

Depression through VR

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1. Abstract

This paper shows the research and development that went into making a VR application that takes the player through the morning routine of someone with depression. It showcases the struggles and thoughts that come with the illness and how it affects a person's life. The application takes place in a house, where the player gets woken up by their alarm.

The player can go through a variety of interactions, each with their own inner monologue that narrates them through the day. The application's goal is to be an informative experience for people to understand depression better and for people with depression to feel more understood. This is necessary because it can help people be more empathetic to their loved ones who suffer from depression, making the step towards asking for help and treating the illness more accessible. A link to a video of final product can be found in Appendix [A8](#).

Using VR can make the experience more immersive and direct. The goal of the game is to be informative and to be an experience, not a fun and entertaining game to play.

The problem statement says that *A quarter of the people in The Netherlands will suffer from depression at least once in their life, yet there is still a lot of stigma and misunderstanding around the illness and its treatment* (Trimbos Instituut, 2019-2022). While talking to people with the illness can be effective, many people still struggle with understanding why people with depression live the way they do.

This resulted in the main research question, which is: *What interactive, visual, and auditory elements does an immersive application need to capture the experience of having depression within a 3D environment?*

To answer this research question, it was divided into the three following sub-questions:

1. What auditory elements can be used to convey the experience of depression?
2. How can the use of lighting, color, and atmosphere contribute to the overall mood and feel of the application?
3. What game interactive or gameplay mechanics can be incorporated to simulate the challenges faced by people with depression?

This document will contain the answers in this document. The answers were found through questionnaires, surveys, and field research combined. The results of the research showed that people understood that interactions and environmental features were correlated to depression. They also seemed to understand people who suffer from depression better.

If there was more time or if anyone continued with the development, It would be recommended to add more rooms and clutter to the house. Furthermore, they should add multiple voice-over options and add more interactions scattered throughout the house. It should also be considered to use another platform for the application.

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2. Glossary

VR: Virtual Reality

MoSCoW sheet: A sheet divided into four categories, which include: Must have, Should have, Could have, and Won't have. The MoSCoW sheet is a tool used to prioritize tasks within a project.

Greybox: A block-out of what an environment is going to look like, without many details.

platformer: A genre of action video games where the core objective for the player is to move between points in the environment

3. Introduction

My graduation project was done for the research group on ethics and technology. Together with another student named Max Manenschijn, who is a technical designer, an application is going to be made, to be placed in their ethics lab. Their goal is to do further research on depression, its treatment, and people's views on the illness. They wanted us to create an application that would show the experience of having depression. The goal for this project is to make an application, that shows the point of view of a person who's diagnosed with depression. You will see the world through their eyes and hear their thoughts. The application should be interactive and serve as an informative "game". A personal goal for this project is to research how to create an interactive experience that shows a generalized experience of mental illness. There will also be the creation of an environment in 3D, the environment should be optimized, slightly stylized, and most important of all, feel familiar to people who suffer from depression.

3.1 The project

For the graduation project, the research group wants the students to create an interactive application that puts them in the shoes of a person with depression. The application should function as an informative "game" and show the user what depression could look like to a person from a first-person perspective. The purpose is to inform the users about what people experience when they have depression. Besides that, the application should make people with depression feel a little more understood. An important part of the project is that an environment needs to be created that emulates the way a person with depression lives and how they see the world, also making sure the models are optimized enough for the game. The main goal is to do research on the topic of depression, the usage of games to represent mental illness, and already existing games and other media with similar topics. This information will be crucial to the process of creating this application together with an engineer/designer. The research will be used to find a creative and compassionate way to show the experience of having depression through interactive media.

3.2 The client

The client is the Research Group of Ethics and Technology at Saxion (Hogeschool Saxion, n.d.). The group consists of 13 teachers, researchers, and external experts, and they do scientific research together on the topic of ethics. They also give ethics consultations to companies and other organizations. They are located at Saxion Deventer but also work at Saxion in Enschede.

In the teams' first meeting, we discussed another assignment we could do for them. It would be an installation about an ethical dilemma, which they would present in their lab. Since this was too vague for a graduation assignment, we were referred to a different associate of the research group, her name is

Anne Bonvanie. Anne is a researcher, focused on ethical issues in the medical world. She works together with Psychiatrist Dr. A.A.G. van den Ende from ZGT (ZGT, n.d.) She is researching depression, its treatment, and the stigma around certain treatments. The question was if the team could make an application that could show the public what it is like to suffer from the illness. Her goal for this project is to collect data through the application and by surveying after use (Bonvanie, 2023). This data will be used for further research. The goal of the project for the research group itself is to put the application in its ethics lab. A room in Saxion Deventer where they present various projects with an ethics theme.

3.3 Design thinking method

This report was written following the rules of design thinking. It was divided into five phases. Empathizing, defining, ideating, prototyping, and testing. It is a methodology approach to solving problems and is commonly used in research reports (Friis, 2022).

4. Empathizing

4.1 The market

The target group for a VR application that showcases depression could include individuals with mental illness, their friends and family, mental health professionals, and individuals interested in mental health awareness and education. There are a variety of games that showcase what it is like to suffer from mental health problems.

Gris

A popular example of this is the platformer game called “Gris” (Nomada Studio, Blitworks, 2020). Although it is not exactly about a person with mental illness, it does do a good job of portraying mental states, like denial or depression. This video game takes you through the stages of grief with a female character named Gris. The story has no dialogue and is driven by the environment and its colors. All the colors represent one of the stages of grief, and the game mechanics represent the feelings that go along with it.

For example: in the anger stage, the character can become “heavy”. This mechanic turns the character into a stone to help them to break through floors in the environment to progress in the game. Every emotion has its own special abilities that represent one of the stages. The strength of the game is that it can convey a strong emotional tension without giving the player an explicit narrative, it leaves the journey up to the user. This showcases a realistic experience of someone going through grief and all the emotions that come with it, since it is not linear and the stages overlap and come back often, just like in real life.

The game also has a unique aesthetic, using watercolor effects to color the world. This makes it a memorable experience and ensures clear distinctions between the emotions. A weakness of the game is that the movement system is sometimes slow and repetitive (Booth, n.d.). This is used to convey a certain message or feeling, but it could work against the player's will to explore. Also, the visual cues are sometimes confusing because their use is inconsistent and since there's minimal context, the player doesn't know how much he is progressing in the game. This last point could also be a strategy/analogy since the process of grief is not measurable, but it does hinder when there are extra challenges in the game (Booth, n.d.). Overall, it is a very positively received game that gets a lot of praise for the way it portrays the process of grief.

Hellblade: Senua's Sacrifice

Another game that uses its gameplay to portray mental illness is “Hellblade: Senua's Sacrifice” (Ninja Theory, QLOC, 2017). The story follows Senua, a Viking warrior that is going through a psychosis after a

traumatizing event in her life. The player makes their way through the game by fighting enemies and solving puzzles. The psychosis aspect of the game is shown through a distortion of reality and hearing voices. They used a binaural microphone, which is a microphone that functions like a human ear, to capture the reality of psychosis.

The puzzle aspect of the game takes from another aspect of psychosis, which is seeing patterns that aren't visible to others. All their mechanics were inspired by the input of psychiatrists and people with the condition. This is part of the strength of the game, it really commits to clinical accuracy in a way that not many other corporations have done (Fordham & Ball, 2018, 9). The game does particularly well with gaining the player's empathy for the main character. Instead of presenting someone with a mental disorder, like psychosis, as dangerous or evil, they offer an insight into what life is like with that condition. By gaining sympathy and giving perspective to the player, it can prevent people who suffer from mental illness from being demonized or isolated by society. This can result in people seeking out help faster or not feeling as alone or misunderstood (Austin, 2021, 4).

Actual Sunlight

Depression on its own seems to have less of a focus in the market. The closest example is the game "Actual Sunlight" (WZOGI, WZO Games Inc., 2021) which is a 2D game where you play as a man with depression. The game lets you interact with his world while you get a lot of inner monologues in between. The game often gives the player the illusion of choice, the character will do the opposite of what they choose. Reviews say that the game does a realistic job of showcasing life with depression. The negative way the character speaks to himself is very accurate. The criticism about the game is mostly that there is "too much depressive rambling" and that it is "provocative". People have said that if you suffer from depression, this is not a good game to play, and it doesn't justify itself as a game (Metacritic reviews, 2020).

The market shows that alternative game methods, like VR, are used to help with the treatment of the illness. Some examples are: "Amelia Virtual Care" (Amelia Virtual Care, n.d.) "The waiting room" (Mapplebeck, n.d.), and "Anxiety RelieVR" (Mimerse, n.d.). These applications help the user with managing their anxiety through exposure therapy.

Through research, it is shown that there are practically no informative experiences that emulate the perspective of a depressed person. There is a market gap for informative or immersive experiences that show mental illness through their perspective.

4.2 End-user

The function of the application is to show the person using it the perspective of a person with depression. It should show the struggles and thoughts of someone with the illness. Our end-user will be any adult living in The Netherlands since around a quarter of the people living here will go through a depression at least once in their life (Trimbos Instituut, n.d.). A game or application that emulates depression could result in repetitive gameplay, which is a way to show depression. If this is done with good research and testing.

It could potentially also be harmful to people with mental illness. If the illness is shown in an insensitive way by not testing enough with people with depression, it can create an even more negative stigma around it (Anderson 29). Potentially, the game could also help the user recognize signs of depression in others and themselves, which could result in people seeking out help earlier and preventing the depression from getting worse.

After finishing the graduation project, the VR application will be placed in the research groups' ethics lab. This means that the end user is also people that visit Deventer's ethics lab. This would probably be students between 17 and 30 years old.

4.3 Exploratory research

To get a better and more professional insight into depression, an interview with a psychiatrist at ZGT was conducted. His name is Dr. A.A.G. van den Ende (ZGT, n.d.) and through this interview, the team was able to gain more understanding of the subject of depression and how to approach it. The transcript of this interview can be found in the appendix [A1](#).

The team got connected with the psychiatrist through Anne Bonvanie, from the research group. She thought it would be a good idea to talk to him and gather information from a professional. An interview was set up and the students prepared a few questions beforehand, the questions were open-ended and useful to gain more understanding of depression. The interview was at the Hospital in Almelo (ZGT, n.d.) in the psychiatrist's office. The team asked their questions, which would help them understand a professional's perspective on the illness and to hear about his experience with patients who suffer from depression. The team also asked him about some of the causes of depression, how people describe it to him, and what some big differences are between different patients.

To gain knowledge on how people with depression experience life, A questionnaire was sent out to people who have or had depression. This questionnaire's answers function as an inspiration for the mechanics of the application and to gain a better understanding of what people who suffer from depression struggle with. A summary of the answers can be found in the appendix [A2](#).

The first two questions about treatment and age were to check the answers. This way it would be easier to tell what the reason could be if some of the answers deviated from the other ones. Age could be a factor if the routine/lifestyle answer was different from the other answers. Treatment could be a factor in how the person experiences depression.

The students look for answers that overlapped. A majority of people that filled out the questionnaire described their depression as a heavy feeling and a very negative mindset. This was mentioned by one person as *"Negative thoughts, fatigue, heartache, heavy chest, paranoia people don't like you, not believing in your abilities"*.

The majority of the people also answered having trouble waking up in the morning and snoozing their alarm often. They mentioned having trouble with socializing and with house chores like dishes and laundry. Some also mentioned not having the energy to take a shower. Their days consist of waking up and going to school/work without eating. If they don't have school or work, it is mostly staying in bed.

Some media that were mentioned to find relatable were the shows Bojack Horseman, The good place, Euphoria, and The perks of being a wallflower. They said characters in these shows/movies felt relatable to their experience.

5. Define

5.1 Problem definition

5.1.1 Problem statement

A quarter of the people in The Netherlands will suffer from depression at least once in their life, yet there is still a lot of stigma and misunderstanding around the illness and its treatment (Trimbos Instituut, 2019-2022). While talking to people with the illness can be effective, many people still struggle with understanding why people with depression live the way they do.

5.1.2 Indicators of success

The indicators of success are the following:

- When the player can recognize what depression looks like after playing the application.
- If the player feels immersed in the application.
- If the application makes the player more understanding of people who suffer from depression.

5.2 Research goals

Together with the client (Hogeschool Saxion, n.d.), the student determined the goals for this project. This had to align with their vision and with the requirements for graduation. The following goals were determined.

1. To develop an interactive 3D environment for an application that shows what it is like to suffer from depression.
2. To conduct research about the accuracy of the depiction of depression in the application with people with the illness.
3. To create an application that can be showcased in an ethics lab.

5.3 Scope

The end deliverable will be an application that showcases depression in an informative way. The gameplay will be around 5 to 10 minutes. The gameplay should consist of a 3D environment the player can more around in and interact with.

The application will not serve as a treatment method, the goal is to be informative. The game will include a video of the gameplay, in case the chosen solution can't be played/reviewed on appropriate designated hardware. The game should be able to be played in the client's ethics lab without complications.

The core target audience will be between 18 and 40 year old and have minimal video game experience.

5.4 Research question

What interactive, visual, and auditory elements does an immersive application need to capture the experience of having depression within a 3D environment?

5.5 Sub-questions

1. What auditory elements can be used to convey the experience of depression?
2. How can the use of lighting, color, and atmosphere contribute to the overall mood and feel of the application?
3. What game interactive or gameplay mechanics can be incorporated to simulate the challenges faced by people with depression?

5.6 Methods

1. What auditory elements can be used to convey the experience of depression?	
Approach (how)	The student analyzed the questionnaire answers from 4.3 and uses parts of the answers to create a script for the application. The script consists of negative sentences that could relate to the mindset of someone with depression.

	<p>The playtesting was done at Saxion XR lab.</p> <p>The tester was placed in the room and was explained how the controls work within the game. The student took notes on what the tester was saying and about the auditory elements that stand out to them. The student was only allowed to talk to the tester if they got stuck.</p> <p>After they finished the game, they gave their feedback and described their experience in a survey that was given to them online.</p>
Data type (what)	Qualitative through the playtesting.
Data source (what)	The data was collected through research and playtesting in real life, which resulted in the user filling out a questionnaire about the experience after.
Data relevance (why)	<p>The data collected from the questionnaire would be able to tell if the auditory elements made them understand the perspective of a depressed person better and the experiences they might go through.</p> <p>It's important because the voice over and other auditory elements can enhance the sad feeling in the application and deepen the sympathy towards depressed people for the user.</p>

2. How can the use of lighting, color, and atmosphere contribute to the overall mood and feel of the application?	
Approach (how)	<p>Data was gathered by researching the effect of colors and saturation on people through online articles.</p> <p>There was also a smaller survey taken, using pictures of the bedroom scene. The pictures consisted of the same room but with a variety of different effects on them. This included different levels of hue, different levels of saturation, and different levels of a "bloom" effect.</p> <p>The client was concerned that a game about depression might end up looking "ominous" or</p>

	<p>“scary”. This was considered in the questions to prevent the game from evoking such feelings.</p> <p>The questionnaire was sent out in student group chats with little information about the game, to prevent biased answers. Each of the three categories consisted of 5 different pictures. Underneath each picture, the tester would have to rank the pictures. The first question asked the tester to rank the room’s atmosphere from happy to sad on a scale of 1-5. The second picture asked to rank the rooms’ atmosphere from ominous to pleasant on a scale of 1-5.</p> <p>The last approach for testing the environment was a real-life playtest with a few users to express how the game makes them feel and why. The student added questions to the survey, asking the tester to give their opinion on how the environment impacted the experience.</p>
Data type (what)	<p>Mostly qualitative through play testing and researching articles Quantitative by testing with a picture survey. The pictures were be divided into 3 different categories (hue, saturation, and bloom) each of these categories consist of 5 different pictures.</p>
Data source (what)	<p>The data was collected through researching articles about the effect of color on emotions, real-life play testing, and an online survey. The online survey tool from Google Forms was used to make the image ranking survey.</p>
Data relevance (why)	<p>This survey determined what kind of feelings the game evokes in people. It was important because the atmosphere and look of the game give the player a chance to look through a depressed person’s eyes.</p> <p>The playtest was to check if the atmosphere evoked an immersive and sad feeling, to confirm if the earlier done research that was applied was correct and functioned as it should.</p>

<p>3. What game interactive or gameplay mechanics can be incorporated to simulate the challenges faced by people with depression?</p>	
Approach (how)	<p>This data was collected through researching</p>

	<p>another game and a user test. The tester played the application in a classroom.</p> <p>The tester was placed in a classroom with the VR glasses on and given very little instructions on the mechanics.</p> <p>The student took notes during the testing of anything the tester says and the interactions that stand out. After the test, the tester was given an online survey and answer questions about how the interactions made them feel and which one of the interactions stood out to them.</p>
Data type (what)	The data was qualitative by testing with a few people.
Data source (what)	The data was collected through play testing and a questionnaire after.
Data relevance (why)	<p>Testing with people who don't have depression will prove if the game's purpose has been achieved through their views on the application and how it impacted them.</p> <p>It's important to know if the interactions are accurate to the experience of those who struggle with depression, because it will give the user a deeper understanding of the illness and make it easier for them to empathize.</p>

6. Ideate

6.1 Platform Solutions

During the Ideation phase, the team came up with multiple solutions for the project. Although the client already leaned more toward a VR experience, the team decided that there were other options to explore and discuss. The brainstorming started with making a mind map on a whiteboard and naming different approaches to the problem. The second step of the brainstorming consisted of adding words that the team associated with these solutions. The mind map was then re-created as a digital drawing (see Figure 1).

