Sam's Story

CSC491/CSC492 Senior Project

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Introduction

Video games and mental health have long been intertwined topics. From discussion regarding the health of playing games for long periods of time to presenting violence in video games, the mental health of players has become a topic of discussion and research.

While the negative impacts of video games on mental health are often at the center of this conversation, research has shown that depending on the video game, they can have positive effects on the player. One such exploration is highlighted in research conducted by Kellie Vella and Daniel Johnson in a paper titled *Flourishing in Video Games*. This paper investigates the 10 criteria that describe a term coined *flourishing*, in other words meeting the needs of the human mind and body. A key finding from this paper was that "while video games have been widely criticized for encouraging unhealthy practices and attitudes, current research has found positive effects of commercial video game use in the form of increased engagement, visuo-motor coordination, cognitive skills; and applications for games in the fields of education, mental health support and physical therapy" (Vella and Johnson 1). This suggests that, with the proper presentation of material, video games can be used as a tool to benefit the player, help them understand themselves, and learn more about coping mechanisms and other skills.

Similarly, research conducted and presented in a paper entitled *Respawn, Reload, Relate: Exploring the Self-Care Possibilities for Mental Health in Games through a Humanistic Lens* by Velvet Spors and Imo Kaufman examined the topic of self care presented in video games, and how effective those strategies are. Among many questions posed in the paper, one central question postulated "What can we learn from games being used in such a transformative and reconfigurative manner (for the design of mental-health-focused self-care technologies)?" (Spors and Kaufman 3). They addressed the difficulties with acknowledging mental health and heavier topics in video games, which is applicable to the aforementioned focus of this paper. They state specifically that "...outside of academia, serious games also provide a vibrant opportunity for interdisciplinary knowledge exchange, e.g. learning from the best practices of

professional designers for serious games. For example, serious games have been adapted to help treat and manage trauma response(s) and PTSD" (Spors and Kaufman 5). However, they also acknowledged the importance of contextualizing the game, else they "...risk encouraging an overly decontextualized engagement with games, mental health and neurodiversity" otherwise (Spors and Kaufman 5).

Given the context of the above exploration, this paper discusses the creation of a game called Sam's Story. Sam's Story was conceptualized to focus on three topics: animation, game design, and mental health. Graphics are a vital part of the studies and explorations done at Cal Poly in computer science, and there are also many opportunities to find a career in this field in the future. Mental health and mental health awareness are also very important to the lives of many, so the motivation for this experience is to combine all of these passions into one fun, enjoyable, and relaxing visual piece. It is also a goal that this project will serve educational, relatable, and awareness purposes regarding different mental health challenges that individuals face.

Mental health awareness is relevant and important to many peoples' experience in life, and it impacts everyone in different shapes and forms. In investigating mental health awareness games, many of them lacked certain qualities, including:
1. Acknowledging that mental health challenges are different for everyone who experiences them.
2. Providing a perspective on many mental health challenges that may exist for one person or many people, and what those mental health issues look like.
3. An experience where a user can embody a character and experience behaviors that they themselves may not understand without proper explanation within the game.
4. Welcoming and educational approaches to some common symptoms that those without a specific mental health issue may not recognize.

With all of these shortcomings in mind, and the research above regarding the importance of contextualizing games and the positive benefits that it can promote, this experience attempts to

address all of them. The goal of this game is to teach users about what different behaviors portrayed through the main character may mean in terms of mental health. For example, Sam excessively washes their hands in one portion of the experience. The user, possibly unaware of signs of OCD, will then learn about this behavior and some of the science behind the mental health issue. This experience is a way for all users to become more aware of some of the symptoms of these challenges that many people live with on a daily basis. This game is a 3D, interactive experience within a world for the main character, an axolotl named Sam. This goal and design address the above shortcomings, including perspective on different mental health issues that people experience, educating users in the experiences of others, and embodying a character that is dealing with these struggles.

Additional research was conducted into therapies that are used in psychological treatments, as well. One of the key research points found was related to Cognitive Behavioral Therapy, or CBT. CBT recognizes that many different mental health challenges are related to core principles, one of them being that "psychological problems are based, in part, on learned patterns of unhelpful behavior", in addition to that "people suffering from psychological problems can learn better ways of coping with them, thereby relieving their symptoms and becoming more effective in their lives" ("What"). Through this research, it became clear that one of the key components that can be addressed in the game is awareness. This game is in no way trying to serve as a replacement for therapy from trained professionals, but rather provide a perspective to users of behaviors that may indicate that someone is struggling with a particular mental health challenge.

The mental health challenges portrayed in this game are Obsessive Compulsive Disorder (OCD), Social Anxiety Disorder (SAD), Post Traumatic Stress Disorder (PTSD), and Body Dysmorphic Disorder (BDD). In addition, since the goal is to encourage learning and awareness about a topic and explain common symptoms, a pre-gameplay and post gameplay survey was taken for each user to see what they learned, what they thought could be improved, and how their experience was playing the game. Further explanation of the data is included in the Analysis and

Verification portion of this paper, but we received positive feedback from player to player. Being that mental health and mental health awareness are both very important subjects, it was necessary to ensure that the mental health challenges are portrayed accurately and in an educational manner. Our user testing results demonstrated this to be true.

Background

This game was developed in Unity, where it took advantage of the 3D capabilities that Unity offers. Unity allows for the implementation of colliders, camera movement, platforming mechanics, and more. Unity is the best resource to capture the designed game environment. It uses C# as its programming language, and there are also many examples for coding in this language that exist on the internet for very specific purposes in Unity. Additionally, there is also more comfort and familiarity with Unity compared to its competitors, including Unreal Engine. There are many tutorials and walkthroughs of Unity's features on Youtube and also a forum where people share problems and solutions. Since there was a significant amount of outside resources that could aid in the game's development, it was decided that making the game in Unity was the best option.

