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Dopamind$^+$: Mobile-Based Application to Prevent and Treat Mental Health Disorders in Adolescents

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Abstract: To achieve the third goal of the SDGs, which is to ensure a healthy life and promote well-being for individuals of all ages, mental health in Indonesia has been insufficiently addressed. Mental health disorders prevalent in the community include stress, depression, and even suicide. Factors triggering conditions, such as irregular sleep, especially among women, can affect the regularity of their menstrual cycles. Therefore, preventive measures are needed by creating the Dopamind+ application. The purpose of developing this application is to 1) Analyze the impact of the Dopamind+ application on users who are likely to experience mental health disorders, 2) Reduce the incidence of mental health disorders, 3) Support innovation in mental health issues by collaborating with technology, and 4) Create a mobile-based application that provides healthcare services and education, especially for teenagers. Hopefully, this application will help users access information, support, and mental health services. In addition, it can demonstrate the importance of cross-sector collaboration in providing holistic and integrated mental health services and has the potential to improve users' quality of life by reducing levels of stress, depression, and risk of suicide; in making this application, we used the design thinking method. This approach is used to understand user needs and design solutions better accordingly. The Empathize stages help in understanding the experiences and challenges faced by individuals regarding mental health. Define and identify the problems you want to solve and direct innovation. Ideate makes it possible to generate a variety of creative solution ideas. Prototype allows developers to test those ideas, and testing helps evaluate application performance and receive user feedback. The findings highlighted in this application are SOS, which will enable users to trigger emergency signals, and beacon signals, which will enable them to ask for help from

those around them in mental health emergencies. The target users of the Dopamind+ application are classified based on age, gender, and diseases/genetics. Stakeholders in this application include health departments, social services, users, police, fire departments, developers, researchers, academicians, and relevant organizations. The limitations of the Dopamind+ application are that it uses the English language, requires a user email password, and employs features designed for all groups, especially teenagers prone to mental health issues. This application is accessible via mobile platforms such as Android and iOS. The features include Smart to-do list, Red Day tracker, Educare and Counseling, Virtual Community, Sleep tracker, SOS, and Stress tracker.

Keywords: Mental Health; Mental Health Disorders; Teenagers; Health; Innovation.

1. Introduction

Mental health is an important issue that needs attention to achieve goal 3 of the Sustainable Development Goals (SDGs), namely ensuring healthy lives and promoting prosperity for all people of all ages. According to Bappenas, 38 SDG targets in the health sector need to be realized. Mental health is important for a person to feel good physically, socially, and emotionally. This condition also affects how a person thinks, feels, and acts daily. Mental health in Indonesia is currently still given less attention than physical health, so there is a need to increase understanding of mental health. Data from the Basic Health Research (Riskesdas) of the Ministry of Health of the Republic of Indonesia shows that around 6% of the population aged 15 years and over, or around 14 million people, experience mental (emotional) health disorders such as depression and anxiety [1]. Apart from that, the 2014 Health Research and Development Agency also noted that around 400,000 people, or around 1.7 per 1,000 population, experience schizophrenia, which is a health disorder. Mental health has equal significance to physical health and influences each other. Katherine Ann Saunders (19 years old), Nada Jiilaana (20 years old), Farhan Somi Putra (21 years old), and Alfa were victims of suicide by jumping from the top of buildings and malls, hanging themselves and taking drugs, which we have only heard about for less than from one year in Semarang. All the victims acted with various motives, from romantic to academic. Not only that, several friends had the intention to commit suicide due to various factors; this was closely related to their mental health, which did not receive more attention.

Mental health disorders do not only come from hereditary factors. Excessive life demands can trigger stress, which can then worsen mental health disorders [2]. Stress is caused by a mismatch between a desired situation and an individual's biological, psychological, or social conditions. Stress can also influence reproductive disorders related to menstruation in women. Apart from that, depression also has a severe impact on mental health disorders [3]. Depression is a condition where a person feels sad or disappointed when facing change, loss, or failure, and it can become pathological if they are not able to adapt well. Moderate or severe depression can become a serious health problem and can even lead to suicide. Every year, nearly 800,000 people lose their lives to suicide, making it the second leading cause of death in the 15-29 year-age group [4]. By looking at these conditions, it is time to maximize the use of mental health services by increasing public awareness of mental health disorders. Therefore, we provide a technology-based health facility to deal with these problems, namely the Dopamind+ platform. The Dopamind+ application has been designed to reduce and overcome a person's stress levels, provide education about the mental health experienced by a person, increase awareness of the importance of mental health, and provide appropriate services for users online just by using a smartphone device and accessible internet access. It can be accessed for free by all Indonesian people to give better results in the future. Apart from that, the Dopamind+ application also supports the achievement of Sustainable Development Goals (SDGs) in the third point regarding good health and well-being, which focuses on mental health problems in this application.

In this application, features such as Save Our Soul (SOS) will allow users to send SOS signals to emergency services such as ambulances, firefighters, and police and simultaneously activate beacon signals to get help from nearby users. This feature is essential because it can provide a quick response in emergencies related to mental health. Usability testing will play a crucial role in assessing the effectiveness of the Dopamind+ application, particularly in terms of accessibility and user-friendliness, even for individuals with mental health conditions. This evaluation aims to gauge how easily users can navigate and utilize the application. Developers can gain insights into the app's performance in delivering planned mental health interventions by conducting usability tests.

Additionally, this process helps identify potential obstacles or challenges users might encounter while using the application. Gathering user feedback through usability testing enables developers to understand user preferences and areas requiring improvement, facilitating ongoing enhancements tailored to user needs. Regarding the research goals, the study addresses several key questions. Firstly, it seeks to analyze the potential prevalence of mental health disorders among the target users of the Dopamind+ application. Secondly, it aims to identify the necessary stakeholders involved in the development of the application, particularly considering the needs of individuals with mental health disorders. Lastly, the research aims to design a mobile application that caters to the community's health and educational needs and targets explicitly teenagers, thereby fostering their well-being and providing valuable resources.

