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StressOnCampus: An App for Stress Management

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Abstract

The goal of this study was to develop a mobile app that would be used as a self-help and stress-reduction tool for university students. The StressonCampus app adopted a hybrid questionnaire based on the DASS-21 and Kessler PT models, which identifies the level of stress and, likewise, provides suggestions for relaxation exercises. The improved version of the app includes a chatbot or conversation agent that allows a dialogue with the student to detect the student's stress situation and present a relaxation recommendation based on it. A group of students used the app for two weeks, allowing them to assess their stress levels before and after performing the suggested relaxation exercises.

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1. Introduction

College students are more likely than the general population to suffer from mental health issues. University psychological support departments are limited in terms of both financial and human resources, however, social stigma prevents students from seeking these services.

Stress is a major mental health issue among college students. Stress is an unpredicted response that the body produces in response to overload(Lee and Jung 2018). Due to differences in cognitive processes, each person perceives stress and the environment in which he moves differently.

A result of the specificities of its requirements, the academic environment is conducive to students expressing stressful situations(Davies, Morriss, and Glazebrook 2014). As a consequence, it is critical to provide students with the skills and tools they need to recognise these situations and train themselves to avoid and control the effects of stress (Ebrahimi 2019)(Schutte, Malouff, and Thorsteinsson 2013).

Due to students' constant contact with mobile technology, mobile health monitoring apps are a discreet and affordable way to support college students' self-monitoring of health.

The purpose of this work was to create StressOnCampus, a mobile application that incorporates a conversational agent and allows students to identify their level of stress. Specific questionnaires, already validated in the field of psychology, are used for this purpose, and it is recommended to conduct relaxation exercises in a personal, interactive, and appealing manner, using the student's mobile phone.

2. Stress measurement and management

Stress can be measured objectively using physiological and physical methods, but the results may contain errors(Vanitha and Suresh 2014). Subjective assessment, or using questionnaires

designed specifically for this purpose, allows for the measurement of stress based on the individual's perception of feelings and events. This procedure becomes simpler and faster over time and is now commonly used in clinical settings(Adewuya, Ola, and Afolabi 2006).

The Kessler PT questionnaire, designed to detect anxiety and depression in higher education students in Portugal, produces consistent results(Pereira et al. 2019). It can be combined with the DASS questionnaire due to their similarities, with the advantage of obtaining a questionnaire capable of measuring stress levels(Arusha and Biswas 2020).

It is nearly impossible to eliminate stress what is sought is the reduction of situations that lead to its occurrence, as well as a better personal management of how each individual faces them(Mital, Kilbom, and Kumar 2000). To that end, various techniques can be used to reduce the imbalance in the relationship between the individual and the environment, and this relationship can be formed based on the sociological environment or by focusing on the individual.

Mindfulness-Based Stress Reduction (MBSR) is a renowned stress-reduction technique. It is a meditation technique for balancing the mind that allows the person to train full attention on himself. Among the proposed exercises, which can be performed in a variety of positions, are simple stretching, breathing exercises, and yoga, which create conditions for breathing control and blood pressure reduction(Zivin et al. 2009).

2.1. Personal Stress Monitoring Applications

Mobile applications have already been used in the context of mental health to aid in the detection of emotional disorders as well as the level of stress(Sano and Picard 2013). Plenty of them are geared toward self-help, so they allow the user to train and manage stress in their own unique way, or to improve their emotional intelligence skills(Hwang and Jo 2021).

Among these applications, those based on passive questionnaires stand out, as they enable a study of stress by compiling the user's responses to the questions presented to him. These questions consider a variety of dimensions, including the individual's affective, behavioral, physical, and cognitive dimensions. Monitoring the stress level, on the other hand, can be done through a conversation with a chatbot or chatterbot conversation agent, during which questions aligned with such questionnaires are presented.

Serious games are another method that can assist the user in adopting a different posture in stressful situations. These games are based on developmental theories and employ Virtual Reality and Augmented Reality techniques to allow users to develop and train their emotional skills and abilities(McCallum 2012).

2.2. The StressOnCampus app

The development of the stressoncampus application in this study began with the requirement of fluid navigation, direct responses to the user, and a secure authentication mechanism. Following completion of the survey questions, the app allows the student to perform a relaxation exercise based on a video with instructions.

The app uses questions from a combined questionnaire synthesized from the DASS-21 and Kessler-PT questionnaires, which focus on evaluating personal experiences and events from the previous seven days. Figure 1 depicts the main interactions between the actors in the app.

