Helping patients with depression: An Arabic application-assisted approach using cognitive behavioural therapy

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Abstract— **The increased functionality and uses of smartphone devices can provide a means for the delivery of mental health services. This paper presents an Android smartphone application designed for Arabic users that uses the cognitive behavioural therapy (CBT) method to help patients who have been diagnosed with depression, with clinical therapist-assisted delivery. The proposed app has been developed with mental health expert input through collaboration with a medical facility. The proposed app aims to provide support beyond the formal treatment sessions to improve the completion rates of treatment.**

Keywords: CBT; mHealth; app; depression.

I. INTRODUCTION

The proliferation of smartphones and tablets offering advanced ability to transmit and receive data over wireless connections has led to the strong emergence of mHealth (mobile health care). A report forecast that, by 2015, 500 million people would have adopted mHealth applications [1] and the rate in 2021 could only be expected to much higher. Indeed, numerous mHealth apps are now found in almost every facet of conventional medicine, these having been developed for smartphone users [2], and many healthcare organizations are now using the apps [3].

mHealth is being used to (1) increase efficiency and reduce costs in the healthcare systems [4], (2) facilitate communication between doctors and patients [5], and (3) facilitate remote patient monitoring solutions inside and outside the hospital [3]. According to Global Observatory for eHealth (GOe) of the World Health Organization (WHO), mHealth describes as comprising the use of mobile and other wireless devices to aid public health and medical practice. Such devices might include mobile phones, personal digital assistants and patient monitors [6].

Researchers are now proposing mHealth applications as a new mode for improving the monitoring, self-help, access and delivery of treatment for mild to moderately high mental health conditions [7] [8]. Indeed, the latest estimates suggest that more than 10,000 apps related to mental health are now commercially available to patients [9].

A. Mental health disorders

According to WHO (2017), mental health disorders are the main causes of disability worldwide [10]. At a global level, WHO estimated that mental health disorders would account for 15% of the total burden of disease in the year 2020 [11]. Among mental health disorders, depression has been recognized as the most prevalent with over 300

million people affected and a major contributor to death by suicide, which number close to 800,000 per year [10].

Mental health disorders not only affect the personal and social life of individuals, they also have strong negative economic impacts. Higher rates of long-term and recurring worker sick leave have been linked to poor mental health [12] [13], as well as low work productivity [14] [15].

Even though mental disorders are common and despite substantial increases in documented effectiveness of mental disorder treatment [16], many people do not make use of mental health services. A 2007 Australian National Mental Health and Wellbeing Survey suggests that three-quarters of young Australians who met the criteria for a mental disorder did not seek professional help [17].

Barriers that prevent mental health patients from seeking professional help can be related to individual beliefs, practices, and resources, as well as factors associated with the ways that the mental health system is organized, financed, and delivered, or a combination of both [18]. Such barriers to mental health care include scepticism about treatment effectiveness [19] [20], low socioeconomic background [19], fear by students of documentation in academic records [21], and lack of time and fear of a negative impact on career [22].

B. mHealth as means of accessing mental health care

A study conducted in 2010 explored Australian attitudes towards use of mobile phones for mental health monitoring and self-help. The majority of survey respondents (399/525, 76%) and focus group participants (33/47, 70%) showed an interest in using their mobile phone to track mood and to manage mental health symptoms of depression, anxiety, or stress [7]. Reasons given for positive attitudes towards use of mobile phones for mental health monitoring and self-help varied. They included speed, convenience, ease of access, the importance of being able to monitor and reflect on mood changes during the day, as well as being less confronting than face-to-face consultation [7].

A growing body of work is evaluating the effectiveness of mental mHealth applications that aid

an individual's access to effective treatments [23] [24].

Mental mHealth apps can be used effectively for a wide range of purposes: (1) psychoeducation [25], (2) diagnosing a mental health condition [26], (3) tracking symptoms over time [27], (4) reduction and self-management of symptoms [26], and (5) supporting delivery of evidence-based treatments [27]. Moreover, these apps can be used at any stage of treatment: preparing individuals for treatment, engaging them in such treatment, facilitating the treatment, and sustaining gains after treatment has ended [28].

Research has studied the development and evaluation of mHealth that supports a psycho-social model of treatment, the cognitive behavioural therapy (CBT) approach [29] [30]. CBT has been recognized as an effective treatment for depression [31]; the model provides a structured approach for identifying and treating underlying beliefs and negative thought patterns [32].

In the Middle East, mental mHealth apps designed to give support in clinical practice are scarce. To the best of the researchers' knowledge, there are no Arabic mental mHealth applications in major app marketplaces designed for treating depression using the CBT model, apps that would encourage engagement in self-care behaviours.

To bridge this gap, and to improve access to high-quality evidence-based treatments and to reduce the burden of mental illness, a collaboration between researchers and the Psychological Support Center for Consultation developed a mental health app especially for patients who have been diagnosed with depression. The design of this application is a response to the clinic's desire to improve patient care, especially since the number of patients is large, which makes it difficult to keep track of each case, and many of these patients are from cities and governorates far from Riyadh where the clinic is located.

II. PSYCHOLOGICAL SUPPORT APPLICATION

The proposed app is designed for Android smartphones and supports Arabic language. It has been developed to support cognitive behavioural therapy (CBT) for patients who have been diagnosed with depression. The app aims to extend the reach of the therapist beyond that of the formal session.

The psychological support application is designed to provide useful functions to be integrated into and go beyond the formal treatment sessions in the clinic. It provides a means for self-assessments and allows a patient to provide critical information to the clinician/psychiatrist supervising his/her condition to keep track of the state of mental health. In the context of therapy, the psychiatrist can integrate information provided by a patient through app with their medical knowledge and other data resources to evaluate and track treatment outcomes and to improve overall patient care.

