Decreasing Students' Stress Through DeStressMeNow Mobile App

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***Abstract:** Disseminating information on psychological health for university students is critical to university adjustment, interpersonal relationships, academic issues, and others. Using smartphones as the mean of conveying information is vital as it become devices of choice for the millennials. On this basis, the study aims in developing DeStressMeNow app that acts as early preventative tool in managing stress: to identify stressors, to understand its negative consequences, and to cope with stress. There are three main parts; online activities, offline activities and a podcast; along with detailed definition, self-assessment, techniques and strategies, and stress management success stories revealing the app novelty and uniqueness. The results from Usability Testing show that Relax Your Mind is the favorite segment of the app and is effective in managing stress. Further, the results of the effectiveness study of the app showed its significance in decreasing the stress level among university students. It extends the Emotional Intelligence principle in stress management and improve students' health. We are proposing a mobile app, a technical version of stress management module, as an accessible instrument to prevent the high occurrence of stress among university students*

Keywords--- Stress, mobile apps, students, emotional intelligence, health

1. INTRODUCTION

It is widely known that young people experiencing mental health problems such as stress, depression, and anxiety may face problems in their academic performance. This is critical information, as psychological stability of an individual is an important predictor which could contribute to high academic achievement [1]. The factors causing stress, or stressors, range from low competent in managing oneself and others, to assignments datelines, financial problems, and isolation. These negative consequences are detrimental and if not addressed appropriately, may result in chronic mental health issues such as sleep deprivation, depression, and suicide.

In a recent study, Holt described research on stress and the effect on student's academic performance. This descriptive study accessed the level of stress among students, and investigated the factors of students' stress [2]. From the result of the study, the overall students were in moderate stress level (58.63%), while statistic showed a negative correlation between stress and academic performance. Therefore, stressful situations are linked with poor academic activities and performance. Prior to this study, a needs analysis was conducted to 261 students in a local public university to assess the degree to which students experienced unique stressors. Using the 11-items College Students Stress Scale (CSSS; Feldt, 2008), a majority of the students

reported experiencing academic problems (3.52%), followed by meeting up goals (3.25%), anxiety about financial issues (3.24%) and managing difficulties in life (3.21%). Based on our evidence, there are various kinds of stress and it is important to address every stressor students are facing.

Martin et al. noted that computational-based techniques and now mobile apps are showing promise to enable ease of use and access while educating end users on self- and stress management [3]. However, despite abundant of stress strategies apps created, they are not comprehensive in covering all unique stressors. They are focused on the stress detection or on specific strategy alone. This study aims to fill this gap.

The purpose of developing this app is to address the stress issue and support students with psychological principles, and at the same time, make the app attractive for millennials to use. The principles of Emotional Intelligence are introduced and embedded in those attractive features and segments that are accessible for students in their smartphones [4]. Additionally, this app has been created based on a self-help module to works as predictive tool and as an early intervention for stress among students.

2. LITERATURE REVIEW

The preliminary theory of stress by Lazarus (1984) defined stress as the way that our body responds to environmental demands made for us, and our perceptions and interpretations on those demands (Lazarus, 1990). There is positive stress, or eustress, that could have a healthy effect for individuals and keep us more aware and alert to what happening around us. However, usually experiencing stress consistently or for a longer period of time will have negative consequences on the human body, especially on young individuals that may have difficulties appraising and coping with stress effectively [6].

A university student's life is particularly challenging, as there is a need to adapt to various changes from the time she enters university [7]. Some might be able to deal with the new routines, but some might not, causing them to fall into significant distress and leading to poor academic performance [8]. For example, studies on stress among university students have shown that there are variety of stressors resulting to students' apprehensions and disturbed relationship outcomes [9, 10]. With the propensity for health issues to hinder the success of university students, it is vital that they are provided with ample information on stress.

An in-depth look at how stress management is disseminate to university students, mobile based techniques and apps shows promise in terms of ease of use and access, while educating end users on self-management [11]. Studies by Junker and Baras created stress monitoring activities on mobile app for new students cope with unique stressors in the university [12, 13]. Borjalilu, Mazehari and Talebpour showed university students' stress level decreased after an app introduced by the authors [14]. Several other apps offer very limited exercises or techniques, but these exercises have shown improvement for stress relief aids [3]. Apps such as *Meditation* and *Relax* offer activities from yoga, breathing and meditation exercise, noting the importance of managing your emotions and direct your energy for calming. This is in line with a study by Sirgy and Wu in which students sometimes become stressed when they devote too much time and energy to one aspect of their life, at the expense of other important areas [15].