Regarding animation and 3D modeling, Blender is the best option to design assets and create animated movement. Blender is an open source 3D, node based modeling software that supports modeling, editing, texturing, UV editing, VFX, and animating characters, environments, and anything else that a user could think of (Foundation). For the purposes of this project, Blender was used to create and animate the axolotl, which then was imported into Unity. There are many reasons why Blender was the primary choice for this project, one being because it has many advantages over other 3D modeling software, such as Maya. Because it is open source, there are many user resources and debugging forums from other users, as well as many videos online for different tricks and tutorials. This puts Blender at an advantage over Maya, in addition to that it is much more intuitive in many different ways, in addition to that there was more of a

familiarity with the tool. However, one disadvantage is that Maya has traditionally been industry standard for 3D modeling.

Related Work

In the search for games that address mental health, research was conducted through various platforms to find different ways that this topic is addressed. Below, some of the games that were used as inspiration for this project are described below.

Kind Words (lo fi chill beats to write to) (Popcannibal)
The style of this experience is very powerful, and it is an effective way to portray the message that the creators are trying to achieve in Sam's Story. The basis of the game is to receive and share messages from strangers in a small room. Although the main inspiration from this game is the style, the game effectively incorporates the letters from others into the gameplay. This served as an inspiration for the style and format to inform the user of the different mental health symptoms that are demonstrated through the character in Sam's Story.

Adventures With Anxiety (Case)
Adventures with Anxiety is a strong example of a story-like walkthrough gameplay, similar in many ways to what Sam's Story is attempting to achieve. Sam will behave similarly in this gameplay, with preset behaviors for the character that exemplify the mental health symptoms that different people are dealing with on a daily basis.

Marc (Remedios)
This game is another example of the gameplay Sam's Story has taken inspiration from. The simplicity of this experience is an important inspiration for the gameplay of Sam's Story, as well. Marc is able to achieve a clear message in a short amount of time, compared to the longer play time of the Adventures with Anxiety game. When observing Marc, it is also important to keep in

mind that the gameplay should be simple in order for the users to fully understand the story that is unfolding in the various scenes.

In addition, once development of assets began, there were a few assets including a phone (a_dallahh), an apple (Bariacg), and a room model (Studio Billion) to add more life into the scenes that were being created and rendered. These met the style of the world that was being built, and allowed for more focus on the gameplay after most of the initial assets had been created.

Design

The main goal of this game tied closely to its creative design. Because Sam's Story is created with the intent of teaching about various symptoms associated with mental health issues in an approachable way, it was decided that the style should be simple, approachable, and cute so that all users can enjoy and learn from the game while addressing serious topics. Therefore, the below color palate was selected to work with, using warm colors to work with the feel of the game.

Figure 1: Color Swatch Inspiration for Sam's Story

Then, after deciding upon the basic colors and style, a storyboard was designed depicting the gameplay for Sam's Story (Appendix 1). The storyboard highlights some of the overall goals of the project, including depicting mental health in an educational and relatable way while also adding gameplay for the user. In addition, many parts of the implementation of this game follow the design principles taught in 3D modeling and game design classes at Cal Poly.

Additionally, the look of the mental health cards were designed by incorporating the same color scheme, analytics and information about the specific illness, and a link to reference the information (Appendix 2). However, after initial feedback through user testing, one piece of feedback received was that there was a significant amount of text in the initial informational cards. Following reception of this information, the cards were segmented into multiple cards, allowing for users to click through the information and made it more visually appealing (Appendix 3). This also promoted further interactivity for the user with the game.

Another important aspect to the design and feel of the game was player movement. We decided to implement a slower movement with WASD controls for Sam, as it matched the design of the rest of the game. In addition, the feel of the movement appeared to be a disputed topic among user testers. Some user testers did not like the feel of the movement, as they thought that it was too slow. Yet, it was decided that Sam's Story should remain with slower player movement movement as it was an important component to hold the game's pacing and allow the user to slowly experience each room.

Finally, music was another fundamental part of the game that assisted in its design and final implementation. The goal of the music was to achieve a calm and peaceful feel and atmosphere, similar to the music presented in Animal Crossing (Lynfinity Music), with a simple piano and melody, even in the scenes where a stressful situation was being portrayed. The game drew inspiration from these resources and themes for its design, which in turn led to a successful implementation using Unity and Blender.

Implementation

For the initial phase of prototyping and game generation, a main focus was primarily on the design from scratch of all of the assets for the experience, including both the environment and the character. This was a large undertaking in order to achieve the exact style for the game that is shown in the storyboarding above and game inspirations. In order to learn about the style of

modeling that the initial design of the game envisioned, tutorials proved to be an effective resource, including a YouTube tutorial for modeling in this style (3DGreenhorn). As a result, Figure 2 depicts the three initial rooms where gameplay would take place, followed by adding textures in Unity based on the color swatch presented in Figure 1 above.
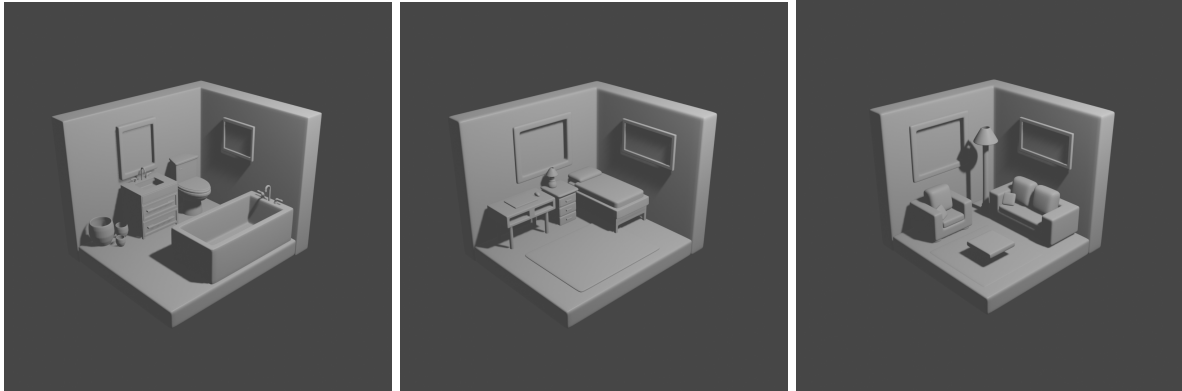

Figure 2: Bathroom, bedroom, and living models for Sam's Story

This provided a primary design for the player to interact with their environment, as well as locations for the interaction of Sam with various parts of the home that upset them and exemplified a mental health challenge.

