Breaking Bad Habits

Graduation Report

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Breaking Bad Habits

Providing tools to assist those with ADHD identify and break bad habits

Graduation Project CMD (CMVB17ASO)
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Summary

This graduation project process report presents a design challenge aiming at addressing problematic sleep habits in individuals with ADHD through the use of gamification. Habits and routines are a crucial role in our daily lives and making sure we utilize them in healthy manners boosts our productivity and mental wellbeing.

The client Jennifer Kalkoven is an art therapist looking for methods to create helpful products that can help those struggling with ADHD to improve their daily life. Jennifer tasked me with exploring the potential for gamification as a means to address habits and routines related to individuals with ADHD.

To tackle this challenge, extensive research was conducted to explore the many nuances of habits and ADHD, exploring best practices for tackling problematic habits. Exploration was done into possible genres that could be employed to get the best results out of a project like this. Ultimately, the virtual pet genre was determined to be the best fit. Research into the relevant fields yielded interesting results to help alleviate bad habits and introduce stronger and healthier alternatives.

The final product produced was a mobile virtual pet game, built in Unity. The application aims to help monitor the users sleep, gave feedback based on results and gave helpful tips and feedback for improve sleep quality.

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Chapter 1 – Project

1.1 Client

The client (Jennifer Kalkhoven) is an art therapist who runs a company which uses the many nuances of the fields to create opportunities to help people overcome obstacles and issues related to neurodivergence. She does this through art coaching and games. Jennifer also creates and serializes a comic series called “Living with ADHD” which showcases the internal and social struggles of ADHD. A lot of Jennifer’s work centers around atypical people and assisting them through therapeutic means.

1.2 Problem Context

ADHD or Attention deficit hyperactivity disorder is a common neurodevelopment disorder (Furman, 2005). The disorder can affect multiple facets of an individual’s daily life, Hyperactive-impulsivity and inattentiveness are the most common symptoms of ADHD. Individuals can vary with how strong they resonate with these symptoms, with some struggling with both equally.

People suffering with ADHD often struggle to maintain healthy habits and routines (Pacheco, 2022), which can cause issues in all manners of their lives. The client wants to create awareness and provide assistance so that her neurodivergent clientele can deal with their atypical struggles in a more proactive way. However, the client doesn’t have products to assist those, which have already identified their neurodivergent traits. The premise of the comic is to bring awareness of ADHD to readers, she does this through the client sharing snapshots of her daily life of living with ADHD. However, she wants to move beyond merely creating awareness and exploring options which can assist or help alleviate the struggles associated with ADHD. The focus of this assignment is to provide a way for the client to realize this goal, by providing a gamified mechanism for proactively tackling some of the lesser-known issues that stem from ADHD. Jennifer has noticed recurring issues that stem from neurodivergents habits and routines both in clients and herself and is looking for a method to help others identify and combat their struggles. Jennifer expressed the desire to have fun as one of the core design pillars when creating the product – she wants to incorporate her brand identity into the digital interactive product.

To get a better look into the problem context and why it’s occurring, the Five W’s method (Galiana, 2019) was employed (Five W's). The method helps break down who, what, where, why and when the problem is occurring. This gave me a stronger preliminary look into the problem at hand.

1.3 Scope

The initial target audience was too broad and identification of multiple bad habits and routines meant that the scope of the project could have been way beyond the time constraints. In order to solve this, I got in contact with my client regarding possible avenues that could be taken regarding condensing the scope. Jennifer highlighted that the

most prevalent issue occurring for her clients during art therapy sessions was sleep problems. This was thus chosen as the key theme for the project going forward. Sleep has an abundance of research (Pacheco, 2022) which I can utilize to support my design.

1.4 Target Audience

The original target audience of this assignment was going to be people with ADHD. Discussion with the client gave us an opportunity to pinpoint where and how we want to tackle the problem as aforementioned. As mentioned in the *Who* of the 5W1H – not all people with ADHD struggle with the same bad habits, therefore reducing our scope to the issue of sleep fits with the clients wishes and time constraints. For this, a single habit was chosen to be tackled with sleep being the chosen habit. This allows me to reduce the target audience too people with ADHD who struggle with sleep as a first step to better identify our target audience.

According to research done somewhere between 25-50% of all people with ADHD have issues with sleep (Wajszilber, Santiseban, & Gruber, 2018). It's possible to make our audience even more defined by excluding people who are being medicated for ADHD, which are about 30% of people with ADHD (CDC, 2022).