2. Research Method

In this case, the method used is Design Thinking. Design Thinking is designing and solving a problem that focuses on the user. In making the Dopamind+ application, the design thinking method was used because this method places the user as the center of attention in the development process in the empathize stage. This method encourages innovation based on a deep understanding of users, found in the define stage. In the ideate stage, developers can generate various ideas for creative solutions to overcome mental health problems. This method allows developers to quickly prototype solutions and test them with users to gain valuable feedback. The Testing stage makes it possible to evaluate application performance and make improvements based on user response. In this way, the Dopamind+ application can be designed holistically and responsive to the needs and challenges users face regarding mental health. This ensures that the application provides relevant, effective, and beneficial solutions to the user as a whole. The following is a diagram of the application method adapted to the stages of Design Thinking.
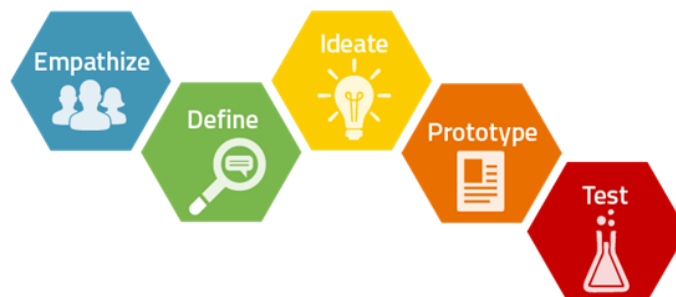

Figure 1. Stages Design Thinking Method

In the "Empathize" stage of the design process, the initial step involves conducting thorough research by delving into pertinent literature and studies concerning the targeted issue. This encompasses understanding the circumstances, prevalent challenges, and statistical insights about mental health. Furthermore, it entails acknowledging all stakeholders involved in mental health, ranging from individuals grappling with mental health issues to the professionals providing support services, along with others within mental health environments. Through addressing these aspects, user personas are crafted to encapsulate the characteristics, needs, and emotions of individuals navigating mental health challenges, drawing from data sourced through interviews and observations with relevant individuals. Within this stage, an empathy map emerges as a pivotal tool. This document visualizes the collective knowledge amassed about a specific user archetype, fostering shared understanding and aiding decision-making processes. Comprising four quadrants, the empathy map delineates the key attributes exhibited by users during interview observations conducted in the research phase: what they articulate, think, engage in, and feel. Leveraging an empathy map confers several advantages, including the rapid visualization of user needs, facilitation of nuanced perspectives directly from users, identification of potential opportunities, and seamless iterations when refining assumptions based on empirical data.

Table 1. Aspects of Empathy Map

Empathy Map Aspects	Information
Says	Difficult to organize a busy schedule of activities
	It's hard to find a place to talk when you're stressed
	It's difficult to arrange a schedule with a psychiatrist

	Can't see the menstrual cycle
Thinks	Worried about his health being compromised
	Worried that all activities will not be carried out
	Worried that her menstrual cycle is irregular
	Worried about being affected by a bad environment
Does	Schedule your menstrual cycle
	Looking for articles that can help reduce stress
	Looking for a doctor to consult
	Looking for a suitable story location
	Make a To-Do list of activities
Feels	Confused
	Worry
	Hopeless

The "Define" stage follows the comprehension of user needs and involves articulating the concept underpinning the development of a product or application. Within this stage, key artifacts include user personas, scenarios, and customer journey maps. User personas serve as representative documents embodying essential user insights crucial for analyzing their goals, needs, and interests. These personas facilitate a deeper understanding of target users, shedding light on their objectives, behaviors, and pain points. By grounding design decisions in user behavior, psychology, and demographics, personas play a pivotal role in shaping the development process. Additionally, they serve to validate design choices, rendering data more comprehensible by humanizing it with identifiable names, faces, aspirations, and challenges. For instance, consider Siti, a 20-year-old student enrolled at Diponegoro University, actively engaged in various campus endeavors such as BEM meetings, teaching assistantships, and PKM activities. Siti's demanding academic schedule and inadequate rest exacerbate stress levels, compounded by similar experiences among peers. Furthermore, Siti grapples with an erratic menstrual cycle, frequently experiencing delays, which further impacts her mental well-being. Siti's persona encapsulates demographic, psychographic, and situational attributes, providing invaluable insights for designing solutions tailored to her needs.
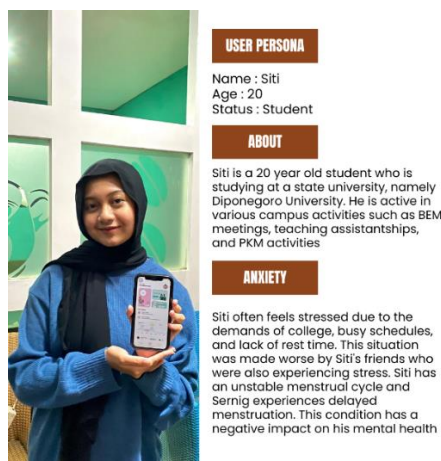

Figure 2. Sample User Persona

Goals and Needs:
1) Manage stress from busy activity schedules and ensure adequate rest time.
2) Understand and manage the instability of the menstrual cycle and its impact on mental health.
3) Looking for efficient ways to manage time between campus, academic and organizational activities.

In the next stage, the user scenario, each user has three activities or stories and contexts. The user scenario consists of column one, which explains the user's job. The second column describes the user's expectations or expectations with convenience based on the concerns taken from the user persona. The third column represents the expectations for the solution desired by the user. The last column, namely "scenario," is a story and context that explains user activities related to behavior, attitudes, and pain points for that user.

Table 2 Sample User Scenario

Scenario			
Student	I want to know how to organize my study schedule and campus activity to be more productive, apart from that, I want to know my menstrual cycle	I can manage my time effectively and give myself enough rest. Apart from that, I was able to overcome the impact of menstrual cycle instability on my mental health.	On Monday at 14.00, she attended an association meeting. At 15.00, she had to take part in learning activities for the Data Structure course which was scheduled to finish at 18.00, but at the same time she had to attend a committee meeting for his work program. So, she had to shift the meeting time to 20.00. Long story short, Siti finished the meeting at 23.40 and the next day, Siti had to leave to prepare for the event at 04.00. When she got home, she felt stressed and realized the lack of rest time she had. This affects her menstrual hormones so that she experiences delayed menstruation. Therefore, Siti hopes for an application that can manage her activity schedule, sleep patterns, and menstrual cycle so that she can reduce the stress levels the Siti experiences.

Pain points are specific problems experienced by potential users which cover various aspects. The purpose of this pain point is to minimize the difficulties faced by users so that they can increase their satisfaction when using the application and can increase success in business. The following are pain points that can be felt directly by users and related stakeholders in image 3.

Figure 3. Pain Point

In the next stage, namely the customer journey map, sections such as stages, user actions, user goals, problems and ideas will be explained. The stage section explains the stages that users will go through in solving the customer journey map, consisting of awareness (user concern). regarding the problem), consideration (user consideration of the solution), decision (decision making regarding the solution obtained) and finally interest (interest in the solution used). The user actions stage explains how the user acts on each stage encountered. The user goals explain the objectives of each stage. The problems stage explains the problems faced at each stage. The ideas stage explains the solutions obtained from each stage faced by the user.

