Depressn't: A Mobile Cognitive-Behavioral Therapy App for Depression

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I. Introduction

A. Background of the Study

Cognitive Behavioral Therapy (CBT) is a type of psychotherapy where thought patterns are modified to change moods and behaviors. It is based on the idea that current distorted beliefs or thoughts lead to negative actions or feelings [1]. CBT has been demonstrated to improve problems such as depression, anxiety disorders, alcohol and drug use problems, marital problems, eating disorders, and severe mental illness. Many studies suggest that CBT is effective, or more effective than, other forms of psychological therapies [2].

A lot of people, especially at this time, are using their mobile phones. Given the widespread use of smartphones, mobile and wireless technologies for health objectives can be used to improve the quality of health received and increase treatment accessibility globally [3]. According to Chandrashekar [4], mobile applications are a good choice for psychological treatment delivery due to ease of habit, low effort expectancy, and high hedonic motivation.

Mobile CBT has been proven an effective treatment for several mental health disorders, including depression [5]. Those aimed to treat depression displayed positive results. Although many mobile CBT apps are available, only a few of them have been subjected to research on their efficacy and usability.

B. Statement of the Problem

University students are reported to be displaying signs of depression and anxiety in many regions of the world. Puyat, Gastardo-Conaco, Natividad, and Banal [6] described about 1 of 10 Filipino young adults experience moderate to severe depression.

CBT has long been used to treat depression and has been proven effective. Mobile app implementation of CBT will be helpful to these students to deal with their depression. But most CBT techniques like cognitive restructuring, activity scheduling, and mindful meditation do not come in a single application.

C. Significance of the Study

The application to be developed can help people with depression by helping them identify thought patterns, identify and challenge faulty thinking, explore, re-frame, and restructure causes of faulty thinking, motivate them to complete tasks even when feeling low, and calm themselves and focus on physical relaxation.

Implementing CBT into a mobile application made for people with depression can help them find new ways to behave by changing their thought patterns. It will be convenient to include different CBT techniques in a single application so that users do not need to download multiple applications.

D. Objectives

The aim of the study is to design, develop, and test a mobile app that uses CBT to help with depression. To achieve the goal, the study will have a number specific of objectives:

- provide a framework for cognitive restructuring based on the 7-Column Thought Record by Christine A. Padesky to help identify and challenge faulty thinking through journaling and then explore, re-frame, and restructure its causes;
- provide an activity scheduler that includes rewards for completion to motivate users to complete tasks even when they are feeling low;
- calm the users using guided mindfulness meditation; and
- test the finished application's usability and efficacy through surveys.

E. Scope and Limitations of the Study

The application is meant to be run on android devices. The application covers specific techniques in CBT including activity scheduling, cognitive restructuring, and meditation. The application is aimed towards university students with depression, diagnosed or not.

II. Review of Related Literature

A. Cognitive-Behavioral Therapy

Depression, anxiety disorders, alcohol and drug abuse, marital issues, eating disorders, and serious mental disease have all been shown to benefit from cognitive behavioral therapy (CBT). According to APA [2] CBT has been shown to have a considerable impact on a person's functioning and quality of life, according to several studies.

CBT emphasizes the importance of empowering patients to take control of their own treatment. Patients/clients are assisted in developing coping skills via both in-session and "homework" tasks. When it comes to Cognitive Behavioral Therapy (CBT), the psychologist and patient/client collaborate to devise a treatment plan.

Presented to the Faculty of the Institute of Computer Science, University of the Philippines Los Baños in partial fulfillment of the requirements for the Degree of Bachelor of Science in Computer Science

Additionally, CBT may help people cope with stress, difficult relationships, grief, and other life challenges. CBT works on the premise that how we think and interpret events affects how we act and feel. It has been shown time and time again.

In CBT, the person is actively involved in a problem-solving process. In it, they discuss their current concerns. It is also time-limited, so participants know when to expect a course to conclude. A course usually consists of 20 one-on-one sessions. It might be solo or group.

