research team as suggestions for future updates.

When a user selects a skill they are provided ratings for identifying their current level of ability with the problem area (from novice to expert) and what level they would like to eventually achieve (Fig. 3). This information is used to select challenges at the appropriate level of difficulty. For example, a user at a novice level working on the "standing out from a crowd" challenge might first be encouraged to wear two different colored socks as a behavioral experiment (cf. Bennett-Levy et al., 2004), but at an expert level to drop a large bag of apples on the floor of a supermarket in front of strangers. A user can track their progress with a graph of their initial level of skill ability, the intermediate challenges they accomplished (date/time and duration of activity), and their chosen goal level.

Goal-setting has a long tradition in psychotherapy practice (Wollburg and Braukhaus, 2010). Conscious goal-setting helps facilitate goal achievement (Kolb and Boyatzis, 1970). In one study, success rate of a self-directed behavior change exercise increased from 44 to 61% after being modified to emphasize goal achievement (Kolb et al., 1968). Goal achievement is partly affected by how people formulate their goals, whether they are specific or vague, challenging or modest, proximal or distal, an approach or an avoidance task (Gollwitzer and Muskowitz, 1996). Those who are more optimistic about achieving their goals are more likely to attain them (Michalak et al., 2004). In cognitive models of SAD, social apprehension is associated with deficiency in properly defining social goals and selecting specific, attainable behavioral strategies to reach them (Hofmann, 2007). Identifying and achieving discrete, increasingly challenging goals that are personally motivating may be