Table 3. Sampel Customer Journey Map

Customer Journey Map				
Phase	Aware	Consideration	Decision	Interest
User Action	Try for prevent happened disturbance health mental. Because a number of factors that experienced	Ask to friends- friend who thesame thing about Application for reduce disturbance health mentally	Try several of that application help in trouble health mentally, however difficult to find	Try look for that applicationfit through smartphones

			which are suitable.	
User Goals	Find solution for mentally health disturbance	Get information about theapplication health mentally	Find that an application in accordance with the need.	Use application for overcome stress and manage health mentally.
Problem	Lack of awareness about mental health solutions available and the apps used	Confusion in searchingapplication health mental, because many	Difficulty in make decision in find a suitable application	All applications own superiority and the drawback each
Ideas	Understand what factors that's all influence disturbance health mental and look for the solution, so that problem disturbance health mentally can reduced and prevented	Gather information from environment around, related various efforts for handle disturbance health mentally	Make a platform compare to various application or service health mental based on user specific needs.	Use that an application in accordance with the utilize superiority which are given application.

During the Ideate stage, diverse ideas are gathered to address the problems identified in the Define stage. Through brainstorming sessions, various solutions are explored to effectively resolve the identified issues and mitigate potential risks during implementation. One essential tool utilized in this stage is the Use Case Diagram, which falls under the umbrella of Unified Modeling Language (UML) diagrams. These diagrams illustrate interactions between actors and systems, depicting the user's perspective and delineating the functionalities of the system being developed. In developing the Dopamind+ application, users are shown as actors engaged in registration, profile viewing, task list creation, accessing mood trackers, educational content, consultation services, joining virtual communities, setting sleep trackers, and utilizing the SOS feature. The Use Case Diagram provides a visual representation of these interactions, aiding in conceptualizing and refining the application's functionality.
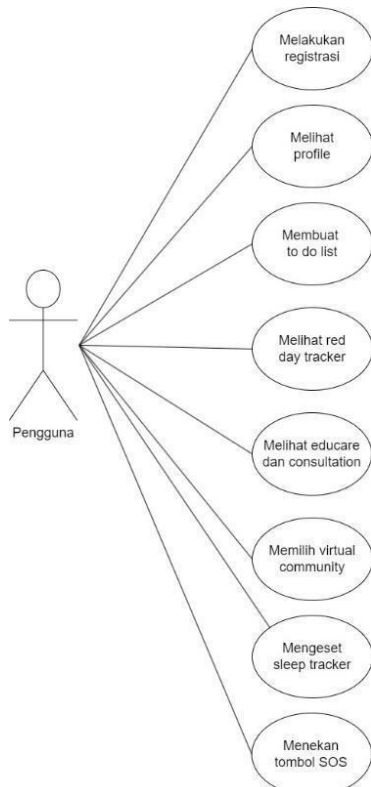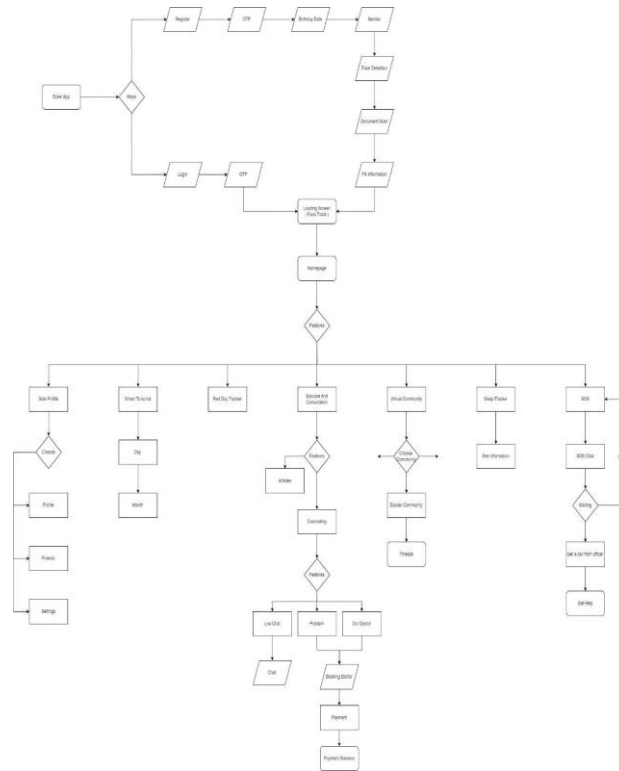

Figure 4. Use Case Diagram

Figure 5. Information Architecture

During the Ideate stage, various existing ideas are gathered to address the problems identified in the Define stage through brainstorming sessions, ensuring diverse solutions to effectively resolve the identified issues and mitigate potential risks during implementation. Additionally, this stage serves to avoid unwanted risks when implementing the solutions. One essential tool utilized in this stage is the Usecase Diagram, a modeling diagram under the Unified Modeling Language (UML), which describes interactions between actors and systems. This diagram provides a depiction of the user's perspective, focusing on the functionality of the system being developed. In the context of creating the Dopamind+ application, users are depicted as actors engaged in various processes, including registration, profile viewing, task list creation, accessing mood trackers, educational content, consultation services, joining virtual communities, setting sleep trackers, and utilizing the SOS feature, as depicted in Figure 4. Information Architecture, another crucial aspect at this stage, simplifies and organizes information by designing, integrating, and combining information systems. This architecture aims to facilitate users in finding, understanding, exchanging, and managing provided information. It involves decomposing design structures to achieve information accuracy, as illustrated in Figure 5. Regarding the application's Environment, Dopamind+ is designed to be accessible across all circles and available anytime and anywhere. Compatible with iOS and Android operating systems, the application can be accessed via smartphones, requiring an internet connection to access additional content and resources. It is engineered to function seamlessly across various network conditions, including mobile data connections, ensuring optimal user experience.
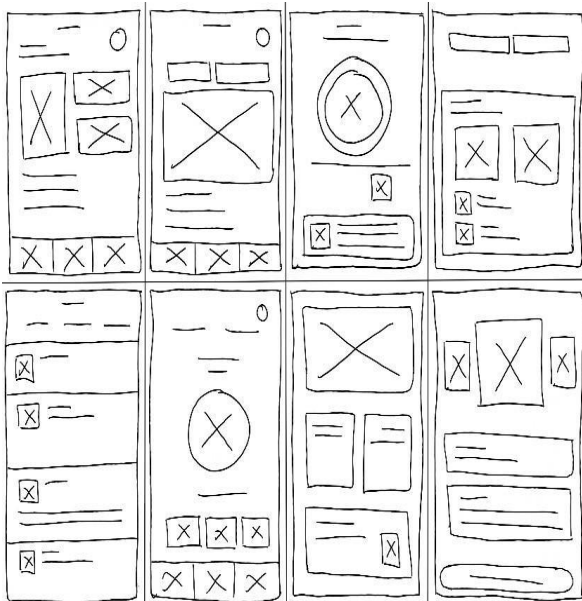

