

**DEVELOPING A VIRTUAL REALITY PSYCHOLOGICAL HORROR VIDEO
GAME TO RAISE AWARENESS ON THE NATURE OF SCHIZOPHRENIA**

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ABSTRACT

Schizophrenia is a widely misunderstood mental illness that is infamous for its symptoms of psychosis. Exacerbated by the inaccurate, and often exaggerated, portrayal in popular media, a stigma has formed around patients affected by it. In this day and age, schizophrenia is often associated with negative terms such as “madmen” and “*taong grasa*” (lit. grease person; psychotic vagrant). The study aims to aid in raising awareness of the mental illness by educating the players of the real nature of schizophrenia, thereby supporting the effort to reduce the stigma towards affected patients. The proponents will try to achieve this goal by letting participants partake in a virtual reality psychological horror video game that simulates the different symptoms of schizophrenia. An assessment will be done before and after experiencing the simulation that tests their level of knowledge regarding the subject, as well as their views and opinions of patients with schizophrenia.

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CHAPTER I

INTRODUCTION

1.1 Context of the Study

Schizophrenic disorders are generally distinguished by the symptoms of hallucinations, delusions, and abnormal behavioral characteristics [82]. While most patients maintain clear consciousness, their perception of reality is distorted by the symptoms they experience [83]. There are different types of schizophrenia: positive, negative, and mixed (a combination of positive and negative symptoms). Positive symptoms are ones that represent excessive mental functions and are usually the cause of a distortion of one's awareness of reality. These symptoms include, but are not limited to, delusions, hallucinations, and bizarre behavior. On the other hand, negative symptoms impair normal behavior such as speech (alogia), emotions (affective flattening), and sociality (anhedonia asociality) [2] [87][89][83][17][28].

The stigmatization of mental illnesses has existed all throughout the history of humanity and is still very much present in this day and age [72]. In a study done in 2005, it was found out that mentally ill individuals (particularly those with schizophrenia or are substance abusers) have been most linked to the adjectives “unpredictable,” “dangerous,” and “hard to talk with” [13][66]. In fact, some campaigns that aim to fight against the stigmatization of mental illnesses specifically target schizophrenia because its symptoms are homologous to the characteristics of the notion of a “madman” [57][65]. These preconceived negative notions that this stigma is rooted upon bring about a dangerous

predicament wherein serious violation of human rights such as discrimination and negative labelling can occur [39].

Numerous efforts have been done to address this issue of stigmatization [29][16][85]. The “Program Against Stigma and Discrimination Because of Schizophrenia” (see openthedoors.com) led by the World Psychiatric Association (WPA) is one of the more notable ones as it has been active all over the world for more than two decades. One of the main goals of the program is to educate people about the real essence of schizophrenia, and the stigma that is associated with it [57][65]. By doing this, people are made more aware of any prejudices they might have, thereby eliminating the root cause of stigmatization [39].

Recently in the Philippines, the Philippine Mental Health Law (Republic Act 11036) was enacted. It aims to improve the current healthcare services by making it more affordable and accessible for everyone. Another one of its goals is to promote mental health education in the country, which could possibly be the key to a significant decrease in the stigma around mental illnesses [19][15][54].

1.2 Research Objectives

This main objective of this study is to create a virtual reality game that will allow its players to experience a simulation of the various aspects of schizophrenia. The developers intend to educate players and give them new insight regarding the mental disorder by exposing them to a simulation of the lives of many suffering patients with schizophrenia. It is the developers’ goal to correct the misinformed when it comes to mental illnesses such as schizophrenia, so as to fight against the stigma surrounding these patients. This, in

turn, should make people more informed of the proper actions that should be taken when interacting with them.

1.3 Research Questions

This study aims to answer the following questions:

1. How should one accurately and effectively portray schizophrenia in the form of a horror game without misrepresenting people who have been diagnosed with this mental disorder?
2. Which aspects, symptoms, and treatments of schizophrenia should be included in the game?
3. How will the researchers quantify the effectiveness of the game as a medium in raising awareness of the nature of schizophrenia? Consequently, how effective will having this awareness be in fighting the stigma on patients with schizophrenia?

1.4 Scope and Limitations

The game will be developed using Unity 2018.2.7f1 with the C# programming language. The target platform is Windows 7 and above. The game is designed to be played with Vive controllers but will also be playable using mouse and keyboard.

Blender will be used to create the 3D assets that are unique to the game. Generic assets such as textures and models to be used as decoration will be outsourced from free 3D model sources to speed up the development of the prototype. Adobe Illustrator and Adobe Photoshop may also be used by the team if the need arises.

The target audience of the game will be people of ages 18 and above. Due to the game's psychological horror nature, the people who will test the game must first undergo

a screening test. Those who pass said screening test will take a pre-test survey to measure their knowledge on schizophrenia before playing the game. Similarly, a post-test survey will be given to them to measure their knowledge after playing the game.

Psychotic disorders have always been a challenge for physicians to quantify as they are complex in nature and are usually heterogeneous [76][78][17][83]. The fact that these disorders (particularly schizophrenia) are also caused and exacerbated by both environmental and genetic factors make it all the more difficult to classify, treat, and prevent [46].

With this in consideration, the proponents have agreed to focus on the symptoms that define the characteristics of a “madman” (specifically hallucinations, delusions, abnormal social behavior) instead of a complete simulation of the disorder. Misrepresenting schizophrenia might aggravate the problem at hand, so this decision was made to ensure that there will be no misinterpretations of the mental disorder that the game is trying to simulate.