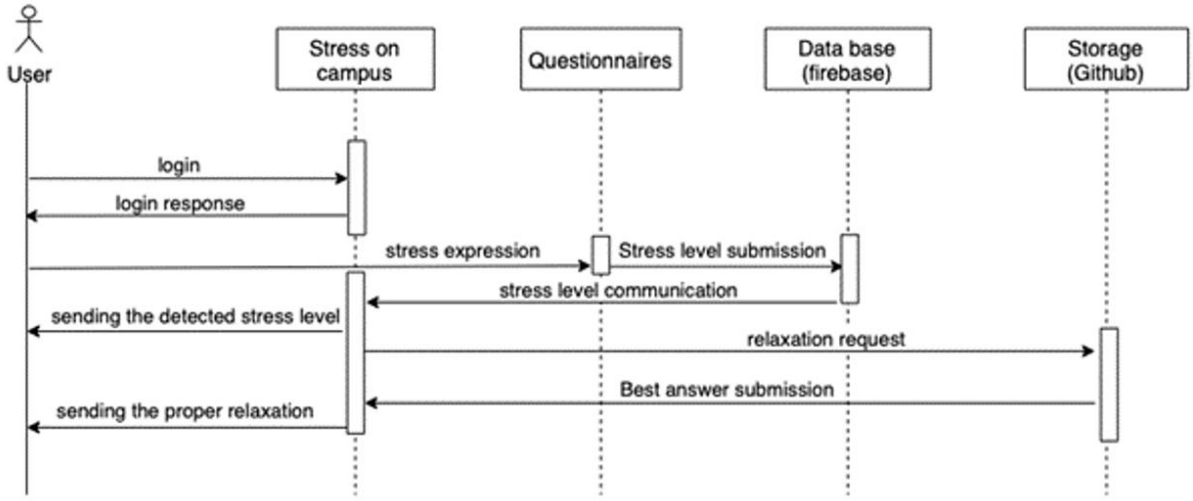

Figure 1 - Sequence Diagram of the Stressoncampus

The operating principle of the app is essentially based on capturing information and sending it to a server, which processes, analyses, and identifies the user's state of stress, and then provides a training and/or relaxation service.

The app is divided into three sections, the first of which is dedicated to authentication using the assigned credentials, the second of which requires the student to complete the questionnaire and submit it, so that the application can perform the necessary calculations and finally display the interpretation of the result with the level of stress and the type of relaxation programme suggested.

2.2.1.Chatbot

The chatbot was developed as part of the stressoncampus app. When using the chatbot, students can write down their experiences, both positive and negative, and the app will provide guidance.

Different Google tools were used in the development of the chatbot, ensuring good integration. The DialogFlow environment is used for Natural Language Processing, a technique that allows you to understand the user's dialogue by capturing the keywords and discarding the rest. The flutter app development tool was used, and the Google CloudPlataform platform enabled secure app access and real-time communication with the Firebase database.

2.3. Results

The features of the StressOnCampus app were evaluated using two groups, one control and one test. They were formed by students from various faculties at the University of Porto. A preliminary questionnaire was used to determine the initial state of students' stress in relation to the demands of the academic environment during the semester's examination phase.

And after that, the app was distributed to the test group. It was recommended that this group use the app at least three times per week. Basically, the students answered the questions in the mixed questionnaire and then received a video recommendation for a relaxation exercise. They could also use the augmented version of the app, which had a chatbot-like interface. This took key expressions from the established dialogue and responded to them.

After the two-week evaluation period was over, students in both groups were asked to complete the stress level assessment questionnaire once more. Students who used the app reduced their stress levels, whereas those who did not used it maintained or worsened their

anxiety levels. Those who have used the app are enthusiastic about the chatbot interface and suggest ways to improve responses.

3. Conclusions

The primary goal of the presented study was to develop a stress management app for students. The use of previously validated questionnaires allowed for a psychologically safe starting point that proved adequate for detecting and assessing stress in students.

The created system, which includes the app and a remote database, runs in real time. The collected personal information is only used to access the application. Other data gathered in relation to stress identification is stored anonymously for statistical purposes only.

Understanding how it works and connecting the firebase and github platforms to the stressoncampus app were difficult but necessary tasks to ensure the systems worked together.

The main objectives of the work, the development of the stressoncampus app using validated questionnaires and a conversational agent that can eventually prevent extreme stress situations for students that normally trigger anxiety and emotional disorders, can be said to have been met.

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