In this project, an iterative user-centred design cycle has been followed for psychological support applications. A series of workshops has been conducted with five clinical psychiatrists in the Psychological Support Center for Consultation to explore the design and to determine app specification. At the end of the workshops, prototypes were developed and evaluated to identify any usability issues.

III. RESULT

During the app development and design, patient privacy and data security have been carefully considered. To reduce unauthorized access, a built-in password protection feature on the app has been used. To ensure patient data confidentiality, once a patient has signed up with app, an informed consent procedure will be presented to the patient that clearly states the benefits and risks associated with the use of the app. Once the patient has approved the consent form, app will track patient progress over time, based on the self-assessment data.
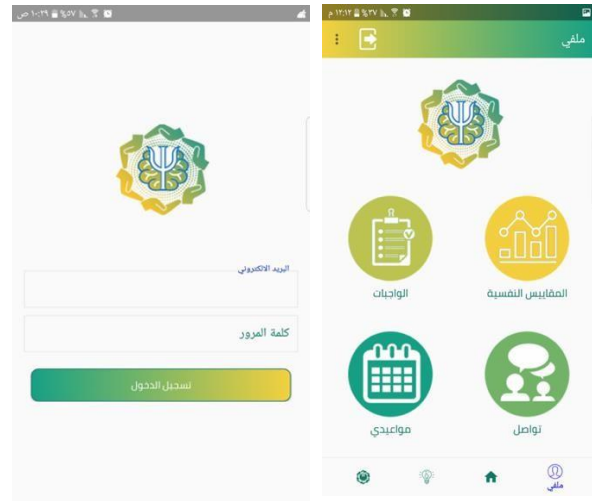

Figure 1: Interfaces of sign-in and my profile pages.

As one of its features, the psychological support application enhances CBT homework compliance; it allows the patient to perform the homework that is usually required to be completed by patients between formal treatment sessions; the homework results are recorded and sent to the specialist who assesses the patient's performance. Homework is a routine of a set of structured and specific therapeutic activities; such activities can be considered an important component of CBT [33]; the nature of the assigned homework is according to patient's condition and age. Homework supported by the app is divided into motivation exercise and confrontational exercise. The proposed app also supports an alerting feature to remind users of the homework delivery deadline dates.

Psychological scales are also supported by app. The app offers two types of scales: the first scale is the Beck Depression Inventory (BDI), and the second scale is the Birleson Depression Self-Rating Scale (DSRS), a scale designed for children. Scale results are recorded and sent to the specialist.
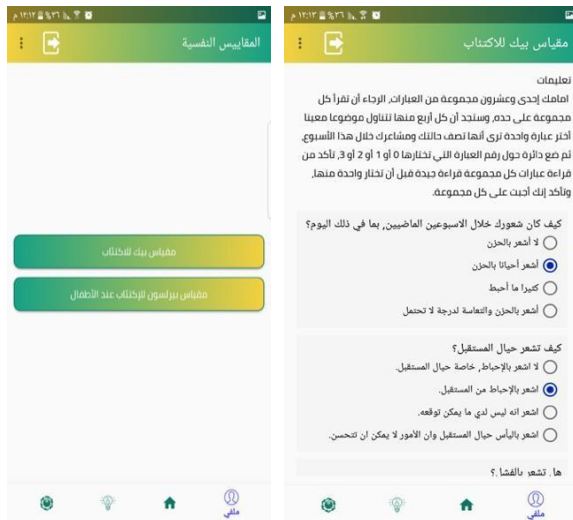
Figure 2: Interfaces of psychological scales.

Figure 3: Interfaces of home page and educational page.

What is more, app users, both patient and clinician/psychiatrist, can gain access to patient health record to check all the tasks, the homework, and history of scale results. The clinician/psychiatrist can add notes related to patient's condition to health record and those notes will only appear to clinician/psychiatrist.

To make the app more effective for both patients and therapists, a chat feature via messages is established to allow in-time connection between patients and therapist.

The application also supports a varied range of activities (games, exercises) that were chosen by psychologists and would be effective in reducing depression-related symptoms and improving the ability to meditate. There is evidence that gaming and exercising approaches are found to be effective in the prevention and treatment of mental disorders [34] [35].

The proposed app is also designed to provide features that can help to enhance mental health literacy. The psychological support application provides its user a variety of depression educational materials (books in PDF format, video, pictures, and infographics) that have been selected by psychologists. The materials can help to educate patient about depression symptoms and how to deal with these symptoms, discuss treatment options, stress the importance of adherence and participation in treatment, and more importantly, help in eradicating the stigma of depression.

IV. DISCUSSION AND CONCLUSION

CBT is a well-known form of psychotherapy that has demonstrated its efficacy; however, access to CBT remains difficult owing to the cost of treatment sessions and shortages of skilled psychotherapists [36]. ICT technology can provide a useful and active solution to improve access and delivery of CBT. This paper presents a mental mHealth app designed to support cognitive behavioural therapy (CBT) for patients who have been diagnosed with depression. Further, the paper contributes to Saudi Vision 2030 ("Vision 2030") that has one of its focus areas as a determination to improve the efficiency and effectiveness of the healthcare sector [37]. The proposed app has developmental input from a mental health expert; given this, we believe that such an app will help to improve completion of treatment. It is expected that the proposed app will extend care, support patients, and improve their engagement in treatment as well as improve those patients' perceptions of the quality of overall care that they receive.

For future work, evaluation of app efficacy will be conducted with a clinical sample.

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