Another facet of Blender and animation work went into the design and animation of Sam the axolotl. The work began by designing and modeling the initial character with base sketches, followed by modeling in Blender. After the initial model was complete, a high poly version of the model was then created, as shown in Figure 3.

Figure 3: High Poly Render of Sam the Axolotl

However, it quickly became clear that this would be extremely difficult to work with in a real time game environment. This was due to the deformations of the high poly mesh during animation and gameplay, as well as the power of the computers that the creators were using at the time. Thus, further investigation showed that the low poly model was much more applicable to a real time game environment and allowed for more ease of use during the creation of animations. Following completion of the model, UV Unwrapping the model took place, followed by Adobe Substance Painter texturing work to create custom smart textures to design Sam's appearance. The final textured low poly model is shown below.

Figure 4: Low Poly Render of Sam the Axolotl

Following texturing, learning about the extensive process of building a good armature and animating a character using bones in a walk cycle took place. Research and investigations into the process of weight painting, redefining bones to mesh movement, and keyframing to produce an effective animation was vital for the success of this portion of the project. This final animated model can be seen in the current state of the game, where it was configured to load and work effectively in the Unity project.

Following the base walk cycle of the axolotl in Blender, each of the different animations were broken down piece by piece. As a result, nine separate animations were created. Many challenges arose during implementation, which YouTube tutorials helped to follow and learn more about the possibilities of animations in Blender.

For example, in a scene where Sam washed their hands, knowledge of fluid simulations was required. To complete this, a YouTube video helped to understand fluid dynamics in Blender and

how to render the fluid after it had been baked (Olav3D Tutorials). In addition, knowledge of reflective surfaces, rendering in cycles, and details regarding textured materials were used and applied in the fridge scene. Therefore, implementation of the animations required much time and research, and resulted in impactful final results.

With regards to Unity development, the main focus was on the start of the Unity project and implementing key features of the game. The main functionality lies in the movement and interaction of the axolotl. The axolotl has a script that moves and rotates the axolotl based on the WASD inputs and only checks input from the mouse when an interactable is in range and its connected particle effect is playing. Additionally in the script, the axolotl's position is constantly being compared to the interactable in the room. Once the axolotl is in range of a specific interable, a particle system is enabled to show the user that there is something to interact with; Also, because each room has its own interactable, the code has to track which room the user is currently in. Because everything is in relation to the axolotl, Unity helped handle room transitions with the aid of box colliders, trigger events, and object tags.

A big component to the flow of the game was the inclusion of saving data across all scenes. Tracking data was necessary to keep triggers to a minimum. For example, a game design choice was to not trigger the particle effects and interactable after the user has seen its specific animation. Additionally, the final animation is only available once the user has interacted with all the prior triggers. Therefore for this to execute as intended, the data tracking of all the interactions must be passed from room to room and across all the informational panels.

In addition, the gameplay is heavily reliant on multiple scene transitions as the user learns more about the different mental health issues presented in the game. Knowledge of Coroutines were also used to move through the different animated clips after they were played, as well as control the data of the gameplay. In addition, preserving and pausing different sounds and songs also involved control attached to Sam's player movement script. A YouTube video also helped with this portion of controlling the code for a general approach on how to implement

this feature (Billy Man). The code of the game and development in Unity required an understanding of Unity's engine and tools, which the creators of this game had prior to the start of this project. However, it took combined knowledge to complete the game.

Analysis / Verification

After completion of 60% of the prototype, user feedback began in the form of a survey. Users completed the game, and then provided feedback, notes, and places for improvement in the game. The second round of feedback came after completion of the 100% prototype, and the feedback improved as iterations of the game took place.

At the 60% stage in game development, only one animation, the OCD animation, was complete, the users could walk through all of the scenes in the game, and only the sink was interactable. There also were no instructions or introductory cards to explain the goal of the players and what they should be searching for. As a result, feedback generally discussed statements such as:

- "The rooms were all interesting and Sam is such an adorable character. I was a little lost as to what I should be looking for to interact with"
- "A bit confused what I was supposed to do"
- "I really like the style of the game and think it's a really great idea to approach mental health with a likable character like Sam."
- "I accidentally got Sam out of his house and he couldn't get back in"

The general feedback was that the game design achieved what we had hoped at this stage, and improvements could be made to illustrate what should be done in the game and how the goal is to find interactable elements. At this stage, feedback generally indicated that the game needed to be completed in order to understand its effectiveness.

Following completion of the 100% prototype of the game, a new user feedback form was sent out to be filled out before and after gameplay. Prior to the start of gameplay, users were

surveyed upon their general awareness of mental health, how they learn about it, and how important it is to them. Of those who played the game, 85.8% of respondents ranked how important mental health was to them as either a 4 or a 5 out of 5. However, of those who played, almost none of the players marked that they were 5/5 in their knowledge of BDD, PTSD, SAD, or OCD.

In addition, a component to playtesting was to find a diverse group of people to participate to get responses. For example, a wide range of users, including those who did and did not consider themselves gamers. The goal for the game was to make it as universal as possible where gamers and non gamers can easily navigate the experience. Appendix 5, in the pre-gameplay section, highlights details of the diverse demographic, including an approximately 33% to 66% split between those who do and do not consider themselves gamers.

Appendix 5 also shows information about how often the testers play video games, with approximately 40% playing almost every day and 60% playing a couple times per week, once, a week, or rarely. This demographic demonstrates the differences in our playtesters' gaming connection. The range of playtesters that participated fell between either playing everyday or rarely playing; however the majority of our playtesters did consider themself a gamer despite the differences in play time. The pool of playtesters that considered themself as gamer were also found to be diverse as their favorite games were identified from not a common genre; games like Rocket League, Destiny, Stardew Valley, Minecraft and other titles were amongst the discussion of favorite games.

