

Virmentalness: Prototype of Therapy for Dysthymia Patients Using Virtual Reality

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Abstract

Depressive disorders can happen to anyone and will affect the pattern of life. However, there are still people who underestimate depression itself. Generally, depression problems or mental disorders are carried out with psychotherapy, a method for treating problems to find out the experienced problem and using anti-depressants. This study aims to produce a therapeutic aid for depression sufferers in this dysthymia by using Virtual Reality technology, which can be used by patients and medical experts, namely psychologists and psychotherapists, to use Virtual Reality-based therapy methods. The research method used is the prototyping method. The way to collect data is by interview and scientific literature. Researchers used Unity3D Software to create Virtual Reality applications. Virmentalness application is expected to help people with dysthymia symptoms in doing therapy to reduce symptoms. The application displays a 3D viewing environment of a room, a 360-degree atmosphere, and content video and audio for therapy methods.

Keywords— Depressive disorders, Dysthymia, Virtual Reality, Therapy, Android

1. INTRODUCTION

Health is the condition of a person free from all forms of symptoms of mental disorders. A mentally healthy person can carry out everyday activities and live his life without excessive thought disturbances and can adapt to the various problems he faces [1][2][3]. One of the mental health disorders is depression which is a mood disorder that can cause the sufferer to be depressed constantly, always feel alone and sad. Individuals who experience stress, anxiety, and restlessness, if allowed to drag on, can cause the immune system to become abnormal [4][5][6]. However, there are still people who think that depression is not a mental disorder and underestimate depression. This was evidenced in a 2015 study on knowledge about depression among undergraduate students in Hanoi, Vietnam, concluding that there is a need to improve mental health literacy [7]. In fact, depression is a disease that can interfere with a person's activities and everyday life functions, which can become a severe health problem. Impaired mental health can have an impact on mental disorders that can change the way a person behaves and can trigger thoughts of self-harm [8].

One type of depression is Dysthymia or Persistent Depressive Disorder (PDD), which is included in mild depression and is defined as a depressive disorder that has a duration of illness of at least two years which has an impact on depressive mood disorders characterized by a depressed mood most of the day [9][10]. Symptoms experienced by people with dysthymia are poor appetite or overeating, insomnia or hypersomnia, low energy or fatigue, low self-esteem, poor concentration or difficulty making decisions, and feelings of hopelessness [11].

Treatment of depression is adjusted to the sufferer and the level of depression experienced. Treatment for less severe depression usually includes a combination of medications, therapy, and lifestyle changes.

The use of technology has been applied in various fields, one of which is in the health sector, namely Virtual Reality (VR). Virtual Reality is a multimedia technology that displays visualizations that can interact with an environment that is simulated by the user as a user [12][13]. Thus, users can feel they are in a visual environment that looks real. One method of using virtual reality to deal with mental health problems is the Virtual Reality Therapy (VRT) method, a new paradigm to provide innovative therapeutic modalities. Using VRT will allow users to enter a virtual environment that can evoke a sense of dread similar to seeing their natural world experience. Many psychologists have used VRT to perform cognitive therapy for psychological disorders [14][15]. Through the use of Virtual Reality technology as a medium for delivering information, it can become more interactive and practical because it can reach the human senses [16]. The development of Virtual Reality technology has had a positive effect on helping the treatment of anxiety and depression reduce the symptoms experienced [17].

In this study, several related studies are also used as references and references or comparisons. In a 2017 study aimed at healing acrophobia, Virtual Reality Exposure Therapy (VRET), technology, Kinect Technology, and Trinus Virtual Reality methods were used. The results of this study are that through virtual Reality and Kinect Technology, the level of phobia, in this case, acrophobia experienced by participants, can be reduced [18]. Other research is to deal with depression in general with the help of Virtual Reality technology and the mindfulness method, which is meditation for mental health treatment to reduce stress and encourage relaxation for users. The result of this study is that there is a significant change for mindfulness meditation using virtual Reality, where participants feel much more relaxed and calm [19]. The similarity of several previous studies with this research is the use of Virtual Reality technology, as well as the use of relaxation and meditation in reducing dysthymia symptoms. Researchers used several previous studies as a reference and a basis in the research process to develop virtual reality therapy applications for dysthymia sufferers.