The goal is to create a product that not only *helps* the target audience, but also that the target audience wants to use. People with ADHD are often looking for ways to combat their struggles and with games or digital interaction being a commonly used outlet, this product would create a great opportunity to help them address concerns around some of the potentially unhelpful habits and routines that affect sleep and provide helpful and neurodivergent friendly solutions.

1.5 Design Challenges

Digital Interactive Product
Gamification and games in general are common habit setters (Iurchenko, 2017) – both good and bad. With the correct use of gamification, it is possible to provide an application which can be used to promote good habits that counteract the bad habits that stem from ADHD (Suleiman-Martos, Grcia-Lara, & Martos-Cabrera, 2021). With one of the required design pillars from my client being fun, the use of games and gamification ties appropriately with the client's brand image while simultaneously being a good avenue for the product. The digital interactive product's goal would be for it to be used as a game that's core mechanics and features would help negate or correct bad habits in sleep, through the clever use of gamification, behavioral and habit science.

1.6 Key Concepts & Research Questions

Core Key Words
In order to derive the keywords linked to the assignment, ideation was done (Key Word Ideation). This ideation period explored what terms were related to the various different areas of the project, including target audience, context of use, aspects of design, problem

domains and more. From this core key words were created, the core foundation of the project can be broken into specific key terms that most research questions for this topic can be derived from. Usually when something is being considered in the design, it will lead back to one of these terms.

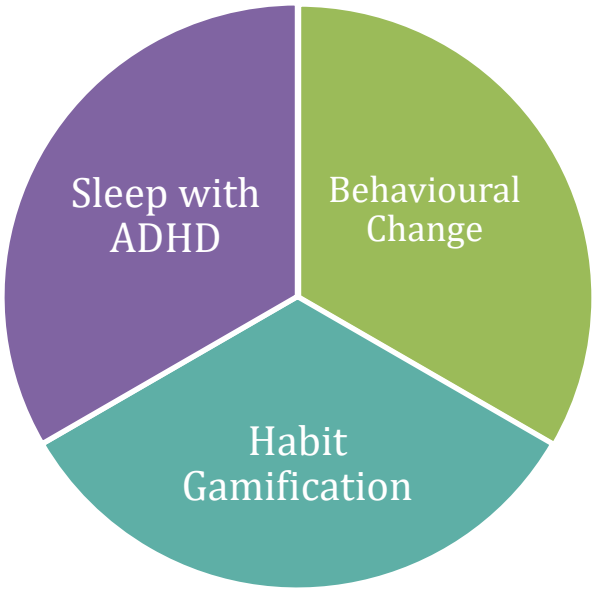

Figure 1.A: Key Word Pie

Since the project's premise is about alleviating bad habits and routines – it's important to have behavioral science and change as a key concept. When researching, having behavioral change as a pillar, I can make sure that I'm researching into methods of identifying and assisting bad habits while also knowing the correct procedures to proceed with these habits and to validate the changes in the user.

	Research Question	**Research Methods**
#1	How do you integrate a habit into a gamified mechanic?	Desk research, Literature study
#1 Sub-Question's	*How do you integrate a brand image into the design of a product*	Desk research
#2	What are the best practices for gamifying sleep for people suffering from ADHD?	Competitive analysis, Desk research, Best good and bad practices
#2 Sub-Question's	*How do applications that assist with sleep work?*	Competitive analysis, Desk research, Survey
	What ADHD-friendly games are currently available?	Competitive analysis, Desk research
	How to utilize feedback loops to promote habit change?	Desk research, Literature study

#3	How do you promote behavioral change through gamification?	Survey, Literature study
#3 Sub-Question's	*Best practices for changing habits?*	Desk research, Literature study
	How to make learning new habits fun?	Literature study, Desk research
	Best platforms for gamified self-help products?	Survey, Desk research
	Best platforms for people with ADHD?	Literature study, Survey
#4	Why do people with ADHD struggle with sleep?	Literature study, Survey
#4 Sub-Question's	*What are considered good and/or healthy sleeping habits?*	Literature study
	What known systems help with getting better sleep?	Literature study

Chapter 2 - Orientating and Understanding

2.1 Findings

2.1.1 Desk Research & Literature Studies

With the ground basis of my project being in sleep habits relating to ADHD, it was important to dive into what habits and routines really are.
Habits can be summed up as actions set in motion by triggers (Arlinghaus & Johnstone, 2018); these typically don't require much mental power or thought and can be carried out easily. The goal of a habit is to reach a desired outcome, but the process of doing this or the outcome might not always be healthy. Routines are more akin to a recipe; they're planned routes which require some mental effort to reach. Routines are sequential actions to reach a desired outcome. Over time, routines can develop into habits, but this process can take anywhere from two weeks to almost a year.

