

# A Literature Review of Application-based Technology in Stress Management for Students

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**Abstract** — *Stress is a condition of mental pressure when someone is facing problems from environmental and social well-being that may also lead to physical problems. Students are most frequently affected by stress due to their academic life. Stress management arises as one of the solutions to help students through stressful times. As the technology becomes advanced, applications based for stress management are developed to become a more convenient and comfortable solution. Various kinds of applications for stress management are available on the Application store. This writing's objective is to discuss the various implementations of application-based technology, such as mobile application, in stress management for students.*

## I. INTRODUCTION

Students today experience high levels of stress in many areas of life. Stress is a reality of everyday life of students. They often experience stress that comes from their academic life. The source of the stress is called a stressor. Stressors may come from the inability to carry out their obligations as a student or high demands and expectations of one self or the environment against students' academic performance (Gamayanti, 2018).

Beside the academic life, there are other stressors that have a major impact in causing students to experience stress. Phinney and Haas (2003) explained that sources of stress more specifically as a unique set of stressful encounters among students which includes: difficult

financial challenges, domestic responsibilities, responsibilities related to holding a job while in school, and a heavy academic load.

Stress may cause problems in students' lives. Owusu and Essel (2017) stated that stress may affect students' life academically, leading them to have bad performance in school work. Secondly, stress also impacts student's life socially (Owusu & Essel, 2017). Stress causes students to be pushed away from people and even their closest friends. Furthermore, stress also causes restlessness in students making them always feel so tired. In extreme cases, stressed students may be trapped in drug abuse, alcohol, and tobacco (Owusu & Essel, 2017). Lastly, students with stress may show some outward signs of anxiety, depression, and other emotional anomalies. This emotional impact will likely to arouse suicidal behaviour and even suicide attempts.

Based on survey research by EL-Matury et al. (2018), 23.4% students are having stress out of 500 students participants. A research in 2014 found 21.6% nursing students experiencing depression with more than 60% experiencing stress. As the demands number of stressed students have increased, demands of qualified solutions will also likely to increase.

Stress management arises as one of the solutions to help people through stressful times. The intensity of stress and the perception of stress are unique and different from person to person, time to time, and situation to situation. Different people may have different strategies in managing their stress. Stress managements are a varied collection of techniques and methods to help people manage their stress.

As the technology becomes advanced, application based for stress management is developed to become a more convenient and comfortable solution. Especially for students in Indonesia, it shows promising potential as more than 55% of the students spend more than five hours a day on their mobile devices (Pratama, 2018). This promising solution can be developed to produce qualified solutions that are suitable for the students' situation. Later on, this writing will discuss the implementation of application-based technology in stress management for students that can be developed as qualified solutions.

## **II. LITERATURE REVIEW**

### **Definition of Stress**

According to Lazarus and Folkman (1984), stress is a mental or physical phenomenon formed through one's cognitive appraisal of the simulation and is the result of one's interaction with the environment. The term "stress" was actually used first in physics in order to analyze the problem of how man made structures must be designed to carry heavy loads and resist deformation (Kassymova et al, 2018). According to Wheeler C. M. (2007), stress is a word of physics, which refers to the amount of force used on an object and it somehow relates in real life to how certain issues that carry force are applied to humans.

Stress is the process by which a person reacts when faced with external or internal problems and challenges. Selye (1956) defines stress as "any external event or any internal drive which threatens to upset the organism equilibrium is stress". Stress is a condition or feeling experienced when a person perceives that demands exceed the personal and social resources the individual is able to mobilize.

### **Stress Management**

Stress management is a key factor one should adopt in their whole life which is aimed to control a person's stress especially which is normally for the motivation improvement in one's life. Regardless of stress often being thought of as a subjective experience, level of stress can be measured using different physiological tests. Many stress management techniques are available for controlling and not harming one's immune systems. Few stress management techniques are finding a hobby, daily exercise routine, writing your feelings and thoughts. Evaluating stress management techniques can be tough as it is limited and will be different for different kinds of people. Not all techniques are suitable for different kinds of persons. It might require different techniques for the same factor of stress among different persons. Stress management is the one every individual should adopt in everyone's life as it will be useful not to harm themselves and accomplish their daily routines successfully and live happily.