1.5 Significance of Study

In the Philippines, 1 out of 5 adult Filipinos suffer from a mental or psychiatric disorder [67]. Another population survey done in 1993-1994 showed that the prevalence of mental health disorders was at 35% of the population of 3 provinces of Region IV (which includes urban and rural settings among them), and that the three most frequent diagnoses among the adults were: psychosis (4.3%), anxiety (14.3%) and panic (5.6%), all of which are symptoms are tied to the diagnosis of schizophrenia [10]. Additionally, according to a report done by the World Health Organization (WHO), around 70% of the patients

admitted to mental hospitals in the country suffer from schizophrenia and related disorders [86].

Patients with schizophrenia are about 20~40% more like to attempt suicide in their lifetimes. If their schizophrenia is coupled with childhood adversities, substance abuse, and chronic pain, the risk increases even more [69][25][73]. People who suffer from schizophrenia (and other schizophrenia-related mental disorders) also have a significantly higher chance of dying prematurely compared to the general population [7][56][67][45]. Some studies have even concluded that these patients have a reduction of about 10-20 years in life expectancy [80]. The gaps that exist in mortality rates have been attributed mostly to cardiovascular diseases, but also to suicide, accidental deaths, and physical illnesses [41][7][56]. The use of some antipsychotic drugs has been observed to be connected to the increase of cardiovascular and physical diseases [75].

Impairment of insight (anosognosia) is another important hallmark of schizophrenia. This means that a considerable number of schizophrenic patients are not even aware that they have a mental disorder in the first place, which makes it even harder for them to get proper help and medication. This is a dangerous predicament, as it has been exhibited that there is an even larger increase in mortality rates when accounting people who receive no treatment at all [75].

Because mentally ill patients are labelled as a danger by society, their human rights are often violated. They experience discrimination and are often victims of alienation in social settings, which makes it hard for them to experience regular social contact. As a result, they often have negative thoughts and feelings about themselves since they don't feel like they fit in [34][38]. A significant portion of mental health staff from 27 different

countries have been found to act disrespectful towards these patients [31]. There is also a massive gap between the paid employment rates of people with schizophrenia (8%) and the general population (71%). This makes it even harder for these people to not only sustain themselves financially, but also socially [8].

Entertainment and education are grounded in the engagement between the player and the subject matter. Initially developed with entertainment in mind, video games are seeing a new light in the form of educational materials. They have become a medium to expose and engage the player in concepts such as mental health, politics, and environmental issues among many others. With the rise of the use of virtual reality, players can now situate themselves in a more immersive and engaging environment that cannot be found in video games that use conventional technology. The ability to immerse and engage the player in the life of a schizophrenic patient is valuable as a medium to raise awareness as it offers a more realistic and impactful perspective on the realities of schizophrenics. The players are given the opportunity to be in the main character's shoes, which helps cultivate a sense of empathy and understanding [81].

In this regard, the developers wish to acknowledge the presence of a relevant social issue that affects a significant percentage of not only the Filipino population, but also that of the world. The output of this study will provide an entertaining yet informative means of educating people on both the mental disorder known as schizophrenia and the harsh realities that schizophrenic patients face.

CHAPTER II

REVIEW OF RELATED LITERATURE

The purpose of this review is to provide a more detailed background on schizophrenia and identify its symptoms, examine the capability of virtual reality technologies in delivering an immersive game experience, and review video games that incorporate mental health disorders as a central theme in narrative and game mechanics. Additionally, this review examines game frameworks that will aid in the design and development of the video game experience.

2.1 Schizophrenia

2.1.1 Definition

Schizophrenia is a chronic mental disorder that is marked by the symptoms of delusions, hallucinations, poverty of speech (alogia), and abnormal motor behavior. This mental disorder affects the way people perceive reality, and often distorts the brain operations of a normal person. This often leads to people having trouble dealing with school, work, and social relationships, especially when it is left untreated [62][47][37].

2.1.2 Symptoms

Symptoms of schizophrenia can be divided into two categories: positive and negative. Positive symptoms represent excessive or distorted bodily functions. These are often associated with the idea of a “madman” as they distort one’s sense of reality. Negative symptoms, on the other hand, make a person function regressively. These are typically seen in speech, motor behavior, and social interactions [24][77].

2.1.2.1 Positive Symptoms

Hallucinations. These are perceptions that occur without an external stimulus. Auditory hallucinations are the most common kind, but it is also possible for them to occur in any kind of sensory modality such as touching, smelling, and seeing. Hallucinations usually cannot be voluntarily controlled and seem as though they are as real and as impactful as normal perceptions. This symptom is one of the main causes of the distortion of one's recognition of reality [17].

Delusions. These are impressions or beliefs that patients with schizophrenia maintain despite being proven wrong by facts or rational arguments. There are different kinds of delusions, but some of the more common types are: persecutory delusions, or the notion that one is being persecuted or harassed by an individual or a group, and grandiose delusions, which is the belief that one is gifted with exceptional abilities, power, fame, or wealth.

Formal thought disorder. This symptom is usually exhibited by multiple signs which are usually correlated to the speech of the patient. Incoherency in speaking is one of them, where the patients speaks in a way that is almost incomprehensible, resulting in a "word salad." Another sign is derailment (or could also be a form of tangentiality), where the patient suddenly switches to a different topic in the middle of communication.

Abnormalities in motor behavior. The abnormalities that are included in these symptoms can be exhibited by unusual actions, non-goal-oriented movement, or repetitive motions. These usually vary in intensity and can range from child-like behavior to unpredictable (and potentially violent) agitation. Catatonic behavior is also included in this symptom, which numbs the affected person's reactions to the environment [63].

