Persuasive Strategies to Facilitate the use of mHealth Applications for Stress Management

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Abstract.

Stress-induced conditions constitute some of the major health challenges experienced by individuals. Persuasive technologies have the potential to improve health behaviour as shown in the literature. Despite the availability of mHealth applications for stress management, there is a dearth of studies on the use of persuasive strategies in mHealth applications for stress management among university students. There is a need to investigate persuasive strategies that will facilitate university students to use mHealth applications to initiate health behavioral change. This study aims to develop the persuasive strategies that will facilitate the use of mHealth application for stress management among university students in Namibia using the Namibia University of Science and Technology (NUST) as a case study. This study will apply Design Science Research methodology and a case study approach to evaluate and validate the identified persuasive strategies to support the use mHealth applications relevant for stress management among university students. A systematic review will be conducted to identify persuasive strategies used in mobile apps in general. This will be followed by interviews and focus group discussions which will be conducted with NUST students and mHealth apps development professionals to evaluate and validate the identified persuasive strategies and provide recommendations on relevant persuasive strategies that will facilitate the use of mHealth applications for stress management among university students. This study will develop an artefact in the form of persuasive strategies, guidelines and recommendations to facilitate the incorporation into the development of mHealth applications for stress management among university students. The findings of this study will provide guidelines to developers when focusing on developing mHealth apps for stress management to be used by university students.

Keywords: Persuasive strategies, mobile health, stress management, health behavior change, university students.

1   Introduction

Stress and anxiety among university students are common occurrences. This is as a result of certain issues such as academic pressure, financial burden, family pressure, relationship challenges, and other mental health related issues [1] In educational settings, there is a high rate of stress-induced conditions such as chronic stress, headaches, depression, poor academic performance, alcohol abuse and lack of sleep among students [2].

Poorly managed stress conditions may lead to adverse mental health conditions, most especially among students in higher institutions where expectations are higher, thereby causing issues like depression, burnout, school drop out as a result of poor grades, loss of appetite and gender-based violence [3]. As such, stress cannot be prevented but can be managed [4].

Mobile health (mHealth) applications have achieved remarkable success in the healthcare domain [5]. The use of mHealth applications to manage chronic illnesses have gained popularity with patients, especially as mobile phone become ubiquitous [6]. Mobile apps for stress management are readily available and can be easily downloaded online for individual use [7]. Most of these mHealth applications are free and they work either online or offline. Some of the mobile apps available for stress management include Breathe2Relax (Psyberguide.org/apps/breathe2relax), Sanvello (www.sanvello.com), Calm (www.calm.com), DeStressify (www.destressify.com), Heartmath (www.heartmath.com) and SAM-Self Help for Anxiety (sam-app.org.uk) These are free self-help app for managing stressful condition and they were designed by researchers at the University of West England (UWE) ([8]. The initial evaluations of these apps show limited persuasive strategies in their design, especially for health behavioural change [9].

One of the well-known persuasive strategies is Personalizing or Tailoring which is an alternative to taking a one size fits all approach [10]. Tailoring persuasive strategies towards a cultural or subgroups of a population have a higher chance of enhancing the desired persuasion goal [10]. People with health conditions like excessive cigarette smoking or unhealthy eating habits have benefitted from persuasive technologies based mHealth applications [8]. Introducing persuasive technologies into mHealth apps can help achieve significant positive change of behavior and adherence. [11]. Persuasive technology is the "use of any computing system, device, or application intentionally designed to change a person's attitudes or behavior in a predetermined way" [12], there is demonstrable improvement that apps with this technology can improve physical exercise with those living with diabetes or sedentary lifestyle [13]. Persuasive technologies have also been used to motivate university students to embrace healthy social interaction [12].

Preliminary study from an unpublished online survey (survey monkey) shared among the Namibia University of Science and Technology (NUST) students' social media networks and 22 responses were received. 81% expressed that the experience some degree of stress daily while 72% of the respondents claimed to be unaware of mobile health apps for stress management despite owning a smartphone. More than 95% of those who filled the survey were between the ages of 18-24years old and 63%

were female. The study also showed that 100% of the those involved in the preliminary study owned a smartphone. This study was a precursor to the development of the research proposal, and it gave some hints on the sources of student's distress condition. A search of existing literature showed limited literature around the use of mHealth applications for stress management among university students in Namibia.

NUST is located in Khomas Region, the region ranks one of the top four with the highest suicide rates in Namibia [14]. Urban centers tend to account for more stressful situation for university students [15]. The Ministry of Health and Social Services (MOHSS) national study on the prevalence of and interventions in relation to suicide in Namibia, indicates that ages 20-30 (coincidentally the age range of most of the university student population) as the highest number of people with attempted suicides rates, especially educated and living in the urban settings such as Khomas region [16][8]. The findings suggest that Namibia is 11th highest suicide rate in the world and 4th highest in Africa [17]. In addition, it was also reported that there is at least one suicide per day in Namibia and suicide was the second highest cause of death amongst youth between the ages of 15-29 years [18]. The university students' population is made up of the suicide susceptible age range according to the national statistics data [17].