I quickly started conducting field research into the neurodevelopment disorder the project stems from, ADHD. Those suffering from ADHD tend to have a much stronger correlation with poor habits and routines (Advokat, Lane, & Luo, 2010). While it's common for bad habits and routines to develop, it doesn't mean that everyone with ADHD suffers from the same collection of poor habits. There's a variety of reasons as to why someone with ADHD might be struggling with sleep from an inflicted standpoint, such as excessive screentime or dietary reasons or as some research suggests, neurological reasonings such as delayed circadian rhythm and restless leg syndrome (Pacheco, 2022).

This variance in sleep issues means we need to identify specific habits we want to break. Methods such as promoting less screen time before sleep, dietary changes in the hours leading up to sleeping or light exercise/stretching before bed. Cognitive behavioral therapy is a method of changing your sleep patterns to improve your sleep "hygiene", something which could prove useful to use within the application (Babson, Feldner, & Badour, 2010). Sleep hygiene training consists of setting specific rules for sleep with the goal of improving your sleep over time gradually. It would be possible to incorporate these rules through gamification (Pramana, et al., 2018). Many other methods including stimulus control, cognitive control and relaxation training are used to help improve sleep for the user but can be harder to incorporate in a gamified manner given the scope of the project.

Integrating a habit into a mechanic can be seen as designing a mechanic to change the behavior of a user, rather in game or in real life. Figuring out the correct techniques for designing these mechanics is important for what goal we want from the mechanic. Habit techniques such as the four laws (Clear, 2018), allow us to map out a sequence for either introducing or breaking habits, foundations such as this allow us to mold the mechanics and user interaction to promote positive change in the user.

Four Laws	Form *good* habits	Break *bad* habits
Cue	Make it obvious	Make it invisible
Craving	Make it attractive	Make it unattractive
Response	Make it accessible, easy, and simple	Make it difficult
Reward	Make it satisfying	Make it unsatisfying

This technique utilizes both positive and negative feedback loops with the goal of changing the users psyche to have certain habits become more desirable than others.

Integrating your client's brand in your product can be done by finding out the primary focus of the brand. For my case, that's neurodivergent art therapy. Since the project already has a clear audience and goal that aligns with the client brand, finding alternative avenues to boost its correlation can be great. Consistency and cohesion across brand products can be an important indicator of brand reliability (Perelra, 2021). For this we can utilize the colour palette and font styling of my client's website and serialized comics within the application, to showcase they're coming from the same brand. This in turn will give the product a similar goal and focus as Jennifer's other projects and have a cohesive connection between them.

2.1.2 Target Audience Survey

I conducted a survey directly with my target audience (Survey Results ADHD & Sleep), participants were collected through the r/ADHD discord server. The goal of this survey was to collect quantitative data regarding my research and validate findings. The results showed that a large majority of the participants were getting a sub-optimal amount of sleep at night, even if they went to bed around an appropriate time. Factors such as mobile phone usage could provide some reasoning for this, but of course this can't be summed up as the entirety of sleep issues. The first survey only had a sample size of seven participants, which didn't feel like enough to validate claims with or make design justifications from. I decided to expand upon the survey and reach out to more members of the target audience in order to make sure their needs were met. The survey participants over doubled and gave a much stronger insight. Additions were made to the survey too identify technical devices they may own such as smart watches and exercise regularity.

2.1.3 Best, good & bad practices

Knowing the foundations for my product, I explored into applications and studies which work with habits/routines or are created with atypical people in mind. Using these I can create a basis for my design requirements and provide guidance for my ideation. Data was found through desk research and collaboration with an expert in ADHD (my client).

Best	Practice
Habit Change	Provide **player feedback** in response features or mechanics. Positive reinforcement for the user's growth through the form of rewards and affirmation can provide a sense of achievement and add an interest in continuing their own personal development (Pramana, et al., 2018).