2.1.2.2 Negative Symptoms

Alogia. This symptom is exhibited by a reduction in the speech output of a patient. At times, speech delays are also manifested when responding to questions, or when speaking (usually in between sentences or words) [51].

Affective flattening. This refers to a reduction of outward expressions in emotion. Expressions that are typically shown in facial expressions, speech intonation, and hand movements are affected. Some patients that exhibit this symptom have reported that they still experience the feeling of emotions but have difficulty in expressing them [35].

Anhedonia, asociality, avolition, and apathy. These symptoms refer to the decreased in interest to participate in activities that one may find (or have found) enjoyable. This can be manifested in social relationships, self-improvement activities, and labor in general [5].

Anosognosia. Also known as impairment of insight. This symptom is manifested in the patient's lack of self-awareness, and the lack of recognition that he or she is affected by a mental disorder. When coupled with hallucinations and delusions, anosognosia renders the patient incapable of perceiving reality. This symptom also makes it harder for patients to get themselves a proper diagnosis and treatment [32].

2.1.3 Treatments

Although there is no cure for schizophrenia, it can be treated and controlled in two ways: intake of antipsychotic medications and regular psychosocial therapy. These treatment processes are led by an experienced psychiatrist and can last for a lifetime [61][60][64].

2.1.3.1 Antipsychotic Medications

Antipsychotic medications aim to effectively control schizophrenic symptoms by affecting the brain's dopamine neurotransmitter. Because many of these medications have possible side effects, it is vital for the patient to maintain contact with a psychiatrist to monitor the effectiveness of these medications and revise treatment as needed. Generally, second-generation medications such as Aripiprazole (Abilify) and Lurasidone (Latuda) are preferred over older, first-generation medications such as Chlorpromazine and Haloperidol since they run a lower risk of inducing side effects. It is key to routinely take the prescribed medications even after acute episodes have subsided; 80% of patients who stop taking medications experience relapse within a year [61][60][64].

2.1.3.2 Psychosocial Therapy

Aside from medications, patients need to undergo psychosocial therapy. The objective of these therapy sessions is to help patients cope with their mental illness and help them integrate into society. Methods outside of individual therapy sessions include social skills training which focuses on improving the patient's communication skills, family therapy which educates the family members on schizophrenia and ways to support the patient at home, and vocational rehabilitation which equips schizophrenics with the skills necessary to find and secure livelihood opportunities.

2.1.4 Stigma and Discrimination

Patients with schizophrenia are often discriminated against because the mental disorder is most associated with the idea of a “madman” [57][65]. As such, they are often perceived as dangerous and violent people. In fact, some studies have reported that they are at times thought of as individuals that are even more dangerous than criminals [66].

2.1.4.1 Global Context

In the eyes of the public, a connection still exists between the concept of mental illnesses and violence [79]. A study in 2009 found out that there was little to no difference when comparing the percentage of patients with schizophrenia committing violence and people who solely used drugs, even without schizophrenia. The study then suggests that while there is indeed a connection between mental disorders and violence, substance abuse was the commonality in the statistics and not schizophrenia [22].

Some studies have also suggested that the connection exists due to the media sensationalizing criminal acts done by mentally ill people, despite the fact that only 3-5% of violent acts are committed by them [88]. On the contrary, mentally ill people are 3 times more likely to be the target of such violent acts as they are more vulnerable [55]. An article of The Sun entitled “1,200 killed by mental patients” in huge, bold text has been called out for being an example of headlines that sensationalize mental illnesses [48][11].

The term “schizophrenic” acts more like a label that puts a burden upon patients. In fact, most contemporary experts on the subject matter would prefer calling them “individual *with* schizophrenia” so that it separates an individual from his or her mental disorder. By doing so, people are more inclined to recognize that a patient suffering from schizophrenia is not defined by his mental illness [58]. In Japan, the term “schizophrenia” was actually renamed from “Seishin Bunretsu Byo” (“mind-split-disease”), to “Togo Shitchō Shō” (“integration disorder”). This was done in response to the inhumane treatment towards patients that suffer from it. It also served as a solution to the ambiguity that previously surrounded the mental disorder in the past [59].

2.1.4.2 Philippine Context

In the Philippines, derogatory terms like “*abnoy*,” “*taong grasa*,” and “*may topak*” are used as insults that target one’s mental health. These terms are often associated with the imagery of a psychotic vagrant who walks the streets of Manila with dirty clothes and a face that clearly exhibits tiredness. More often than not, they are avoided as they are considered unpredictable [68].

Because of the expenses that come with treating mental illnesses, most patients are unable to acquire proper help. Thus, they usually become sufferers of homelessness and criminal activity, which makes it even harder for them to get treatment [67].

2.1.4.3 Effects on Patients with Schizophrenia

Patients often report having negative thoughts and feelings about themselves as they feel inadequate to fit in with the general population. Their inferiority complex that is rooted in not being able to have any accomplishments in life, like employment or independence. This also carries over with interacting with their family, as some are aware of the burden that their mental illness puts on their relatives [34].

Some patients with schizophrenia have also disclosed that they feel discomfort in others finding out about their illnesses. People try to hide the fact that they have a condition to not only avoid confrontation but to also avoid feeling ashamed of themselves. This could lead to even bigger problems, such as letting their mental illness be left untreated. Without proper medication, it is possible that their mental disorder will worsen, which will not only be harmful for the patient but also for the people around him [34]. The patient might even be inclined to having dangerous and suicidal thoughts [25].