### III. METHODOLOGY

Information needed is collected by combining and reviewing literature. A review is conducted from eight literatures (article, proceeding, books, etc) (APPENDIX A). Literatures are chosen based on its topics, publication year, and journal publications. Literatures must be related to the topic of *Stress Management Application* or *Stress Management*. Beside the main idea of *Stress Management Application*, the idea of other *Stress Management* techniques and methods are needed to be discussed as a recommendation. Publication year of the literature must be no older than 2017. Publication journals must be indexed in Scimago Journal ([www.scimagojr.com](http://www.scimagojr.com)). The literature will be summarized and combined to see all possibilities of the implementation. List of literatures are collected from *Sage Publication*, *ScienceDirect*, *JSTOR*, and *Scopus* which can be accessed through [remote-lib.ui.ac.id](http://remote-lib.ui.ac.id).

### IV. DISCUSSION

The purpose of this literature review is to evaluate and discuss the literature related to the use of application-based technology in stress management for college students. The objectives for this review are listed below:

- To summarize the current state of research related to the use of application-based technology in stress management for college students.
- To discuss the strengths, weaknesses, and issues in the previous research.

#### **The Study of Stress Management Application**

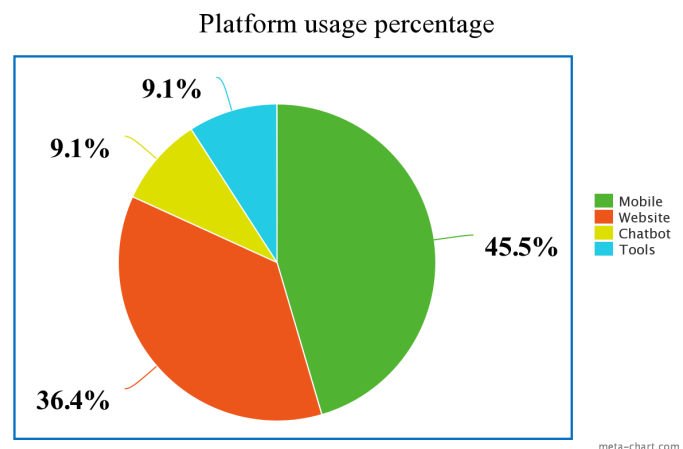
The study of application-based technology in stress management has been conducted for some kind of purposes. Some applications have also been published to the public, such as Healthy Path (Morrison et al, 2018), Healthy Mind (Morrison et al, 2018), Minddistrict (Hareer et al, 2019), StudiCare (Hareer et al, 2018). There also exists applications that are being developed and evaluated, such as The Uni Virtual Clinic (Farrer et al 2019) and Bonobot (Park et al, 2019). Most of the research due to stress management applications are discussing the hypothesis about quality of developed applications.

All the studies aim to analyze different techniques in stress management. While most of the literature are showing the efficacy of application-based technology in handling stress, there still exists study that has proven that stress can be reduced by using stress management modalities such as massage chairs or meditation (Bennion, 2017). (APPENDIX B)

### **Stress Management Application Characteristics**

Based on Application Characteristics Table (APPENDIX C), online application type is the most chosen one to reach the subjects of stress management application. It is chosen because of its ability to reach any kind of research subjects even in great distance like distance-learning college students (Hareer et al, 2019). Beside that, the implementation of stress management application is likely to be developed in Mobile platform (Chart 1). It is likely to occur regarding the massive usage of mobile smartphones nowadays. Based on datareportal (datareportal.com, 2019), there are 5.112 billion unique mobile users or equal to 67% of population in the world.

Features	1	2	3	4	5	6	7	8
Healing	✓							
Breathing methods	✓		✓			✓		
Therapy modules	✓	✓				✓	✓	✓
Health information	✓	✓				✓		
Screening tools		✓						
Monitoring condition			✓		✓	✓		
Social interaction			✓		✓	✓	✓	
Psychoeducation modules					✓		✓	
Planning activities					✓		✓	
Intervention expert					✓	✓		
Others				✓	✓		✓	



(left)Tabel 1. Feature listing of every application.

(right)Chart 1. Percentage of different platform in the implementation of stress management application

Therapy modules become the most favoured feature in stress management applications as more than a half of the applications reviewed include therapy modules as its feature. Therapy modules such as Cognitive Behavior Therapy, Mindfulness-based, or Breathing Modules are indeed proven to be needed in a stress management application. It provides people with a new perspective on a situation, enabling people to regain control of self, and will improve the ability

to solve personal problems also reduce and eliminate stressors by itself (Harrer et al, 2019). The data also said that social interaction is needed in terms of getting rid of stress. Interaction might come from experts or even fellow friends. There also arise a different kind of feature for stress management solution; chatbot (Park et al, 2019). Chatbot is something new as the development of this feature is considered to be difficult to implement.