Figure 6. Crazy 8's

Figure 7. Wireframe

This stage involves implementing ideas into application form to generate user scenarios tailored to meet specific needs. The Crazy'8s technique, as depicted in Figure 6, facilitates this process by rapidly creating rough wireframe sketches within eight minutes on paper, divided into eight sections. These sketches serve as a foundation for developing digital wireframes. Additionally, illustrated in Figure 7, wireframes represent the application concept visually, serving as a guide in interface design. In the case of the Dopamind+ application, wireframe designs are derived from user experience observations, with subsequent refinement of colors and visuals to develop the mobile application's user interface design. User Flow, depicted in Figure 8, delineates users' process or activity when utilizing the application. This visualization aids in understanding the sequential steps users take within the application interface. Transitioning to the Testing stage, experiments are conducted with users to garner crucial input and insights aimed at enhancing the implemented application. Usability testing plays a pivotal role in this stage, involving evaluators' selection, usability test tasks using an application prototype, analysis of test results, and formulation of recommendations for application improvement. This iterative process ensures that the application is refined to effectively meet user needs and preferences.
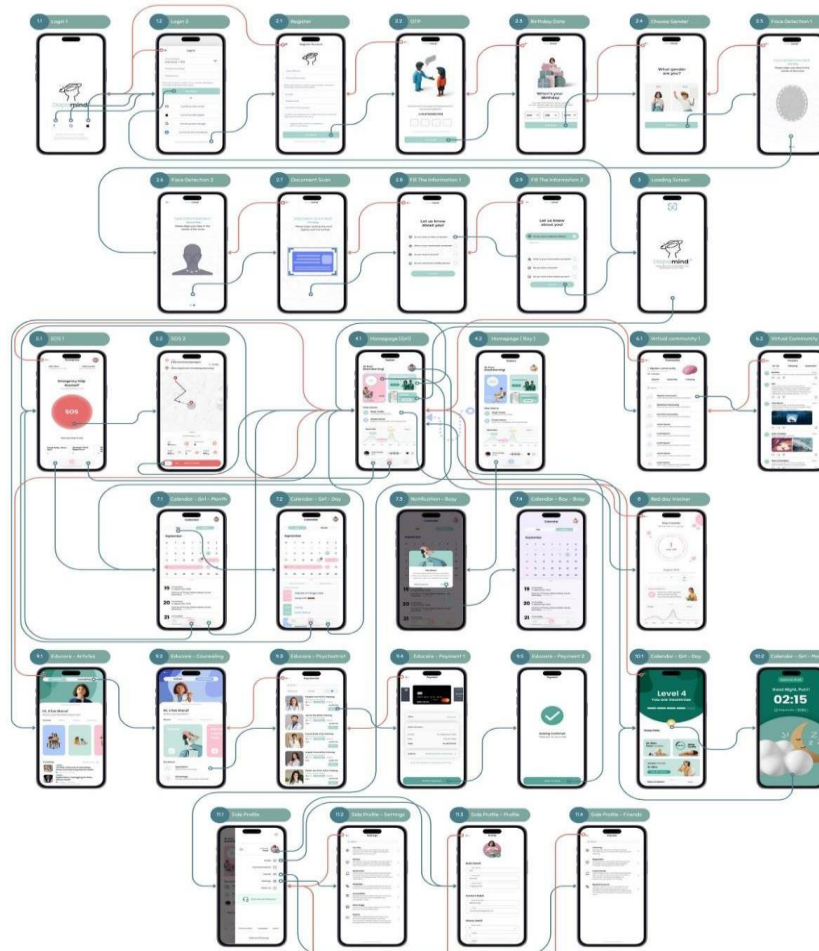
Figure 8. User Flow

Determining the evaluator for usability testing is to measure the use of the Dopamind+ application by dividing potential users into new and active users. New users are users who have never used mental health applications before, while active users are users who have and often use mental health applications similar to the Dopamind+ application.

Table 4. Evaluator Sample

Name	Age	Gender	User Type	Busyness
Dimas Gary Irawan	21	Male	Active	Student
Zeka Emo	19	Female	New	Student
Ike Pertiwi	42	Female	Active	Lecturer
Annisa Charisma Wijayanti	22	Female	New	Student
Namira Nuralfeani	38	Female	Active	Lecturer
Kurniawan Teguh	52	Male	New	Lecturer
Anugrah Excell	23	Male	New	Student
Arseto Satrio Nugroho	33	Male	Active	Lecturer
Muhammad Azhar Renaldi	25	Male	Active	Student
Patricia Evericho	45	Female	New	Lecturer

When creating a usability testing task, it will be tried on selected respondents, including new and active users. The usability testing is based on learnability and memorability because these aspects are the needs of users who want accessible applications to learn and remember. A task or scenario will be created for each component based on the usability test script. At this stage, we create tasks based on each feature available in the Dopamind+ application.

Table 5. Usability Testing

Functions and features	Task
Login	Try logging in to the application
Register	Trying to register an account
Assessment	Try to fill in your personal data and current conditions
Scan Wajah	Trying to detect faces using AI
Smart To-Do List	Try adding activities
Consult	Try booking a consultant doctor or therapist
Mind Help	Tried to contact CS
Account Setting	Tried the account settings menu
SOS	Try calling for emergency help
Sleep Tracker	Try to monitor sleep quality
Red Day Tracker	Try to monitor your menstrual cycle
Threads	Try to interact with fellow user's application
Artikel	Try to open and read the article

After preparing the task scenario, which will be given to respondents, a questionnaire is needed to determine the usability measurement results. Below is a usability testing questionnaire using learnability and memorability aspects. In analyzing the results of usability testing, we use quantitative tables to calculate the results of respondents' questionnaires to measure the level of success in making them. The calculation formula is as follows:

$$p = \frac{number\ of\ answers}{total\ questions} x100\%$$

Table 6. Usability test measurement Scale

Range	Qualification	Results
0-55%	Bad	Fail
56-65%	Enough	Fail
66-85%	Good	Succeed
86-100%	Very Good	Succeed

In the Customer Satisfaction Testing phase, several vital stages are executed to analyze the customer satisfaction index. This includes formulating a questionnaire encompassing service satisfaction measurement tools utilizing a Likert scale. Ensuring the validity of each measurement item is crucial, followed by data collection through tested questionnaires. Subsequently, the customer satisfaction index is calculated, considering Physical Evidence, Responsiveness, and Guarantee. The culmination of these efforts yielded a total satisfaction score of 4.26, qualifying as "Satisfied" according to the survey calculations. Detailed results of the questionnaire are provided in the attached documentation.