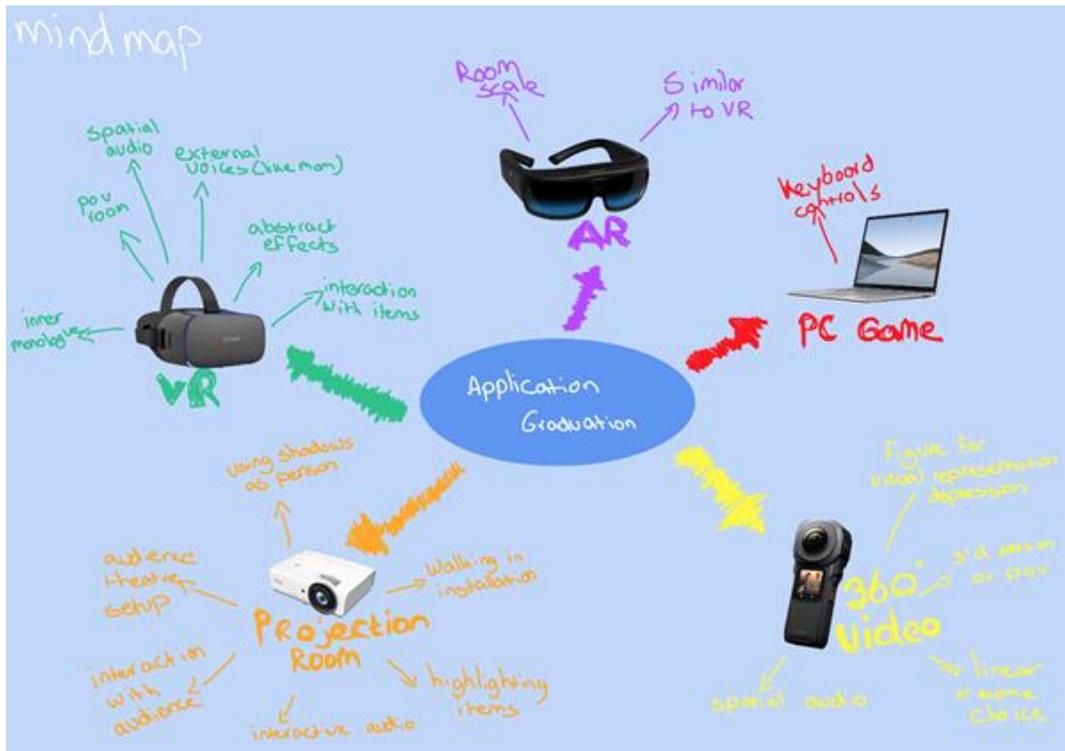


Figure 1: Mind map brainstorming platforms

6.2 Swot analysis platform

A Swot analysis was done to discuss different ways the application could be made into an informative experience about depression. Some feature we wanted to keep in mind is that it needed to be practical to set up and test with, that the game was immersive, and that it is unique experience.

Video Game	
Strengths	Weaknesses
Very accessible, most people have a PC. You don't need external hardware to work with this game. Intuitive as most of the target audience is young, so they have played a game in their life, so they know what to do.	Not very immersive and blends with other games as this has done before. We need to stand out with this game, otherwise, people won't remember our game.
Opportunities	Threats
You have more of a chance to do interaction as you have a lot of buttons. More personalized options, as it is intractable.	The game will be easy to forget if there are no unique options. People will take it less seriously because it is just a video game. Less immersion in the story as you can look away from real depression.

VR Application	
Strengths	Weaknesses
are immersed in the story as you can feel like you are there. Easy to take with you and move around with you and show to people.	Less intuitive than a normal PC game for most people. Depending on the VR game, you might need a lot of room. You need to test in person as not a lot of people have a VR headset.
Opportunities	Threats
There is an opportunity to make a real impact as it is a unique way of making a game. Using controls to make a bigger impact with this game, which is not something you can do in normal video games.	Motion sickness is a thing for some people. The scope can become too big as it is too ambitious. People with glasses will have a harder time as their glasses might be in the way.

AR Application	
Strengths	Weaknesses
are immersed in the story as you can feel like you are there. Easy to take with you and move around with you and show to people.	Needs to be room scale and cannot be static. You need to make sure objects align with real-world objects. It is difficult to fit in every room. Hard to test, because every room is a different scale and has different objects.
Opportunities	Threats
There is an opportunity to make a real impact as it is a unique way of making a game. Using controls to make a bigger impact with this game is not something you can do in normal video games.	Less immersive than VR as you are still in the real world. Limited features in the game as you need to make it customizable for every room.

360 Video	
Strengths	Weaknesses
Immersive stories can be made accessible because everyone has a phone. It gives you more immersion than a normal video as it is sort of like VR without the glasses. You can choose the story of what you want to look at.	Very linear, not really intractable as we can guide them into what we want to see. Action will only happen on one side as you do not have eyes on the back of the head. Both of the developers don't have experience with 360 video.
Opportunities	Threats
You can do it in 3 rd person which can offer a different perspective for the user. As you are looking down at a person with depression. The feeling of hopelessness can be conveyed through this medium.	Limited interaction makes it feel more like a movie. So you don't have the human touch to it to make it feel like you are experiencing depression.

Projection room	
Strengths	Weaknesses
Unique experience as solutions like this is only in museums and not really somewhere where. We make a lasting impression on the player as they will really be experiencing it without tethers.	Hard to set up, need a lot of space, and a dark room and this makes it hard to test as it is a static object which is placed in a room. How to apply this to our game/experience is an extra hard thing to do.
Opportunities	Threats
We can make it interactable to get the audience to work in this way to make decisions. Audio is more immersive than when you are playing a game. Light can be used in a cool way to show this topic. You can really walk through the installation.	Very expensive product as you need a lot of room and equipment. Very breakable, as small changes to the room can break the game. Waiting for the next thing to happen in order to see what is changing rather than focussing on the message.

6.3 Chosen solution platform

Through discussion with our client and our own reflection (see Figure 2), we came to the conclusion that indeed a VR application would be most suitable for this project.

COMPARISON MATRIX

FEATURES	VIDEO GAME	VR	AR	360 VIDEO	PROJECTION
Immersive		✓	✓		✓
Practical	✓	✓		✓	
Unique		✓	✓		✓
Intuitive	✓			✓	✓
feasible	✓	✓	✓	✓	

Figure 2: Comparison Matrix of the SWOT analysis

The reasons why:

- It is portable and easy to place in their ethics lab
- The immersion of VR fits the project because it will show you a first-person, interactive perspective
- It is more memorable than a pc game

6.4 Solutions gameplay

When the platform was decided, the student had to come up with a solution for the gameplay using VR technology. The team started brainstorming again and came up with two ideas

Idea 1: Outer-body experience (Max's idea)

This would be a VR experience where you are able to look through someone's eyes who is depressed. This concept will first starts with the player at work or another social gathering where it is required to be there. This fits perfectly with how depressed people feel. They have to be there and want to not stand out. They are present but are either in the corner or somewhere hidden. The player notices them and makes 'eye contact'. This is then how you are transported to this person's brain and eyes.

This concept can also be adapted towards a simpler concept in order to gain more empathy and simplicity towards this VR experience. This idea would still follow through my eyes, but it would be a bit easier to understand.

The features

- You are able to look at this person and will then be transported into their world.
- During this outer-body experience the player sees abstract objects and hears muffled sounds.
- You start out in a colorful world but as soon as you switch bodies the color fades.
- One room type of game where the player can walk around in the game while walking in real life.
- Movement can be limited to none at all with the darkening of the screen to teleport around in order to not generate motion sickness.

Idea 2: The creature (The student's idea)

The VR experience puts you in the place of a depressed person. You can interact with your environment and hear their inner thoughts. The depression will also take the form as some sort of creature that you can see. For example, it can sit on you the moment you try to get out of bed. Combined with the VR controls making it harder for you to get up by having to push it off or push a button multiple times to actually sit up, it will simulate the feeling of how hard it can be to even get up when you are depressed. By making depression a visual aspect, it might help the user identify with it and understand that it is an illness, instead of thinking someone is just "sad" or "lazy". It is also a good way to remind the user that it is a simulation. Two concepts were made to visualize the idea, they can be found in the appendix [A4](#).

Basic features

- desaturated colors
- negative inner monologue, catastrophizing
- interacting with environment/ having to perform tasks
- being able to walk through the house (bedroom, bathroom, kitchen, living room)
- Having a positive option but not being able to choose it or perform it
-

6.5 Chosen solution gameplay

The students decided to take parts from both ideas and design a new concept. This decision was made to fit the scope better and have a realistic workload for the time frame. Creating a creature for the gameplay or an outer-body feature would take up a lot of time since the engineer wasn't sure how to create these features in only 2 months by himself.

It was decided that the application was going to be a first-person VR experience. The player will live through the morning of a person with depression while they have the task to leave the house. While the player moves through the house, an inner monologue will play. This is both to represent depression in a realistic way and to guide the player. All the interactions should represent an aspect of depression, which could be in a physical or abstract way. A rough playthrough was created to showcase the minimal viable product (see Figure 3). The flowchart would serve as a starting point for the design process.

Flowchart

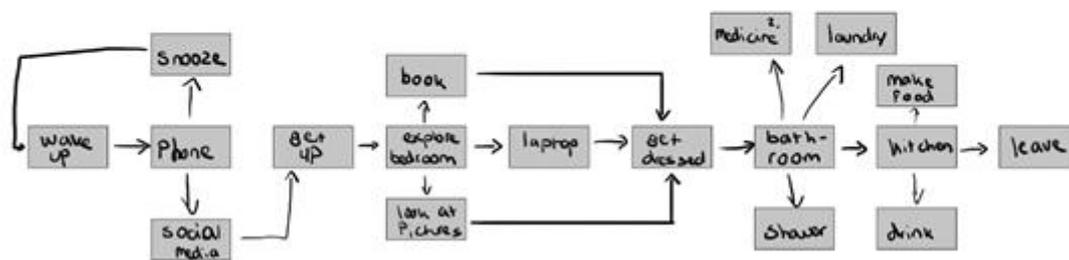


Figure 3: Flowchart of minimal viable product

7. Prototype

7.1 Design Process

The design process started by brainstorming ideas for the interactions named in the flowchart (figure 3). The team created a gameplay design document where the core features were described. The flowchart was designed to determine the scope of the project and the flow of the application, it was written down what features the user would have to interact with. After the flow was determined, all the interaction ideas were written down next to each feature. The team would discuss which interactions were doable within the scope and time for production. While the engineer of the project started the creation of those interactions, the artist student created a MoSCoW sheet for all the items that were needed in the scenes (figure 4) which was created through the same process as the interactions. A MoSCoW is a method that divides the models into 4 categories. It helps define which project features are important and which are not to determine priority.

<i>MUST</i>	<i>SHOULD</i>	<i>COULD</i>	<i>WILL NOT</i>
Artists			
Bed	creature	lamp	office space
Desk	carpet	toilet	car
chair	curtains	living room	toilet
closet	clothing	garage	outside/exterior
shower/bath	trash can	bike	character models
mirror	medicine container	shoes	
fridge	toaster		
countertop	headphones		
stove	plate		
kitchen cabinet	waterbottle		
laptop	coat rack		
phone	hand models		
door			
window			
sink			
pictures			
bedside table			
glass			
food ingredients			
hallway			
digital alarm with big button			

Figure 4: MoSCoW sheet for items that need to be created

7.1.1 Bedroom interactions

The first room the player sees in the application is the Bedroom. For this room, the team chose to have a blinking effect when you start the game to show that the game is in first person and you are waking up. Through the results of the questionnaire (see pages 4 and 5) it is shown that almost every person struggled with waking up and snoozed their alarm a lot. The first interaction after waking up is having to turn off or snooze your alarm. The alarm keeps going off every few seconds and the player has to push a big button to shut it off. The sound of the alarm is very obnoxious to give the player an anxious and annoyed feeling. After shutting off the alarm a few times, the player has to go on social media. This feature will teleport you to a scene where random social media posts fly at you. The player can shoot these with the controller. This simulates the overwhelming feeling social media can give someone with depression. A smaller interaction in the room is looking at old pictures. The people who filled out the questionnaire mentioned how hard it is to socialize and that they feel people don't like them. While the player looks at these pictures, the inner monologue will talk about that experience.

7.1.2 Bathroom interactions

The second room in the application is the bathroom. In the bathroom, you won't be able to interact with the shower. Not having the energy or time to shower was another point mentioned in the questionnaire. Again, the inner monologue will serve as a guide as to why you can't perform a certain interaction. The bathroom also consists of a laundry basket, washing machine, and dryer. The player can try to put the laundry in the washing machine, but will discover it is full, and so is the dryer. This is meant to show how household tasks like laundry are hard to do for people with depression and how easily it can demotivate them. The last feature of the bathroom is the mirror. The player needs to try and create a smile in the mirror but will fail to do so. When they try to put the corners of their mouth up, they fall down again. This is to show how hard it is for them to "just smile" or "just be happy".

7.1.3 Kitchen Interactions

The last part of the gameplay is the kitchen. The team saw from the questionnaire and research that people with depression struggle with making a meal or eating breakfast. In the kitchen is a fairly empty

fridge, the items in the fridge are all expired. This represents the struggle of doing groceries and cooking. The option the player will have is to make tea/coffee since it is mentioned in their morning routine. The kitchen will contain trash from take-out food.

After the kitchen, you go into the hallway, and by opening the front door, you end the gameplay. The whole game will be guided by a negative-inner voice.

The end screen will contain some statistics on depression and links for more information on the topic. It is important for the team to mention in the end screen that this is just a glimpse into what it is like for people who suffer from depression.

7.1.4 Greyboxing

An important step in the design process was the creation of the grey box (see Figure 5). Three blueprints for the house were made and the team decided on the house which had the best flow for the game. This was then visualized in a 3D environment, using free furniture assets from an artist called Kenny (Brito, 2018) The grey box was created to get a general idea of the scale and feel of the house. This version was also used by the engineer to start implementing the interactions while the student worked on the final models.