CBT is a client-therapist-team-based treatment. Some psychotherapies look backwards to understand the present. But CBT concentrates on now.

CBT can help with many issues involving beliefs and ideas. Perspective-shifting is emphasized. CBT views thinking patterns as a pair of glasses that allow us to see the world in specific ways. CBT teaches us how our ideas affect our surroundings and behaviors. Changing biases and misconceptions may help people perceive things differently. CBT aims to alter negative thinking and behavior. Depression, for example, impairs perceptions. A distorted vision may lead to negative thinking, impulsive judgments, misunderstanding situations, and seeing everything as either good or bad. Fearful or gloomy thoughts may become habitual. Questions are asked and compared to reality in CBT. Suffering is reduced if a person can change their attitude and behavior to benefit themselves and others. Developing new skills facilitates productive problem solving [7].

B. 7-Column Thought Record

Written by Christine Padesky, the 7-Column Thought Record is a cognitive behavioral strategy where the thoughts are challenged for intervention. It is based on a table that includes 7 different columns: situation, emotion, automatic thoughts, evidence that supports automatic thoughts, evidence that is against automatic thoughts, alternate thoughts, and outcome.

Automatic thoughts and underlying assumptions, which are challenged on the 7-column thought record, are directly linked to core beliefs. Changes at this level can occur quickly and have an immediate and direct impact on the behavior and emotional experience. This thought record, according to Padesky [8], is the *sharpest tool* for teaching how to manage all the negative automatic thoughts that characterize depression.

C. Mobile Health

The term ”mobile health” relates to the practice of medicine and public health in the context of mobile devices. When it comes to health information distribution, gathering, and access, mHealth encompasses the use of mobile devices. Emerging fast, it plays a critical role in the evolution of healthcare. According to Roncero et.al [9] it is just a matter of time until mobile health applications have the ability to fundamentally alter our understanding of medicine. Patients will be able to access their health information, have brief consultations for certain conditions without contacting a physician, and find emergency assistance using these applications. In addition, they will aid in the monitoring of chronic patients, improve the safety of medicine administration, and provide a conduit for connecting with others in a similar position. Moreover, mobile devices are owned by a whopping 66.53 percent of the global population (cell phone, tablet or cellular enabled IoT device). Over 5.13 billion individuals throughout the globe owned a mobile phone in August 2019, according to GSMA real-time intelligence data. Patients are increasingly turning to telemedicine as a means of receiving medical care through mobile health applications. Tracking patients' conditions and alerting clinicians when the patient's biological data is putting them at danger is a huge step forward in healthcare management. As a matter of fact, recording and monitoring such data would be difficult or impossible without the use of mobile devices and mobile health technologies. If someone is having trouble remembering when to take or renew their medicines, there are hundreds of applications that can help them out. Medical professionals may see all of a patient's prescription drugs and their pick-up and refill history with Cureatr Meds 360. In order to better coordinate a patient's treatment, the platform makes it simple to view the whole picture of their health history, including where they've been, who has treated them, and for what [10].

Communication between patients and healthcare providers is progressively being improved via the use of mobile applications. Vernet [11] believes that smartphones seem to be the most popular gadget among doctors, according to recent surveys. In addition, the usage of these technologies by the general populace has increased significantly. As a result, consumers are at danger because of an increase in unsupervised usage. In order to ensure the quality of government-approved health applications, the federal government has launched a number of measures. Examples include ”Appsalut” and ”Regulation of Software as a Medical Device,” both of which focus on app usability. This serious issue has also been addressed by clinicians and researchers. A number of other methods have been proposed for evaluating mobile health applications, each with its own set of quality standards. There are both good and bad aspects to each of these approaches. In the app development and quality evaluation process, there is no single set of criteria that can be utilized by all stakeholders.