After completion of the game, users were surveyed about how long it took them to play the game, their understanding of the game, and what they gained from it. Some key data points that were telling of the game's success included that the users were asked how many themes they could relate to. The breakdown of the chart is shown in Figure 5.

How many of the themes could you relate to?
15 responses

● 0 Themes
● 1-2 Themes
● 3-4 Themes
● All Themes

80%
13.3%
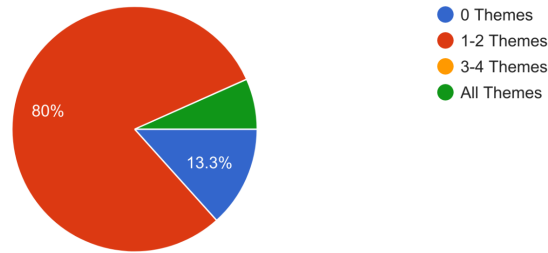
Figure 5: User Survey Breakdown of "How many of the themes could you relate to?"

This illustrates that the vast majority of users found Sam's Story's themes to be relatable in some way. Figure 6's information also shows more about the user experience.

Did you feel emotionally impacted by Sam's Story?
15 responses

● It was more of a learning experience for me
● I was slightly emotionally impacted
● I was mildly emotionally impacted
● I was very emotionally impacted

26.7%
20%
26.7%
26.7%
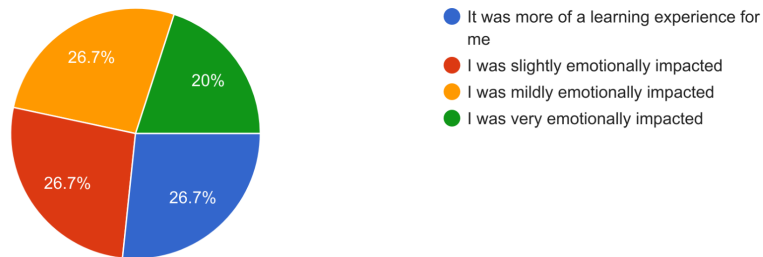
Figure 6: User Survey Breakdown of "Did you feel emotionally impacted by Sam's Story?"

These two charts highlight an important theme of the experience of the users. While some resonated with its message and related to it, others found it a way to learn more about different mental health disorders that they may not be as familiar with. Therefore, the user survey illuminates that different players had very different emotional impacts and experiences while playing the game.

We also asked users if they would share the game, and 92.8% stated that they would. The users mentioned that they would share the game with friends, younger people, parents, and family.

Finally, as discussed above, the users gained different knowledge and had different experiences during gameplay. While about a quarter were very emotionally impacted, others saw the experience as more of one to learn. This also ties together with Figure 7, where users were asked "Did you learn anything new through Sam's Story?" Because of the range of experiences with the game, this ties closely to what users learned.

Did you learn anything new through Sam's Story?
15 responses
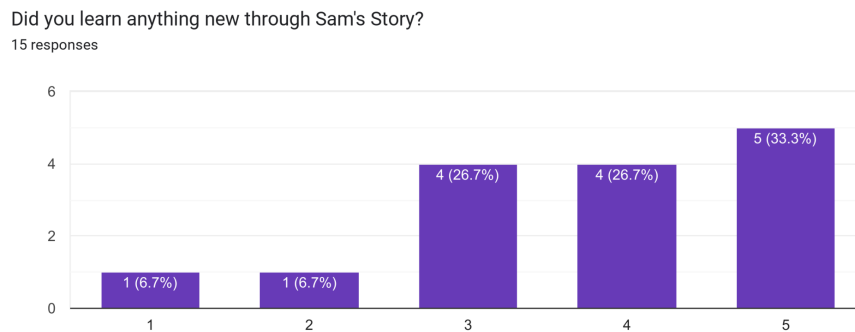
Figure 7: User Survey Breakdown of "Did you learn anything new through Sam's Story?"
(1: I already knew most of the content, 5: I learned about new content)

These results relate to the vast experience that humans have with mental health. While some of the users may not have known much about these mental health challenges, others related heavily to the themes presented and may have already known what was being shown through Sam's challenges. This is ultimately what the goals of this game were - to help users learn more about the disorders and have a space to relate to them. These user survey results highlight that this game succeeded in its intended goals.

Sam's Story is scalable, efficient, and fast, as well. Given the development of the game, more rooms can be generated and connected to the gameplay, in addition to introducing more learning materials and behaviors for more mental health challenges that may not have yet been addressed. To see the full data from the report, including what users learned from each disorder, please see Appendix 4 and Appendix 5.

Future Work

In general, the vast majority of our initial goals were completed in Sam's Story. As discussed above, options for more mental health challenges to be represented would be a place to extend work further. In addition, the developers discussed implementing a way to measure how much users learned in the game through playing, including the possibility of a quiz that the user takes before and after completing the game. However, that was not implemented in Unity, rather through a Google Form with playtesting. This still gave valuable feedback as to the learning that took place during the game, yet there was not time to complete this in Unity.

Conclusion

Regarding personal assessment of contributions, the assets look great and with work in Unity, the project came to life. Much was researched and learned over these past two quarters about modeling, design, and working with games rather than something like a short film, so getting to be a part of this project has been a very rewarding experience. In addition, work on this project is coming from a place of passion and excitement, so devotion to the project continued until it was complete. Getting to be a part of this project was incredible; I learned a significant amount about Unity, Blender, animation, and creativeness combined with technology!

In regards to the Unity implementation, the structure of the game is sound. A goal was to tackle most of the implementation of Unity besides integrating the models, with a focus on attempting to make sure the feel of the game matched the goals of the project, which was successful. All the core mechanics are implemented including movement, interactables, room transitions, and UI. The flow of the movement is also great, as it seems to be very smooth and consistent with the style that was originally envisioned. Seeing all the elements come together in the Unity Project shows a lot of motivation throughout the duration of this project. The ideas aligned and the final project demonstrates this well. The creators of this project are very proud.