Figure 5: Greybox for the environment

7.1.5 Asset creation

After the team settled on the interactions and the grey box was created, the next step was to create a stylesheet (figure 6) and mood board (figure 7) for the game. An inspiration for the style of the game was “Life is Strange”(Dontnod Entertainment et al., 2015). The style within the game is semi-realistic, with the environment having a slightly painted look, while still maintaining realistic dimensions and scale. This style was chosen because the project needed many assets and since this it would be created by one artist, this was a style that was more pragmatic to achieve than a realistic style. Another reason for the decision to take inspiration from this style was to not overwhelm the user by making the game real to life. Although

the goal is to be immersive, the application shouldn't induce panic in someone who might suffer from depression.

The colors used for the objects in the environment will have a dark undertone. Through testing the student will determine what the final atmosphere looks like, using the style sheet as a starting point.

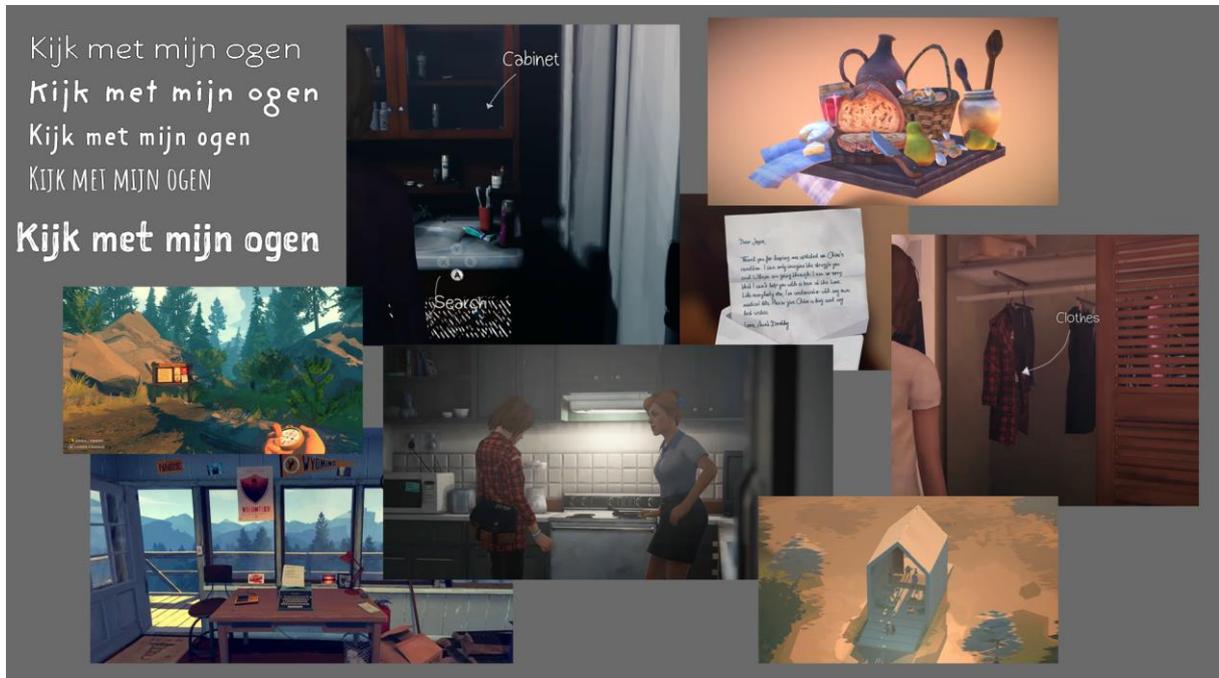


Figure 6: Stylesheet for the game, including font inspiration

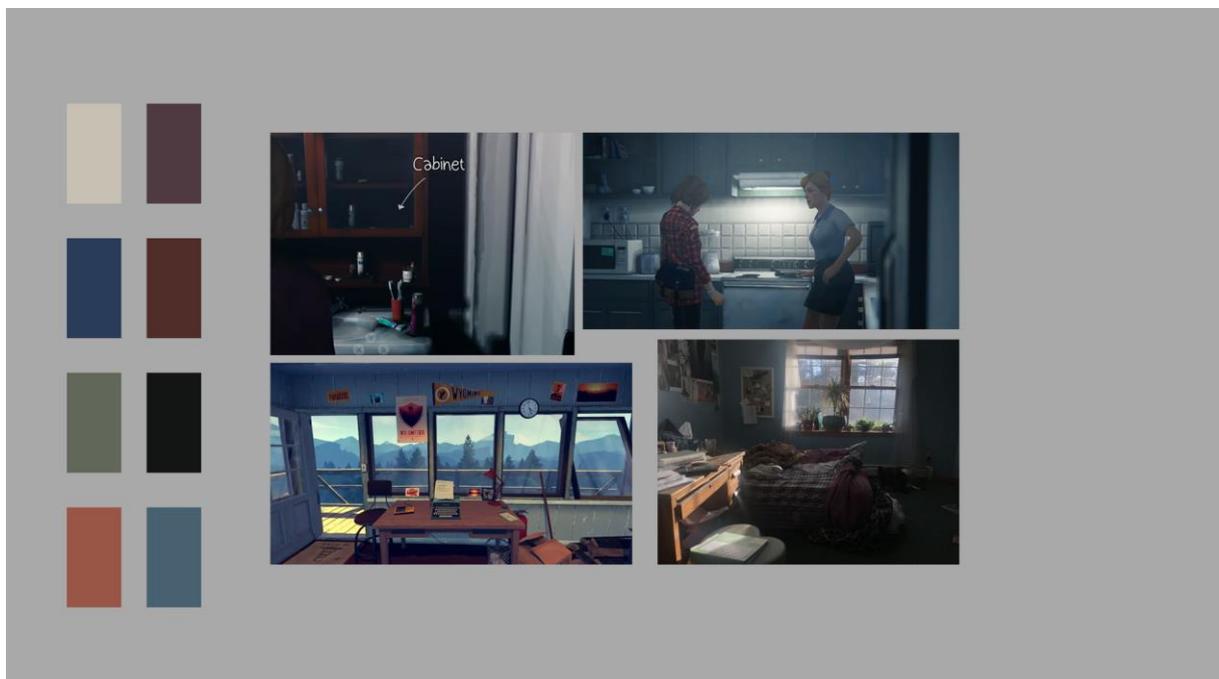


Figure 7: mood board for the game

Through the planning website "Trello" (Trello, 2019), all the assets were divided into sprints that consisted of two weeks. The order of the models was divided by rooms and priority. The last sprint was planned for iterations and lighting the scene. The models were all created in the software Maya and textured in Substance Painter. The first model created was the bed, this would serve as an example for the other

models. The student experimented with different ways to create the desired texture, without copying the inspiration (see figure 8) This technique was continued with all the other models.



Figure 8: Bed, textured

7.1.6 Script and UI elements

Lastly the student created a script for all the inner-monologue that would guide the player through the experience. This was created through taking inspiration from the questionnaire that was taken in chapter 4.3. The student also created simple assets for the social media interaction and the pictures on the wall. The illustrations were made with simple flat colors and little detail to not distract the player too much.

8. Test plan

8.1 Test goals

The main goal of the test was to determine if the application made people understand depression better. The student needed to determine the following goals to see if the applications is successful:

- When the player can recognize what depression looks like after playing the application.
- When the player feels immersed in the application.
- When the application makes the player more understanding of people who suffer from depression.

8.2 Participants

The participants were young adults since the applications were mostly based on their lifestyle. An elderly person might not have related as much to the environment and inner monologue. The application would be tested the same with all people, they didn't have to have depression. This way the team could determine if the application reached the goal of being informative and if it the participants gained more understanding on depression.

8.3 Format and setting

The application was tested in a room that wasn't too busy, so the users could hear the voiceover. The game could be played either sitting or standing, although standing was preferred for the scale of the models. The users were placed in a classroom, where they put on the VR headset and were explained how the controls worked. There were no further instructions unless the players got stuck. Any feedback given during the test was written down. This was also the case for any bugs noticed by the designer/engineer or the artist, even if the players didn't notice them.

After the test, the users had to fill out a questionnaire about their experience playing the game. The answers to these questions showed the student if the application had reached the test goals mentioned in chapter 8.1 and functioned in the desired way.

These were the questions that were asked for each sub-question to determine if the application fulfilled its intended purpose:

What auditory elements can be used to convey the experience of depression?

- What auditory elements were used to convey the experience of depression?
- How did the inner monologue make you feel?
- Did the inner monologue make you understand people who have depression better? Why?

How could the use of lighting, color, and atmosphere contribute to the overall mood and feel of the application?

- Did the environment feel immersive?
- What about the environment felt unrealistic?
- What about the environment felt realistic to someone who suffers from depression?

What game interactive or gameplay mechanics can be incorporated to simulate the challenges faced by people with depression?

- What game interactive or gameplay mechanics could be incorporated to simulate the challenges faced by people with depression?
- What interactions stood out to you?
- How did the experience make you feel?

These were some questions that were important for the design process and also for the artist. After receiving answers to these questions, the team could make iterations to the application and give recommendations.

9. Research results

9.1 First test results

The first full gameplay test was done on the 17th of May and was tested with 5 people. The notes of the test can be found in appendix [A3](#).

This test was to test the first version of the application and to see if the mechanics and flow of the experience were understandable. A big part of the application was not yet functional, which was the inner monologue system. This meant that the player would need guidance from the team. None of the models were implemented yet and neither were the visual effects. The players could only test the greybox models with the interactions.

The testers were placed in a room and explained how the VR controls worked. They were guided through the first interactions, which was the alarm clock going off, and told how to turn off. After the alarm clock they were free to roam through the house. They did get instructed to go into the bathroom and check the interactions there.

The general problem seemed to be that it wasn't clear which objects were intractable. It was suggested by one of the players that the problem could be solved by highlighting those aspects of the application. Most of the players said they felt immersed in the environment, one argued that the lack of finished objects and clutter took away from the immersion. Many people walked past the bathroom before they were told it was interactable. It was also mentioned that the fridge seemed empty and a player suggested putting expired food in there.

The team sensed more urgency after the first playtest to add in the voice over as soon as possible, since it seemed that the player didn't seem to understand the experience was about depression. Overall the test was a success and people seemed immersed in the experience and curious to explore the space. The next test was done a few weeks later, with all the features and iterations.

Applied iterations

The iterations that were made after the first playtest were:

- A light around interactable object
- A voice over that would get triggered in the hallway mentioning the bathroom
- 3D models of expired food added to the fridge

9.2 Final test results

The team did their final playtest on the 14th of June. The application was tested with 7 people and to keep anonymous and respectful, none of the players were asked if they suffered from depression. This test was to see if the application reached the goal of gaining understanding towards depression.

This version of the applications had the voice lines and atmosphere iterations in it, it also included all the polished models. These would be tested together with the interactions.

The tester had to stand in a room and put on the VR glasses on. Whilst the player was testing, the team wasn't allowed to explain or help unless the player got stuck. The student wrote down notes of what stood out about the playtest and what problems occurred. The notes from the playtests can be found in appendix [A6](#).

One of the first things the student noticed was that people seemed to struggle with picking up items from the floor once they were dropped. A few of the testers also had a hard time getting the social media post interaction to work when they would hold up the phone to their face.

It was also very noticeable that the testers wanted to pick up every item and throw it. Some testers also thought the phone was the alarm in the beginning of the experience and would try to grab it instead of pushing the red button. The testers all seemed to struggle with opening the door of the dryer and the washing machine and the voice line would overlap and start playing at the same time. It was mentioned by multiple people that the subtitles were too low and didn't fully show up on the screen.

The first person who tested said the stains on the kitchen counter looked like blood. This wasn't mentioned by any of the other testers. A few people also still walked past the bathroom, without interacting with it. Two people said that the teleportation feature distracted them from the inner-monologue.

The testers audibly reacted to when the voice over started playing. They would make remarks about how sad it sounded and depressing and that they felt bad for the person. One tester also said they thought the world looked realistic. The overall reaction to the application was that the voice over made them feel sad, but the interactable objects were fun to play with and throw around.

After the players were done testing, they were sent a questionnaire to give their opinion and feedback on the application. These results can be found in appendix [A7](#).

Quick iterations that were made:

- The engineer fixed the voice line mechanic so they wouldn't overlap.
- The washing machine and dryer were turned 90 degrees.
- The height of the VR glasses was changed within the application.
- Increased height of subtitles and made font size smaller.

9.3 Sub-question 1:

What auditory elements can be used to convey the experience of depression?

This sub question was important to include since many people that filled out the questionnaire from chapter 4.3 mentioned that they struggle with negative self-talk. This is a part of a depressed person's life that no one hears and could function a tool to understand their perspective in a deeper way. The student wrote a script that had a few inner monologue lines written out for each interaction, as if you could hear the depressed person's thoughts while they got ready for the day. The lines were taken from daily activities that people mentioned in the questionnaire.

The student purposefully left out background music and UI sounds, since the experience needed to be close to reality. These functions were tested and the following results came out of it and can also be found in appendix A7.

85,7% said the inner monologue made them feel sad.

85,7% said the inner monologue made them understand people with depression better.

28,6% said they missed UI sounds in the application.

9.4 Sub-question 2:

How can the use of lighting, color, and atmosphere contribute to the overall mood and feel of the application?

This sub question was important to include. It was used to test what environmental elements make atmosphere look like how a depressed person would see the world. A part that stood out from the questionnaire answers in chapter 4.3 and further research, was that people who suffer from depression often have a messy house/room (Wade, 2022).

The student also discovered through research that people who suffer from depression see the world bluer, grayer and darker (Valin Bloom, 2017). It is also proven that colors have an effect on people's emotions and that it can influence the way they perceive an experience. (Kaya, 2004, #). Colors can be used to evoke certain emotions.

To further test those claims and apply this theory to contribute to the depressive atmosphere of the application, the student sent out a survey to different groups of people. The test showed the player pictures of different versions of the same room. The goal was to find out which visual effects evoked a sad feeling in the tester, without making the room look ominous.

The only difference in the pictures for the first category was different hues. For the second category it was different saturations and the third category was different amounts of "bloom" effect, which makes the room look gloomy. The following results were gathered.

Results online survey:

29 people filled in the survey asking them to rank pictures in different categories. For each picture of the room, there were two questions to answer:

1. Rank how the atmosphere of the room makes you feel (from happy to sad)
2. Rank how the atmosphere of the room makes you feel (from ominous to pleasant)

The full test results can be found in appendix [A5](#).

Room 1:

Hue: 57,1% find the room to have a sad atmosphere.

Hue: 63% find the room to be neither ominous nor pleasant looking.

Saturation: 46,4% find the room to look happy.

Saturation: 42,0% find the room to look more pleasant.

Bloom: 60,7% find the room to look towards sad.

Bloom: 67,9% find the room to look towards ominous.

Room 2:

Hue: 42,9% find the room to look neither happy nor sad (neutral).

Hue: 44,4% find the room to look more toward the pleasant side.

Saturation: 57,1% find the room to look sad.

Saturation: 42,9% find the room neutral, and an equal amount finds to room more ominous.

Bloom: 35,7% find the room to look towards sad.

Bloom: 39,3% find the room to look towards ominous.

Room 3:

Hue: 53,6% find the room to look towards the happy side.

Hue: 42,9% find the room to look towards the pleasant side.

Saturation: 71,4% find the room to look sad.

Saturation: 40,7% find the room to look towards the ominous side.

Bloom: 39,3% find the room to look towards sad.

Bloom: 39,3% find the room to look neutral.

Room 4:

Hue: 53,6% find the room to look towards the happy side.

Hue: 50% find the room to look pleasant.

Saturation: 39,3% find the room to look more towards the happy side.

Saturation: 46,4% find the room to look more towards the pleasant side.

Bloom: 50% find the room to look towards sad.

Bloom: 39,3% find the room to look neutral.

Room 5:

Hue: 50% find the room to look neither sad nor happy (neutral)

Hue: 33,3% find the room to look towards the ominous side

Saturation: 50% find the room to look more towards the sad side.

