Developing and testing a smartphone health application for older people to improve their mental health

Emergent Research Forum (ERF)

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Abstract

There is an increasing number of smartphone health applications available to smartphone users. Mental health applications are becoming an increasingly influential part of healthcare. While the adoption of smartphones has emerged as a vital tool for health-related behavioural interventions, making mental health support more accessible, and reducing barriers to help seeking, little is known about the potential benefits that smartphone health applications can provide in the mental health care of older people. There are hardly any contributions that focus on smartphone mental health applications for older people. This paper asks what are the key features needed for smartphone health application designed to improve mental health of older people? To answer this question, a comprehensive literature review of studies conducted in information systems and mental health disciplines has been undertaken and a theoretical model is proposed. This study contributes to the existing knowledge base through the development of a new theoretical model and the introduction of the features of a mobile health application that may have a positive impact on older peoples’ mental health. Key words: smartphone health applications, mental health, older peoples’ mental health.

Keywords

Smartphone health applications, mental health, older people.

Introduction

Technology has had a significant impact on our daily lives and has made our world far more interconnected. This has greatly changed the way we adjust to and control the physical, mental and social domains of our lives. The widespread adoption of mobile technology has resulted in 83% of the Australian population owning a smartphone, which they check many times per day. The use of smartphone technology for service provision and improving mental health has a range of potential benefits (Erfani et al. 2017a). These include engaging users with multimedia and audio-visual tools to help them understand mental health; providing real-life instructions to facilitate engagement, self-management and empowerment; allowing users to record moods and perform therapist activities in real time with relatively low costs; and providing support that is always easily accessible (Oulasvirta et al. 2012). Smartphone apps, particularly health-related apps, can be used to implement behaviour change interventions. While the adoption of smartphones has emerged as a vital tool for health-related behavioural interventions, making mental health support more accessible, and reducing barriers to help seeking (Bakker et al. 2016), little is known about the potential benefits that smartphone health apps can provide in the mental health care of older people (Erfani et al. 2017b). The World Health Organization has defined mental health as a state of wellbeing in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community. Studies have shown that obtaining social support, experiencing social connectedness and enhanced self-efficacy play a key role in improving individuals’ mental health and wellbeing (Erfani et al. 2016).
By 2030, around 20 per cent of the Australian population will be over 65 years of age. Exploring and introducing innovative approaches for creating genuine opportunities for social connection for older people, encouraging them to have healthy lives with improved mental wellbeing would be great advance. Innovative solutions to improve the mental health of older people is encouraged by health organisations. The accessibility of smartphones and their features designed to support extensive interactions, deliver understandable messages, allow extensive distribution of apps, improve cost-effectiveness, diminish participant burden, provide sophisticated on-board sensors, provide immediate feedback, and provide experiences that are inherently enjoyable to users (O’Reilly and Spruijt-Metz, 2013) makes smartphones an ideal psychological support tool for older people who are susceptible to loneliness and social isolation. Emerging evidence has shown that users prefer opportunities that are provided by a familiar medium such as personal smartphones, which are always accessible to users (Bakker et al. 2016). Growing smartphone ownership has led to an increase in the number of health-related smartphone apps. However, our analysis of the main online app stores, iTunes and Google Play, showed that while there are dedicated apps for mental health, none of these apps are specifically targeted at older people. Accordingly, developing smartphone mental health apps for older people is crucial for the provision of appropriate supportive mental health care. The study in this paper is a part of a larger study that aims to design and test a smartphone mental health app to facilitate supportive aged care and enhance mental health outcomes of older people. This paper therefore seeks to answer the following research question: (RQ) What are the key features needed for smartphone health apps designed to improve mental health of older people? To answer these question, a comprehensive literature review of studies conducted in information systems and mental health disciplines were undertaken and a theoretical model is proposed. Based on theoretical framework a prototype of the app will be developed and its impact will be tested on the mental health of older people.