Patients with schizophrenia may also have trouble with their finances as they are not usually accepted in the workplace [8]. While this may be a result of their inability to

properly work (as manifested in apathetic symptoms), there is still the possibility that companies, and their employees already have a perceived notion of the kind of worker they are. This creates a cycle that only those who suffer from schizophrenia are harmed and affected negatively.

2.1.4.4 Efforts to Fight Against the Stigma Towards Patients with Schizophrenia

There have been multiple campaigns and programs from around the world that have tried to push towards a society that does not discriminate against patients with schizophrenia. Some of these are still active to this day, and more are popping up in support of movements towards mental health literacy [70]. One of the major examples of these programs is *Open The Doors* (openthedoors.com), an effort started by the World Psychiatric Association (WPA) back in 1996. It is also known as “The Global Programme against Stigma and Discrimination Because of Schizophrenia.” What differentiates *Open The Doors* from other campaigns is that it is a long-term commitment for the organizers, and that it is an international effort with varying processes for each country they are in. It has been considered a success based on the evaluations done on participants and their families, as well as on the level of interest that the general public has shown towards the program [33].

Some campaigns are more general, as they tackle the whole subject of mental health. Examples of these include Time to Change (England; time-to-change.org.uk), See Me (Scotland; seemescotland.org), and Bring Change 2 Mind (U.S.A.; bringchange2mind.org). Most campaigns and programs have the same means to achieving their goals, which include initiation of activities, as well as distribution and creation of learning resources, on the subject of mental health and its advocacy [26].

In the portrayal of mentally ill people in media such as movies, there has always been cases of stereotyping and exaggeration. Some have also portrayed mental illnesses in their most extreme forms, such as illnesses that make people unusually violent. An example of this is the 1991 movie, *The Fisher King*. In this movie, a person with schizophrenia is portrayed to commit mass murder in a bar. While movies similar to these exist, some also portray schizophrenia in a more neutral stance, such as the 2001 biographical film, *A Beautiful Mind*. Mental health advocates have praised this film for having portrayed some of the symptoms of schizophrenia like paranoia properly [49][1][74]. Still, this kind of portrayal was still assessed by some critics as stereotyping, as the character in the film was a genius, which might lead to people thinking that having schizophrenia entails having a secret ability as well [30][42].

2.1.4.5 Possible Methods to Reduce Stigma Associated with Schizophrenia

Education. The existence of stigma on schizophrenia and other mental illnesses is based upon ignorance, fear, and misinformation [40]. This problem is further exacerbated by the fact that the media has negatively portrayed mental illnesses into extreme stereotypes. Countering these preconceived misconceptions about mental illnesses with facts and statistics has been proven successful in the past, although its effectiveness in the long-term showed negative results [43].

Contact. Another way of solving the problem of misinformation is letting people experience being in contact with the stigmatized group. Not being able to communicate directly with the affected people not only breeds fear and distrust on the part of the communicator towards the stigmatized person, but also creates a divide between them.

Being in contact also allows the chance of creating an emotional connection between the two groups, which can facilitate positive interaction [43].

Protests and mental health advocacy campaigns. By protesting against institutions, companies, or organizations that are associated with displaying prejudice towards a certain community, stigma is shown as something immoral. This, in turn, can affect how observers think towards the stigmatized group, which in this case are people affected by mental illnesses. In addition to this, the organization being targeted by the protest may also be convinced to cease their stigmatizing actions [12].

2.2 Virtual Reality

This section examines the recent applications of virtual reality, and its potential to serve as the project's platform as a video game.

2.2.1 Applications of VR

Aside from simulated virtual experiences, virtual reality has been an increasingly trending platform for video games for entertainment. VR-exclusive categories have been established by Steam, the largest online distribution platform that specializes in video games, for VR-exclusive titles such as Job Simulator and VRChat [18]. Many titles that were developed originally in 3D are being redesigned to cater exclusively to the VR consumer market such as The Elder Scrolls V: Skyrim VR, Doom VFR, and SUPERHOT VR.

The use of virtual reality in training military personnel is also slowly gaining traction. A reason for this is its cost-effectiveness and efficiency. Since training sessions done in classes are limited to only theory, VR goes beyond that by enabling students to

undergo a more hands-on experience. To add, the number of situations that the students can be subjected through VR is endless; it can create complex real-life situations and simulations that can be used to improve the skills of a soldier, such as driving cars or shooting with rifles [71].

2.2.2 Immersiveness and Engagement

An experiment was conducted to quantify and compare levels of immersion in virtual reality and games that use a standard monitor. The metrics used for measure was a player's electroencephalography, the patient's brain activity, and galvanic skin response, the patient's electrical activity on the skin. These were measured using various sensors on an EEG headset and GSR device. These would indicate the levels of physical stimulation and the brain's responses as the player progress through the game [21].

The players would undergo a simulation of a roller coaster ride. They would be measured in what the players were feeling based on the electrical activity in the brain, and how intense these emotions were. These metrics were collated and the researchers were able to classify the levels of engagement that a player felt all throughout the experience. In conclusion, studies have shown that virtual reality can provide a more physiologically arousing experience based on the GSR metrics, and higher engagement is clearly more present in a virtual world based on the EEG readings [21].

Virtual Reality and how affects the effectiveness of learning and memory retention and recall is a topic with uncertain results. Some studies have been shown that immersion in a virtual reality space and “being there” has positively affected memory performance, especially for adult participants [4][9]. On the other hand, there have also been experiments that proved otherwise, or not be of any help at all [3][6]. What these studies

all have in common is that they all suggest further research into the use of virtual reality [14]. The proponents of this study hope to contribute in furthering this research, even if it is not the main concern of the research.