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Appendix

Appendix 1: Sam's Story Storyboard
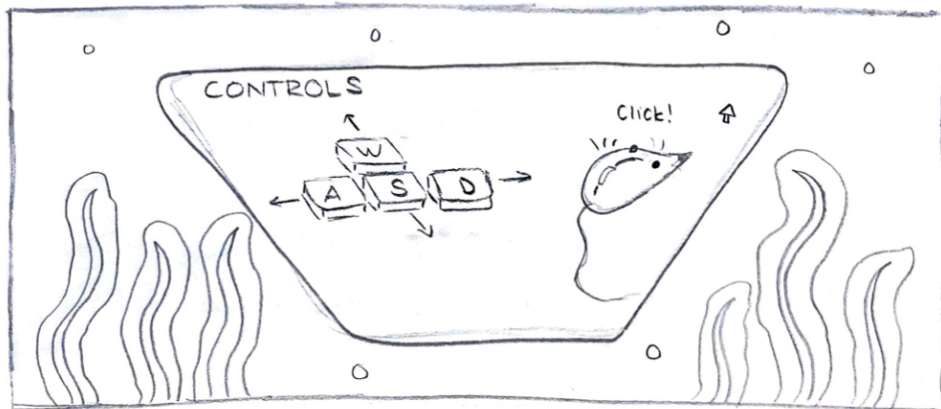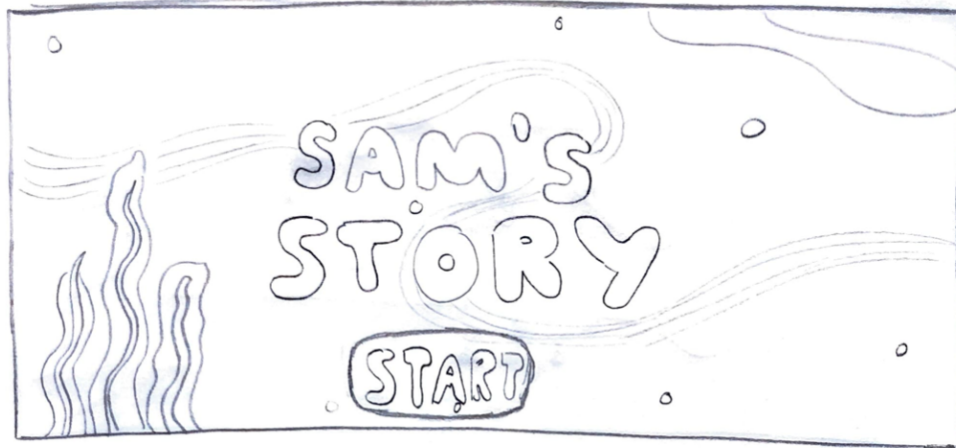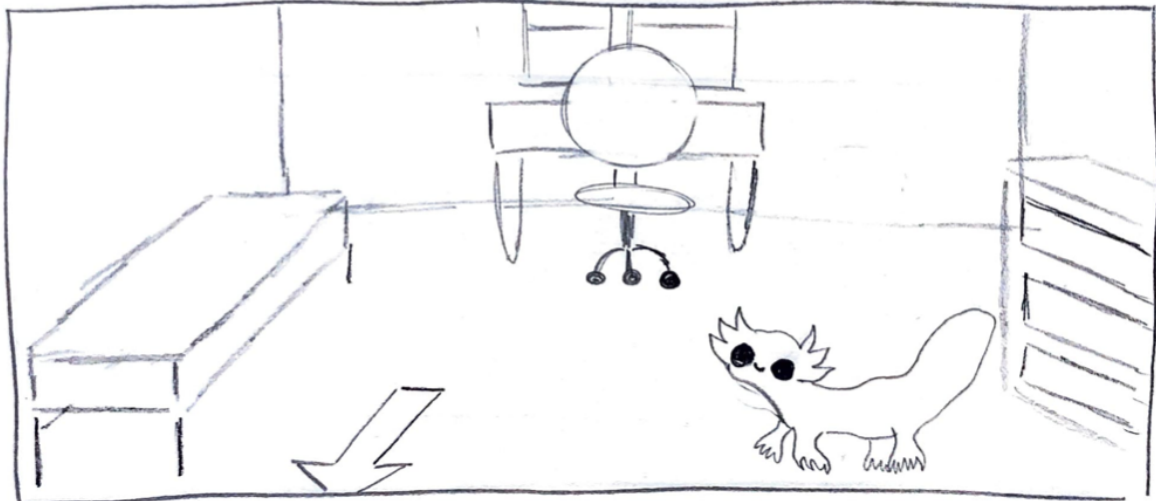
Player can walk around bedroom, arrow leading to hallway. Going to bathroom.
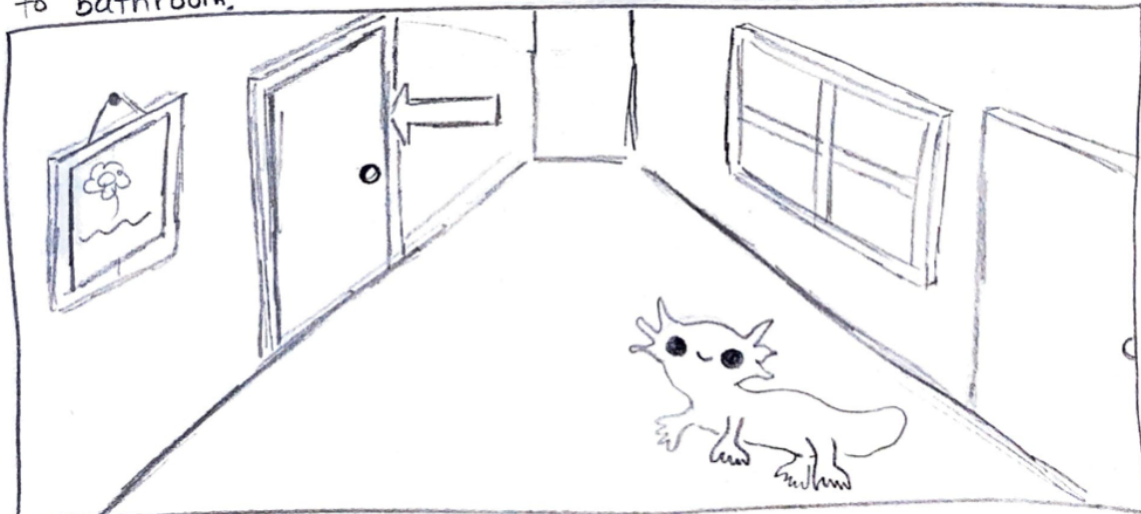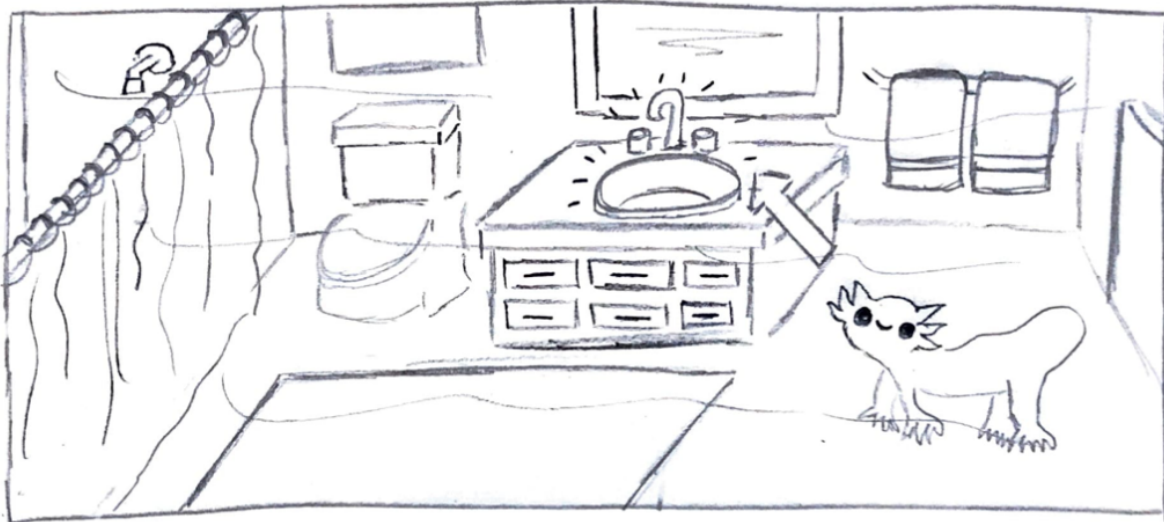
Showing a common symptom of OCD: hand washing. After an excessive time where Sam gets visibly upset, an explainer for OCD pops up.