**Theoretical underpinnings and hypothesis**

Recent studies have highlighted the lack of an appropriate theoretical underpinning and lack of rigorous experimental testing to guide development of smartphone health apps (Bakker et al. 2016). There is little trial-based evidence for many of the available smartphone health apps. Accordingly, recent studies have called for the establishment of a theory-based guide for development of smartphone health apps (Bakker et al. 2016). Therefore, we aimed to use a multi-theory perspective, including social support theory, belongingness theory, social cognitive theory and self-determination theory to develop a theoretical framework that depicts the features needed for a smartphone health app to increase mental health of older people. In designing the modules of smartphone mental health app for older people we used cognitive behavioural therapy’s (CBT) collaborative customised psychological approach that leads to behavioural and emotional adjustment to psychological issues and issues that will negatively impact an individual’s mental health (Baumeister and Leary 1995). To ensure that the smartphone mental health app for older people is CBT-based, we applied the principles of context engagement, attention change and cognitive change. The developed tool will be pilot-tested in the second phase of the study that will be presented in our future publication. The intervention will have four components, as outlined in the following section.

**Networks**

This module will enable users to create an online profile showing their demographic information, upload photos, and share their interests and talents. Users will be able to see the profiles of other users and will be able to create and share content and consume content provided by other users. The older people will be able to connect and engage with other older people, post questions, respond to other users’ questions, share stories, suggest fun activities to others and arrange to meet and develop extensive supportive interactions. Recent studies have shown that supportive interactions enrich the experience of social connectedness and improve users’ adherence to treatment regimens. Belongingness theory (Agosto et al. 2012) posits that individuals who develop supportive relationships can experience a sense of belonging and connectedness and consequently greater mental health. Studies have shown a positive correlation between integration in peer support interventions, sense of belongingness and experiencing wellbeing (Erfani et al. 2017b). This evidence led us to propose theses following hypotheses: 

H1: A positive relationship exists between using the Networks module and obtaining network and emotional support. 

H2: Obtaining network and emotional support has a positive impact on the mental health of older people.
**Information Centre**

Recent studies have shown the important role of CBT for treatment of mental health issues. The principles of CBT, context engagement, and concepts of informational support will guide designing the Information Centre module. This module will address context engagement through providing opportunities for older people to learn signals for threats to mental health and rewards that lead to effective functioning and improved mental health and wellbeing. Information provided in this section will teach older people about processes and activities to diminish their distress and feelings of loneliness and will notify them about the support features available in the app. By delivering information, the app can provide evidence-based justifications for motivating users to engage with a given treatment and recommended activities. This component enables users to receive guidance, advice, facts and stories of personal experience, and can refer users to informational support. Recent studies showed web-based interventions that facilitated informational support enabled patients to learn how to better cope with their illness and ultimately experience better mental health and wellbeing (Juslin et al. 2010; Erfani et al., 2016). Based on this evidence, we developed the following hypotheses: H3: A positive relationship exists between using Information Centre module and obtaining informational support. H4: Obtaining informational support has a positive impact on the mental health of older people.

**Mode Booster**

Activities in this module are designed to directly boost mood and consequently improve mental health. The principles of CBT, attention change, and concepts of emotional support will guide designing Mode Booster module. Attention change reflects the ability to focus attention on relevant and non-distressing event and will also be addressed in this module. To this end, therapeutic methods such as tolerance training, blocking distraction, positive talk will be used. This module will support the adjustment of self-help programs to suit the users’ needs based on ecological momentary assessment and experience sampling methods. It enables users to record and report their mood and feelings while they are performing their daily routines or directly experiencing stressors. Users who record their own thoughts, feelings, and behaviours will be able to monitor and track their reports and consequently increase their emotional awareness, which is a common factor for mental issues. Self-monitoring can boost help seeking behaviours and in specific situations the support links to crisis support services, which are valuable resources for vulnerable individuals undergoing acute psychological distress. Activities such as mindfulness meditation and breathing relaxation will be supported through this module. Exercise and relaxing music can decrease anxiety and can help users with emotional regulation and improve their mental health. Relaxing music is known as an influential factor that can evoke emotion, challenge emotional recall biases, decrease anxiety and improve wellbeing. Studies have highlighted the vital role of physical activities in boosting individuals’ physical wellbeing which is connected to improved mental health (Payne et al. 2014). Accordingly, in this module appropriate physical activities will be provided; these will be embedded into a narrative game for boosting mental health. H5: A positive relationship exists between using the Mode Booster module and obtaining tailored tangible support. H6: Obtaining tailored tangible support has a positive impact on the mental health of older people.