2.3 Portrayal of Schizophrenic Symptoms in Video Games

This section explores video games that have mental health incorporated as a central theme. Such titles would attempt to explore mental disorders as a mechanic in gameplay and explore its theme of mental disorders to craft characters and the world around them.

2.3.1 Hellblade: Senua's Sacrifice

Hellblade: Senua's Sacrifice is about a Celtic warrior who struggles with psychosis. The goal of the game is to follow Senua as she travels to Hel while fighting creatures and solving puzzles.

The game is able to exhibit psychosis through the hallucinations and voices that Senua experiences throughout her travels. The hallucinations can come in the form of the creatures that she has battle, while the voices would sometimes act as a guide [23]. The game has received mixed reviews stating that it lacked in properly depicting the experience of having psychosis. The psychosis was used as a plot device and without it, the game would still play the same. The connection between the player and to Senua and her psychosis was lacking due to not knowing what her whole journey with it was like [20]. The developers can use how the voices were used in order to act as a guide for the player. These voices can also be changed in a way that they trick the player instead of helping them. The developers can also learn from the mistakes that *Hellblade: Senua's Sacrifice* made in terms of representing the mental illness to the players.

2.3.2 Amnesia: The Dark Descent

Amnesia: The Dark Descent is a survival horror game developed by Frictional Games. Players take on the role of a 19th century Englishman named Daniel who wakes up in a dark castle and has no recollection of his past. All he has is a note, which he had written to himself before erasing his own memory, that says he must descend to the depths of the castle and eliminate its baron [44].

The game makes use of a Sanity mechanic that sets the game apart from many others of its genre. Aside from the health bar, players must maintain Daniel's sanity bar which lowers in the darkness or when looking at monsters and raises when near a light source or completing objectives. Unsuccessfully maintaining sanity results in various visual and auditory hallucinations that eventually cripple the player, leaving him exposed to monsters. Notable effects include distorted paintings, warped screen effects, fake monsters, and high-pitched whines [27].

This mechanic of having to manage one's well-being and the special effects and consequences that come with it can serve as an inspiration in the development of the project's mechanics and special effects, particularly when the main character is experiencing auditory and visual hallucinations.

2.3.3 Silent Hill 2

Silent Hill 2 is a survival horror developed by Team Silent. Players take on the role of James Sunderland, a man who ventures to Silent Hill in search of his wife, Mary, after receiving a letter from her three years after her death.

The setting and monsters are the most notable details about the game since they are reflective of James's psyche. The appearance of the buildings in Silent Hill are illusions

created by James's hallucinations; the buildings twist and deform to their true, dilapidated structures as James begins to understand his situation. The monsters are all representations of James's painful experiences and regrets in life. For example, Pyramid Heads resemble executioners and were created as a response to James's want for punishment after euthanizing his wife and are only truly defeated in the end when James accepts his guilt for the actions he committed in the past [50].

Silent Hill 2 is a great example of how one's mental state can serve as a central theme in narrative. Denial, grief, depression, and eventual acceptance were all exhibited well in the character of James Sunderland and their embodied hallucinations. The power of one's mental state to affect James's interactions throughout the game can be used to further the project's narrative and the world that the developers would want the player to engage in.

2.3.4 Layers of Fear

Layers of Fear is a psychological horror game developed by Bloober Team. Players take on the role of a psychologically ill painter who is searching for ways on how to overcome his creative block and complete his magnum opus. A narrative-driven game, *Layers of Fear* explores the depths of madness and isolation with strong visuals.

The game is ambitious in its visual art style and its unique fusion of madness, painting, and horror. The author not only experiences hallucinations of his paintings which haunt him in his quest for completeness, but also exhibits antisocial behavior which is common in schizophrenic patients [53]. The developers can use this as an inspiration in painting a character that accurately struggles interacting with the people in his community and the journey into the descent of alienation.

CHAPTER III

METHODOLOGY

3.1 Design

3.1.1 Intended Experience

The game will fall under the psychological horror game genre. It intends to educate the player on the different symptoms of schizophrenia, as well as the nature of the illness, through the use of virtual reality. See Appendix A for the game design document created for this study.

3.1.2 Pre-development Data Gathering

In order to properly simulate the experience of having schizophrenia, the researchers gathered data on the nature and symptoms of schizophrenia, as well as various anecdotes involving those with schizophrenia. Various symptoms, particularly those involving visual and auditory hallucinations, were then chosen to be the foci of the simulation so that the project will have a limited yet precise scope. The data gathered and the plans that were made from said data were then confirmed and approved with the help of a subject matter expert.

3.2 Pre-development Planning

3.2.1 Hardware

The hardware to be used will be the HTC Vive. The player will be able to control their in-game movement via the Vive controllers, which will be paired with the Vive base stations and headset to complete its tracking system.

3.2.2 Software

The game will be developed and ran using the Unity game engine. Blender, Adobe Photoshop, and Adobe Illustrator will all be used for creating assets. Trello will be used for project management. GitHub will be used for version control.

3.2.3 Development Cycle

The Scrum development cycle will be used for the development of the game. Scrum has been used in game development for its flexibility, ability to find the fun through its iterative process, reduced costs, and frequent receiving of feedback [36].

The development process will be split into several sprints, where each sprint will focus on a single module or feature of the game. The iterations of the game will receive feedback from the developers to make the needed changes at the end of each sprint.

3.3 Development

3.3.1 Virtual-Reality Integration

In order to develop the VR aspect of the game, the researchers made use of the SteamVR and VRTK plugins of Unity. Because the HTC Vive was used for the project, the developers opted to use SteamVR, which contained everything that was needed to make the HTC Vive work. VRTK, or Virtual Reality Toolkit, enabled the researchers to be more efficient by making use of its pre-made functions for VR locomotion and in-game camera control.