Table 7. Customer Satisfaction Testing Measurement Scale

Tiers	Qualification
1	Very Dissatisfied
2	Not satisfied
3	Just normal
4	Satisfied
5	Very Satisfied

Then a validity test calculation is carried out to produce valid items. The following is the Pearson Correlation (product moment) formula used to calculate the Correlation Coefficient:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{\{n\sum x^2 - (\sum x)^2\}\{n\sum y^2) - (\sum y)^2\}}}$$

Information

n = Number of pairs of data X and Y

$\sum_X$ = Total Number of Variables

$\sum Y$ = Total Number of Y Variables

$\sum_X 2$ = Square of the Total Number of Variables
$\sum_Y 2$ = Square of the Total Number of Y Variables
$\sum XY$ = The product of the total number of variables X and variables Y.

Table 8. Validity Test Result

rxy	$rtabel$	Status
0.725	0.544	Valid
0.762	0.544	Valid
0.605	0.544	Valid
0.597	0.544	Valid
0.661	0.544	Valid
0.809	0.544	Valid
0.743	0.544	Valid
0.664	0.544	Valid
0.812	0.544	Valid
0.733	0.544	Valid

3. Result and Discussion

3.1 Results

3.1.1 Target User

The general public is more likely to experience mental health disorders. According to the World Health Organization (WHO), mental health is a state of well-being in individuals who are aware of their potential, can control emotions or life usually stress, can work productively, and can contribute to their community. Just like other physical illnesses, mental health also has health conditions that are not good or what we usually call mental illness. The categories of mental disorders assessed in Basic Health Research data[1] are known to consist of emotional mental disorders (depression and anxiety) and severe mental disorders (psychosis). Emotional, mental disorders, or psychological distress are conditions that indicate a person is experiencing psychological changes. This disorder is at risk of becoming more severe if it is not treated successfully. Mental disorders can happen to anyone and can be classified based on several factors. In making this application, this classification is used to determine what appropriate action to give or suggest to the user. The classification is:

1) Age

Human age groups are classified into four groups: children from 5-11 years, teenagers from 12-25 years, adults from 26-45 years, and older adults from 46-65 years [5]. For the group of children aged 5-11 years, the mental health problems they face usually come from excessive use of gadgets. Based on research conducted by Boston College in 2012, 75% of children aged 9-10 years often use gadgets before going to bed, thus experiencing sleep disorders, which have an impact on reducing their learning achievement. Adolescents aged 15-24 years have a depression percentage of 6.2%. Severe depression will cause a tendency to self-harm or suicide. As many as 80 – 90% of suicide cases are the result of depression and anxiety. According to sociologists, 4.2% of students in Indonesia have had suicidal thoughts, with 9.9% of this number being university students. The depression they experience can be caused by things such as bullying, family factors, piling up tasks, economic difficulties, and love problems. When leaving adolescence, a person will enter adulthood with higher responsibilities, which can increase levels of stress or depression. According to Hurlock [6], adulthood can be divided into three groups, namely early adulthood 21-40 years, when it is full of problems and adjustments to new lifestyles; middle adulthood, 40-60 years, when the period in life adjusts to the physical and behavioral New, old age (> 60 years) when there are declining physical and psychological changes. So the target users for the Dopamind+ application include the youth group (aged 12-25 years) who may face mental health problems due to excessive gadget use, as well as the adult group (aged 26-45 years) who experience high responsibility and risk of depression.

2) Gender or Sex

Gender is a socio-cultural construction about the characteristics of men and women, including the roles expected of men and women [7]. Gender imbalance or injustice is a socio-cultural factor that, for some people, can cause psychological pressure and contribute to mental dysfunction that hinders the implementation of their social roles. The prevalence of mental disorders in women in Indonesia in 2018 reached 12.1%, higher than men at 7.6%. Apart from that, women's depression rates also tend to be

higher at 7.4% than men. Another study conducted by Annika, A., Nummi, T., and Hammarstrom (2017) [8] revealed that people with mental disorders are more common among women. Apart from that, depression and anxiety are also more often found in women (Busfield, 2012)[8] and (Hill & Needham, 2013)[9]. One of the factors that influences women to experience stress is reproductive disorders related to menstrual events (Hawari, 2016)[10]. The menstrual cycle that occurs in women is not always regular. Several factors that influence irregular menstrual cycles include changes in hormone levels, primarily through stress factors. According to a study conducted by Fertility and Sterility (2014), chronic stress can cause irregularities in the menstrual cycle, including shorter or longer cycles. In ongoing stressful situations, stress hormones such as cortisol increase, which can affect the hormonal system that regulates menstruation. Therefore, maintaining good mental health and managing stress can be crucial in maintaining the regularity of women's menstrual cycles. Although the prevalence of mental disorders and mental problems tends to be higher in women, the economic crisis seems to have a different impact on men. During the economic crisis, there was an increase in depression in men by 155.7%. The same thing also happened to anxiety, where men experienced an increase of 98.3% higher than women. These data show that the impact of the economic crisis explicitly affects men's mental well-being more in terms of depression and anxiety [11]. The stereotype of men must be strong, making men not easily express their feelings of stress and not easily ask for help when they experience pressure problems that are difficult to overcome. As a result, the problem of mental disorders in men is not easily detected; it is only discovered after the pressure builds up and is released with anger. The target users of the Dopamind+ application include men and women who experience mental health problems related to gender imbalance, stress, depression, or anxiety. This application can help maintain mental health, provide support for stress management, and facilitate understanding of the impact of mental disorders. Also, apps could be designed to help men cope with stress during the economic crisis, taking into account stereotypes that make it difficult for them to express their feelings.

