Understanding Challenges and Design Opportunities for Digital Mental Well-Being in Saudi Arabia

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ABSTRACT

Mental health is considered a growing and highly stigmatized concern in the Kingdom of Saudi Arabia (KSA). Despite the high interest in mobile health (mHealth) in the KSA and its potential to overcome traditional barriers, research on its application in the Saudi mental well-being context is scarce. My thesis reviews the Saudi app market and explores the main opportunities and barriers to the use of publicly available Arabic mental well-being mobile apps in the KSA from various perspectives including mental health clinicians and Saudi individuals, with a particular focus on young Saudi women. Ultimately, this thesis aims to contribute to the current knowledge by providing design recommendations derived from interviews, co-design workshops, development and evaluation of a prototype, to inform the future design of Arabic mental well-being technologies considering values and cultural norms.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**.

KEYWORDS

mental health, well-being, mobile apps, mHealth, qualitative study, culture, Saudi women

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1 RESEARCH STATUS

I am a third year doctoral candidate in the Human Centred Computing research group at the Department of Computer Science at the University of Oxford. I am co-supervised by Professor Sir Nigel Shadbolt and Professor Max Van Kleek. My doctorate focuses on understanding opportunities and barriers to digital mental well-being support for Arabic speakers, with a particular focus on the young Saudi population. I have completed my first assessment (transfer to DPhil status), and my second assessment (confirmation of DPhil status) is expected to take place in the spring of 2024. The expected completion date for my doctoral program is July 2025.

2 BACKGROUND AND MOTIVATION

Mental health and well-being difficulties are considered a growing problem in the Kingdom of Saudi Arabia (KSA) where 34% of Saudis have experienced a mental disorder during their life [23]. Studies [2, 5, 22–24] have shown that young Saudi adults, especially women, have a significantly high lifetime risk of stress, anxiety and depression and are highly prone to emotional distress and poor well-being. Several stressors affect their mental well-being including high study load, feeling anxious and distressed, the lack of support [11, 13, 16] and being a family caregiver where a significant proportion (79%) of caregivers in the KSA are women between the ages of 20 and 50 [8]. Moreover, the stigma surrounding mental health topics and seeking mental healthcare in Saudi society significantly exacerbates these challenges [12, 13, 18, 53]. In a culture where family and community are highly valued, the stigma may further extend to the family leading to social disapproval and devaluation by others [13, 15]. For instance, studies have reported that [13, 40] Saudi women tend to keep their issues and struggles to themselves and avoid disclosing them to others mitigating the social stigma on their families. Consequently, these perceptions significantly shape individuals' attitudes towards seeking mental health support [15].

Over the last decade, mobile apps have emerged as a viable means of at-hand support to promote mental health and well-being [39, 46, 58]. Mobile apps have the potential to circumvent traditional barriers and could offer a supportive avenue that reduces stigma. Accumulating evidence [32, 66] demonstrated promising results for promoting individual mental health and well-being via mobile apps employing psychological interventions such as mindfulness and meditation, positive psychology interventions (PPIs), cognitive behaviour therapy (CBT), self-tracking, assessment, counselling and educational content. Nevertheless, studies [47, 64] showed that interventions alone offer limited utility when delivered in a way that does not maintain individuals' engagement with the intervention. Beyond intervention content, studies [29, 65] emphasized the importance of addressing user requirements and incorporating design features to support engagement with mental health and well-being apps.

The majority of past research on the use of mobile apps in promoting mental well-being has focused on Western contexts [20, 27, 32, 33, 41, 44, 66, 68]. As technology becomes more prevalent, more efforts are needed to understand technology use within the challenges and opportunities of other countries and cultures [45]. In Arab countries, the collectivistic nature of these communities and the adherence to religious and cultural values influence

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the use and interaction with technology [7, 10]. Alabdulqader et al. [9, 10, 50] discussed the under-representation of Arab and Muslim populations in HCI research and emphasised the importance of delicate adaptations of studies designed for the Western setting to fit Arab and Muslim communities.

Saudi Arabia is one of the highest countries in Internet penetration and smartphone usage [4, 61]. Nowadays, Saudis access services through their smartphones more than any other channel [35]. Most Saudi young adults, who represent more than a third of the Saudi population [34], own smartphones and spend more than 4 hours daily on their devices [52]. This high adoption of technology is paired with a notable interest in digital health tools, especially in mhealth (mobile health) in the KSA. The Saudi Ministry of Health (MoH) has launched various mhealth apps to support the Kingdom's 2030 Vision of digital health transformation [19, 59]. Particularly for promoting mental health and well-being, multiple governmental and private sectors released well-being mHealth apps such as psychoeducational and online consultations apps [37, 49]. Saudi individuals, especially young populations [25], are interested in using mhealth apps to maintain their health and well-being [17, 26, 36, 42].