Virmentaness stands for Virtual Reality for Mental Illness, a virtual reality-based application that can be run on Android smartphones with a minimum of OS 4.4. Virmentaness is an application developed from this research. This application uses Unity 3D, where Unity 3D can be used by anyone and has exclusive features such as editor, scripting, and audio engine [20]. In addition, this application uses the baking technique to make the room's texture look more realistic [21][24][25].

The purpose of this study is to develop a prototype that can be one of the media for therapy for depression sufferers using Virtual Reality.

2. RESEARCH METHOD

A. Research Conceptual Framework

The prototyping model is the Model chosen by the researcher because the Software can be developed and worked on quickly but as desired. This Model also has the advantage that any improvements made to the prototyping model result from user feedback who will use the Software, so the results are more reliable.

Fig. 1 is showing the conceptual framework of this research. Here are the explanations on every step:

1. *Information Gathering*: the search stage, as well as gathering the required information regarding the therapeutic application to be made, and this information comes from stakeholders, in this case, psychiatrists and psychologists, as well as other supporting literature.
2. *Delivery Model*: the planning stage of how the application will be made in outline, designing what things can reduce the depression experienced by sufferers, determining

what words of encouragement and motivation will be heard by sufferers, and determining the tools used.

3. *Deliver Design*: the interface design stage is based on the existing requirements and quick plan.
4. *Build Software*: the stage of making therapeutic applications by combining existing designs and designs using programming languages.
5. *Testing & Deploying*: conduct a trial test on a ready-made application, then evaluate the shortcomings of the application. The application can be submitted to the user, in this case, the patient, if the application that has been made has successfully met the existing requirements. However, if the application is not running as intended, it will be redesigned until it runs as intended.
6. *Final State Application*: The final stage is that the author has been able to submit an application that has met the existing requirements so that it can be used by users, in this case, those with dysthymia.