Saturation: 53,6% find the room to look more towards the neutral side.

Bloom: 39,3% find the room to look towards sad.

Bloom: 32,1% find the room to look ominous.

After drawing a conclusion from the test results, which can be found in chapter [10.2](#) and applying the research that was done. The environment was iterated and the final playtest was done to test if the findings from the survey that were implemented provided the desired effect. The following results were gathered from the playtest and can also be found in appendix [A7](#):

Playtest results:

85,7% found the environment immersive.

4/7 said the house felt realistic because of the clutter.

7/7 people named at least two features that made the house look realistic to the theme.

9.5 Sub question 3:

What game interactive or gameplay mechanics can be incorporated to simulate the challenges faced by people with depression?

As a co-designer of the application, it was important to know what game mechanics the student could add to the application to simulate the feeling of depression.

To start the research, the student looked at other games that included depression and the mechanics they used to convey depression. One of those games was already mentioned in the market research in chapter 4.1. That game is called "Actual Sunlight" (WZOGI, WZO Games Inc., 2021). The game showed part of the characters depression through the inability to make choices or interact with objects and people. The interaction would either make a different choice for the player, or not react at all. This game also had a "inner-voice" features, which was just text on the screen. It would show all the characters negative thoughts about himself and the world.

To gather more inspiration the student studied the questions from the questionnaire that was filled out by people who suffer from depression, which can be found in appendix [A2](#), specifically from the daily routine question. It was shown people struggled with basic tasks like laundry and would spend time scrolling on their social media. Studies have shown that there could be correlation between the use of social media and depression (Haand, 2020, 783). It is argued that depression could be caused by social media or that depression increases the use of social media. The struggle that was mentioned the most in the questionnaire was waking up. People mentioned having to snooze their alarm often and it being the hardest part of their day.

The student took the non-reactive interactions from "Actual Sunlight" and the inner monologue as a way to display how depression takes away a person's motivation to do daily tasks. Since there's a correlation between the excessive use of social media and depression, the student also designed a feature where the

player has to shoot social media posts while they rapidly fly around them. This was done to overwhelm the player together with the inner monologue.

Another two features that were designed for the application were the laundry pile in the bathroom and the alarm in the morning. These two tasks were mentioned often as a struggle for people who suffer from depression.

The interactions are that The player would have to turn their alarm off multiple times whilst in the bedroom. In the bathroom they would have to do laundry, but discover that both the washing machine and dryer are already filled up. This was a way to acknowledge how hard those simple tasks can be.

After these features were added, they were tested with a few players.

These were the results and can also be found in appendix [A7](#):

85,7% said the gameplay was immersive

6/7 people could name at least two features that felt accurate to depression

10. Conclusions

10.1 Sub-question 1:

What auditory elements can be used to convey the experience of depression?

It can be concluded from the previous chapter that since over 50% of the testers thought the inner monologue was sad and made them understand people with depression better, using a narrating speech element conveys depression and helps people gain more understanding about experiencing depression.

It can be concluded that since less than 50% of the testers were missing UI sounds or music that the silence helps the game feel more immersive and close to depression. It is hard to draw a clear conclusion from the answers since everyone answered in various ways and added feedback about the parts they liked. Two people mentioned they liked the absence of music.

10.2 Sub-question 2:

How can the use of lighting, color, and atmosphere contribute to the overall mood and feel of the application?

Survey conclusions

Test 1: Hue

Room 1 (figure 9) had a blue hue added to the room. Participants found this room to be the saddest room without it feeling pleasant or ominous. This means applying a blue hue to the room will fit a game about depression. It evokes a sad feeling without making the game feel scary.

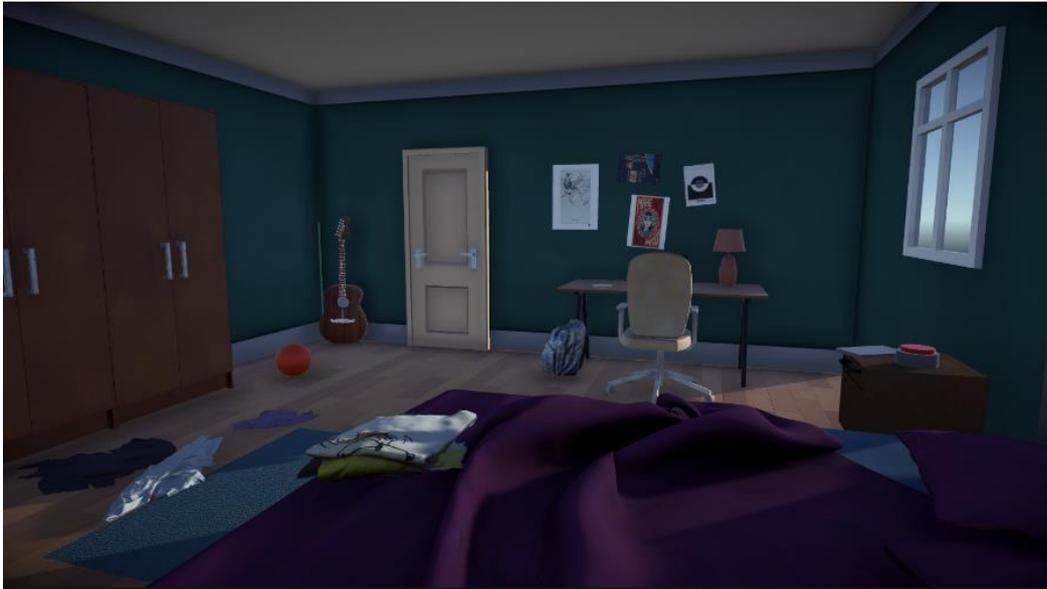


Figure 9: Room with blue hue

Test 2: Saturation

Room 2 (figure 10) was slightly desaturated and was rated as a sad-looking room, with people feeling it was mostly neutral and a bit ominous. Adding desaturation will evoke a feeling of sadness without making it too scary.



Figure 10: Room with slight desaturation

Test 3: Bloom

Room 4 (figure 11) had a bit of a bloom effect on it. It was considered to look the saddest and also the most neutral on the ominous scale. This means people find a little bit of bloom fitting for a sad scene, without evoking any fear.



Figure 11: room with slight bloom effect

Gameplay test conclusions:

It can be concluded from the previous chapter that since over 50% of the testers thought the environment feels immersive, adding a blue hue, desaturation, and bloom contribute to the sad mood of the application

It can also be concluded that since over half of the testers could name at least two environmental elements that felt accurate to depression, the clutter in the house helped convey depression more accurately and contributed to the sad atmosphere.

10.3 Sub question 3:

What game interactive or gameplay mechanics can be incorporated to simulate the challenges faced by people with depression?

It can be concluded from the results in the previous chapter that since over 50% of the testers thought the gameplay was immersive, the implemented mechanics conveyed the struggles of depression accurately.

It can also be concluded that since over half of the testers could name at least two interactions that reminded them of depression, the implemented interactions represent the life of a person with depression accurately. Which would confirm that struggling with laundry, social media and waking up

10.4 Conclusion Main question

To create the application and answer the research questions, the team created a prototype in VR that takes the player through the morning routine of someone who suffers from depression. They interact

with the environment while they are narrated by the person's inner voice. They hear all their negative thoughts and self-doubt. The environment consists of a bedroom, a bathroom, and a kitchen. In each of these rooms, there are interaction points, and a fitting inner monologue plays. The game flow was designed to emulate a part of a depressed person's life. This application was created through researching three sub-questions that helped the student understand how to portray depression in a 3D VR environment to gain empathy

To answer the main question "What interactive, visual, and auditory elements does an immersive application need to capture the experience of having depression within a 3D environment" the following conclusions were drawn.

According to the playtest, the application felt immersive. The players understood the elements that showcased signs of depression and they concluded that they felt they understood people with depression better and gained more empathy. They thought the gloomy, blue tone of the experience added to the simulation of depression, this was also the case with the clutter in the house, although some people said even more clutter could be added.

The narrating inner voice was a good way to guide the player through the application and gave them the most insight into why people with depression make the choices that they do. The absence of music and UI sounds seemed to add to the experience with most testers. The interactions were clear and immersive and conveyed some of the struggles that people with depression go through.

VR was the most immersive choice to make, but some people were more focused on the fact that they could pick things up than on the experience. It was difficult to fully guide the player in the application since you can't force what they will look at when the inner monologue starts playing. This can make the experience less informative. Overall the experience mostly reached the goals set for it.

So in conclusion to the main research question, an immersive application needs to have a narrating inner voice, a blue and gloomy atmosphere, and interactive elements that show the everyday struggles of someone with depression. This made the user immersed in the experience and resulted in more understanding and empathy toward people who suffer from depression.

11. recommendations and discussion

The prototype of the applications achieve the research goals well. There are still features that could be added to make the experience more immersive and realistic to depression. It would be recommended more rooms are added to the house, especially a living room. The team couldn't fit a living room into the scope, but it would add to the realism of the house and make the space feel more cluttered. There's an open space next to the kitchen that would fit a living room.

It would also be wise to think about whether all the items in the scene should be interactable. Players had the tendency to want to pick everything up and it would be worth it to look into the effect that has on the experience.

Another recommendation would be to add more 3D models, specifically clutter items like clothing, dirt, and kitchen appliances. The testers mentioned in their feedback that it would add to the realism of depression.

For the interactions, it would be recommended to add a few more. This would increase the gameplay time, which could deepen the immersion. Some idea that the team didn't end up putting in would be a "try to smile" feature in the bathroom.

The plan was to make a line for a mouth, dots for eyes, and eyebrows in the mirror, which the player would have to put into a smiley face. The face would fall back into a sad face every time they tried to pull it into a smile. Another idea was to make the player pull on a rope as soon as they wake up in the application, to make it harder to get out of bed. These ideas could be used to showcase depression in a more figurative way and make it more understandable for the player.

Another aspect that could add more immersion and a personal touch for the player is to have multiple voice options. Currently, the application only has one male voice option. A female and neutral voice could be a nice addition to the experience, it could help people connect more to the inner thoughts.

A further recommendation would be to add more developers. This application was created by two people. An artist and a technical designer. It would be recommended to add at least another two artists and a designer. This way the application could be more polished and have more features. The artist could work on more models and UI elements.

Lastly, it would be an idea to look at different mediums. It was earlier mentioned that it was hard to focus the player's attention on the correct part of the room while the voice-over was playing. They also said they were distracted by the teleportation function and couldn't focus on the voice over that was playing. Although a normal video game might not give the immersion that this application needs, it does have to option to force focus on certain areas of a game. It would be recommended to test with other platforms or to test more with options to focus a player more within VR.

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14. Appendix

A1. Transcript interview with psychiater

1. Hoe beschrijven de meeste patiënten een depressie?

a. Er valt een deken over de mensen heen. Het gaat gewoon niet meer, geen energie of geen plezier. Ontzettend vlak en veel spanningen. Alsof je in de put zit. Pieker en angst komt ook vaak voor. Ratelt maar door met negatieve gedachten. Niet meer productief in hun dagelijks leven en ze denken vaak in catastrofes.

2. Wat zijn de grootste verschillen in symptomen die je ziet tussen mensen met depressie?

a. Vitale depressie, niet eten geen lust. Somberheid en nergens meer van kunnen genieten. Het raakt de persoon meer. Mensen werken wel door met high functioning depressie, want die gaan gewoon door. Depressie met psychotische episodes. Een ander beeld van de wereld, schuldgevoel, kosten aan dingen en een waan hebben. Catatonie geen contact (ECT levensreddend). Hokjes passen niet. Hier moet je ook vooral niet aan denken.

3. Hoe beïnvloedt depressie het dagelijkse leven van deze mensen?

a. Hangt van de ernst af. Niet meer instaat om hun normale leven te kunnen doen. Ouders verwaarlozen hun kinderen. Neem remming mee, je bent op alles geremd in je leven. Invalideren. Sociaal is heel belangrijk voor de ondersteuning, want dit help deze mensen heel erg. Ze kunnen dan hier ook hun verhaal kwijt. Het is allemaal te veel. De drempel is hoog om in contact te blijven.

4. Hoe zorg je er als psychiater voor dat mensen met depressie zich begrepen voelen

a. Als mensen hier komen is er al een drempel die ze overkomen zijn. Luisteren is heel belangrijk voor de patiënten. Het is een opluchting voor de patiënten dat er hier een plek is waar ze een werk relatie kunnen opbouwen. De persoon fysiek zien is heel belangrijk. Niet definiëren naar hokjes. Stoornis separeren van de persoon. Mensen met depressie lijden enorm. Diffusie is de term om hiervan los te komen. Mensen moeten uiteindelijk zelf de keuze maken voor deze psychotherapie. De psychiater moet nog wel echt helpen tijdens dit traject voor de patiënt. De huisarts heeft altijd de doorverwijzing en de eerste stap is ook daar al gezet.

5. Wat is een metafoor wat mensen veel gebruiken om hun depressie te beschrijven

a. Weer die deken en het wil niet meer. Zo moe dat is ook een. Ze geven hun stemmen een naam. Eigenaam aan de depressie.

6. Wat voor soort medicatie is er naast antidepressiva en ECT?

a. Onderscheid tussen klassiek en nieuw. Er is een bult keuze. SSRI en lytshiem met klassiek medicijn. Anti phytolium middel. Deze krijgen ze om beter te kunnen slapen. Magneet therapie staat nog niet in de richtlijn, maar wordt al wel soms toegepast. Moet nog onderzocht worden om dit ook echt in de richtlijnen te krijgen. Ketamine wordt ook gebruikt als een van de laatste stappen voordat er wordt overgegaan op ECT. Dit is nu ook erkent in de behandeling. LSD en Hallucinerende drugs komen ook weer terug in het behandel process. Weinig vernieuwing in de Medicijnen en daarom zie weer een terugval in de oude medicijnen. We zoeken naar andere wegen voor een behandeling. Deep Brain stimulation is ook iets wat we steeds vaker proberen. Echt diep in de hersenen dit gebeurt samen met de Neurochirurg om de juiste hersenmassa te stimuleren. Nervus Vagus stimulatie is ook iets wat wij vroeger deden. Tegenwoordig wordt het niet meer vergoed, maar dit helpt echt en heeft de mensen ook een veel beter kwaliteit van leven gegeven.

7. Wat is de algemene houding tegenover ECT?

a. Vaak schrikken mensen daarvan het is het laatste redmiddel. Als dit niet werkt dan werkt niks meer. Zo denken deze mensen. Zijn gaan er toch vanuit dat het werkt als in als de dokter dit zegt dan zal het wel werken. Het klinkt heel heftig. Goede voorlichting van wat er allemaal gebeurt. Ze horen soms verhalen van bekenden of in de media. Onbekend en vaak roept het vragen een weerstand op.

8. Wat houdt een chronische depressie in als in hoe wordt dit geconstateerd?

a. Dysthymie is een chronische verlaagde stemming. Dit is milder en een langdurige depressie. Therapie resistente depressie bestaat ook en dit klinkt heftiger dan dat het is. Hier is nog een ECT toegepast namelijk en dit kan deze patiënten echt helpen. ECT kan hier dan helpen. Onderhouden en beschermende factoren is een belangrijk iets voor de mensen die het hebben. Met een partner ben je wat beschermd en als je je gasrekening niet kunt betalen dan heb je een onderhoudende factoren. Iemand met een slechte jeugd is daar misschien biologisch zwakker voor. Je kijkt naar een multifactor ding, zoals oorzaak wegnemen helpt niet bij een depressie. Een goede basis is van belang voor het weggaan van een depressie.

9. Ziet u deze vorm van depressie bij een specifieke leeftijd of is dit aanwezig bij elke leeftijd.

a. Kinderen kunnen wel depressie hebben, maar wordt niet zo gediagnosticeerd. Meestal bij de 40 zit de piek. Ook bij ouderen. Dementie komt ook soms gepaard met depressie. Sociale media heeft ook zeker een invloed. Sociaal maatschappelijk heeft ook invloed rondom het individu.