### **Research Design Characteristics**

There are many research studies with subjects of college students (Farrer et al, 2019; Bennion et al, 2017; Harrer et al, 2018; Harrer et al, 2019). The aims of these researches are to reduce the stress level of students due to academic load and to improve the academic performance due to the improvement of healthy well-being. Beside students, graduated students like employees are also relevant to the situation of need in stress management (Hwang and Jo, 2019; Baek et al, 2018).

Most of the research is conducted with a long period of time and gradually follow-up the results to the subjects. This is not limited to all the research, a one-shot research is also possible to be done (Park et al, 2019). (APPENDIX D)

## **V. CONCLUSION**

Stress is the process by which a person reacts when faced with external or internal problems and challenges. Selye (1956) defines stress as “any external event or any internal drive which threatens to upset the organism equilibrium is stress”. Stress is a condition or feeling experienced when a person perceives that demands exceed the personal and social resources the individual is able to mobilize.

Stress may cause problems in students' lives. Stress can cause many effects in students' lives either academically, socially, physically, or emotionally. In extreme cases, stress may lead to drugs abuse or even suicide. A development of solutions for stress problems in students might be needed in order to improve a healthy well-being and life in all aspects.

As the technology becomes advanced, application based for stress management is developed to become a more convenient and comfortable solution. App-based technology in stress management has become a new trend in solving stress problems among students. These applications are equipped with different features in different platforms. The features are created based on some psychiatry and psychological factors of stress, such as Cognitive Behavioral Therapy and meditation. Some applications are ready to be published and few are in the stage of development.

Regardless of how much research has been conducted to solve stress problems for college students. More research may still have to be conducted regarding different and unique stressors of stress in people.

## **VI. RECOMMENDATION**

Some research may still be in the stage of ideation or not implemented in the form of application-based technology. It is recommended to do more creative work to digitalize the non-app solutions because physiologically has proven that these solutions can be of help to reduce and manage stress. It is also suggested for everyone who is willing to contribute to the research of stress management to explore more about psychiatry conditions or psychological aspects in terms of getting a more reliable and meaningful solution.

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## APPENDIX A

**Literature Review Information Table**

No	Title	Author	Pub Year	Publication Journal/Conference
1	Evaluation of the Effectiveness of Mobile App-Based Stress-Management Program: A Randomized Controlled Trial	Won Ju Hwang, Hyun Hee Jo	2019	International Journal of Environmental Research and Public Health ( <i>H Index: 78</i> )
2	A novel multi-component online intervention to improve the mental health of university students: Randomised controlled trial of the Uni Virtual Clinic	Louise M. Fareer, Amelia Gulliver, Natasha Katruss, Daniel B. Fassnacht, Michael Kyrios, Philip J. Batterham	2019	Internet Interventions ( <i>H Index: 19</i> )
3	Comparing usage of a web and app stress management intervention: An observational study	Leanne G. Morrison, Adam W.A. Geraghty, Scott Lloyd	2018	Internet Interventions ( <i>H Index: 19</i> )
4	A comparison of four stress reduction modalities on measures of stress among university students	Erica Bennion, Michael N. Olpin, Mark DeBeliso	2018	International Journal of Workplace Health Management ( <i>H Index: 16</i> )
5	Internet- and App-Based Stress Intervention for Distance-Learning Students With Depressive Symptoms: Protocol of a Randomized Controlled Trial	Mathias Hareer, Jennifer A. Hagen, Lara Fritsche, Marie Drüge, Ludwig Krings, Korinna Beck, Christel Salewski, Anna-Carlotta Zarski, Dirk Lehr, Harald Baumeister, David Daniel Ebert,	2019	Frontiers in Psychiatry ( <i>H Index: 52</i> )
6	Smart Stress Care: Usability, Feasibility, and Preliminary Efficacy of Fully Automated Stress Management Application for Employees	Ji Hyun Baek, Jeong Hyun Kim, Sohee Oh, Ju Young Kim, Soyoung Baik,	2018	Psychiatry Investigation ( <i>H Index: 26</i> )
7	Effectiveness of an Internet- and App-Based Intervention for College Students With Elevated Stress: Randomized Controlled Trial	Mathias Hareer, Sophia H. Adam, Rebecca J. Fleischmann, Harald Baumeister, Randy Auerbach, Ronny Bruffaerts, Pim Cuijpers, Ronald C Kessler, Matthias Berking, Dirk Lehr, David Daniel Ebert	2018	Journal of Medical Internet Research ( <i>H Index: 116</i> )
8	Designing a Chatbot for a Brief Motivational Interview on Stress Management: Qualitative Study	SoHyun Park, Jeewon Choi, Sungwoo Lee, Changhoon Oh, Changdai Kim, Soohyun La, Joonhwan Lee, Bongwon Suh	2019	Journal of Medical Internet Research ( <i>H Index: 116</i> )