Despite the rising interest in mobile mental well-being from the healthcare ecosystem and stakeholders in the KSA, there is a scarcity of research on the availability, adoption, and perceptions around the mental well-being mobile apps in the KSA [21]. No efforts have been made yet to bridge this gap by reviewing available mental well-being mobile apps in Saudi app markets, seeking to understand professionals' perspectives on using mental health apps in Saudi practice or considering Saudi users' perspectives and needs for mental well-being mobile apps.

3 RESEARCH OBJECTIVES AND APPROACH

To fill the existing gap, my thesis research aims to understand the opportunities and local barriers to the use of mental well-being mobile apps in Saudi Arabia, to better meet the needs of Saudi users and inform the future design of digital Arabic mental well-being technologies. This research seeks to explore this topic from various perspectives, including mental health clinicians and young Saudi women, to formulate a comprehensive understanding of challenges and design opportunities.

To achieve this objective and considering the research gaps discussed earlier, this thesis aims to address the following research questions:

- RQ1: What are available mental well-being mobile apps in Saudi markets (Apple App and Google Play stores), and what are their characteristics, the type of support they offer, and the engagement features they employ?
- RQ2: What are the main challenges and opportunities for using mental well-being mobile apps in the KSA from the perspective of psychologists and psychiatrists practising in the KSA (a) and Saudi young women (b)?
- RQ3: How can we re-design aspects of mental well-being mobile apps to better support Saudi young women's needs, through an understanding of the barriers identified from addressing RQ1 and RQ2?

To facilitate this study, I established a local partnership with the Princess Nourah bint Abdulrahman University (PNU), Riyadh, Saudi Arabia and ran international multi-university qualitative studies. We first conducted semi-structured expert interviews with psychologists and psychiatrists who are practising in the KSA to understand the adoption of mHealth in practice and identify the main opportunities and challenges to the use of technology in the local mental health context. To further understand the current state of mental health mobile apps in the KSA, we conducted a large-scale review and content analysis of Arabic mental well-being iOS and Android apps available from the Saudi app stores to understand their characteristics, engagement features and the type of support they offer. We are currently conducting interviews and co-design workshops with young Saudi women to expand on our previous findings on the opportunities and barriers to the use and engagement with Arabic mental well-being apps and investigate how the cultural background of our targeted population affects that use and engagement. This will be followed by translating and evaluating some of our findings and insights from the first two research objectives into a prototype of a user-centred well-being mobile app as well as developing design recommendations for future app design that seeks to address the challenges identified in the research. The User-Centered Design (UCD) approach was followed in this thesis to better understand the values and needs of our targeted young population.

4 RESEARCH TO DATE

4.1 Systematic App Review of Arabic Mental Well-being Mobile Apps

Objective. This study aims to explore the current state of mental health-related apps available in Saudi mobile app stores in order to form a basis for understanding what KSA users have available.

Research design. A systematic app review and content analysis of mental health-related mobile apps, available on the Saudi Apple App Store and Google Play Store, was conducted in August 2022. We adopted the definition of "mental health app" by Borghouts et al. [30] as "an application on your mobile phone or tablet device that helps you manage your mental, emotional, or psychological health or get access to resources to support your mental, emotional, or psychological health." In line with this definition and similar exploratory studies [20, 62, 67], our review included a diverse array of apps targeting topics like stress, emotions, and well-being, in addition to mental health challenges, particularly anxiety and depression, given their prevalence as the most common mental conditions among the Saudi population [23]. We identified apps that explicitly targeted mental health and mental well-being (app name or description included one of our - translated Arabic - keywords: 'mental health,' 'mental well-being,' 'anxiety,' 'depression,' 'psychological stress,' 'mood disorders,' 'mood,' 'emotions,' and 'stress,') and supported the Arabic language. Apps were excluded if they targeted clinicians only, or were e-books. We then downloaded the included apps, analyzed the content and coded their features based on the app classification in the Mobile Application Rating Scale (MARS) [63] and the Mhealth Index and Navigation Database (MIND) [43], an objective framework for systematic evaluation of app features based on the American Psychiatric Association's

app evaluation framework [38]. Our analysis of the apps included theoretical background and type of support, engagement features, descriptive information (i.e., mental health difficulties target, average rating, date of last update, affiliations, etc.), mobile sensing features and content delivery modality. We tested for inter-rater reliability using Cohen's kappa [31] and obtained 0.85, which indicates almost perfect agreement [48].