D. Similar Apps

While it could also help with depression, anxiety, and other mood disorders, the *Mind Journal: Diary, Mood tracker, and Gratitude* app was developed by Bazimo for journaling, graphing, reporting, and managing symptoms related to bipolar disorder. The app allows the user to experience mindfulness journaling that lets the user unwind, provides guided reflection wherein it improves mindfulness and teaches gratitude to the user, enables the user to track their daily mood dynamics, provides a self-analysis that encourages the user to a new way of thinking to avoid depression and lastly provides the user with an analysis on the trend of their bipolar schedules.

Mood Tracker. Mental Health is an application developed by Reflexio Team to provide users facing mental problems with a mood tracker and self-care journal app that provides daily questions regarding the user's health, relationships, emotions,

etc. to create a brief analysis on the status and possible solutions to overcome their mental instability. The app showcases daily interaction techniques in order to provide a more in depth and immersive experience to the user in order to create a more accurate analysis on how to help the user and provide steps in order to avoid any complications on the relationships of the user.

CBT Thought Diary – Mood Tracker , Journal and Record is a Cognitive Behavioral Therapy tool developed by Inquiry Health LLC that is designed to make its users feel less stressed, anxious, frustrated, and unmotivated. The main feature of this application is its way of learning to recognize negative and distorted thought patterns in order to change your emotions and behaviors for the better. The app allows the user to document their negative emotions and provides it with its respective solution/re-evaluation to lessen or balance out the user's mental health. That being said, the application can also keep track of the user's daily emotion and create positive daily quotes for the user depending on their mood

III. Materials and Methods

A. Development System

The application will be developed using the React Native framework on a computer running Windows 10. The application will be tested on Samsung Galaxy J7 Prime. The system specification of the device is as follows: Android version 10, 3GB RAM, 1.6GHz octa-core, and 16GB ROM.

React Native is an open-source UI software framework created by Meta Platforms, Inc. It allows users to build natively rendered mobile apps for Android and iOS. The study will rely on the recommendations on React Native Documentation.

Android Studio will be used to generate an APK. Building the app requires a Keystore that developers can easily make in Android Studio.

B. Application Assets

Icons will be taken from the free assets library of fontawesome.com. The artists who made the free assets to be used in the app will be cited in the credits.

C. Application Features

1) Cognitive Restructuring Framework (Record Page): The cognitive restructuring tab will record the problems or situations encountered by the user and will then be analyzed. There will be six boxes to be filled up: the situation, mood, automatic thoughts, objective supportive evidence, objective contradictory evidence, and fair and balanced thoughts. Each entry will be saved for future reflection.

(a) The Situation
This is where users describe the situation that triggered the negative mood.

(b) Mood
This is for the mood/s that the user felt during the situation. The users will select from the 6 basic moods/emotions: happiness, sadness, fear, disgust, anger, and surprise

(c) Automatic Thoughts
These are the natural reactions the user experienced when they felt the mood.

(d) Objective Supportive Evidence
Next is the evidence that objectively supports the automatic thoughts.

(e) Objective Contradictory Evidence
This is the evidence that objectively contradicts the automatic thoughts.

(f) Fair and Balanced Thoughts
After the user has looked at both sides of the situation, the user will be then asked for a fair and balanced view of what happened.

(g) Outcome
The users are facilitated to think again of the triggering event in the light of the new alternative thought that they made as a result of the analysis of the evidence that favoured their negative automatic thoughts and evidence that went against their negative automatic thoughts. They are asked to write about their new feelings in response to the new rational thoughts in the last column of the 7 column thought record sheet.

2) Mindful Meditation (Meditation Page): The mindful meditation will have two main features: breathing exercises and mindfulness meditation.

(a) Breathing Exercises
In this part, it is intended to promote effective and healthy breathing and breath control. Breathing techniques by Paige Fowler on WebMD will be used. Credits will be given and can be found on the settings page.

(b) Mindfulness Meditation
Mindfulness is a type of meditation in which you focus on being intensely aware of what you're sensing and feeling in the moment, without interpretation or judgment. Mindfulness and meditation exercises from the University of Melbourne Counseling and Psychological Services will be used.