**Goal Setting**

The principles of CBT, cognitive change, and concepts of social cognitive theory will guide designing Goal Setting module. Behavioural activation approach, which involves encouraging individuals to plan and engage in psychologically rewarding activities, plays a vital role in decreasing negative mood, anxiety and depression, and in improving mental health (Vallerand and Reid 1984). Accordingly, the features of this module will reduce avoidance behaviours through encouraging and reminding users to participate in the planned activities aimed for improving self-efficacy. Self-efficacy, a central part of social cognitive theory, refers to people’s judgements of their capabilities to perform certain actions (Bandura,1997). The app will also use CBT techniques such as behavioural activation focuses on activity scheduling to encourage users to conduct the activities they are avoiding. To employ the principles of CBT, the app will support users to complete therapeutic tasks in with the aim of improving their self-efficacy and mental health. To this end, this feature of Goal Setting module will encourage users to set goals, develop an action plan for each week, report and monitor progress, and receive feedback. Self-determination theory game-based principles to intrinsically motivate users to engage with the games in the app will be employed in this module (Koepp et al., 1998). The games will encourage autonomy, emphasise user choice, allow opportunities for building mastery, boost motivation to pursue an existing goal and motivate users to repeat tasks until new habits are formed. Gamification rewards remind users that they have prosperously completed a task, and this
encourages users to review their achievements. Goal Setting module will also address cognitive change: the skill to change one’s viewpoint on an event. Therapeutic processes such as decentering or reappraisal will be applied. Based on these ideas, we developed the following hypotheses:

H7: A positive relationship exists between using the Goal Setting module and obtaining esteem support. 
H8: Obtaining esteem support has a positive impact on the mental health of older people.

**Methodology**

This study will follow a user-centric design and development approach that will focus on the experiences and needs of older people. This study will use a four-phase mixed-methods approach that combines qualitative and quantitative data.

Phase one: In the exploratory phase, face-to-face interviews will be conducted with older people to explore and obtain practical insight regarding their preferences for the features and messages of a smartphone mental health app. Participants, age ≥ 65 years and physically and mentally incapable of participating in the study, will be recruited from major aged care providers and support services in New South Wales. The sample size for interviews will be decided by the saturation point of the data. Data will be analysed using thematic analysis, the process of collecting candidate themes and creating relationships between these themes.

Phase two: In the confirmatory phase, findings from phase 1 will be verified through conducting a cross-sectional survey in a bigger population. Findings will provide insight into relative priorities (i.e. rank-ordering) preferences for the smartphone mental health app features.

Phase three: Health care professionals (e.g. psychologists and social workers) will be invited to participate in the research. Health professional participants will be sought through mailing lists for research-interested clinicians. Focus groups will be conducted to identify professionals’ perceptions of support needs that might be addressed by a smartphone health app for improving mental health of older people.

Phase four: A prototype of the smartphone mental health app will be developed, and pilot tested for four months. We will apply a pre-post design approach to measure the effect of using the proposed support smartphone health app on the mental health of older people.

**Discussion, theoretical and empirical contributions**

The proposed smartphone mental health app will provide educational support, leisure opportunities and tools for self-management that will improve older people’s empowerment, enable them to be active and experience healthy lives, and connect with community freely. Use of the proposed smartphone mental health app will assist older people in managing and addressing their social, informational and emotional needs and enable them to obtain more social support, experience enhanced sense of belongingness and self-efficacy and consequently experience better mental health. This research will make significant theoretical
and empirical contributions to our understanding of the benefits of technology interventions and smartphone mental health apps for older people. This research also has broad practical implications for Australian health care providers. It will produce new data about older people’s mental health, which can be used to promote online health-related services and to improve the long-term care of older people. The modules of our support tool will provide empirical evidence that is important for informing health policies, decision-making and service planning.

**References**