3) Disease or Genetics

The causes of mental disorders consist of predisposing and precipitating factors. This factor is viewed from biological, psychological, and social aspects. The most predisposing factor in the biological aspect is that the client has previously experienced mental disorders or is congenital. Examples include depression, bipolar disorder, schizophrenia and psychosis, dementia, and developmental disorders. Schizophrenia is a form of mental disorder that is often found and is multifactorial; its development is influenced by genetic and environmental factors and is characterized by positive and negative symptoms and cognitive deficits [12]. Not all sufferers of this disease have their consciousness taken over completely; most of them can live normally, but there will be times when they relapse when it is time or are triggered by other events that should be prevented. Apart from all that, there is also a closed personality type. So, the target users of the Dopamind+ application are individuals with a history of mental disorders and congenital disorders or who are prone to disorders such as depression, schizophrenia, and the like. This application is designed to help them understand, manage, and prevent the recurrence of mental disorders by focusing on biological predisposing factors. Also, this app can benefit individuals with an introverted personality type, providing support and strategies to overcome psychological challenges.

3.1.2 Stakeholder

Stakeholders are individuals and groups who are actively involved in activities or who are affected, either positively or negatively, by the results of the implementation of activities. The stakeholders involved in the running of this application, namely.
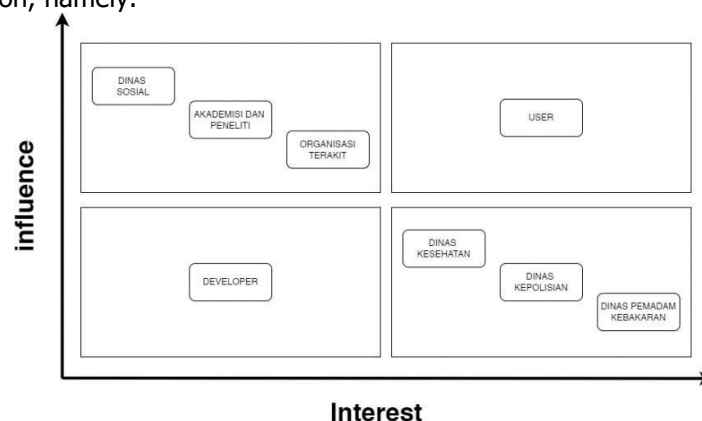

Figure 9. Stakeholder Map

1) Health Service

The health service is one of the critical stakeholders who use this application to provide diagnosis, treatment, and therapy services to patients experiencing mental health problems or mental disorders. They can also utilize this application to manage medical records and communicate with patients to provide adequate care. The advice for health workers is that health workers can work together to reduce the factors that cause mental disorders by taking relapse prevention measures or community-based measures to prevent mental disorders. Apart from that, health workers can also take action with the family because the family is the closest person who will care for the client at home. Apart from families, the surrounding community also needs to be given knowledge about how to care for clients who have returned home. Collaboration with the Community Health Center and health cadres (especially mental health cadres) is also essential for the survival of clients with mental disorders who have returned to the community.

2) Social Services

The Social Service focuses on providing social assistance and services to individuals who need social welfare support. They can use this app to identify individuals who need mental health assistance and coordinate services.

3) Police

The police may be involved in situations involving mental health, such as crisis management or suicide. They can use this app to get information or guidance on handling such situations more wisely.

4) User

Users are individuals who download and use this mental health app to access resources, information, or services related to their own mental health or that of someone they care for.

5) Fire Department

In some situations, firefighters may encounter situations involving mental health, such as rescues from tall buildings. They can use this application to get guidance regarding handling emergencies involving mental health.

6) Developer

The development team is responsible for the development, maintenance and updates of this mental health app. They ensure that the application runs well and meets user needs.

7) Researchers and academics

Researchers and academics interested in mental health studies can use the data generated by this app for research, analysis, and improvements in the understanding of mental health.

8) Related Organization

Nonprofit organizations or other agencies involved in providing mental health services, such as clinics or support groups, can use this app to connect with individuals who need their services and to support mental health campaigns.

3.1.3 Dopamind+ Application Design

1) Product and Service Limitation
    a) The application is in English
    b) Data is required in the form of user email, password, name, telephone number, date of birth and gender.
    c) The features in this application are designed for all groups, especially teenagers who have the potential to experience mental health.

2) Technology Used

The Dopamind+ application is designed to be accessible via multiple platforms, especially via Android and iOS systems, providing flexibility for users. This allows users to access help at any time, maintain privacy, receive notifications and reminders, connect with a support community, and monitor mental health in real-time. In addition, this application uses Artificial Intelligence to organize schedules based on priority scales, helping users manage their time more efficiently and effectively.

3) Feature Design and Explanation
    a) Logo Concept
       Dopamind+ is the name that describes the essence of this application by referring to the hormone dopamine, an important element in neuroscience that plays a role in regulating mood and the transmission of stimuli throughout the human body. The name reflects the app's determination to translate users' minds into a more carefree and happy state. The word "mind" refers to thoughts and consciousness, while "dopa" refers to the hormone dopamine which plays a role in the regulation

of emotions and mood. Through a combination of these words, Dopamind+ aims to understand, support and stimulate users' positive thoughts, so they can achieve better mental health.

b) Color Theory

In UI/UX, the concept of applying color theory is an important element because color selection can influence the user's experience and their psychological response to the interface with the design. Color theory understands how colors can influence a user's feelings, mood and behavior. According to J. Linschoten and Mansur (2021). Colors have the power to influence a person. Color psychology can reveal a person's mental state and its imbalances. Based on this argument, color can be used to diagnose physical and psychological conditions. In addition, the dominant color chosen has an associated meaning as in this design:

1. Pastel blue: Pastel blue is often associated with calm, peace, and coolness. This can provide a feeling of relaxation and reduce stress. In the context of mental health, pastel blue can provide a sense of comfort and support a calm atmosphere.
2. Pastel Green: Pastel green creates associations with nature, growth, and freshness. It can reflect hope, recovery, and feelings of stability. In the context of mental health, pastel green can stimulate feelings of balance and positivity
3. Pastel Pink: Pastel pink is a softer color and is closer to red. It can convey warmth, empathy, and caring. In the context of mental health, this color can reflect social support and positive attention.