3) Activity Schedule (Activities Page): A weekly calendar will be shown where the users can schedule their activities for that day and include rewards for themselves if they finish their tasks. By scheduling these activities and rewards, users learn to motivate themselves to complete necessary tasks even when they are feeling low.

The current tasks for the day will be displayed as a widget on the home page for easy viewing.

4) Assessment (Home Page): The moods from the thought record will be given a numerical value depending on whether it is pleasant or unpleasant and energized or calm. The average score from each category every day will be recorded and displayed as a graph to let the users compare their overall thoughts and mood every single day.

The Center for Epidemiologic Studies Depression Scale (CES-D) will be available on the app so the users can easily check their current status. There will be a reminder every fortnight to let the users know when to take the test again. The results will be displayed as a widget on the home page for easy viewing.

The users will be able to set goals on how many times they want to record entries or meditate. A notification will be sent at the user's specified time if they haven't completed their goal for the day. Their current progress will be shown as a widget on the home page.

D. Consultation with Professionals

The final application will be assessed by licensed professionals from UPLB Office of Counseling and Guidance (OCG). The app will not be distributed until the OCG approves the app and makes sure it will not cause any harm to the users.

E. Usability and Efficacy Testing

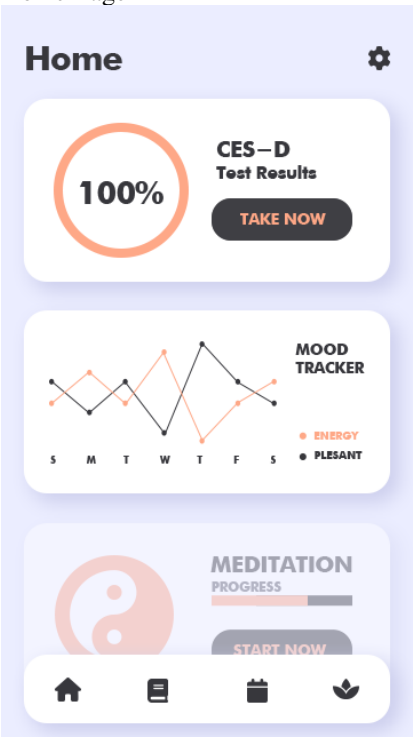
The Center for Epidemiologic Studies Depression Scale (CES-D) will be used for the efficacy test. It consists of 20 scenarios to be rated based on how much it occurred over the past weeks. Users will be asked to answer the test before using the app and then every fortnight until the fourth week.

Mobile Application Rating Scale (MARS) will be used for the usability testing. It rates the app quality and assesses the perceived impact of the app on the user's knowledge, attitude, intentions to change, and the likelihood of actual change in the target health behavior. Users will be prompted to answer the test after four weeks of use.

A total of 30 university students will use and test the app for 4 weeks. The apk will be sent to the students for testing. There will be a pre-test, right before the students use the app, and post-test, right after 4 weeks of using the app. A Paired T-test will be used to see if there is a significant difference between the CES-D results before and after using the app. The mean of the MARS score will be used to evaluate the usability of the app.

F. Initial Results

- Home Page



- Record Page

- Activities Page

- Meditation Page

APPENDIX I
CENTER FOR EPIDEMIOLOGIC STUDIES DEPRESSION SCALE (CES-D)

The CES-D scale includes 20 ways you might have felt or behaved to be answered by choosing how often you felt this way over the past week. The items are as follows:

1) I was bothered by things that usually don't bother me.
2) I did not feel like eating; my appetite was poor.
3) I felt that I could not shake off the blues even with help from my family or friends.
4) I felt I was just as good as other people.
5) I had trouble keeping my mind on what I was doing.
6) I felt depressed.
7) I felt that everything I did was an effort.
8) I felt hopeful about the future.
9) I thought my life had been a failure.
10) I felt fearful.
11) My sleep was restless.
12) I was happy.
13) I talked less than usual.
14) I felt lonely.
15) People were unfriendly.
16) I enjoyed life.
17) I had crying spells.
18) I felt sad.
19) I could not get "going."

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