Emotional intelligence (EI), referring to a set of abilities on how one effectively recognizes and deals with emotions within oneself and others forms the backbone of the app [4, 16]. EI can further assist in regulating moods of people in altering those stress using its five components; self-awareness, self-regulation, social skills, motivation and empathy, to improve self-management and emotion-focused coping respectively among students. Studies from Miri, Kermani, Khosbakht and Moodi and Bryant and Malone have shown that students with higher emotional intelligence are able to decrease stressful feelings when they able to appraise the stress accordingly. They are then able to cope appropriately with negative reactions [17, 18].

FIELD STUDY

This section describes the details of three studies conducted in the scope of this project. First, a needs analysis was conducted to investigate the unique stressors students are experiencing. The second study was Usability Testing to assess students' experience on testing the prototype of DeStressMeNow app. With this, students' suggestions in terms of preference and challenges they experienced on the app functionalities and user interface is obtained. Finally, an analysis of the app was conducted to determine the effectiveness of the app among university students.

Needs Analysis

The first phase of the project started with a survey among 261 students in a public university in Malaysia. 219 female and 42 male students, ranging in age between 18 to 28 years old, with an average of 20 years old, composed the sample. The survey was prepared online and in printed form. There are two sections: demographics and also College Students Stress Scale (CSSS; Feldt, 2008). In the second section, respondents were asked how frequently (on a Likert scale, 1 being "Never" and 5 being "Very Often") these type of stressors occurring in their current semester for themselves.

Needs analysis Findings

The analysis indicates that academic stressors occur more frequently than other stressors, as shown in Figure 1. Respondents felt anxious or distressed the most concerning academic matters (3.52), followed by inability to achieve goals (3.25), anxious or distressed on financial matter (3.24), housing (3.21), plans that are not going as planned (3.06), relationships issues (2.83), family, and overwhelmed by difficulties in life respectively (2.71). The lowest three stressors respondents experience were inability to handle difficulties in life (2.58), and feeling distressed about being away from home (2.56) and the least stressor was feeling as though they were no longer in control of their lives (2.53).

Figure 1
Unique stressors experienced by students in needs analysis study

STRESSORS OF STUDENTS
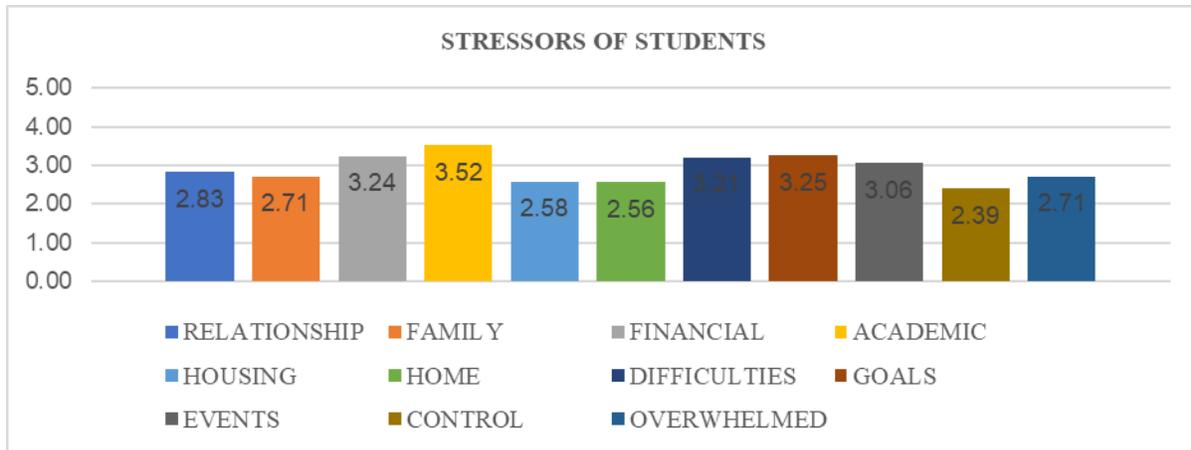
Usability Testing

The second phase of the project is a usability testing involving observation technique. The usability testing is conducted using the prototype of the app the study is proposed, called DeStressMeNow app. There are three main parts of the app: online activities, offline activities and a podcast. Each of these parts have detailed definitions of stressors, consequences, and strategies to cope with the unique stressors. Figure 2 shows screenshots of the DeStressMeNow app. For online activities, there are also segments of self-assessment and stress management success stories that is provided on a forum. In the podcast, users have the opportunity to engage with stress information via listening.