Outcomes. Our app review identified 110 mental health-related apps in Arabic - when this research was undertaken - available in the Saudi app stores. The included apps provided multiple theoretical strategies and styles of intervention and targeted a number of mental health-related goals. Our analysis further found that included apps poorly employed engagement features, apart from basic features such as sharing via social media, reminders and notifications. Surprisingly, included apps missed mobile sensing features and AI applications. More details on the analysis of the engagement features, mobile sensing, AI support and content delivery modality of the reviewed Arabic apps can be found in [14]. The findings of this review study contributed to our understanding of RQ1.

4.2 Expert Interviews with Mental Health Clinicians

Objective. This exploratory study aims to understand the main barriers and opportunities for digital mental health support in the KSA from the perspective of mental health clinicians practising in the KSA.

Considerations. To strengthen my qualitative analysis skills, I successfully completed a Qualitative Research Methods training course offered by the University of Oxford Department for Continuing Education. Given the involvement of human participants outside the UK, we sought ethical approval from both review boards in the UK (by OxTREC, a subcommittee of the University of Oxford Central University Research Ethics Committees) and KSA (by the Institutional Review Board of the PNU Research Ethics Committee).

Research design. I conducted IRB-approved semi-structured expert interviews with mental health clinicians. Blandford et al. [28] highlighted the importance of considering clinicians' and psychologists' perspectives and expertise in designing interactive digital health interventions to enhance their success. Consistent with exploratory qualitative studies in digital mental health context [41, 54, 55, 69], experts were interviewed to understand their experience and attitudes towards using mobile apps for supporting mental well-being. The semi-structured interviews with open-ended questions have been chosen to encourage two-way communication, allowing for a comprehensive discussion with the interviewees to support the nature of our exploratory study [57]. In collaboration with an assistant professor of psychiatry at the PNU, we managed to recruit and interview twelve psychologists and psychiatrists practising in the KSA. This was despite the fact that the number of psychiatrists and psychologists in the KSA is only 1.3 and 2 per 100,000 population, accounting for just 7% and 10% of mental health professionals in the KSA, a lower proportion compared to the global and high-income country averages of 20% and 14%, respectively [8]. All interviews were conducted remotely in the winter of 2021-2022. They were conducted in Arabic to facilitate effective communication, as all participants were native Arabic speakers, and some of them had limited proficiency in English. Interviews mainly discussed the challenges in current mental health practice in the KSA, the benefits and opportunities created by technology to overcome the existing challenges in the Saudi mental health context and the main challenges and barriers to the use of technology in the mental health context in the KSA. Anonymized interview transcripts were analysed using thematic analysis.

Outcomes. Our interview results provided insight into opportunities created by technology in mitigating stigma and promoting access to mental health support in the KSA. Furthermore, results revealed local barriers to digital mental health support and discussed some challenges that are exacerbated when integrating mHealth into mental health care. The findings of this qualitative study contributed to our understanding of RQ2 (a). Along with the available literature, this exploratory study further highlighted the importance of investigating the perspectives of young Saudi individuals, especially women, on digital mental health support as being the main users of existing Arabic mental health apps.

4.3 Interviews with Young Saudi Women

Objective. This study aims to understand the main barriers and design opportunities for Arabic mental well-being mobile apps in the KSA from the perspective of young Saudi women.

Considerations. Participants' privacy concerns and the nature of Saudi culture related to limiting discussions of personal life and views with strangers have been documented in the Saudi literature as a barrier to research participation [3, 51]. To address this challenge, some previous local researchers have employed online communication, recognizing its advantages in providing a sense of anonymity for Saudi participants in qualitative studies [6, 51]. Therefore, to maximize inclusion and accessibility, we designed our planned interviews and subsequent co-design workshops to be conducted online using Microsoft Teams and Miro's online whiteboard platform. Interview questions were thoughtfully formulated taking into account the sensitivity of mental well-being topics within a significant segment of Saudi society. To build rapport with participants, I started the online sessions by introducing myself as a Saudi women researcher and international PhD student interested in digital mental well-being support. Then, I provided participants with a brief introduction about the study and questions that will be discussed during the session to give them the opportunity to inform me early if they do not want to discuss specific topics to mitigate any stress or inconvenience during the session.