## APPENDIX B

**Literature Summary Table**

No	Objective	Summary
1	Assess feasibility and effectiveness of an application for stress management	The study shows that the developed application found to significantly contribute to lower depression, stress, emotional labor, anxiety, and increase self-efficacy and well-being in the experimental group.
2	Assess the effectiveness of an online mental health app	The study demonstrated small significant reductions in social anxiety and small improvements in academic self-efficacy, but not effective in reducing symptoms of depression, anxiety, or psychological distress.
3	Compare the usage of two different based stress management application	The study finds different user behaviors in different based applications with the same application features, but different patterns in User Interface and User Experience. The findings later suggest that changing in which stress management intervention content is delivered will lead to important differences in how the underlying theoretical content is used and received.
4	Compare four stress reduction modalities on the amount of physiologic and perceived stress reduction	The study has proven the use of four modalities (massage chair, chi machine, rejuvenation lounge, sitting meditation) is effective at transiently reducing physiologic and perceived measures of stress of college students.
5	Assess effectiveness of a stress intervention application in distance-learning students with elevated levels of depression.	The study explains the protocol trial of effectiveness assessment that will be conducted to prove the hypothesis. The protocol includes study design, participant recruitment, assessment & randomization, intervention method, and results expected.
6	Assess usability, potential feasibility, and preliminary effect of a mobile-based stress management application	The study shows perceived stress level and depressive symptoms of the participants that used the application were significantly decreased. It suggests that the application may be an acceptable strategy to manage stress for employees.
7	Assess the efficacy of an internet-based and app-supported stress management intervention for college students	The study indicates that an internet-based and mobile-supported intervention for stress management could be an effective and cost-effective approach to reduce consequences of college-related stress.
8	Design a conversational chatbot to investigate graduate students experience in their coping with stress	The study presents a conversational sequence for a brief motivational interview. It resulted that discussing the idea of change was good to self reflection, encouragements from the bot are also appreciated, and the need of informational support provision.

## APPENDIX C

**Stress Management Application Characteristics Table**

No	App-based	Delivery type	Platform	Features
1	Yes	Online	Mobile	Healing Breathing methods Therapy modules (Yoga & Meditation) Health information
2	Yes	Online	Website	Health information Screening tools Therapy modules (CBT)
3	Yes	Online	Web & Mobile	Monitoring condition Breathing methods Social interaction
4	No	Offline	Stress Reduction Modalities Tools	Massage chair Chi machine Rejuvenation lounge Sitting meditation
5	Yes	Online	Web & Mobile	Psychoeducation modules Address book Monitoring condition Planning activities Social interaction Intervention expert
6	Yes	Online	Mobile	Intervention expert Monitoring condition Social interaction Health information Therapy modules (Relaxation) Breathing methods
7	Yes	Online	Web & Mobile	Psychoeducation modules Therapy modules (CBT) Social interaction Motivational messages Planning activities
8	Yes	Online	Chatbot	Therapy modules (CBT)

## APPENDIX D

**Research Design Table**

<b>No</b>	<b>Hypothesis</b>	<b>Subject</b>	<b>Sample size</b>	<b>Sampling Method</b>	<b>Period</b>
1	Yes	Employed nurse	60	Random	4 weeks
2	No	College students	200	Screening	6 weeks
3	No	Internet/Android users older than 18	381 (Web) 162 (Mobile)	Convenient	2 weeks
4	Yes	College students	5,526	Convenient	30 months
5	Yes	Distance-learning college students	200	Mixed	2 weeks
6	No	Employees	68	Mixed	4 weeks
7	Yes	College students	150	Mixed	3 months
8	No	Full-time graduate student	30	Convenient	One-shot