10. Wat voor reacties krijgt u van patiënten als u ECT voorstelt als behandeloptie.

a. Is al beantwoord met vraag 7.

11. Hebben grote gebeurtenissen in de wereld effect op het humeur van de mensen? Schrijft u ze dan ook andere medicatie voor?

a. Zelf onderzoek doen.

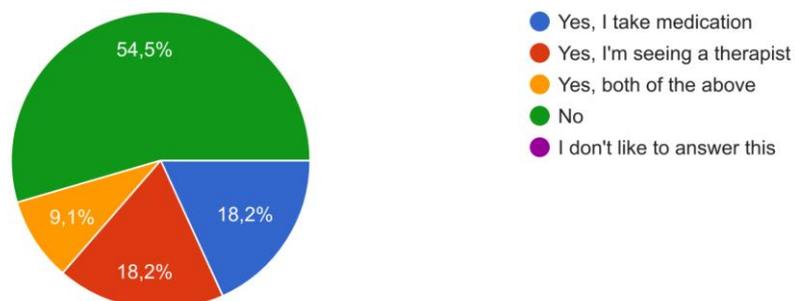
12. Is er een inclusiviteit kaart van verschillen in depressie? (hoe bepaal je de ernst van de depressie?)

a. Daar hebben wij niet echt een richtlijn voor. Wie laat je zien misschien met genderfluid. Iedereen kan het treffen. Onmogelijk om te doen aangezien het bij iedereen voorkomt. Het kan iedereen treffen.

A2. Results questionnaire

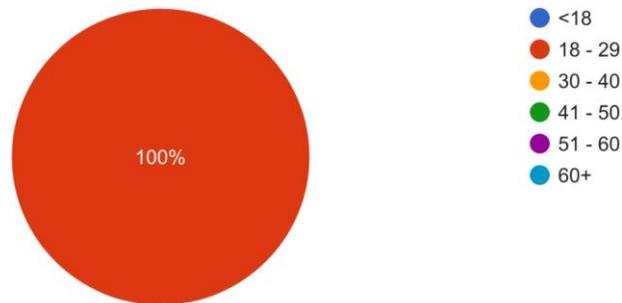
1. Are you currently receiving any treatment for your depression?

11 antwoorden



What is your age?

11 antwoorden



Question 3: Describe your experience with depression. What does it look/feel like to you? Could you describe it with an analogy?:

The most common experiences written down by the testers were a heavy feeling, negative self-talk, and apathy towards people and hobbies. People wrote down: "It makes me have a very negative mindset and I am unable to make myself feel better" or "It is stopping to see the good in things and having no hope for anything anymore"

Question 4: What does a normal morning routine look like to you? Describe it from the moment you wake up to the moment you walk through the front door?:

10/11 people answered that they struggled with getting out of bed and that they would snooze their alarm many times or set multiple alarms in the morning.

Question 5: What are some specific tasks you struggle with? (some examples: making a meal for yourself, taking a walk, socializing):

The most common answers to this question were: Socializing, showering, eating/preparing a meal, and getting out of bed.

Question 6 On school/work days, how do you push yourself to go?:

Most testers answered that what pushed them was having plans to see people or needing money/good grades.

Question 7: Is there a piece of media that made you feel understood or depicted your state of mind the most? (eg: series you watched, games you played, etc.):

A piece of media that was mentioned multiple times was the TV show "Bojack Horseman". Other ones were the shows "Euphoria", "The good place" and "Ginny and Georgia".

A3. Notes first test:

Five play testers:

1. Christian Richters
2. Drilon Bajrami
3. Fin Rovers
4. Mihai Barsan
5. Humam Abdulla

Which mechanics were unclear to you?

1. No dialogue. After finishing clothing I had to think what to do. Grey blocks unclear. With dialogue can be fixed. alarm was great and social media bubble was fun.
2. Highlight the grabbable objects. So you know what to grab. Add collisions to to interactable objects.
3. The general thing is that I didn't know how to pick up things. Highlight grabbable objects. General player guidance.
4. Nothing really it was just three buttons. The shooting mechanic was not intuitive.
5. Turning off the alarm press and bang.

Did you feel or experience motion sickness?

1. No motion sickness was experienced
2. Again not motion sickness
3. No motion sickness. Rather invested to pick up things
4. No, no motion sickness.
5. No, no motion sickness.

Did you feel immersed in the world?

1. No not really. Once every asset is in it should be fine.
2. Yeah actually it was fun. The teleport function is fun.
3. Yes, I was very immersed in the world. The camera sometimes faces the wrong way. Sometimes that made me disoriented.
4. Yes, I could interact with a lot of things so that was a big part of it.
5. Yes, if there was a ceiling it would feel more immersed.

Where did you experience any issues?

1. My coffee cup fell through my coffee machine.
2. The collision boxes are the main issue.
3. There still needs to stuff implemented like the coffee machine. When I left the house I couldn't teleport in to the room to leave. Only the outer edges were teleportable.
4. I missed the bathroom because there was no dialogue.
5. The clipping was a slight issue. For the rest was fine.

Feedback:

Fridge is empty or everything is empty or expired.

I liked the passing of time when you pressed the alarm.

It needs to give urgency to the player. Like firing off the job or missing an important test.

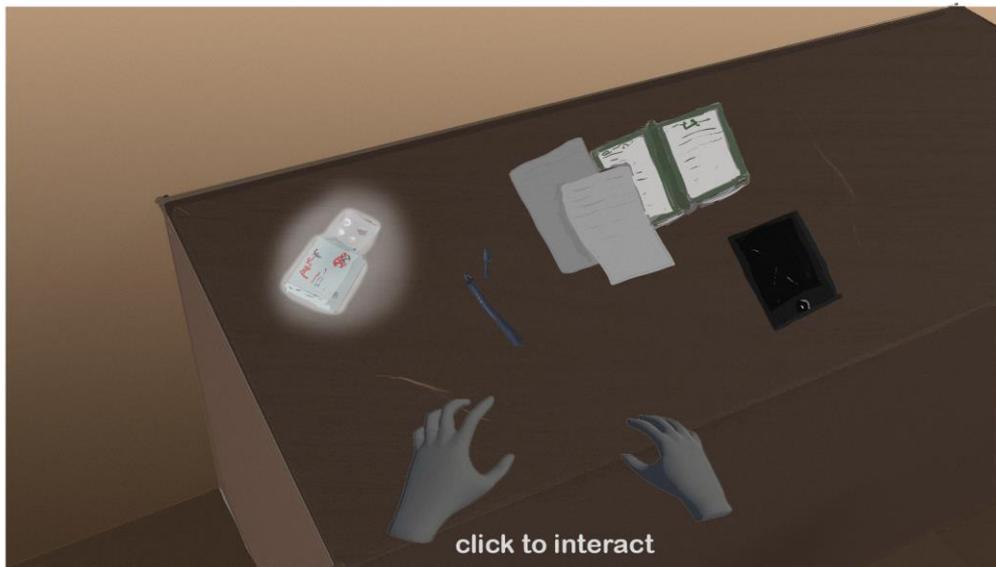
Throwing stuff could be fun.

Add a short tutorial to help with controls.

Add highlight with intractable to make them more clear.

Put some random stuff around and change the alarm sound.

A4. Mock up's for concept creature

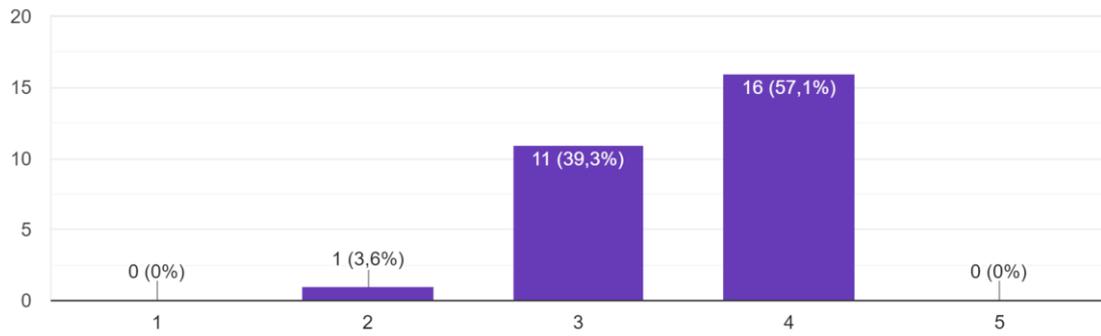


A5. Test results atmosphere survey

Test 1: Hue test

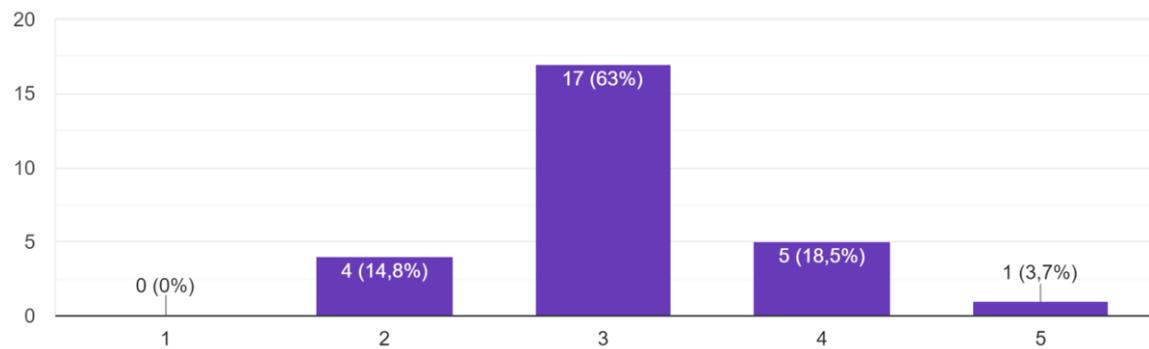
Rank how the atmosphere of room 1 makes you feel (from happy to sad)

28 antwoorden



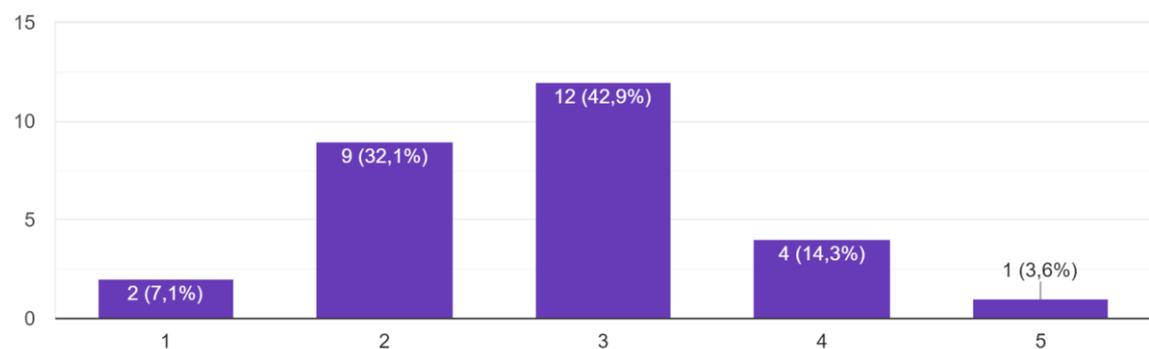
Rank how the atmosphere of room 1 makes you feel (ominous to pleasant)

27 antwoorden



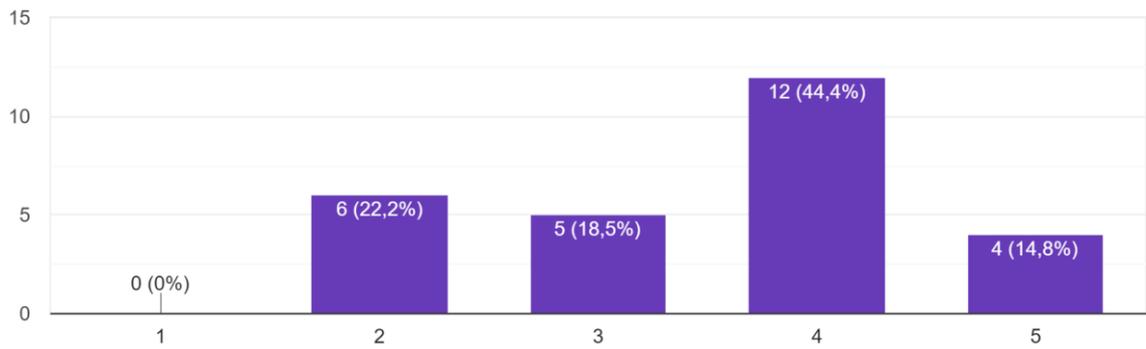
Rank how the atmosphere of room 2 makes you feel (from happy to sad)

28 antwoorden



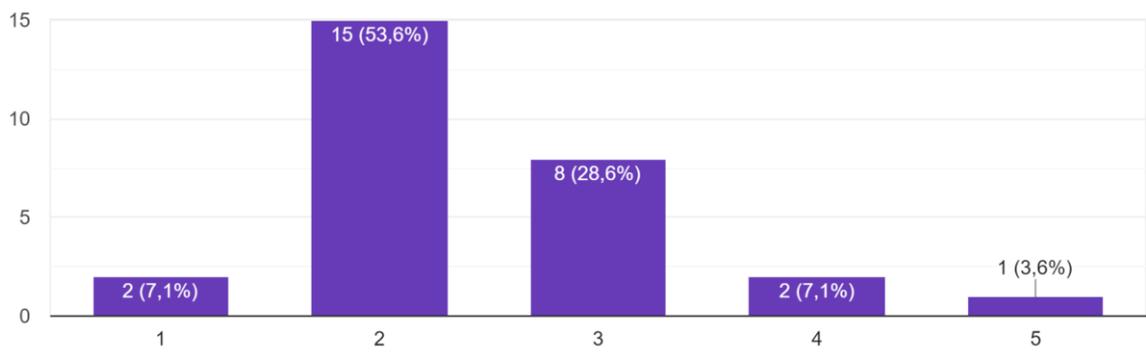
Rank how the atmosphere of room 2 makes you feel (ominous to pleasant)

27 antwoorden



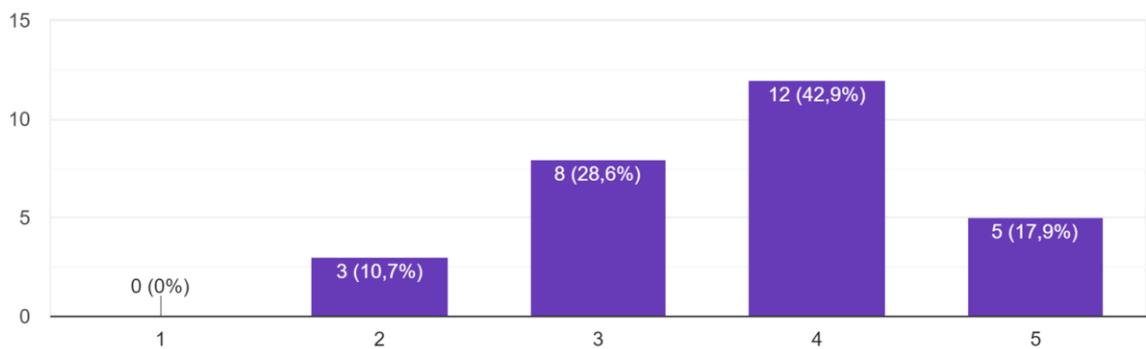
Rank how the atmosphere of room 3 makes you feel (from happy to sad)