OCD

Sam is exhibiting a possible sign of OCD at this moment.

Explainer for OCD, common symptoms, & resources for help....
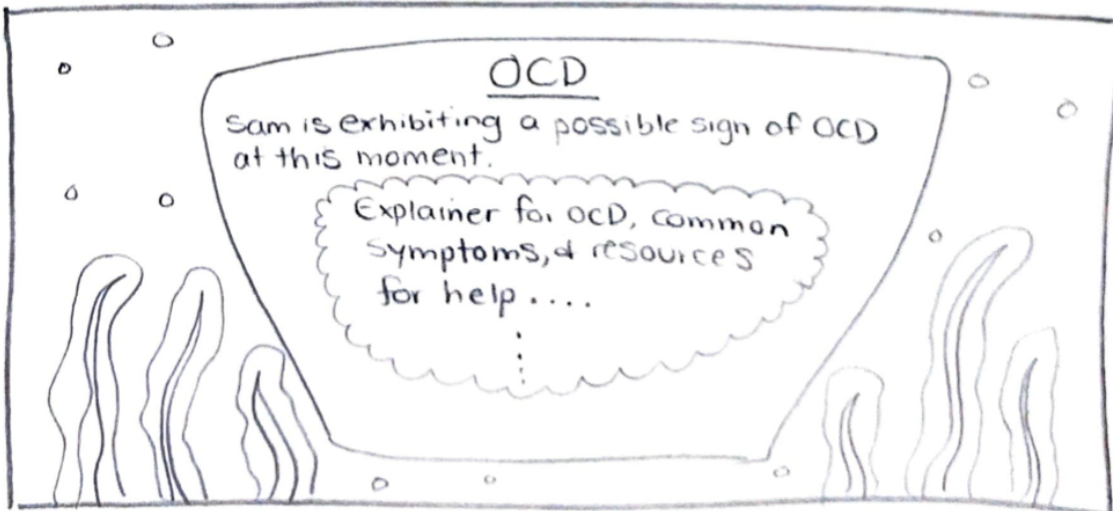
Goes on to exhibit other behaviors...

Appendix 2: Initial Informational Card

post-traumatic stress disorder

Post-traumatic stress disorder also known as PTSD, is a psychiatric disorder that may occur when an individual experiences or witnesses a traumatic event.

PTSD patients have intense thoughts and feelings related to their experience that can last long after the event has ended.

PTSD patients can relive the event through flashbacks or nightmares. They avoid situations or people that remind them of the traumatic event. They can have strong negative reactions to something as ordinary as a noise, or a accidental touch.

Women are twice as likely as men to have PTSD. Additionally, U.S. Latinos, African Americans, and American Indians, are disproportionally affected and have higher rates of PTSD.

For all this information and more, please visit:
https://psychiatry.org/patients-families/ptsd/what-is-ptsd

Appendix 3: Final Informational Card

post-traumatic stress disorder

Post-traumatic stress disorder, also known as PTSD, is a psychiatric disorder that may occur when an individual experiences or witnesses a traumatic event.