2 Problem Statement

Between April and July 2018, 131 people committed suicide across the country [19]. Namibia has the fourth highest suicide rate in Africa and number 11 in global ranking of countries suicide rates [20]. The researcher conducted a preliminary survey (Appendix 1) among the NUST students, and there were 22 respondents, of which 65% of the respondents were female students and almost 40% of the respondents stated that stress was a usual feeling they experienced. Almost 80% were unaware of existence of mHealth application for stress management.

Students have also developed different self-help ways to cope with stress. Students use coping mechanisms like mindfulness [2], self-regulation, meditation [3], physical activities such as walking or running, and some just sleep. The use of mHealth applications and combined with any of the different coping mechanisms have a chance of succeeding, as their will be a means of tracking their progress, personal intervention or unique experiences for each student. It provides cheaper and less stigmatizing alternatives to other means of healthcare services[21].

There are several studies on stress management using mobile technologies [22] [23] [24] [25] [26], and persuasive strategies developed to support behavioral change among people using mHealth apps for health conditions, there is a lack of studies exploring what persuasive strategies can support stress management among university students, specifically in Namibia

3 Significance of the study

Unmanaged stress negatively impacts on the health of students and it has a tendency of leading to mental health disorders [27]. This study aimed at developing persuasive strategies that will facilitate the use of existing mHealth applications to support stress management among university students in Namibia. Stress is a growing problem that impacts a significant proportion of people [4].

The findings of this study could potentially equip mobile app developers to create or adjust their apps to sufficiently address the stress situation of university students, especially from design phase. mHealth app designers and researchers in the area of user interface design and human computer interaction for stress management can find this work valuable. There is limited theoretical framework to prove the efficacy of the strategies in developing countries. It will be interesting to see more studies on the sustainable persuasive strategies for a long-time behavioral change.

4 Research Objectives

The main research objective of this study is to develop persuasive strategies that will facilitate the use of mHealth applications to support stress management among NUST students.

In order to achieve the main objective of this study, the following sub-research objectives must be addressed:

- To investigate the elements of persuasive strategies in mHealth applications for stress management in the current literature.
- To investigate the elements of persuasive strategies to facilitate the use of mHealth applications relevant to support stress management among university students in Namibia, as determined by NUST students.
- To develop guidelines and recommendations capable of persuading students to use mHealth for stress management and instructional to developers and designers of mHealth app for stress management.
- To validate the elements of persuasive strategies in mHealth applications relevant to support stress management among university students in Namibia as determined by professionals in mHealth practice.

5 Research Methodology

This study followed a qualitative research methodology in collecting data and adopted the research onion model [28], which was made up of 6 layers that the researcher engaged, just like peeling an onion. The methodology adopted the following sections.
Philosophy: This research will adopt the interpretivism philosophy because it involves the use of qualitative (focus group discussion, case study, semi-structured interviews, expert reviews and literature reviews) methods in the data collection and

analysis. Furthermore, it allows the researcher to explore any view on the object evaluation in order to reach the target audience based on the research questions [29].

Approach: The study the approach was inductive (Mathers, Fox, & Hunn, 2002). it entailed the creation of theory on how to introduce persuasive strategies to facilitate the use of mHealth application for stress management among NUST students. Inductive approach used the data generated from the research design to build or support a theory.

Strategies: Design Science Research is suitable for behavioral science related studies [31].

Research Choice: The researcher used qualitative method, as the study involved qualitative data which included interviews, the qualitative approach is primarily used for exploratory research [28]. The qualitative data collected through various methods which included systematic literature review, semi-structured interviews and focus group discussions. The findings will be analysed using content analysis and theme analysis.

Time horizons: Cross sectional study was used in this study due to the limited time involved.

Data collection and analysis: The first phase of the study will be conducted through a systematic review which will be analysed using content analysis. The aim of the systematic review is to identify persuasive strategies in mobile apps. In the second phase of the study, NUST students and mobile application development professionals will evaluate and validate the persuasive strategies identified in the systematic review to recommend the appropriate persuasive strategies suitable for incorporation into mobile apps for stress management which can be used by university students. Data collection will entail group discussions and interviews involving diverse segments of NUST students' population. Thematic analysis will be used to analyse the findings.

6   Limitations

This study is limited to developing and recommending guidelines for persuasive strategies for mHealth applications for stress management for university students. The research does not include the development of any mobile application.

7   Ethical considerations

The procedure for this research is based on NUST's research ethics (NUST YearBook, 2020). The proposal was approved by the Department of Informatics and the Higher Degrees Committee (HDC).

8   Conclusion

The purpose of this study is to develop persuasive strategies to facilitate the use of mHealth applications for stress management among NUST students. The findings of this paper could lead to the development of mHealth applications for stress management among university students using the appropriate persuasive strategies. This could facilitate personalization in terms of stress management mobile applications for university students. Although this study will be conducted at NUST, the findings can be applied in similar university settings where student challenges are of similar patterns. This is an ongoing research towards a Master of Informatics programme at the Namibia University of Science and Technology.

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