28 antwoorden



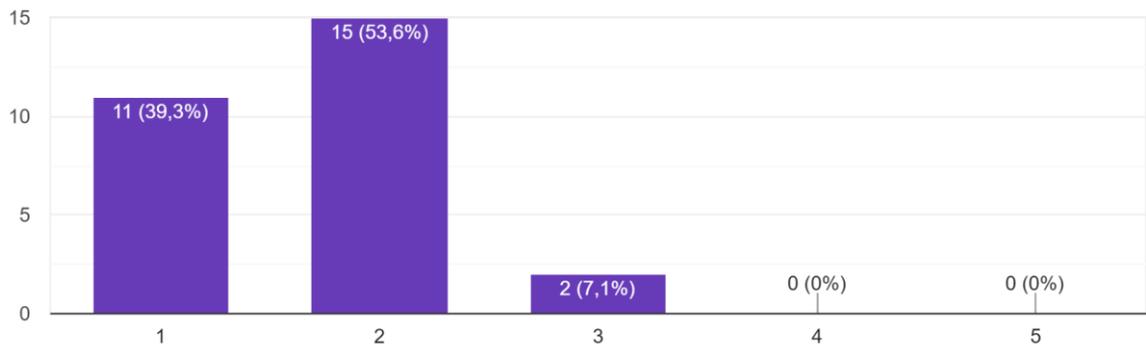
Rank how the atmosphere of room 3 makes you feel (ominous to pleasant)

28 antwoorden



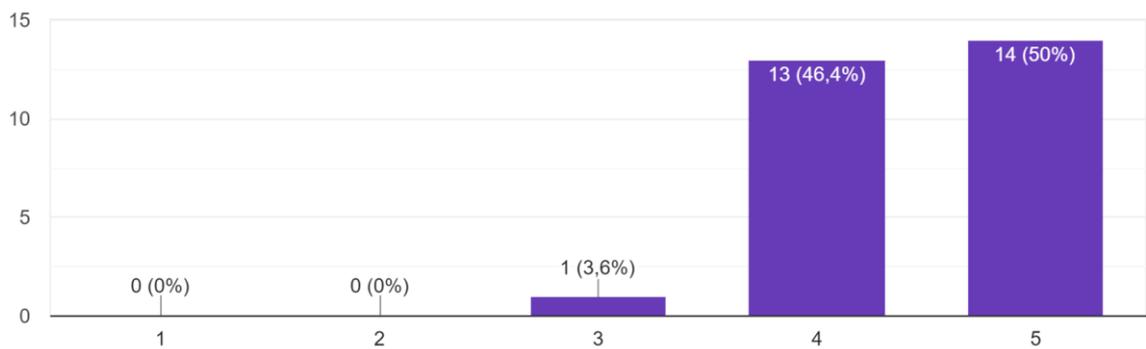
Rank how the atmosphere of room 4 makes you feel (from happy to sad)

28 antwoorden



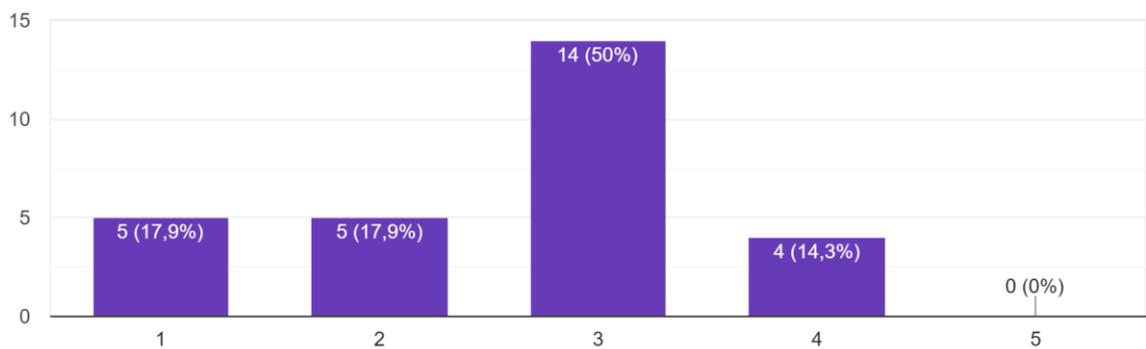
Rank how the atmosphere of room 4 makes you feel (ominous to pleasant)

28 antwoorden



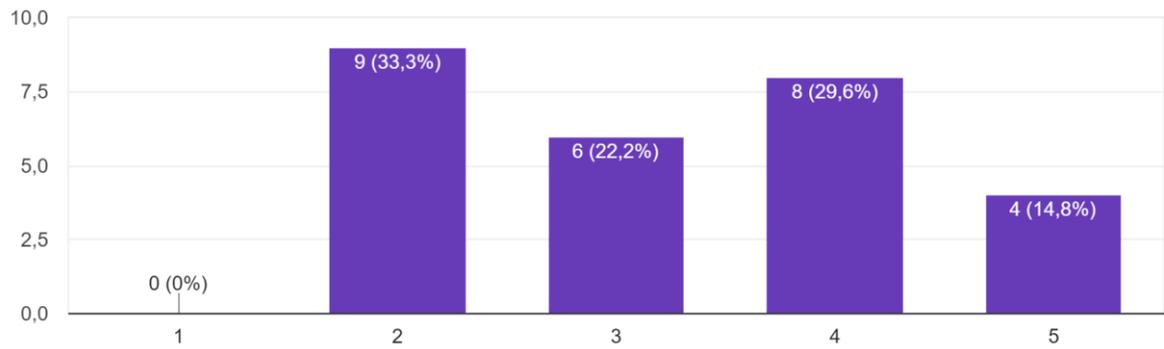
Rank how the atmosphere of room 5 makes you feel (from happy to sad)

28 antwoorden



Rank how the atmosphere of room 5 makes you feel (ominous to pleasant)

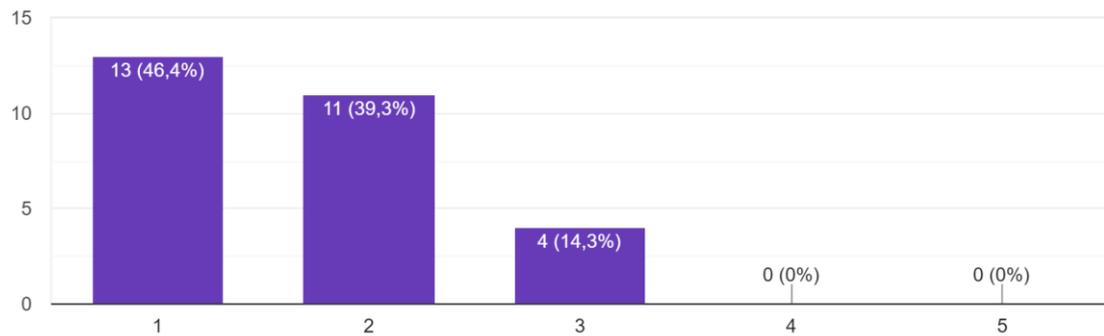
27 antwoorden



Test 2: Saturation test

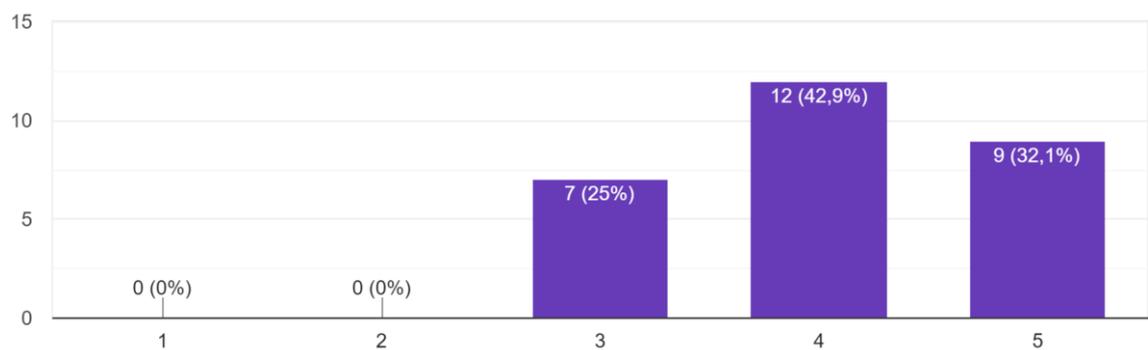
Rank how the atmosphere of room 1 makes you feel (from happy to sad)

28 antwoorden



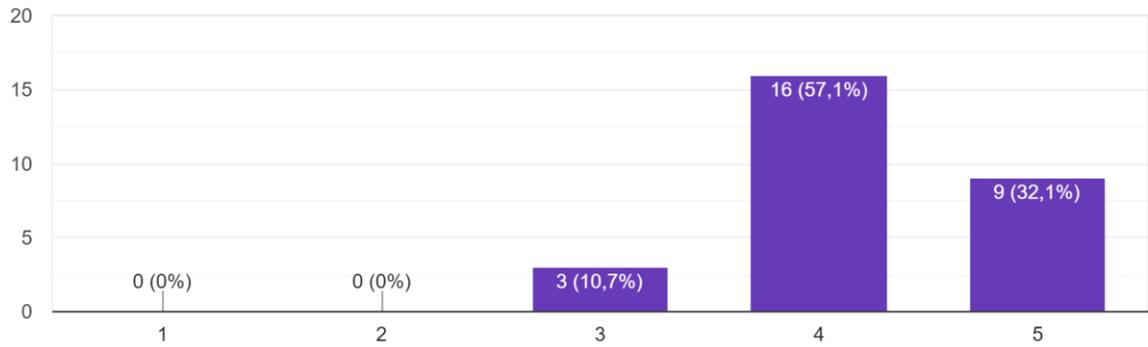
Rank how the atmosphere of room 1 makes you feel (ominous to pleasant)

28 antwoorden



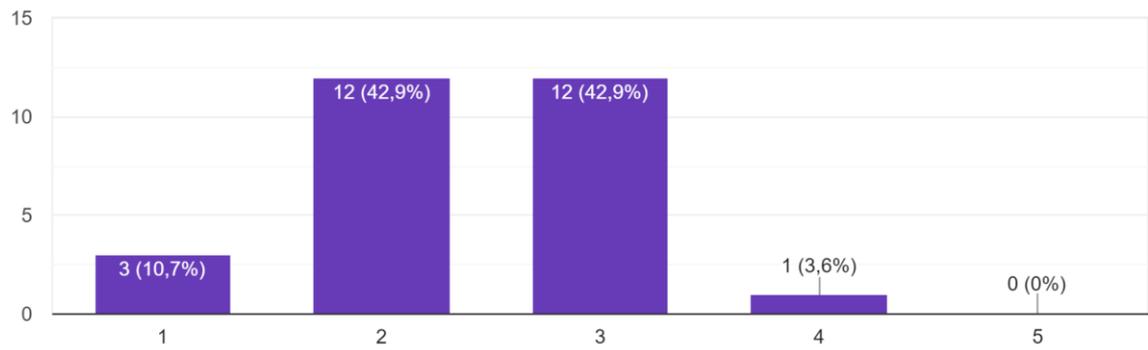
Rank how the atmosphere of room 2 makes you feel (from happy to sad)

28 antwoorden



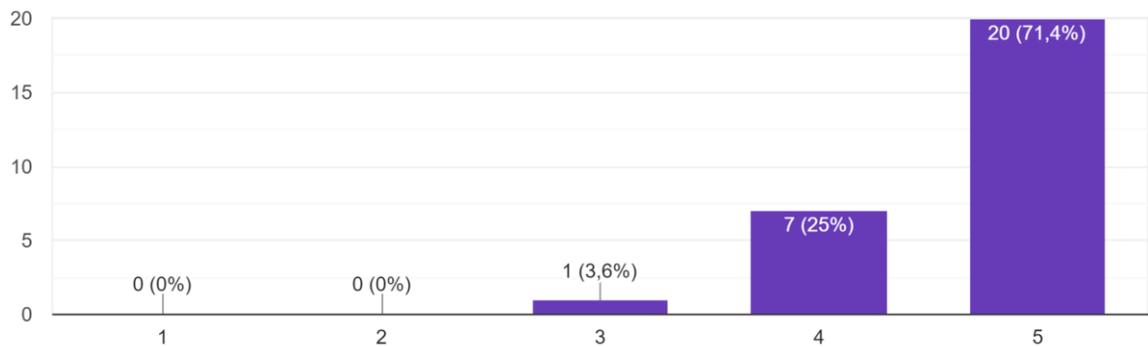
Rank how the atmosphere of room 2 makes you feel (ominous to pleasant)

28 antwoorden



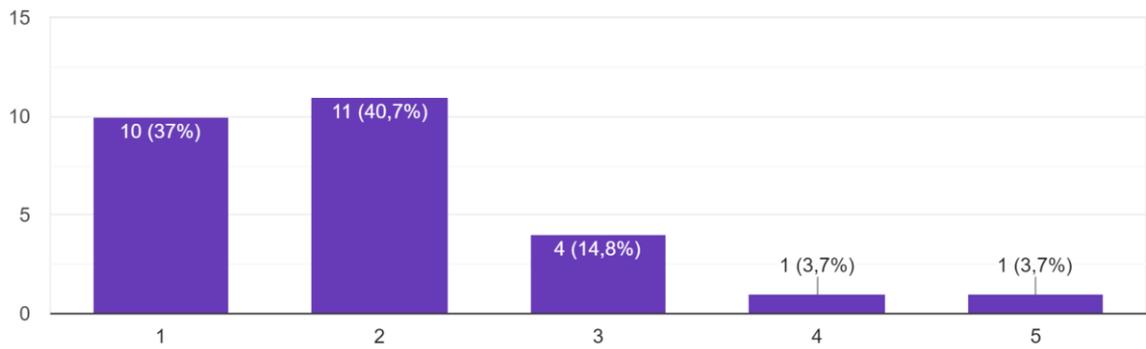
Rank how the atmosphere of room 3 makes you feel (from happy to sad)

28 antwoorden



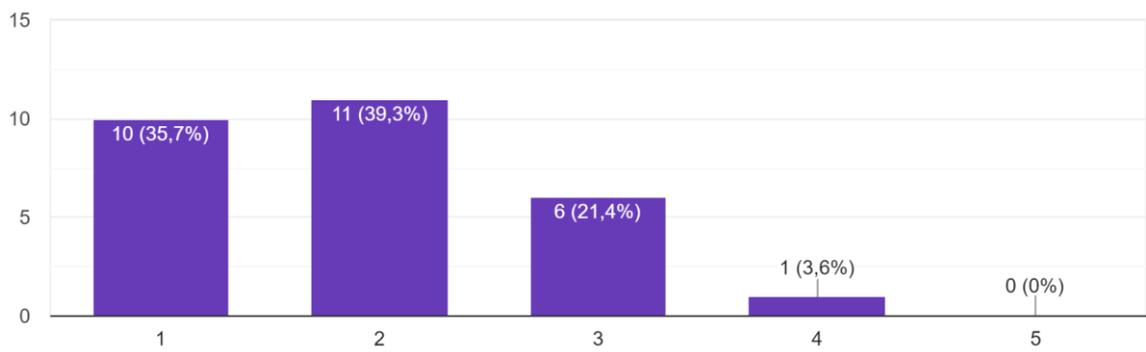
Rank how the atmosphere of room 3 makes you feel (ominous to pleasant)

27 antwoorden



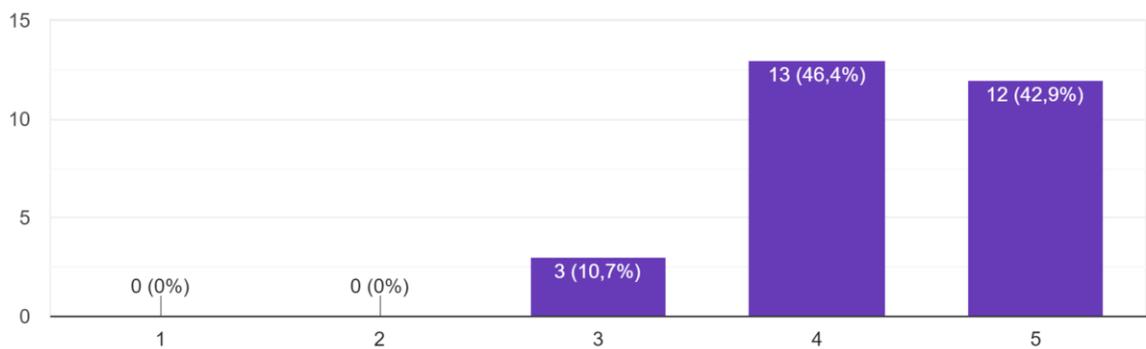
Rank how the atmosphere of room 4 makes you feel (from happy to sad)