4) Features Description

a) Smart To-do List Calendar

Smart To-do List Calendar is an innovative solution specially designed to help users reduce stress by organizing their schedule. This feature uses artificial intelligence (AI) to provide practical and powerful solutions, in order to maintain emotional stability and mental well-being. By leveraging artificial intelligence, Smart To-do List Calendar automatically analyzes and organizes tasks so users can focus on what's most important. This feature bridges the gap between desire and reality, ensuring users feel more in control and ready to tackle tasks without anxiety. The following are details of the Smart To-do List Calendar feature:

1. To-Do List: Users can easily enter their to-do list into the app. This could include work, projects, personal activities, or other things they need to get done.
2. Priority Analysis: Once a task list is entered, our AI will analyze it. AI will rank tasks based on factors such as deadline, complexity, and importance.
3. Smart Scheduling: Higher priority tasks will be positioned at the top of your daily schedule. This allows users to start the day with the most significant and urgent tasks, increasing productivity and giving users a motivating feeling of accomplishment.
4. Schedule Flexibility: Users can easily view changes in the schedule and adjust accordingly if necessary.
5. Visualization: The calendar will display a 'stress alert' warning notification when opened by the user if the stress tracker indicates the user is experiencing stress above the specified percent. The calendar will also change color if the user opens the feature while in a high 'stress tracker' condition to warn that the user should rearrange the predetermined schedule to reduce stress levels.
6. Stress scale bar: There is a small bar integrated with the stress tracker. The bar will fill up if the stress level gets higher. The color of the bar may change as the stress level increases.
   Also integrated with additional features such as Red Day Tracker, Doctor Consultant, Stress Tracker, and also connected to Google Calendar. It allows users to track menstrual cycles, get expert mental health guidance, monitor stress levels and mental health and get alerts if stress levels get too high, and sync plans with Google Calendar.

b) Red Day Tracker

Red Day Tracker is a feature created specifically to help women understand and manage their menstrual cycle, as well as monitor their emotional well-being. We recognize that hormonal changes during the menstrual cycle can impact emotional health, and Red Day Tracker provides an intelligent solution to understand and address these changes. Following are the detailed features of Red Day Tracker:

1. Menstruation Tracking: Users can easily log the start and end dates of their period, as well as any symptoms or physical changes during the cycle. This data will be arranged in a format that makes it easier for users to view and manage their menstrual cycle history.

2. Late Menstruation Alert: This feature provides a warning if the menstrual cycle is delayed. In addition to notifications, users can view a history of these alerts in the form of a log that records changes to their cycle schedule. This feature is also integrated directly with the calendar in the Smart To-do List Calendar

3. Graphics: Red Day Tracker provides clear and informative graphics to help users see the relationship between their menstrual cycle and their emotional health. This graph visualizes menstrual data and emotional feelings in an easy-to-understand display.

c) Educare and Counseling

Educare is a feature dedicated to improving the understanding and well-being of users' mental health. This feature provides easy access to articles, information, and resources relevant to mental health topics. By combining education and support, EduCare aims to empower users with the knowledge and tools necessary to live a more emotionally balanced life. Following are the detailed features of Educare:

1. Educational Content: Users can explore a variety of articles, guides, and resources covering various aspects of mental health. This content is updated regularly and adapted to user needs

2. Mental Health Category: EduCare provides a wide variety of resources, including online courses, book recommendations, educational videos, and practical exercises. Users can choose based on their preferences, allowing access that suits their way of learning to improve mental health. Counseling is a feature that aims to make it easier for users to find, select, and interact with mental health professionals. In an effort to ensure easy access and high quality of care, this feature provides a list of therapists, psychologists and doctors.

Counseling feature details:

a) Doctor Profile: Each doctor has a profile that includes information in the form of name, expertise, experience and price.

b) Schedules and Bookings: Users can view doctors' schedules and book appointments directly through the app. This will be integrated with existing calendars in the Smart To-do List Calendar.

c) Counseling Category: We provide several counseling categories including stress and menstruation. Users can also search for therapists, psychologists or doctors based on the type of specialty they need.

d) Live Chat with Experts: Apart from various education, EduCare also provides a live chat feature with mental health experts. Users can directly interact with professionals who are trained and experienced in the mental health field. This feature allows users to discuss their concerns privately, get advice, and feel heard directly, providing additional support on their journey to better mental wellbeing

d) Virtual Community

Virtual Community is a place where people with mental health can connect, share experiences, and get support from others. This feature facilitates forums and discussions that allow users to build a solid community and share information about mental health. There are forum categories that allow users to explore various topics. The following are details of the Virtual Community feature:

1. Forums and Discussions: Users can join various forums covering topics such as depression, anxiety, stress management, relationships, and more. They can participate in discussions, share experiences, and provide support to each other.

2. Most Frequently Visited Headlines: Virtual Community displays the headlines most frequently visited by users. It covers popular topics and the latest information.

3. Quick search: Users can easily search for forums that suit their needs or follow topics they are interested in. This makes it easier for users to find information and interact within the community.

e) Sleep Tracker

Sleep Tracker is a feature designed to help users understand and improve the quality of their sleep. This feature allows users to record sleep time, wake up time, as well as provide sleep data analysis that includes informative graphs. With Sleep Tracker, users can better manage their sleep patterns. This feature is integrated with a stress tracker to determine the user's mental health level. The following are details of the Sleep Tracker feature:

1. Sleep and Wake Up Time Logging: Users can enter their sleep time and wake up time every day. This helps monitor and record sleep time regularly.

    2. Sleep Quality Analysis: Sleep Tracker provides an analysis of the user's sleep quality based on the data that has been entered. The graphs provided visualize sleep data in an easy-to-understand display.

    3. Graphs: Users can see changes in their sleep analysis graph over time. This helps users understand the impact of changes in their sleep habits.

f) Save Our Soul (SOS)

Save Our Soul (SOS) is an emergency signal that can be used by users in critical situations, including the risk of suicide and menstrual symptoms. This feature allows users to send SOS signals to emergency services such as ambulances, firefighters, and police, while simultaneously activating beacon signals to get help from nearby users. The following are the details of the Save Our Soul (SOS) feature:

    1. Save Our Soul (SOS) signal: Users can quickly activate the signal by pressing a special button on the application. It will automatically contact the appropriate emergency services, such as ambulance, fire department, or police, for emergency situations.

    2. Beacon Signals: Simultaneously, this feature sends beacon signals to nearby users who have the same app. Beacon signals notify nearby users that there is an emergency situation nearby, and they can provide assistance if they feel safe to do so.

g) Stress Tracker

Stress Tracker is a feature that allows users to monitor their mental health levels through analysis of data generated from various application features. This feature provides a visual presentation of levels stress by utilizing data from activity density in the Smart To-do List Calendar, sleep data from Sleep Tracker, and menstrual cycles from Red Day Tracker. With a better understanding of these factors, users can manage their stress more effectively. The following are details of the Stress Tracker feature:

    1. Data Analysis: This feature collects and analyzes data from several other features in the app, including Smart To-do List Calendar, Sleep Tracker, and Red Day Tracker.

    2. Percentage Stress Number: The results of the analysis are presented in the form of a visual percentage number which shows the level of stress experienced. Users can clearly see the extent of their stress and how certain factors are affecting their mental wellbeing.