For movement, the researchers opted to use actual in-game movement over point-and-click teleportation to make the game more immersive for players, as the latter option may ruin the horror aspects of the game. As for the interaction with objects, the player is

required to actually reach out to make in-game actions more realistic. The same goes for the flashlight, as it can be controlled by hand movement. Switching between the flashlight and the phone is done by clicking on the touchpad of the left hand.

3.3.2 User Interface

The phone served as the main graphical user interface in the game, which relayed vital information such as the schizophrenia level of the player and the list of game objectives. A TV screen was also used in the opening and ending scenes of the game to relay text regarding the context and purpose of the game, as well as to broadcast information on schizophrenia.

3.3.3 Schizophrenia Levels

The schizophrenia level dictates the intensity of the simulated symptoms, such as the frequency of the Shadow's teleportation around the player, and the frequencies at which the auditory hallucinations play. The level is gradually increased whenever the player is exposed to visual hallucinations such as going near the player or triggering the bees. Once it reaches 100%, the game ends and the player is moved to the ending scene. Players are able to view their schizophrenia level on the upper part of the display of the phone.

3.3.4 Shadow

The Shadow serves as the main visual hallucination in the game. It is portrayed as a humanoid figure that is entirely black. Since the game environment is dark, the developers opted to add a red, high-intensity emission shader to its eyes to make the Shadow visible to the player from afar. An abrasive, static noise is played to mark the presence of the Shadow even without being in the player's line of vision. A script is attached to the Shadow to make sure that it is always looking at the player.



Figure 3.3.4.1 Shadow

The Shadow spawns exactly ninety seconds after the player is spawned in the main stage of the game. Once the Shadow is activated, a script allows the Shadow to teleport anywhere in an area around the player. To prevent the Shadow from spawning too near to the player, there is a smaller area around the player where the shadow is not allowed to spawn. Both of these areas decrease in size depending on the current schizophrenia levels of the player. To make the game more beginner-friendly, the script follows a different set of ranges when the player is inside the building to prevent the players from getting stuck in the building too often.

The Shadow does not attack, but it has the ability to whisk the player to a spot inside the main game area when the player collides with it. The position where players are teleported to is randomly chosen from a set of predefined positions. Being whisked away by the Shadow will incur a significant increase to the player's schizophrenia levels. The same thing happens when the player starts going near the Shadow.

How near the player is to the Shadow dictates how high the values are of the post-processing effects that are applied to the camera renderer. Some of the effects affected by this adjustment include the intensity and size of the grain, the intensity of the chromatic aberration, the opacity of the hue shift (red), and the shutter angle of the motion blur.

3.3.5 Auditory Hallucinations

In the game, this symptom is simulated by having three *AudioSources* randomly position themselves in varying frequencies in an area around the player. Each *AudioSource* has its own collection of sounds, which include voice recordings of a male and a female uttering insults and random gibberish directed towards the player. The frequencies at which the voices play are dictated by how high the player's schizophrenia level is. The auditory hallucinations only start after the player's schizophrenia level reaches a certain threshold.