Research design. Semi-structured interviews were designed to formulate an in-depth understanding of opportunities that mobile apps provide to support mental well-being and barriers to using existing mental health mobile apps from the perspective of Saudi young women (ages 18-25 [1]). The first part of the interviews targeted understanding the context by exploring participants' understanding of mental health and well-being, their digital and non-digital coping strategies and practices for maintaining their mental well-being and barriers to seeking well-being support. The second part of our interview aimed to familiarize participants with a variety of popular Arabic mental well-being apps available in Saudi stores (systematically selected from our app review list) and explore participants' thoughts and perspectives regarding existing apps. Interviews are

followed by asking participants to select some preferred apps and use them for a while in order to improve the input and discussions of the subsequent co-design session. Given the sensitivity of mental health topics for some Saudi participants, the one-to-one interview is selected over other methods (e.g., focus group [57]) to help participants open up and express themselves freely without concerns about judgment, particularly when discussing opinions that diverge from Saudi cultural norms. This study is in progress. I have successfully interviewed 11 participants and aim for 20 participants as a final sample (consistent with similar HCI studies exploring perspectives on digital mental health support from the perspective of underrepresented populations [56, 60]).

Outcomes. The findings of this qualitative study will contribute to our understanding of RQ2 (b). It will expand on our previous expert interview results, and obtain deeper insights on local barriers and design opportunities including how participants' cultural backgrounds and values affect their use of mental health apps. Results will further inform the subsequent co-design study.

5 PROPOSED RESEARCH

5.1 Co-designs Workshops with Young Saudi Women

Objective. This study aims to expand on our previous study by understanding young Saudi women's needs and design preferences to inform the future design of mental well-being technologies targeting Saudi young populations.

Considerations. To provide some sense of anonymity for our participants, random names will be generated for each participant and sent to participants in advance to be used during the online workshops. Participants will also have the option to disable their cameras if they prefer to mask their identity during the co-design workshop. To improve the co-design outputs, participant recruitment will be narrowly scoped to participants who have experienced one of our discussed apps (see 4.3) by being a participant in our previous interview study (4.3) or a user of one of these apps.

Research design. This study is designed to understand user experience with the selected apps and barriers to their engagement with mental well-being apps, and further explore how existing apps could be improved to better meet our target population's needs for digital mental well-being support. Participants' needs and design preferences related to mental well-being apps will be further explored through a variety of human-centred research methods, including scenarios and storyboard sketching activities. Obtained findings from our previous studies, including existing app features, experts' recommendations and users' needs and preferences, will be used to inform the design of the content and materials of these co-design workshops.

5.2 Design, Implementation, and Evaluation

Objective. This study aims to translate and evaluate the main findings and insights from the co-design workshops into a software prototype of a mental well-being mobile app, as well as provide design recommendations for future app design that seeks to address the challenges identified in this research.

Research design. The main findings from our co-design workshops will be used to inform the design and development of a software prototype. After developing the prototype, an evaluation study will be conducted with 20 young Saudi women. Participants will be asked to engage with the built prototype in their natural settings for a period of time (2 weeks) and then participate in a feedback interview study. The outcome of the co-design workshops and evaluation study will contribute to our understanding of RQ3.

6 CONTRIBUTIONS

This thesis will contribute to filling existing knowledge gaps by understanding barriers and design opportunities for digital mental well-being support in the KSA, where rapid digital health transformation is in progress [37], and the influence of religious and cultural factors are manifest [7, 21]. Firstly, this work provided the first app review and analysis of Arabic mental well-being mobile apps available on the Saudi app market. Secondly, it sought to understand clinicians' perspectives on using mental well-being mobile apps in the Saudi mental health context, which is currently lacking. Thirdly, this work will expand our understanding by incorporating Saudi women's perspectives and design needs for digital mental well-being support considering cultural factors. This work further contributes to the wider HCI research on inclusive design targeting women's needs, where most of these studies focused on the Western context to infer women's necessities while the needs and interests of Muslim Arab women were yet under-researched [50]. This thesis will also contribute to the current knowledge by providing design recommendations derived from the co-design, development and evaluation of a prototype, to inform the future design of Arabic mental well-being mobile apps.

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