<-- -->

Appendix 4: 60% User Survey Charts

How often do you play video games?
6 responses

- Rarely / Never (not more than once per week)
- Sometimes (once or twice per week)
- Often (a few times per week)
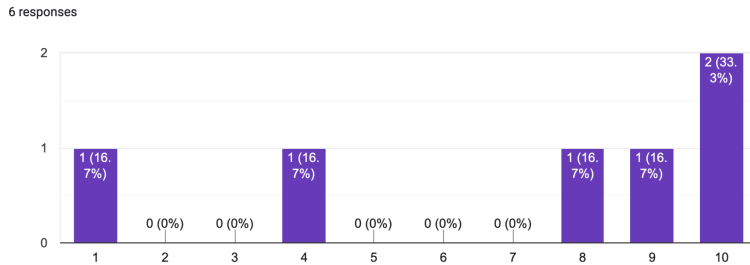- Every Day / Almost every day

16.7%
33.3%
16.7%
33.3%
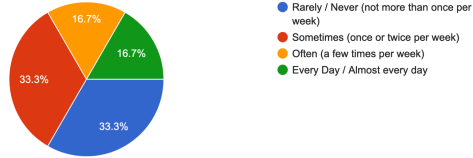
Please rank to what degree you agree with the following statement: I learned something new in Sam's Story.
6 responses
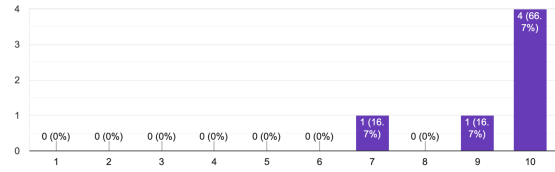
Please rank to what degree you agree with the following statement: Sam's Story was a positive experience.
6 responses
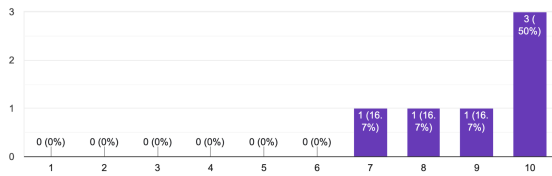
Please rank to what degree you agree with the following statement: I was interested to learn more while I was playing Sam's Story.
6 responses
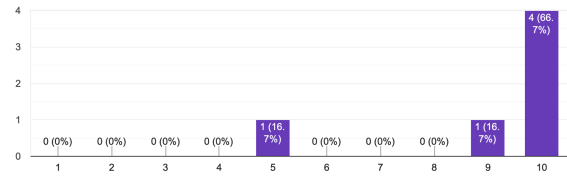
Please rank to what degree you agree with the following statement: I understood the purpose of Sam's Story.
6 responses
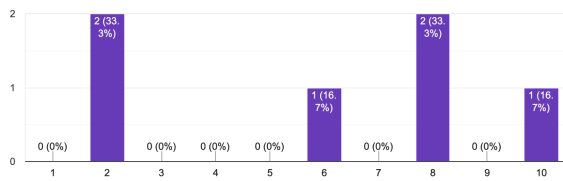
Please rank to what degree you agree with the following statement: I am satisfied with the content shown in Sam's Story.
6 responses
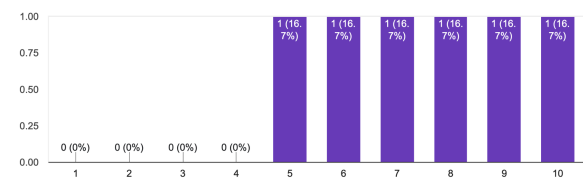
Please rank to what degree you agree with the following statement: I related to some of the themes shown in Sam's Story.
6 responses

Appendix 5: 100% User Survey Charts

Pre-Gameplay:

How often do you play video games?
15 responses

- Rarely/Never
- Once a week
- A couple times a week
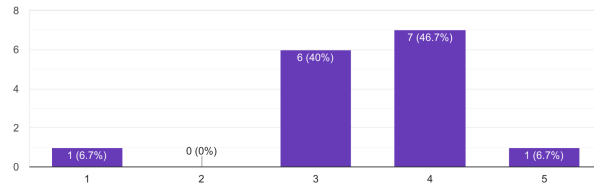- Every Day/Almost everyday

40%
26.7%
26.7%
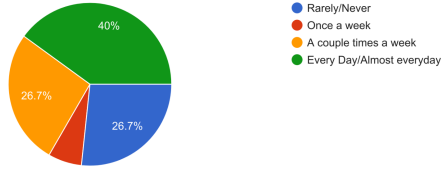
If you answered: Once a week A couple times a week Every Day/Almost everyday   How many hours a week do you spend on video games?
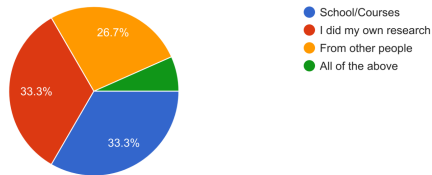11 responses

- 1-2 hours
- 3-5 hours
- 6-10 hours
- 11-20 hours
- > 20 hours

27.3%
18.2%
18.2%
27.3%
9.1%
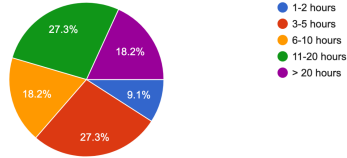
Do you consider yourself a gamer?
15 responses

- Yes
- No

66.7%
33.3%
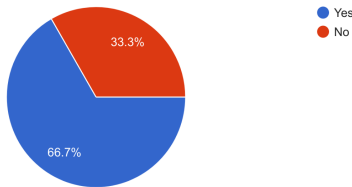
How much knowledge to you have regarding mental health?
15 responses

Value	Count
1	1 (6.7%)
2	0 (0%)
3	6 (40%)
4	7 (46.7%)
5	1 (6.7%)