5) Application Design

In the UI/UX design process, we started by conducting in-depth research to find out the needs and preferences of the target users of the Dopamind+ mental health app, which we designed using Figma. To guide user interactions from start to finish, we create user flows that are detailed and easy to understand. Next, we created an initial wireframe to serve as a basic framework for organizing the main components and layout of the application. Here's the app design and Figma link for Dopamind+ : *https://www.figma.com/file/BdUBNCMuIA8Sp7mLCAz4HH/Dopamind%2B?type=design&node-id=0-1&mode=design*.

3.2 Discussion

The Dopamind+ application significantly advances mental health management, particularly for adolescents and young adults. Its multifaceted approach, incorporating features such as the Smart To-do List Calendar, Red Day Tracker, EduCare and Counseling, and SOS signals, presents a comprehensive solution to address various aspects of mental well-being. By harnessing the power of technology, Dopamind+ offers accessible support that is especially crucial in today's fast-paced, digital-centric world. Practically, the application holds immense promise in revolutionizing how mental health is approached and managed. Integrating AI-driven tools like task prioritization and schedule management can alleviate stress and anxiety associated with academic and social obligations.

Moreover, the inclusion of the Red Day Tracker serves as a practical tool for women to manage their menstrual cycles and acknowledges the significant impact hormonal fluctuations can have on mental health. By catering to diverse needs and experiences, Dopamind+ sets a new standard for inclusive mental health care. However, alongside its potential, Dopamind+ faces several challenges that must be addressed for its effective implementation and sustained impact. Language barriers pose a significant obstacle to accessibility, highlighting the need for multilingual support to cater to a broader user base. Furthermore, ensuring the privacy and security of user data is paramount, necessitating robust measures and compliance with relevant regulations. User engagement also presents a challenge, requiring continuous innovation and personalized features to maintain interest and participation over time.Additionally, integrating Dopamind+ with existing healthcare systems and services is essential for maximizing its reach and effectiveness but entails complex

collaborations and logistical considerations. Looking ahead, several avenues for future development and enhancement of Dopamind+ emerge. Expanding multilingual support can democratize access to mental health resources, particularly in underserved communities. Advancing AI capabilities to deliver personalized recommendations and interventions based on user behavior holds promise for optimizing the application's effectiveness.

Moreover, partnerships with educational institutions, NGOs, and community organizations can facilitate holistic support systems beyond digital platforms. Integration with wearable technology presents an exciting opportunity to harness real-time data for proactive mental health monitoring and intervention. Continued research and evaluation are imperative to assess the application's impact and refine its features based on user feedback and evolving mental health needs. Beyond its technological aspects, Dopamind+ has the potential to catalyze a paradigm shift in societal attitudes toward mental health. By providing accessible resources and fostering supportive communities, it contributes to destigmatizing mental illness and promoting help-seeking behaviors. The social impact of Dopamind+ extends beyond individual users to encompass broader cultural shifts towards prioritizing mental well-being. Dopamind+ represents a groundbreaking innovation in mental health technology with far-reaching implications for individuals, communities, and society. While challenges persist, the collective efforts of stakeholders and ongoing technological advancements are crucial to unlocking its full potential. By embracing innovation, collaboration, and a human-centered approach, Dopamind+ paves the way toward a future where mental health support is genuinely accessible, inclusive, and effective.

4. Related Work

Several studies and publications offer valuable insights into mental health, which inform the development and understanding of platforms like Dopamind+. The Indonesian Basic Health Research (Riskesdas) conducted by the Ministry of Health in 2018 provided comprehensive data regarding the prevalence of mental health disorders in the country, thus providing a basic understanding of the scope and impact of these conditions (Riskesdas, 2018). Sarafino's work in health psychology emphasizes the biopsychosocial interactions underlying mental health, highlighting the complexity of factors influencing well-being [2]. Studies such as those conducted by Gili *et al*. (2016) and Avci *et al*. (2017) highlighted gender differences in mental health and suicide risk and emphasized the importance of considering gender dynamics in mental health interventions [11][14]. Gender inequality, as discussed by Annika *et al*. (2017) and Busfield (2012), dealing with mental health outcomes demonstrates the need for gender-sensitive approaches in mental health services [8][9]. The World Health Organization's report on suicide prevention underscores the global importance of addressing mental health challenges and reducing the incidence of suicide and advocates comprehensive strategies to improve mental well-being [4]. Additionally, research on age-related fertility decline and its implications for women's mental health, as outlined by the American Society for Reproductive Medicine (2014), highlights the intersectionality between reproductive health and mental well-being. In technology-based mental health interventions, research by Karnawan *et al*. (2020) and Jones *et al*. (2011) provide insights into user experience design and investment analysis relevant to developing and evaluating platforms such as Dopamind+ [17][12]. Additionally, research on stress management by Hurlock (2000) and Hawari (2016) offers strategies for reducing stress and increasing mental resilience [6][10], which can inform the design of features in Dopamind+ to reduce stress. In addition, epidemiological surveys such as the Indonesian Basic Health Research (Riskesdas) and Wardi and Ifdil (2016) research on stress conditions among students offer empirical evidence on the prevalence and impact of mental health problems [1][20], which guides the prioritization of features and interventions in this regard. Dopamine+. By synthesizing insights from these diverse sources, Dopamind+ can refine its approach to mental health support, effectively addressing the diverse needs of its users.

5. Conclusion

The Dopamind+ application aims to revolutionize mental health solutions, offering innovative approaches to enhance individuals' well-being. By harnessing technology, these apps empower users to better manage stress, anxiety, and other mental health challenges. The target user base of Dopamind+ spans across age, gender, and specific mental health conditions, catering to a diverse array of individuals. The stakeholders involved in the application ecosystem include users, developers, health services, social services, law enforcement, academia, research institutions, and related organizations. This application holds the promise of providing easier access to mental health support at reduced costs, while also offering personalized solutions

tailored to individual needs. Raising awareness about mental health is crucial for fostering a balanced and fulfilling life for many. Furthermore, avenues for further research include exploring user preferences across demographic groups to inform feature development, evaluating the efficacy of technology-based mental health interventions, implementing intelligent algorithms for personalized services while ensuring data privacy, and fostering collaboration between developers, mental health professionals, and users to ensure the relevance and effectiveness of the application in providing support. The Dopamind+ application was conceived to analyze its impact on users susceptible to mental health disorders, aiming to mitigate such disorders, particularly suicide and depression rates, and to advance innovation in mental health alongside technological advancements. Designed to cater to all demographics, with a focus on teenagers, the application is accessible on mobile platforms such as Android and iOS, aiming to provide health and educational services to communities.

Acknowledgments

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