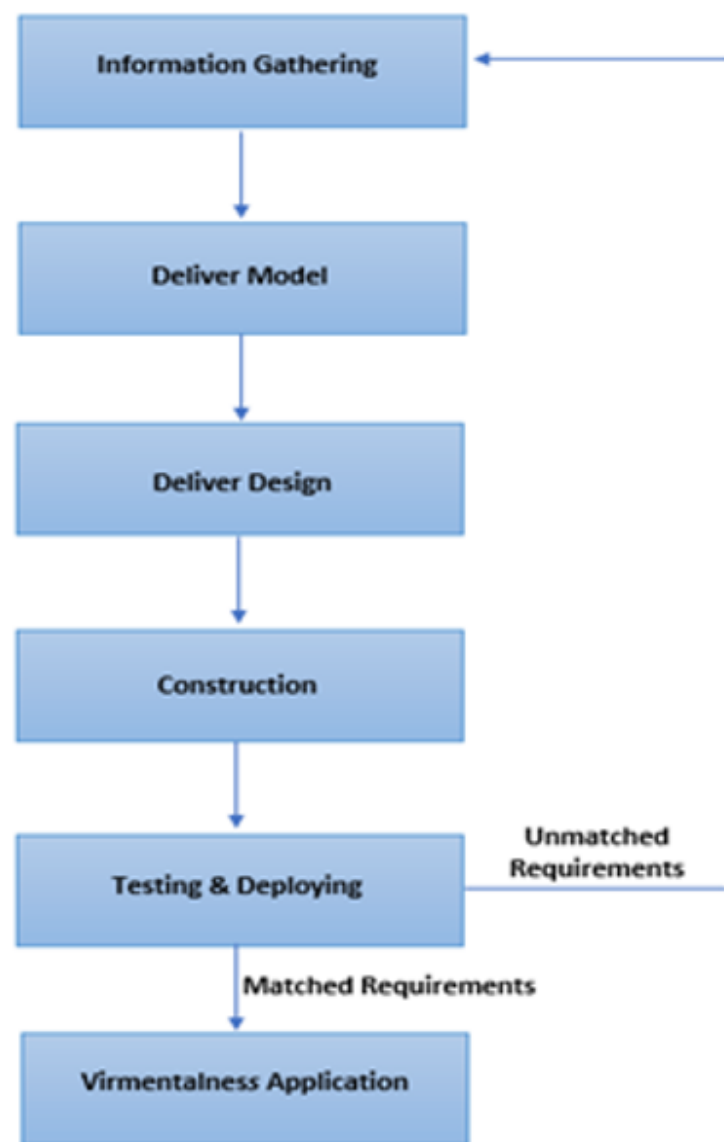


Fig 1 Research Conceptual Framework

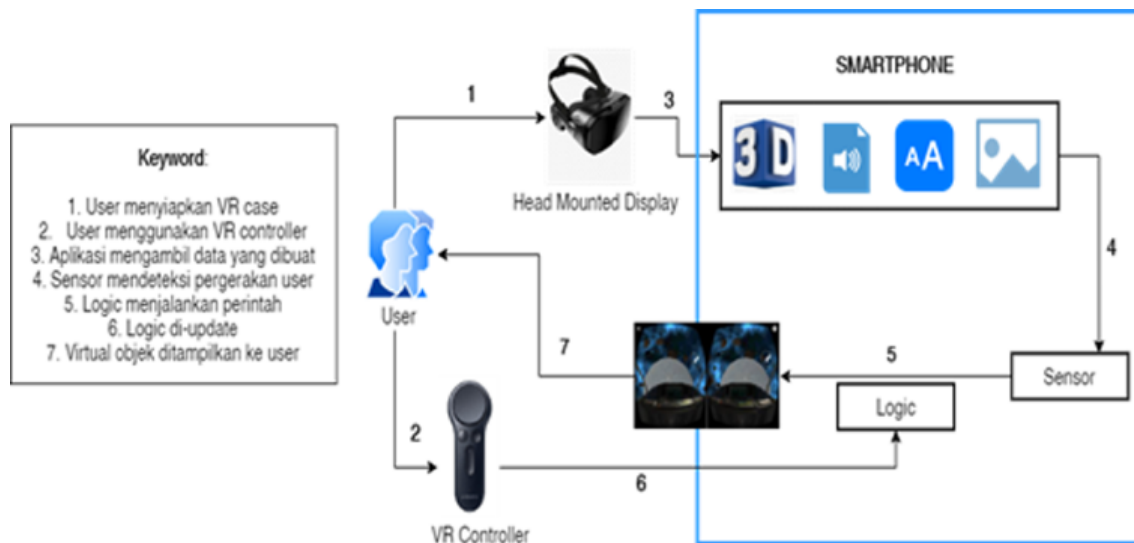


Fig 2 Application Conceptual Framework

B. Research Conceptual Application

Fig. 2 is a general description of the conceptual framework of the application. The conceptual framework of the application starts with the user who prepares the VR case and the VR controller that will display and navigate the application. Applications already running on a smartphone will retrieve audio data, text, images, and 3D objects. The sensor will detect the user's movement when exploring the display. Logic will execute commands from the user and will update. Finally, scripts and interfaces that have been designed through the rendering process will display rendering results to be seen directly by sufferers.

3. RESULT AND DISCUSSION

C. System Analysis

System analysis of the application uses the Unified Modeling Language (UML) to describe the work process of the application. Use case diagrams are used to describe the process of interaction between applications and users [22]. As shown in Fig 3