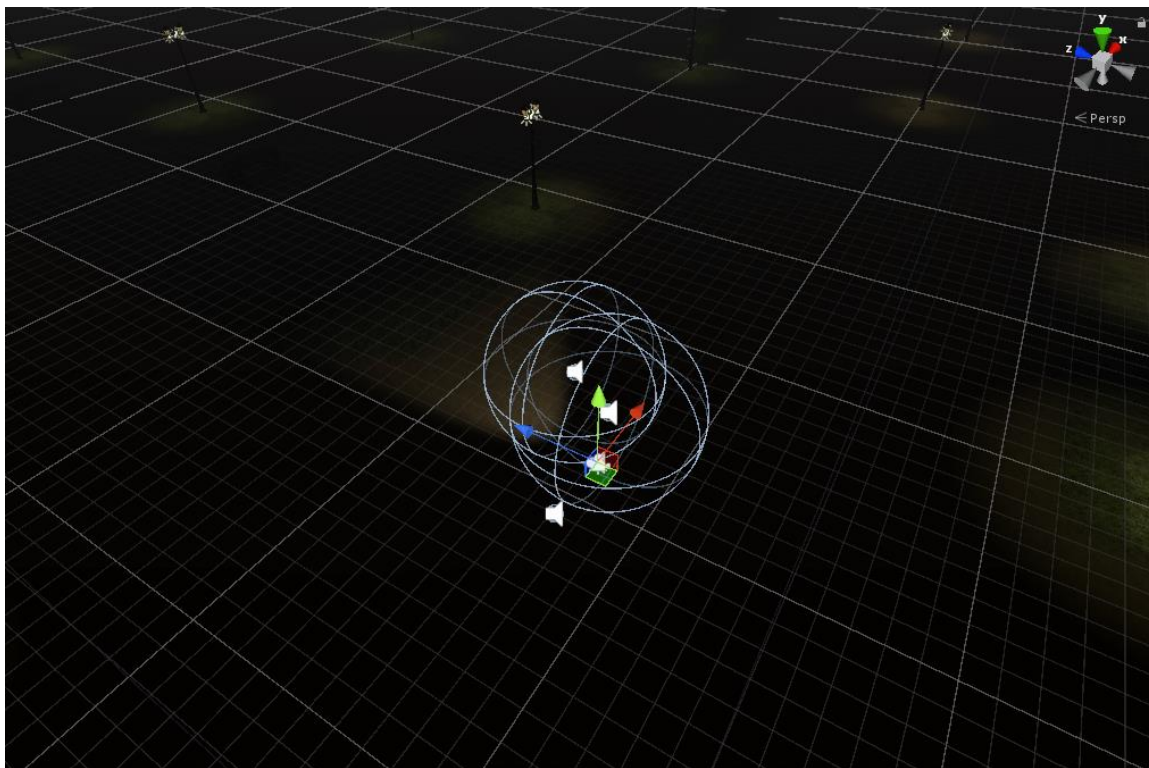


Figure 3.3.5.1. Auditory Hallucinations

3.3.6 Bees

This is a visual hallucination that can only be triggered by closing open windows that are randomly positioned in the school. When triggered, 50 bees are spawned, which all fly towards the center of the player camera to simulate the feeling of being swarmed by bees. The camera then fades out after 5 seconds, and the bees are destroyed.

3.4 Testing

3.4.2 PRIME Test

Playtesters are required to be above the age of 18 years old. The researchers recruited testers mainly through social media platforms.

Before the testers were allowed to participate in the research, they first underwent a screening process known as the PRIME screening test, which is used to detect early symptoms of psychosis [52]. The test consists of twelve statements regarding personal experiences. The participants have to answer how much they agree or disagree with said statements by choosing from the following choices: Definitely disagree (0), Somewhat disagree (1), Slightly disagree (2), Not sure (3), Slightly agree (4), Somewhat agree (5), and Definitely agree (6) [84]. The results are deemed positive if there are one or more scores of 6 (Definitely agree) or three or more scores of 5 (Somewhat agree) [52]. This test was administered via Google Forms, and the results were analyzed and reported to the tester in private prior to the actual testing. Should a participant fail the test, they will be informed of the results in private and recommended that they consider getting connected with the Loyola Schools Office of Guidance and Counselling. This safety protocol was formulated by the researchers and approved by one of the panelists.

3.4.2 Pre-playtest Data Gathering

Testers had to accomplish a pre-test online survey before playing the game. Said survey will provide the researchers a baseline of the tester's knowledge and opinion of schizophrenia and their views on the patients themselves.

3.4.3 Playtesting

The actual playtesting was conducted in the Sandbox, Arete 2F. The venue was spacious so players were able to freely move around. The participants were then briefed by at least one researcher regarding the overall layout of the map and method of control of in-game movement. They were also informed of some visual cues to look out for. To ensure the players' well-being and safety, participants were required to give a safe word so that the facilitators will know when to forcibly stop the game.

After the briefing, the VR accessories were put on the testers with the aid of the researchers. The participants were given a short grace period after the opening scene in the game to allow participants to get a feel of the controls. They were also allowed to ask questions before exploring the game. After the grace period, they were left to explore the map themselves without being guided. At least one researcher kept watch in case anything went awry in the playtest.

3.4.2 Post-playtest Data Gathering

To quantitatively and qualitatively determine the players' experience and the effectiveness of the game in communicating its purpose, the participants were given a post-test questionnaire. The survey sought to assess the gameplay, objectives, and analyze the perceptions of the participants. The data gathered from both surveys were then compared and analyzed by the researchers to see if there was an increase or change in the testers' knowledge and opinions.

CHAPTER IV

RESULTS

4.1 Pre-test Results

The first part of the pre-test gauged how much exposure the participants have had to the portrayal of characters with mental illnesses in media, such as in movies and in video games. All but one participant answered that they been exposed already to illnesses such as depression, autism, and schizophrenia, among other illnesses. The participants revealed that they thought that the general portrayal of these illnesses were done in a negative light.

The next part of the test gauged how familiar the testers are with the nature and symptoms of schizophrenia. Out of the eight testers, five answered that they were aware of its symptoms of paranoia and hallucinations.

The testers were then given a situation in which they meet someone and later find out that this person is affected by schizophrenia. Their initial perceptions ranged from empathy, worry, excitement, and curiosity. Five testers stated that their knowledge of the person's illness would change how they would interact with him.

4.2 Post-test Results

The results are as follows:

Question 1: **How was your experience in playing the game?** The overall experience of the players was positive, in that most of them enjoyed the game. Some players noted that the virtual reality aspect of the game was especially enjoyable. However, some of them found the game disorienting, which made it difficult for them to

traverse the map. Some testers also had discomfort regarding the virtual reality locomotion.

Question 2: The game was immersive and kept me interested. Rate from 1-7.

Why or why not? The average emerged to be 5.9, with scores ranging from 4 to 7. The participants felt sufficiently immersed, stating that the environment felt real and scary. Some of them also noted that the sounds made the experience better. Despite that, they stated that they felt like their immersion was hindered because of the repetitiveness of the map and the uncomfortable controls of in-game movement.

Question 3: The game simulated the different symptoms of schizophrenia well. Rate from 1-7. Why or why not? Did the game portray schizophrenia in a negative light or positive? The average score was 5.6 with scores ranging from 4 to 7. Only two respondents claimed that schizophrenia was portrayed in a positive light. The testers stated that while they were able to experience and perceive the symptoms, they felt that the implementation fell short in terms of quality.

Question 4: I learned something new about schizophrenia/mental illnesses in general. Rate from 1-7. Which symptoms of schizophrenia did you encounter while playing the game and what parts were most effective in conveying these concepts? Seven of our respondents learned something new about schizophrenia. This question garnered a total average score of 6.3. The testers stated they were able to experience visual and auditory hallucinations and paranoia, referencing the “voices in the head” and the Shadow present in the game.

Question 5: The brief description of schizophrenia/list of symptoms of schizophrenia I provided earlier still holds true. Rate from 1-7. Why or why not?