This includes offline activities, definitions, techniques and strategies using the principle of Emotional Intelligence (EI). The aspects of managing emotions for oneself and for others are explained in the definitions, while the strategies are offered for each part are derived from the conceptual explanation of the self-awareness, self-regulation, motivation, social skills and empathy components. Examples include sharing is caring, breathing technique, listening to music, gardening, yoga, and interactive games highlighting the holistic use of each of the components of EI.

Figure 2
Screenshots of DeStressMeNow app
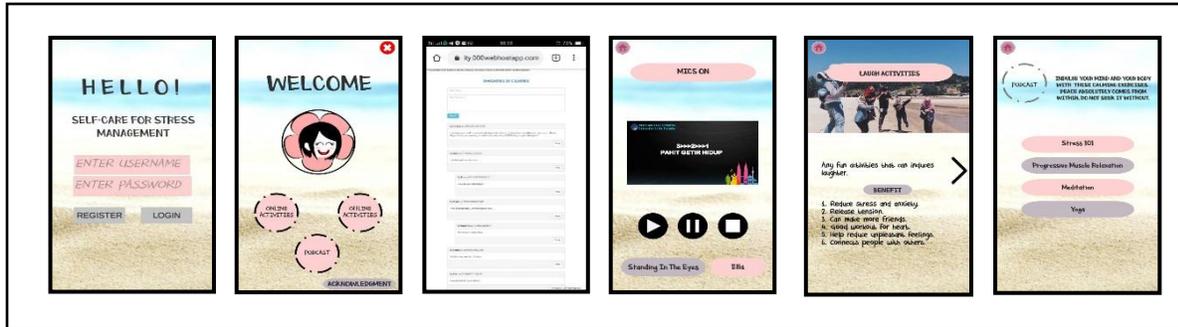
Respondents were required to walk through the prototype by following the instructions from the tasks provided in the study (Figure 3). At the end of the tasks, they were asked to complete a Usability Testing survey, in which four out of six items were open-ended. Respondents were asked (on a Likert scale, 1 being "Strongly Disagree" and 5 being "Strongly Agree") about the functionalities and user interface of each segment. A group of six students (1 male and 4 females) with ages ranging from 24 to 27 years old participated in the study. A navigable app prototype was provided to the users on both a smartphone and a laptop.

Figure 3.
A list of tasks for DeStressMeNow app
First Task : You need to register and log into the application.
Second Task: This segment provides a self-assessment that can identify user's individual and level of stressors. Try to answer and identify your main stressor. *Go to Assess Yourself* segment to answer
Third Task   : You want to know more about stress and what causing them to happen. Go to *Introduction for Stress* to find out more.
Fourth Task   : This segment provides a platform for users to interact with each other. Share your success stories on managing stress on forum provided in *Sharing is Caring* segment.
Fifth Task : Listening to music can lift up your mood instantly. Go to *Relax Your Mind* segment to listen variety of harmonious music. Suggestion:

        1) Sand and Sea
         2) Mozart: Winter Sonata

Sixth Task: You definitely loves to sing your heart out. Go to *Mics On* segment to sing
         along with your favorite song.
Seventh Task   : You want to know more about benefits in practicing yoga. Go to *Yoga* segment
         to find out more.

Eighth Task   : You have been interested in meditation that actually proven to lower
         your stress level and bring calmness. You want to know how to do it
         correctly. Go to *Meditation* segment to find out more.
Ninth Task   : You want to know how gardening can lower your stress level. Go to *Gardening*
         segment to find out more.
Tenth Task   : You want to listen to podcast and doing progressive muscle relaxation
         exercise as it is beneficial for you. Go to *Podcast* to find out more.
Usability Testing Findings

After completing the tasks, user experiences and challenges of the app were received. Three out of four users agreed that *Relax your Mind* was the favourite segment of the app, followed by *Sharing is Caring* and *Yoga*. They strongly agreed that the music in the *Relax your Mind* segment is effective in managing stress and also well-functioning. One of the users is further commented that "The music video can be viewed in different language[s]…add English song[s] perhaps" and the suggestion has been taken to consideration.