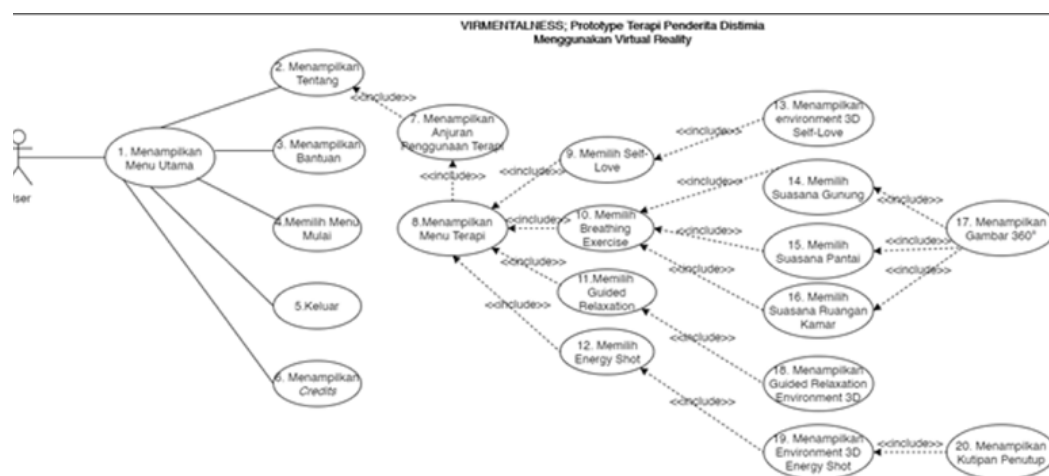


Fig 3 Use Case Diagram

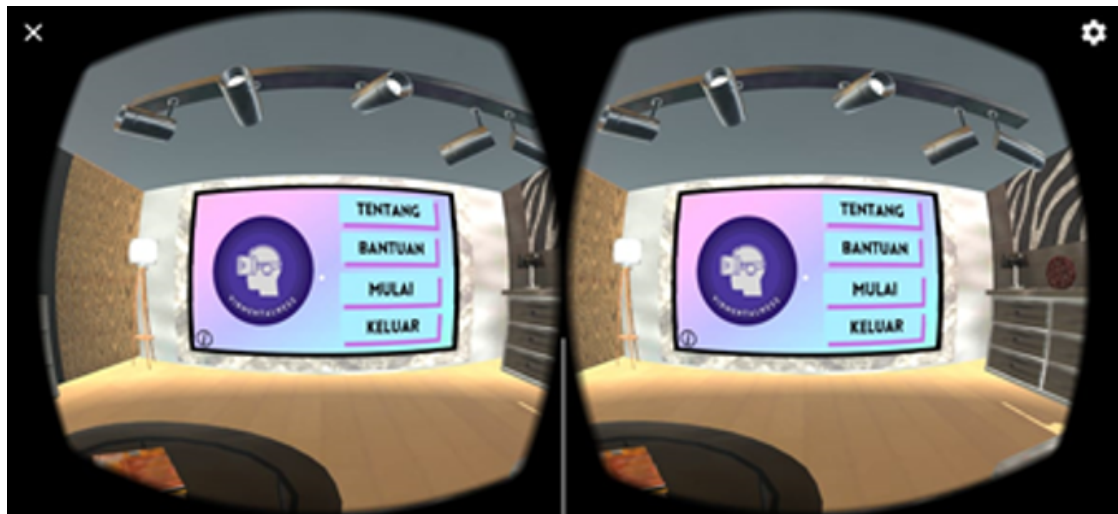


Fig 4 Main Menu Interface

Fig 4 is a feature of the Main Menu, which is the initial view of the Virmentalness application. There are four main menu selection buttons, namely the About button to display a menu about where there is Virmentalness application information, the Help button to display a help menu that contains how to use the Virmentalness application, the Start button serves to display recommendations for the use of therapy before therapy begins, the Exit button aims to display the menu exit to close the application, and the Credits (i) button serves to display the copyright, and the source of the image used in the Virmentalness application.



Fig 5 Therapy Menu Interface

Fig. 5 is a display of the therapy mode selection menu provided by the Virmentalness application. The therapy menu displays a choice of therapy modes that will be used by the user, namely Self Love showing a 3D environment with educational videos to care more about yourself, Breathing Exercise showing a 360 image environment for breathing exercises, Guided Relaxation showing a 3D room environment for relaxation, and Energy The shot features a 3D room environment featuring a motivational video.



Fig 6 "Self-love" Therapy Menu

Fig. 6 shows a 3D self-love environment display which is one of the Virmentalness application therapy menus. The display above appears when the user selects the Self Love button on the therapy menu option. There is a 3D environment of a room on the Self Love therapy menu and educational videos about the importance of caring for yourself. There is a Back button that aims to return to the therapy menu options.

Below are the details of the Virmentalness application on the smartphone used:

- Application File Size: 246 MB
- Application installation size: 198 MB
- Minimum OS: Android 4.4

In the Virmentalness application, there is relaxation audio and ambient music that aims to give a relaxed impression [23]. In addition, there are audio narrations and instructions recorded by the researchers themselves.