The testers were more or less correct in their initial description of schizophrenia as the average was 5.5. One tester in particular did not know much at all, who gave the lowest score of two. Another tester emphasized that the prologue and epilogue scenes of the game helped in making the nature of schizophrenia more clear.

Question 6: **The game is effective in informing the player of the nature of schizophrenia. Rate from 1-7. Why or why not?** The respondents agreed that the game was effective in informing the player of the nature of schizophrenia, with the average score being 6.1. Most of the responses attributed the score to the educative aspect of the game, which are the opening and closing scenes. There were also some who attributed it to the game proper and the actual simulation they experienced.

Question 7: **Imagine that you met someone recently in your class/workplace. You later find out that this person has schizophrenia. How would you feel about being in the situation described above? Do you think it would change how you interact with this person?** Majority of the perceptions were retained from the pre-test questionnaire, with their reactions being in the lines of empathy, understanding, and worry. However, more responses now included more concrete actions such as educating themselves of the illness as well as being more understanding of the affected individual. Only one respondent stated that they would not change their manner of interaction with the individual if put into this situation.

Question 8: **How do you think the game can be improved on?** One person suggested that the symptoms would be better represented if the game models were improved and the hallucinations were given a more definite progression. Many also felt that the map was too large and dull. Paired with the fact that there was a lack of

discernibility with key interactive objects such as the fuse boxes, this made the game confusing and hard to play through. Some suggestions regarding the improvement of in-game controls and features were also submitted, with most of them being directed toward VR locomotion and the implementation of the flashlight and the phone.

CHAPTER V

CONCLUSION

5.1 On the Effectivity of the Portrayal of Schizophrenia

The players were able to get a clearer picture of schizophrenia and understand that what they experienced in the game was not representative of the real experiences of patients affected by the illness. Most of the testers have already had prior knowledge of schizophrenia, but playing the game helped clear up some misconceptions they previously had. Testers noted that they learned something from their experiences in the simulation, but recommended that the proponents improve the implementation as the game lacked polish. Still, most of the participants felt like the opening and closing scene provided sufficient information about the nature of schizophrenia and the stigma surrounding it, which means that one of the objectives of the research was satisfied.

5.2 On the Engagement of Players

Overall, the game was fairly immersive and engaging according to the testers. The virtual reality aspect of the game helped with the improvement of the experience, but was also the cause of the disorientation that some testers experienced. The testers note that the look and feel of the game was appropriate for the horror genre, and that the usage of audio was effective. Unfortunately, the game fell short because of the dull and unnecessarily huge map which made the objectives incredibly hard to meet on the first try. This, along with the awkward method of control, made the game frustrating for some.

Though the game had its imperfections, it was effective in building the players' empathy toward patients diagnosed with schizophrenia. This is evidenced by the responses of the players which showed their desire to better understand individuals affected by the illness through more concrete actions. This exhibits a positive improvement of the knowledge and perspective of the players regarding the subject matter.

5.3 Issues

The main issue that players encountered was the awkward in-game movement, which some testers described as “floaty” and “unresponsive.” The usage of the VR headset also made one tester quit early into the game because of virtual reality sickness despite the countermeasures set by the proponents. Multiple testers also noted that they felt dizzy after the playtest.

While the game itself was playable, there were still some glitches that the testers encountered. There were reports of accidentally clipping through doors, being unable to pass through doorways, and being unable to climb up the stairs. Some parts of the roof were also see-through because of the way the Unity Engine renders faces. The problem was not present during the creation of the model in Blender, so the proponents suspect that there were miscalculation of its normals. In any case, these glitches proved to be at least only minor inconveniences rather than game-breaking bugs, so the testers were still able to play through until the final scene.

A few tweaks regarding the behavior of the flashlight and the schizophrenia levels are still needed, based on the suggestions of the players. Some had noted that the light of the flashlight needed to be wider. There were also some who commented that going near

the shadow should incur a larger increase to the schizophrenia levels to make the game more challenging.

5.4 Recommendations

The results from the playtesting show that the game provided a fairly immersive experience to the players. Still, there were a lot of problems regarding the type of virtual reality locomotion that was used in the game. To add to that, a significant amount of the testers experienced motion sickness, which is a common side-effect from using a virtual reality headset. Considering this, the developers highly suggest that future researchers who wish to experiment with virtual reality explore other methods of control that might be more appropriate for the game or application that they wish to create. The experience that players will go through will vary from person to person, so as it stands, there seems to be no single best way of going about it. Thus, the developers suggest adding multiple types of virtual reality locomotion to the games, which can be changed on-the-fly if the players wish to do so. Not only will this make the game more fun and immersive for the testers, but it will also ensure a more stable way of gathering data for the researchers. Being aware that the usability of a product is as important as its content will be key for maximizing the potential of a project.

In alignment with the recommendation above, the developers propose the addition of a tutorial stage where the players are taught the basic movements of the game. Since it is quite probable that testers have yet to experience VR, it will be beneficial for them to first explore the types of virtual reality locomotion available in the game before starting the actual testing. This will eliminate the process of intervention that was present in the proponents' research, which will make the testing more seamless for all parties involved.

The proponents also suggest that future researchers and developers explore other forms of video games to lift some of the limits that come with developing certain types of games. While almost all of the symptoms of schizophrenia can be simulated in a 3D or virtual reality game, some of them require relatively more resources to develop compared to when they are simulated in a 2D game. To create a more enjoyable experience for players, it is important to determine the type of video game that not only one wants to create but also where one is able to maximize the usage of available resources in actually creating the game.

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