All four of the users felt that the app is accessible, convenient and easy to use. Most of them liked the idea the app is free for users, especially the forum segment that allows users to interact. One user commented, This section helps me and give me awareness that everyone was having stress and it is our choice to manage it. The forum section can be changed to be more friendly-user and attractive..." This suggestion will be taken into account to improve the segment, as it is perceived as one of the highlighted segments of the app.

After this usability testing study, other usability issues were resolved and the overall interface of the app was improved. Based on the results of the needs analysis surveys and the usability testing study, the functionalities and user interface of the app were improved by the researchers involving team of psychologists, a software engineer and instructional design expert.

Effectiveness of DeStressMeNow app

A total of 28 students (3 males and 25 females) were recruited for an effectiveness study on DeStressMeNow app. The study was conducted by sending out online a 11-items College Students Stress Scale (CSSS; Feldt, 2008), which was the same questionnaire used for Needs Analysis. Similar procedures with Usability Testing study in which users are invited to walk through the app prior completing the questionnaire. Users were also provided with informed consent explaining the research objectives, voluntariness to participate, confidentiality, benefits and limitations of the study.

Effectiveness of DeStressMeNow app analysis

In this section, a t-test with level of significance of 0.05 is used to determine the effectiveness of the app. As shown in Table 1, there was a significant difference in the mean reduction of stress level between pre-test and post-test ($t = 4.533$, $p < 0.05$), with the standard error of the mean of .993, and 95% confidence intervals of 2.463 to 6.537. As shown in Figure 4, only two participants showed an increase in the post-test score of the mean stress level, indicating the overall success level among the participants.

Table 1
Paired Samples Test

| | | Paired Differences | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
					Lower	Upper			
Pair 1	Pre_Test - Post_Test	4.500	5.253	.993	2.463	6.537	4.533	27	.000

3. DISCUSSION

The aim of this research is to propose a stress mobile app which focuses on self-management and which is attractive to university students. To address this main objective, three studies have been conducted and a discussion of the studies have been revealed. The needs analysis study reveal that university students face various stressors and levels during adjustment in university life: the most important is academic stress, inability to achieve goals and distressed or anxious on financial matters. These results are in line with research by Joseph, Panicker, and Nelliyanil and Wons, Bargiel and Matusiewicz showing that young individuals have different stressors and need different strategies to address them [9, 10]. In order to address this finding, a prototype of the app, DeStressMeNow app has been built composing of online, offline and podcast activities with various features and segments emphasizing user friendliness.

Next, the Usability Testing study explored the functionalities and user interface of the app by receiving feedbacks on how the app able to meet students' interests and needs in managing stress among themselves. For example, songs in English languages are suggested and added in to *Relax your Mind* segment to address students who are only able to speak and understand English language. Also, no words limit has been set in the forum to increase the possibility of sharing more stories among the students. To improve the app, an effectiveness study was conducted to test the functionalities of the app in reducing stress level among students. The significant result of mean scores between post-test and pre-tests showed students stress level decreased after using the app. The results show the app may be deemed effective in managing stress for the university students. Consistent with literature by Miri, Kermani, Khosbakht and Moodi and Bryant and Malone, a possible explanation for this significant result is because of the use of components of Emotional Intelligence, including self-awareness, self-regulation, motivation, social skills and empathy, covering all plausible stressors [17, 18].

5.CONCLUSIONS

In conclusion, this app is effective in helping university students to easily and conveniently manage their stressors and become more relaxed in day-to-day life. This app establishes an interactive stress management strategy which includes sharing is caring, breathing technique, listening to music, gardening, yoga, interactive games highlighting the holistic use of each of the components of Emotional Intelligence. The research also describes an initial proof of concept study for Malaysian university students carried out to assess the potential utility of a newly developed mobile app in the management of stress.

Further analysis is needed with a larger and more diverse sample to cover university students with various backgrounds and with more robust findings. As this study scope is limited, future user studies with higher fund resources should consider developing own interactive games which require more data for past processing. Notwithstanding this limitation, these results alert us to the importance of developing measures like the DeStressMeNow app to promote self-management and act as a preventative tool among university students. Considering that such technology is already an inseparable part of people's daily lives, stress management through mobile apps that are accessible, convenient and efficient offer powerful potential to improve mental health

6. ACKNOWLEDGMENT

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