How did you learn about mental health?
15 responses

- School/Courses
- I did my own research
- From other people
- All of the above

26.7%
33.3%
33.3%

How important is mental heath to you?
15 responses

Value	Count
1	1 (6.7%)
2	0 (0%)
3	1 (6.7%)
4	7 (46.7%)
5	6 (40%)
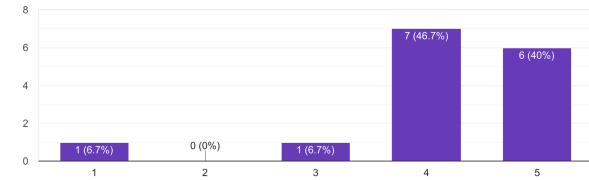
How much knowledge do you have of OCD?
15 responses

Value	Count
1	1 (6.7%)
2	4 (26.7%)
3	6 (40%)
4	3 (20%)
5	1 (6.7%)
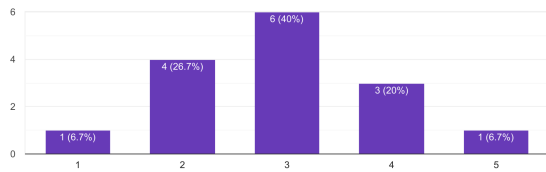
How much knowledge do you have of SAD?
15 responses

Value	Count
1	4 (26.7%)
2	4 (26.7%)
3	4 (26.7%)
4	3 (20%)
5	0 (0%)
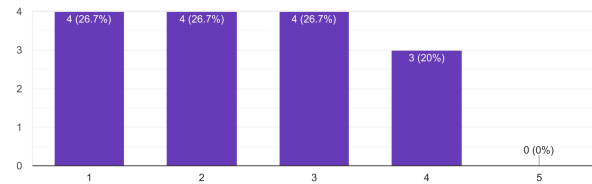
How much knowledge do you have of PTSD?
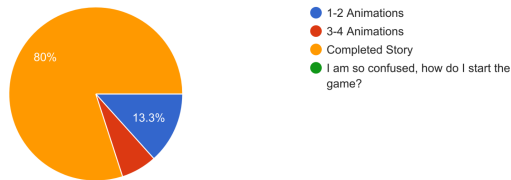15 responses
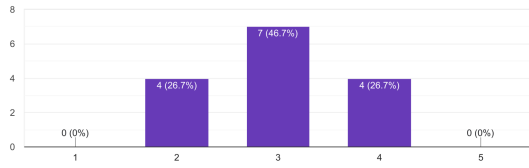
How much knowledge do you have of BDD?
15 responses
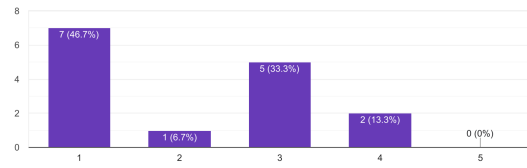
Post Gameplay:

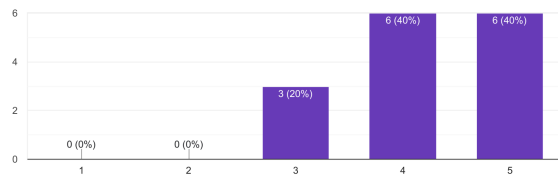How far did you get? (Main Story content)
15 responses

- 1-2 Animations
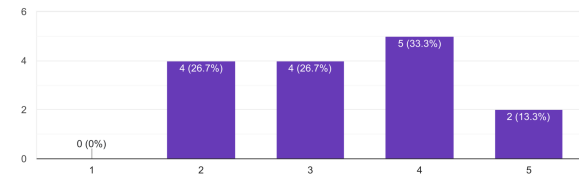- 3-4 Animations
- Completed Story
- I am so confused, how do I start the game?

80%

13.3%

If you completed the experience, how long did it take you reach the end?
15 responses

- < 5 minutes
- 5-10 minutes
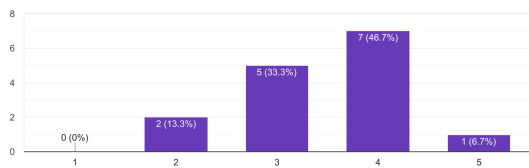- > 10 minutes

86.7%
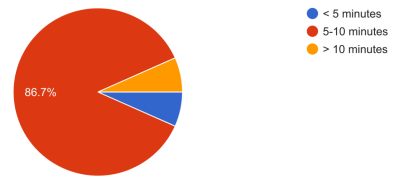
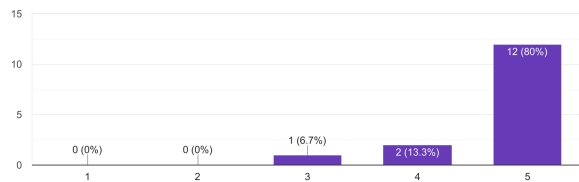Are the introduction panels helpful?
15 responses

How does the movement feel?
15 responses

How does the atmosphere feel? (Sound, Visuals, etc)
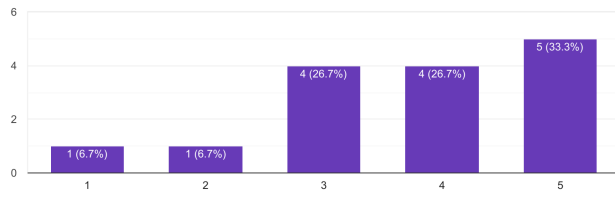15 responses

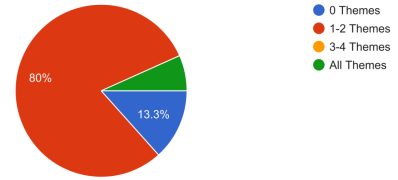Did you understand the purpose/message of Sam's Story
15 responses

Did you learn anything new through Sam's Story?
15 responses

How many of the themes could you relate to?
15 responses

- 0 Themes
- 1-2 Themes
- 3-4 Themes
- All Themes

Did you feel emotionally impacted by Sam's Story?
15 responses

- It was more of a learning experience for me
- I was slightly emotionally impacted
- I was mildly emotionally impacted
- I was very emotionally impacted