Habit Change & ADHD	Creating **engagement and incentive** to return. A product that aims to change habits, needs to be enjoyable enough and have reason for the user to return to the game (Masi, Abadie, Herba, Mutsuko, & Ben-Amor, 2021). If the product isn't interesting enough or doesn't show much merit, the purpose and goal of the product can crumble.
ADHD	**Simplicity** in the right dose. A product that's difficult to comprehend or requires dedicated time to learn can oftentimes be overwhelming for atypical people (Johnson & Kim, 2020). While a game that's too dull can demotivate the user. Providing the right balance of complexity is vital for maintaining a user with ADHD's engagement in a game (Dawi, Kuca, Krejcar, & Namazi, 2021).
Good	**Practice**
Habit Change	Allow for **autonomy and flexibility** from the user (Suleiman-Martos, Grcia-Lara, & Martos-Cabrera, 2021). Irregularities can occur at any time, so allowing the user to adjust their goals, progress and results provide ways to tackle unpredictability in the products design.
Habit Change	An application promoting **consistency** in its design can encourage users to stick with a product. Routines can develop through the use of consistent habit upkeep (bpsdep, 2022), which would be a best-case scenario from a product like this.
Habit Change & ADHD	Provide a **range of choices** for how the user can alleviate or become informed about habit change. Offering different ways can help atypical people finds methods which best suit their needs. Having a variety of options can help users engaged and interested in the product.
Bad	**Practice**
Habit Change	**Restrictiveness** in how the user can utilize the application, can be detrimental for the user's enjoyment and engagement of the application. This is especially important, when it's designed around helping the user (Schmidt-Kraepelin, Warsinsky, Thiebes, & Sunyaev, 2020).
ADHD	**Shame and guilt** are emotions the application should not be invoking in users. Internalized shame from having ADHD is already a common case for atypical people (Fernandes, Dell'Agli, & Ciasca, 2014), and is something which can be harmful to their further development if our application is triggering their mental health. Employing guilt as a method of feedback to the user failing to maintain their habits or relapsing into old habits can stunt a lot of the users growth and make them feel as though they aren't learning or growing.
Habit Change & ADHD	Providing **negative feedback** with no ulterior reasons can demotivate the player and dilute their interest in your product if the feedback is reoccurring (Kim, Song, Lockee, & Burton, 2017).

Techniques such as the four laws, provide a solid framework for designs and ideation. The technique promotes good habit change in a way that effectively ties in with my Best, good &

bad practices results. Although, the concept of applying negative feedback towards your bad habits in an effort to break them can be an excellent approach in a normal setting, feedback loops like this can be dangerous for games of that vein. From the best, good & bad practices findings, negative feedback can be a slippery slope that pushes users away from your product, if not handled carefully. Making sure features and mechanics in this product aren't built with overly punishing or harsh negative feedback, but instead feedback that shows it's ok for slight hiccups to occur in your progress. The application needs to be able to create incentive for the user to return and continue their growth with the product.

2.1.4 Source Validity

To determine the credibility and reliability of my sources, they were assessed within a CRAAP chart (CRAAP).

2.3 Design Requirements

From my initial research and collaboration with my client, I created a set of design requirements for the product. The design requirements were prioritized using the MoSCoW method, to get a clear hierarchy for importance and provide strong direction for future stages of development.

Business Requirements	**MoSCoW**
The client wants a product which helps people with ADHD with identifying bad habits and routines.	Must-Have
The client wants a product which utilizes gamification to help make change for those with ADHD.	Should-Have
The client wants a product which matches her brand identity.	Should-Have
Functional Requirements	
As a user, I should receive meaningful feedback on my progress.	Must-Have
As a user, I shouldn't feel shamed for having ADHD.	Must-Have
As a user, I shouldn't feel like the product is a chore.	Should-Have
As a user, I want to have incentive to return to the product.	Could-Have
As a user, I shouldn't feel forced to follow specific methods to improve my sleep.	Could-Have
Qualitative Requirements	
The product should contain various methods of improving the users sleep.	Should-Have
The game should offer advice, guidance, and identification of habits.	Should-Have

Chapter 3 – Concepting

3.1 Ideation

3.1.1 Diverging

To explore possible ideas, different ideation methods were employed. Brainstorming was done individually, with colleagues and my client. The ideas were converged into a 20 Idea list (20 Idea's). Several standout concepts were extracted from the list and further evaluated and scored within a weighted matrix.