28 antwoorden



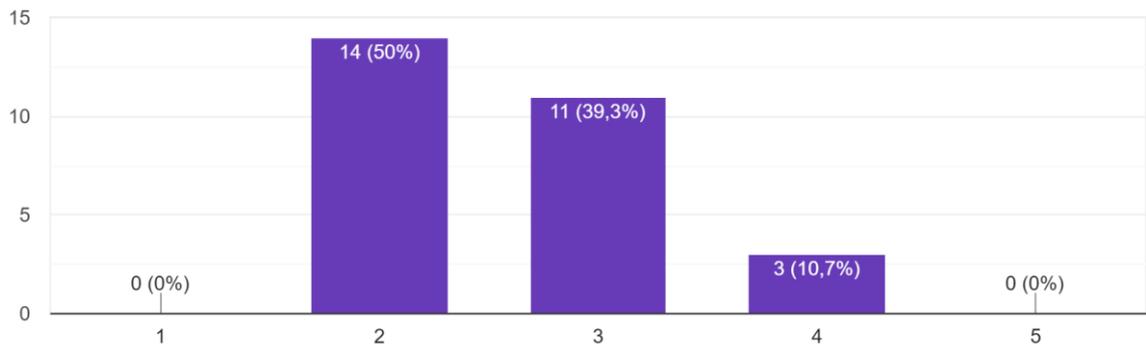
Rank how the atmosphere of room 4 makes you feel (ominous to pleasant)

28 antwoorden



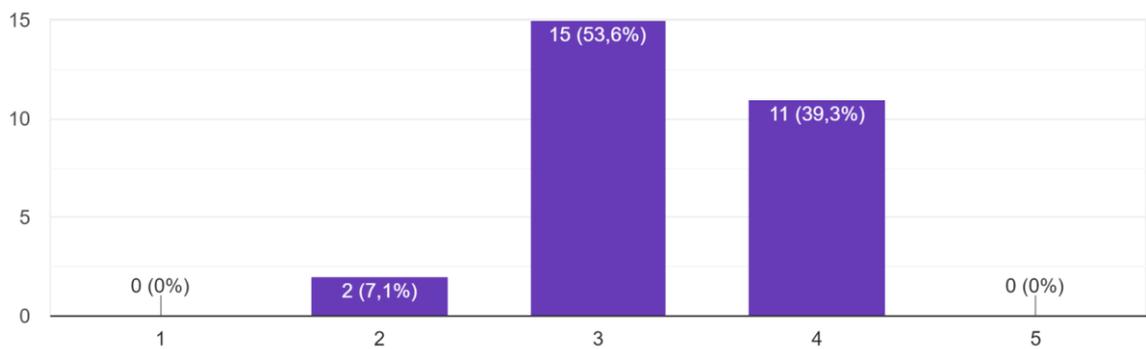
Rank how the atmosphere of room 5 makes you feel (from happy to sad)

28 antwoorden



Rank how the atmosphere of room 5 makes you feel (ominous to pleasant)

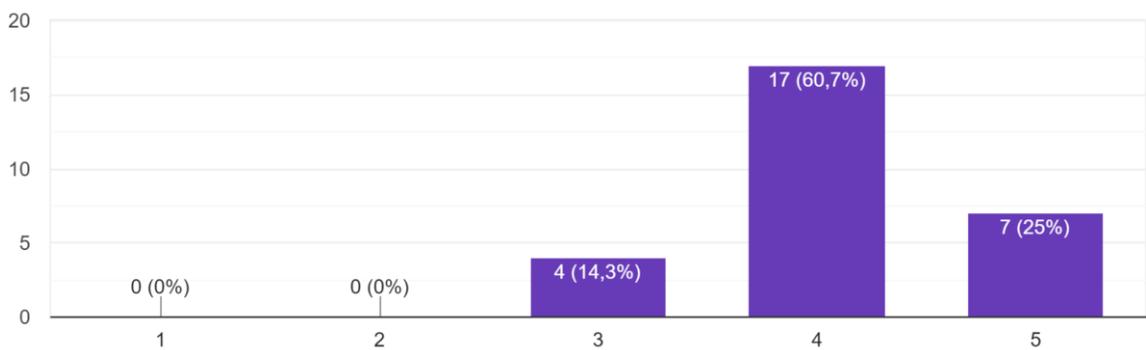
28 antwoorden



Test 3: Bloom test

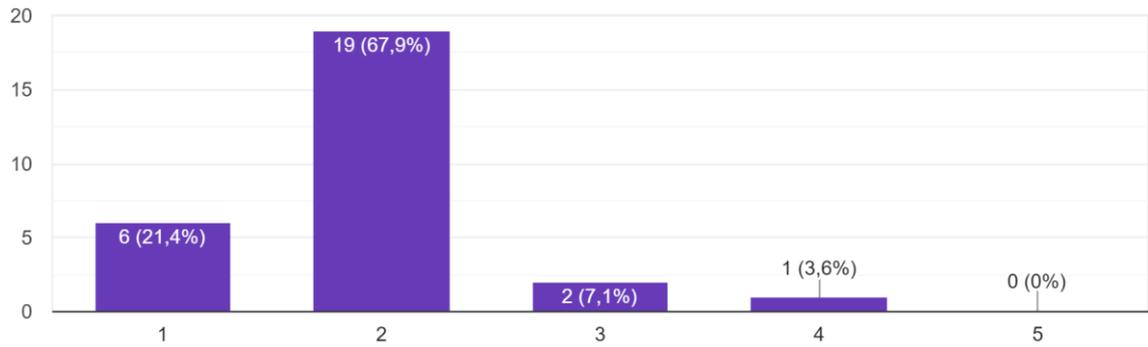
Rank how the atmosphere of room 1 makes you feel (from happy to sad)

28 antwoorden



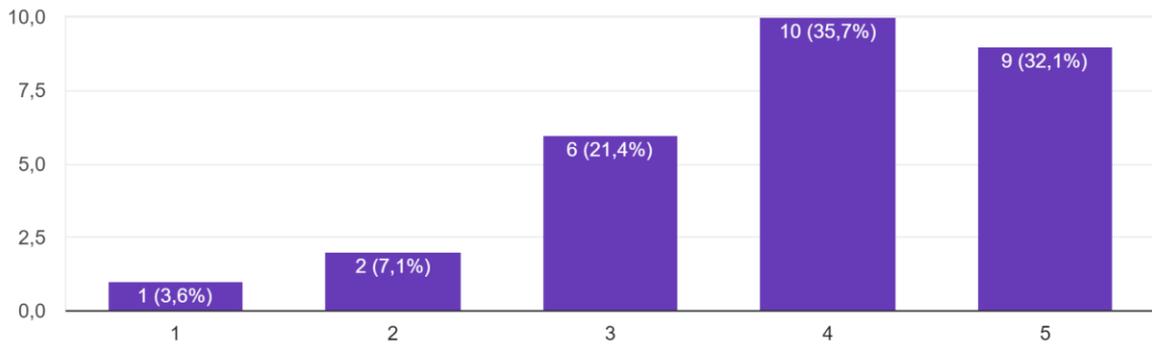
Rank how the atmosphere of room 1 makes you feel (ominous to pleasant)

28 antwoorden



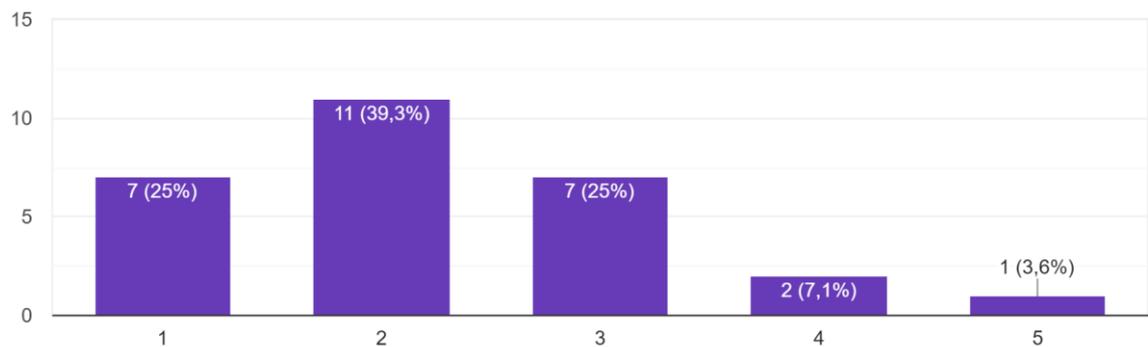
Rank how the atmosphere of room 2 makes you feel (from happy to sad)

28 antwoorden



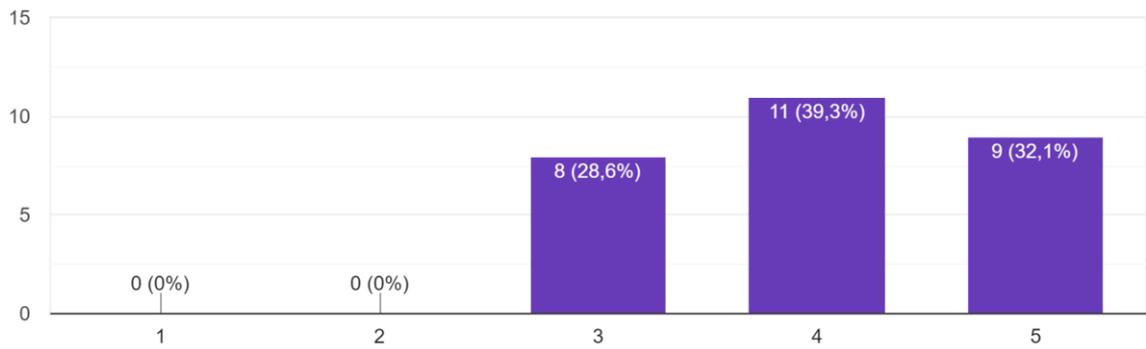
Rank how the atmosphere of room 2 makes you feel (ominous to pleasant)

28 antwoorden



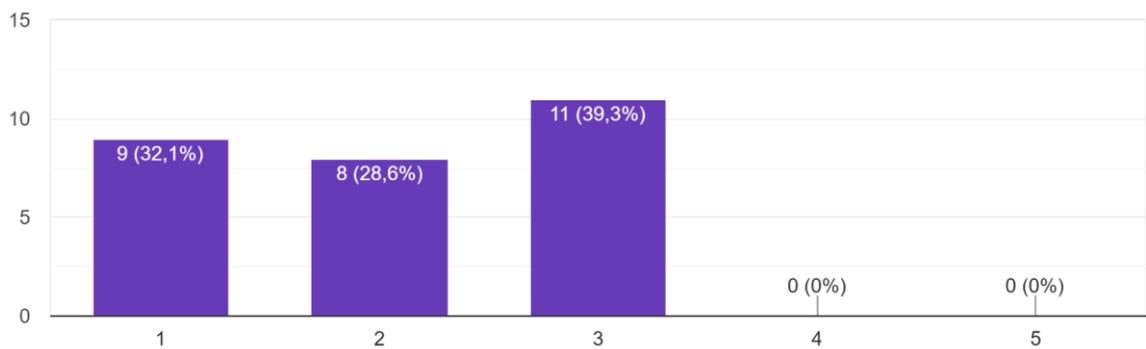
Rank how the atmosphere of room 3 makes you feel (from happy to sad)

28 antwoorden



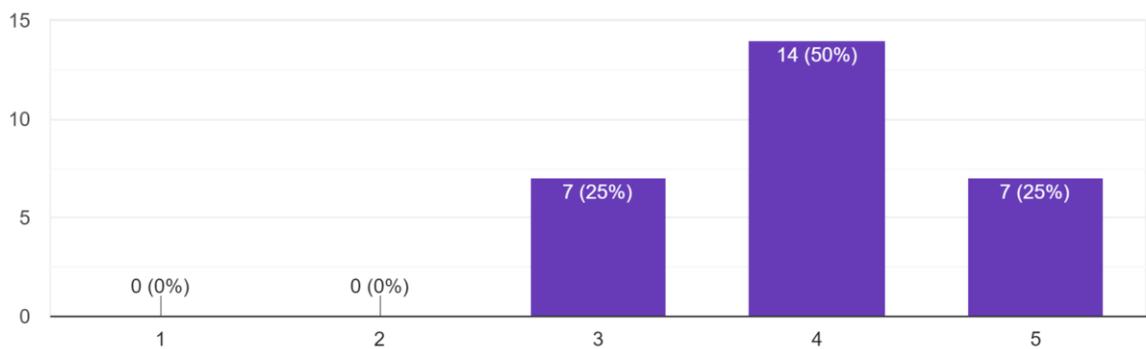
Rank how the atmosphere of room 3 makes you feel (ominous to pleasant)

28 antwoorden



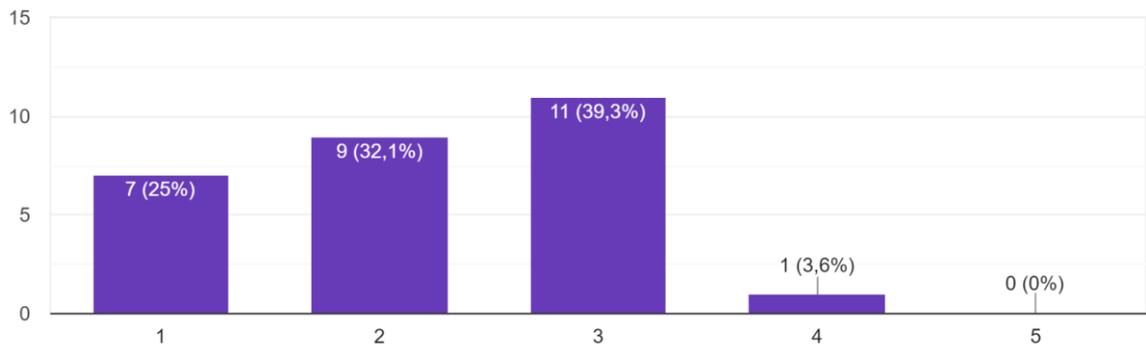
Rank how the atmosphere of room 4 makes you feel (from happy to sad)

28 antwoorden



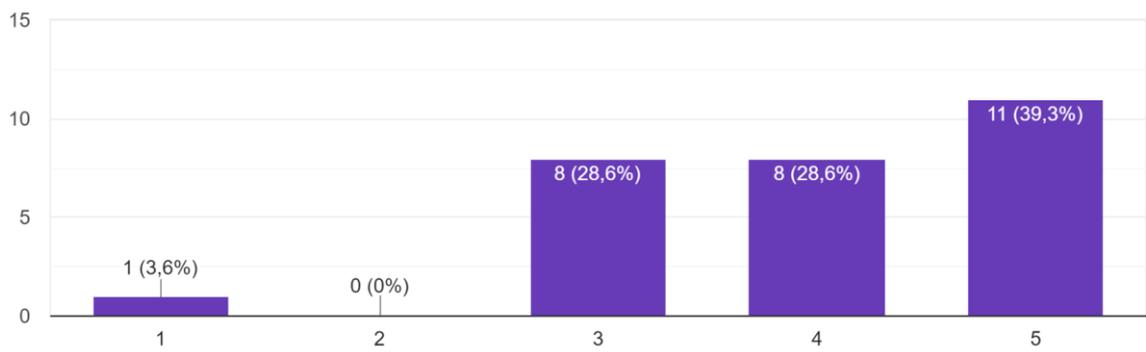
Rank how the atmosphere of room 4 makes you feel (ominous to pleasant)