B. Testing

Researchers carry out application testing to test whether the functionality of the Virmentalness application can be run on smartphones properly. Based on the 20 features tested, it can be seen that all the features can run well.

Table 1 Testing Virmentalness Applications on Smartphones

No.	Fitur	Output	Status
1.	Main Menu.	Displays the Main Menu. from the Virmentalness app	OK
2.	Therapy Menu	Displays the therapy menu and selects the therapy mode to use in Virmentalness	OK
3.	Suggested use of the application	Displays recommended the use of therapy mode on the Virmentalness application	OK
4.	Choosing "Self-Love" Menu	It shows the appearance of the environment of a room, and there is a video that contains education.	OK
5.	Choosing "Breathing Exercise" Menu	Displays 360 images of the beach, mountain, and rooms	OK
6.	Choosing "Guided	Showing the environment of a counseling room and a 3D character who is a psychologist	OK

	<i>Relaxation” Menu</i>		
7.	Choosing “Energy Shot” Menu	Showing the environment of a room and showing a video about motivational words for the user	OK
8.	Showing environment of 3D “Self-Love” Interface	Displays the virtual environment of a room	OK
9.	Showing “Mountain View” Interface	Displays an image of a mountain scene in 360°	OK
10.	Showing “Sea View” Menu	Displays an image of the beach scene in 360°	OK
11.	Showing “Private Room” Interface	Displays an image of the atmosphere of a room in the form of 360°	OK
12.	Showing 360° view	Displays an image of the atmosphere at 360° with a choice of atmosphere, namely a mountain, a beach, and a room.	OK
13.	Showing “Guided Relaxation Environment 3D” Interface	Displays a 3D virtual environment view of a room and 3D characters	OK
14.	Showing “Energy Shot Environment 3D” Interface	Displays the virtual environment of a room	OK
15.	Showing “Motivation Quote” Interface	Showing closing quotes in the form of motivational words	OK
16.	Showing Play Menu	Displays the start menu for therapy	OK
17.	Showing About Menu	Displays an about menu containing information about the Virmentalness application	OK
18.	Showing Help Menu	Displays a help menu containing information about how to use the Virmentalness application	OK
19.	Showing Exit Menu	Displays exit menu to close Virmentalness app	OK
20.	Showing Credits Menu	Displays copyright information of images used in the Virmentalness app	OK

The following are the smartphone specifications used by researchers to run the Virmentalness application:

- Type : Samsung Galaxy A50
- Operating System : Android 10
- Internal Memory: 64GB RAM 4GB
- Display: 6.4-inch FHD+ (1080x2340) Infinity U

The following are the specifications of the VR Glasses used by researchers to view the virtual environment of the Virmentalness application:

- Type: BoboVR Z6
- Compatible: Smartphone with minimum OS Android 4.4, and iOS 8
- Display: Smartphone with screen 4.7-6.2inch (full-screen 6.5inch)
- Features: Headset, High Aspheric Superlens, High-quality audio streams

4. CONCLUSION

Based on the research that has been done, the researchers conclude, namely:

1. Virmentalness application has the potential to be used as an alternative therapy to relieve symptoms of dysthymia sufferers.
2. Application Displays a virtual environment of a room, 3D characters, and a 360° atmosphere.
3. The Virmentalness application has been tested for its functionality, but its effectiveness has not been tested directly on Dysthymia sufferers.
4. The Virmentalness application has content that users can access, namely educational, motivational videos, and is equipped with audio as instructions for breathing and relaxation.
5. The Virmentalness application is equipped with a feedback form from users which can be accessed on the About menu in the main menu section.
6. Unity 3D can produce a virtual environment display in the Virmentalness application.

5. FUTURE WORKS

Here are the suggestions the researcher gave for the following developers of Virmentalness:

1. Added 360 scene options in Breathing Exercise therapy mode.
2. Users can explore each room in each therapy mode by walking in a virtual environment.
3. Conduct further trials regarding the effectiveness of using the Virmentalness application on users, particularly dysthymia sufferers.
4. Update therapy content, namely, music and video background.

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