#	Concept	Explanation
1	Virtual Pet Application	Virtual pet, similar to a Tamagotchi. Take care of the pet and handles its habits and routines relating to sleep.
2	Desktop Widget Assistant	Desktop widget that helps counteract bad habits and provide helpful reminders while on your computer.
3	Smart Watch Assistant	Utilizing apple watches or similar brands, its possible to provide reminders and trigger cues for routines and habits.
4	Routine Journal	Note down your progress, figure out triggers and build new routines from an application which focuses on analyzing your progress and guiding you in the correct direction.
5	Sleep Manager Application	Providing a more gamified and neurodivergent approach to a typical sleep manager
6	Gamified Routine Builder	Similar to the routine journal, but taking a much more gamified approach; Such as building the routines for a character – where healthy routines provide better benefits to the characters within the game.
7	Routine Social Application	A lightweight social media with the goal of sharing and helping others with strong and healthy routines and habits.

3.1.2 Weighed Matrix

A weighed matrix was created with the scoring derived from some of the important design requirements. This helped me identify which concepts matched best with the products goals for both the client and target audience.

#	Fit's client brand image	Helps break bad habits	Helps create healthy habits	Potential for behavioral change	Is considerate of the needs of our target audience	Total
Virtual Pet Application	5	4	4	4	4	21
Desktop Widget Assistant	3	3	3	1	4	14
Smart Watch Assistant	2	2	5	3	3	15
Routine Journal	2	5	4	2	2	15
Sleep Manager Application	1	2	4	4	1	12
Gamified Routine Builder	5	1	3	3	5	17
Routine Social Application	1	1	2	2	1	7

The use of a weighed matrix allowed for the identification of a preferred direction. The process of evaluating and scrapping concepts provided opportunities to draw inspiration and consider incorporating elements of these ideas into the final product.

3.1.3 Exploring Concepts

Gamified Routine Builder

An application which lets the user build routines and incorporate healthy habits in an RPG (role-playing game) like setting. The user can complete quests that are sleep habit themed. These quests are designed around some common sleep improving tips (e.g. stretching, cleaning up around bed, etc) or general activities that are done before sleeping (brushing teeth, taking out the trash, etc). The user will be able to create their own quests that can be completed or have the system auto assign them pre-created quests. Completing the quests will reward the user with XP (experience points) and loot that they can use in the game. The game could also incorporate sleep themed combat/fighting with the user's character to

incorporate more RPG-like elements. The goal would be to create a game which the user can use before going to sleep that helps them keep on track of habits that they should be doing before going to sleep. Simple sketches were created based on the concept to get a better feel for the potential product (Mockups).

Positives	Negatives
Fits in well with the target audience.	Doesn't help with breaking bad habits
Can help with creating good habits in the long run	Potentially repetitive gameplay loop, which can be a bad design choice for users with ADHD
Potential for behavioral change by assigning quests with proper and proven research, like cognitive behavior therapy	No real way of assessing rather the user actually completed the task, thus expecting possibly too much autonomy. Maybe AR could be explored, but it's outside of the scope of the project.
Matches well with the needs of our target audience.	Application would need to be used around when the user sleeps. With heavy gamified elements, this can essentially create a bad habit in itself.

Smart Watch Assistant

An application designed around smart watches that utilizes features of popular smart watches such as sensors and auditory monitoring. The application would intend to monitor the users sleep and provide helpful tips and suggestions to improve their quality of sleep. Deeper data could be collected through certain smart watch functionalities such as heartrate monitoring to better analyze the users sleep. The deeper analysis would allow for even more personalized recommendations. For example, if the user is consistently having spikes in their heartrate at night, suggestions such as avoiding caffeine or trigger foods close to bedtime can be given. Auditory stimulus can be provided by the smart watch application, offering relaxing and soothing noises for the user to fall asleep too. Mockups were created to get an idea of the final product (Mockups).

Positives	Negatives
Easy to use and non-intrusive.	Lack of gamification.
Easy to integrate helpful and personalized tips & recommendations.	Harder to link with client's brand identity.
Great at forming healthy habits.	Hard to break bad habits.
	Requires additional hardware that's not as common as a smartphone.
	Auditory sleep monitoring can be a scope issue.

3.2 Chosen Concept

The primary concept for this project is centered around the idea of a virtual pet application. Through the use of the virtual pet, it's possible to apply techniques such as inadvertent

learning, change through mirroring and cognitive behavior therapy to promote change in the user. Competency.