28 antwoorden



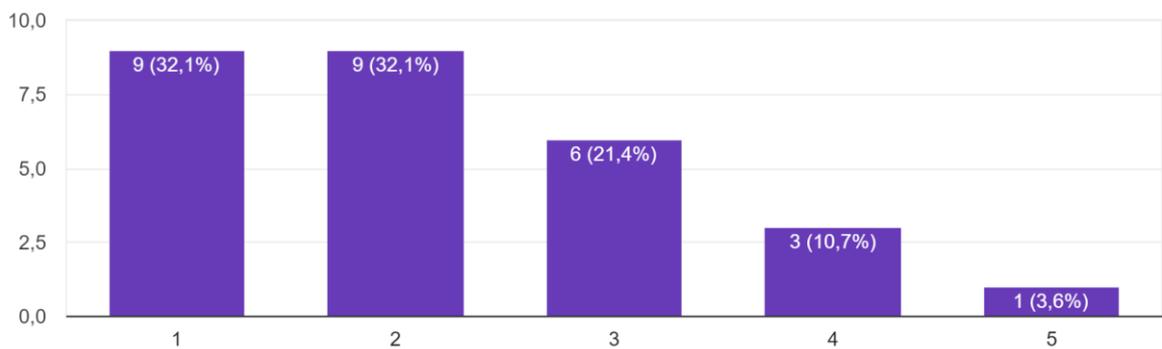
Rank how the atmosphere of room 5 makes you feel (from happy to sad)

28 antwoorden



Rank how the atmosphere of room 5 makes you feel (ominous to pleasant)

28 antwoorden



A6. Notes from final playtest

1. Humam:
 - Dropped phone
 - Can't reach under cover to grab phone
 - Headset is shaky (doesn't fit well)
 - Tried to grab clothes
 - Alarm is hard to push
 - Monologue for pictures not clear
 - All audio plays at the same time
 - Hard to grab laundry
 - no laundry in dryer and washing machine
 - The floor is lower than the actual floor
 - Light from the back of the fridge
 - Thinks counter looks like blood
 - Tried to open oven
 - Tried to move chairs

Feedback in person:

- Add physics to objects
2. Lisa:
 - white screen is bright when you teleport to social media thing.
 - Phone fell off the stand in social media scene and got lost
 - Tries to turn off the alarm on the phone
 - Floor is too low in calibration
 - Tried to grab cup and plate
 - "Because of teleportation it is hard to focus on dialogue"
 3. Mihai:
 - The door glitched a bit
 - Went straight to the closet to throw blocks
 - Took time to look at the pictures
 - The button of alarm flies off a little
 - The controller in the bathroom
 - Can't grab clothes off the floor
 - Hit hand to the actual wall
 - put collider on noodle packs
 - tries to grab everything
 4. Christian:
 - "This guy is so depressed and has a big ass fucking house"
 - Turn off the fields of interactivity
 5. Finn
 - on-screen text is low
 - struggled to start the social media mini-game
 - goes to the phone twice

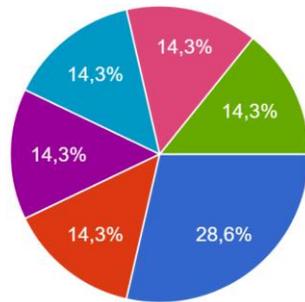
- lines overlapping
 - tries to pick up the cup on the desk
 - tries to pick noodles
 - doesn't find it comfortable to look down to look at the text
 - said the text by the picture was good for context
 - make the triggers a bit better
 - voice randomly kicking in, happens too fast
6. Borja:
- didn't understand how to turn off alarm
 - thought phone was alarm
 - text too low
 - picked up phone twice
 - dialogue for photo's starts playing when he picks up the ball
 - didn't look at photo's
 - skipped bathroom
 - tries to grab everything
 - Didn't know what to do from the beginning
7. Kalina
- doesn't pay attention to the alarm
 - right closet door keeps clothing
 - keeps playing with the ball
 - teleported into the closet
 - phone has problems with transporting to social media scene
 - keeps playing with the ball
 - didn't look at pictures
 - ignored the voice, too busy exploring, the voice did sound depressed
 - You end up in your room again, you never got out
 - The right door keeps closing when you open it.
 - was actually fun

A7. Results final test

Below the data can be found from the final test results. In the following link the full answers and feedback to all the questions can be found: <https://docs.google.com/spreadsheets/d/1TcBi2P-8dwgQ1bN5B6k2Kx0Uy3M0jCnYRu-sAI5qF54/edit?usp=sharing>

How did the experience make you feel?

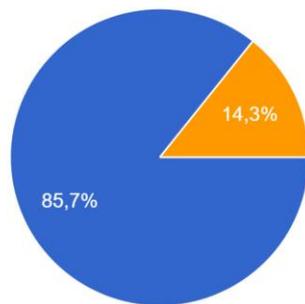
7 antwoorden



- Happy
- Sad
- Angry
- Scared
- It was also a bit funny because I knew who the voice actor was but the experience mostly made me SAD and...
- A bit confused and curious
- Melancholic
- No strong feelings

Do you think the application represented depression accurately?

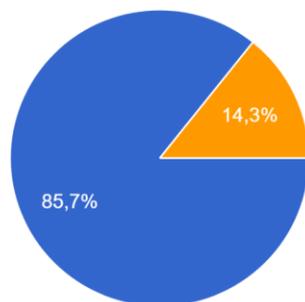
7 antwoorden



- Yes
- No
- I would say it succeeded in most cases

Did the environment feel immersive?

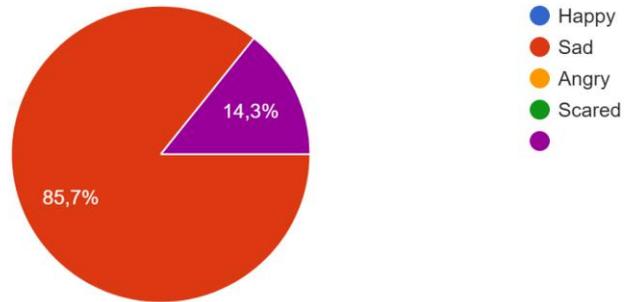
7 antwoorden



- Yes
- No
- Yes there are a lot of interactable objects (although I would get rid of the placeholders and replace them with other objects). The blinking also add to that immersiveness and the player's thoughts

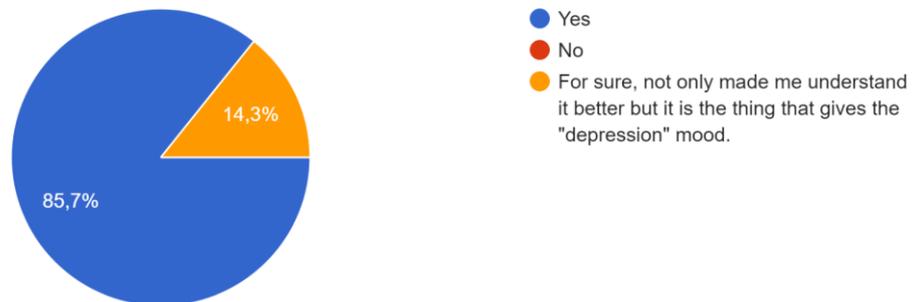
How did the inner monologue make you feel?

7 antwoorden



Did the inner monologue make you understand people with depression better?

7 antwoorden



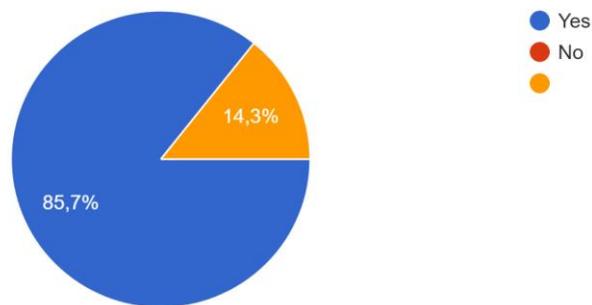
Did you miss any audio elements that could've helped convey the depression better?

7 antwoorden



Did the gameplay feel immersive

7 antwoorden



A8. Video link final product

[Kijk met mijn ogen | gameplay trailer](#)

A9. 12. Reflection

The reflection was written following the remaining of the 12 competences from Saxion Hogeschool.

This self-reflection will provide observations on the design process and the decisions that were made. It will also be discussed what could be improved in the future. It is important to recognize your own strengths and weaknesses and to grow as a developer. this reflection will serve as an essential tool for personal development.

12.1 Technical research and analysis

For this criteria I grade myself a **sufficient**. I showcase that my 3D modeling skills have improved through this project, it has made me faster and more practical, demonstrated by the amount of models made in 8 weeks. It was to work fast for this project since I had limited time to create the environment. I enjoyed making 3D models and texturing them. It is something I have done many times before, but since this was VR I had to pay a lot of time to the optimization of the assets. I did this through combining texture maps and making sure the models didn't have too many polygons.

I depended a lot on the texture to give character to the object and I think I succeeded in doing so. I also made some 2D elements for the social media posts and photo's around the house. This is something I don't practice as often but still had to do. I kept the art simple and fitting to the rest of the textures.

A new aspect that I worked with was post processing in VR. I haven't done that before and it was interesting to see how it impacted the scene when you put the VR glasses on.

I grade myself a sufficient, because the new skills I've gained through it weren't major but still significant for the end result.

12.2 Designing and prototyping

I have graded myself a **good** in this criteria due to my ability to research many different games and other media to determine the mood board and stylesheet for the game, keeping the client's needs and the theme into consideration. I decided to take some inspiration from the game "Life is strange" and took screenshots from the gameplay to see how the textures were made.

I would then test out a similar method of texturing. The client didn't want the game to look too realistic to keep a slight distance from reality for the player, which I agreed with and made sure to keep in mind. I showed them the mood board and stylesheet before I moved on in the process to make sure they agreed.

12.3 Testing and rolling out

For this competence, I would give myself a **sufficient**, because the analysis and testing methods I did was satisfactory. The main test told me if the audio and interactions were suitable. I am glad we did a quick test in the beginning and made iterations, because this way when the final test came around, I was able to focus more on the visual aspect of the game.

The environment picture survey was most useful for me as the artist, because I could test what features influenced the way people perceived the game. I do think I can improve in the way the data is collected through questionnaires, it could be more analytical. Regardless of that, I think I implemented the results in an effective way that was useful for the end result and made for a better application.

12.4 Investigating and analyzing

I give myself an **excellent** for investigating and analyzing. I've shown through my empathizing phase that I can collect relevant sources and gather valuable insights from them. I showcase this through different research methods such as desk research and interviews

One of my favorite parts of the research was seeing what other games had done with the subject of making a game about mental illness. It was interesting to see the depth of the research some of the developers went through, which gave me inspiration on how to continue the development of our product. I think I wrote down well thought out analysis of the market.

A part that was both unique and helpful was the interview with the Psychiatrist. I was able to do field research early on and am thankful for the opportunity to speak to a professional in the field. It was a nice break from the desk research. This made the investigation even more in depth and offered a new perspective.

Also, sending out the questionnaire to people who suffer from depression was a good way to confirm my research and to gain new insights and inspiration for the application. Combining these different ways of research gave me a well-rounded perspective on the subject of depression and was great starting point to dive deeper into to the creation the product.

12.5 Conceptualizing

The grade I give myself for this criteria is a **good**. I give myself a good due to the fact I kept an open mind throughout the process and came up with 5 creative solutions, even though the client was already leaning towards VR. It was good for our creative process to explore the other options too.

I applied the SWOT analysis method to determine the most fitting, option which was discovered through a comparison matrix.

Once we settled on VR it was a bit harder to come up with unique ideas, since we had limited time and needed to stay within the scope. I liked the two ideas we came up with and I am glad we settled on making the scope smaller. I am afraid we would not have been able to deliver a polished product if we went for the “creature” or “outer-body experience”. The smaller scope ended up being the best solution for the client and fitting for the Ethics lab they want to create. I think I approached the concept part of the research in a realistic way, while still thinking out of the box.

12.6 Designing

For this criteria I give myself a **sufficient**, since I was able to adequately design a visualization of the theme through logical steps.

Designing of the environment started after we had decided on our minimal viable product. I had never made a blueprint for any of my games and I am very happy that I did decide to start with that. It made it easier for me to see how the models needed to fill the space and how the rooms would flow together.

In hindsight, there are some things I would do differently. For example, I left space open for a potential living room, whilst this wasn't in the scope. It made sense for the flow of the house, but made it feel empty and a little bit unfinished.

I am happy about the way I used my reference board. I had the scale and multiple perspectives of every single model I had to make in the board, adding on as I moved along the list of models I made. This made the design process much faster and accurate. I am also glad that I used a MoSCoW sheet to determine what had priority. I am afraid that if I had not, the product wouldn't have been as finished as it is.

12.10 Communication

The grade for this criteria is a **good** due to the structure of the report. It is written in clear language and explains all the design steps thoroughly. The layout is simple but looks clean and is readable. The language used throughout the report is professional and follows the rules of academic writing. The citation was done following the guidelines of APA and the report contains illustrations that support what is written in the text and always referenced to. The appendix is always linked through a hyperlink, which makes it easy to find the material that is referenced.

12.11 Learning ability and reflectivity

I give myself a **good** for this criteria. I show through my ability to adapt and apply feedback that I am willing to make iterations and accept that my work can always improve. I'm eager to hear people's opinion and I can handle critical feedback in a professional and appropriate manner.

An aspect that I have improved over the years and especially shows in this project is my ability to design a realistic concept and to cut parts that are out of the scope. As an artist it feels like my work is never done and that I can keep iterating forever.

Whilst the scope was realistic, I still kept working till the last second. That's something I would like to improve on. I need to learn to accept the work I've provided and that I can't have everything. I can see that I've improved on setting boundaries for project, but that I still cross them, even when unnecessary.

I can also improve on asking for feedback or help earlier. I was often left struggling trying to fix a problem myself or not being sure of my work. I should accept help when it's necessary, it's valuable to do so when there's limited time.

The project aligned well with my creative aspirations of becoming a 3D environmental artist. I showcased skills that I started learning in my first year at CMGT and that I have improved on so much since then. This project was a satisfying way to end my 4 years studying this course, because I was able to demonstrate those 4 years of technical and creative improvement in one big project.

12.12 Responsibility

As an artist and co-designer of this project, I have proven that I can take responsibility to arrange meetings when necessary and that I am able to justify and defend my choices. This is why I give myself a **good** on this criteria. I've gotten a positive feedback from the people I've worked with and have had multiple discussion with the client about the ethical aspects and responsibly that come with creating an application about mental illness.

An example of this criteria is that I stopped waiting for the ethical committee to send their advice on our project after trying to contact them multiple times. They still haven't answered to this day and if we had waited, there wouldn't be a product or report by now. Instead I took the responsibility to be extra careful and empathetic in the way we approached our testing and questionnaires, whilst still being able to start our production phase.

We took into account which part of the game could be ethically irresponsible, but also looked into which parts would be ethically responsible, since the application has the potential to help people. We were careful to not create more stigma around the topic of depression, which could result into people not taking the illness seriously and make it harder for people to reach out for help. We are aware that even with the research we have done, people could still form their own opinion on the application we made. They could disagree with how depression is portrayed or generalize the illness.

12.13 Final word

I personally thought it was interesting to research and develop a game about depression. I think the cause is very motivating. I have people in my close circles who suffer or have suffered from depression, which made it important to me that we made the product with care and respect. A link to a video of the final product can be found in Appendix [A8](#)

I believe that an application like this has great potential without it trying to be a cure or treatment. It has the ability to lessen stigmatization around depression and to make asking for help and support more approachable. The product is far from perfect, but I am proud of the progress we have made and I hope it will be put to good use in the ethics lab.