3.2.1 Vision of Operation

This game would allow users to interact with and care for a virtual pet that helps to establish healthy sleeping habits and routines. The pet thrives on sleep, but in turn how much it gets is dependent on the user. The user will be able to utilize the application as a tool to monitor their sleeping habits, learn about new techniques to apply and engage in reward loops centered around a virtual pet. Mockups of the original design were created (Mockups).

Positives	Negatives
Fits in well with the target audience.	Handling sleep monitoring can be difficult.
Great match with the client brand image.	Will require some form of negative feedback loops, which is considered a bad practice.
Can promote healthy habit creation and disincentivize bad habit continuation using the four laws technique.	Could pose to be more difficult to provide a variety of different ways to tackle sleep problems.
Matches well with the needs of our target audience.	
Easy to build functioning prototypes for.	
Easy to incorporate all our best practices into this form of application.	

3.3 Market Research

Knowing a genre for the product means research could be done into the relating fields. Desk research and competitive analysis were employed to collect information. The competitive analysis chart (Competitive Analysis Chart) helped identify what competitors were offering, what was similar and what user needs weren't being met.

3.3.1 Virtual Pets

It was found that virtual pet games often utilize motivation loops that involve cosmetics, social features and mini-games (Bylieva, Almazova, Lobatyuk, & Rubstova, 2019). These elements serve as the core of the gameplay experience, to encourage players to continue to interact with their virtual pets. The pets in these games often had a variety of stats that needed to be tracked and taken care of including hunger, excitement and cleanliness, which helped added an element of realism to the gameplay. With the scope of this assignment focusing on sleep, it's wiser to cut back on these excessive functionalities and features to push it more toward focusing on a single metric.

There is some pre-existing research done into the use of virtual pets as a form of sleep management (Kalaiselvan, Azman, Cheng, & Rahim, 2019), the study explores the possibility of using an assistant to help the user both fall asleep and track their progress. The research report explores the perspective of neurotypical sleep issues and is quiet

barren in how it seeks to improve the sleep hygiene of the user. The application strives on giving insight into their current sleep trends and monitoring the amount of time they sleep, but a lot of this information is very superficial and seemingly inaccurate. The study notes the importance of sleep monitoring and introduction of gamification to boost relaxation and mindfulness. This shows that taking an approach like how I envisioned, may be the best course of action.

3.3.2 Habitica

Habitica (Habitica, 2012) is a game that aims to gamify the process of habit-building to increase productivity and incentivize progress using reward loops. While the concept sounds appealing and aligns with some of the goals of what I want to create, upon further inspection some clear shortcomings are revealed.
The game's method of assisting with habits is near non-existent, the application gives a lot of autonomy for the user to tackle any habit, but no actual assistance with the habit building or breaking. The application allows users to input their own habit descriptions and tracking methods but does not offer any additional assistance or resources. This false-autonomy and lack of proper guidance leaves a lot to be desired, especially for users who are seeking more structured and comprehensive help with habit modification. However, the application works well if the user has the resources and knowledge to alter their habit and is willing to do it without assistance. The fact that some users are able to successfully utilize Habitica suggests that a game of this nature has the potential to facilitate habit change with a similar approach.

3.3.3 Pokémon Sleep

Pokémon sleep is the next installment of health-based games being developed by the Pokémon company (Company, 2023). Due to the game not currently being released, most of the data regarding it is based on what they *promise* to deliver and have shown through their trailers, videos and store pages. The product's base functionality intends to provide a similar experience in some areas to my own design, showing some promise for the direction of my own design. The application tracks sleep by the user setting an alarm through the application or by utilizing a separate hardware device called "Pokémon Go Plus+", an accessory created to interact with all their existing mobile products. The application or device records and listens to the users sleep, then analyzing the data once the alarm is triggered in the morning. The sleep is then categorized, and the user is rewarded with Pokémon within the game based on their sleep.

Pokémon sleep intends to build around some solid mechanics to encourage and promote healthy sleeping habits. The products use of voice recognition to interpret if the user is asleep provides an opportunity for the Pokémon company to get around some of the shortcomings of independently developed sleep trackers and apps. Features like this can be quite difficult to implement with limited time, so they won't be considered for the final concept. With the product providing Pokémon based on the quality of sleep the users gets, it creates an anti-pattern (Riot Games, 2014), promoting the use of bad sleep habits to "Catch em'All". Without visible data on the repercussions of this, it's hard to make strong claims that the feature has a fatal flaw. Potential anti-patterns like this should be weeded

out of this project's product, as an anti-pattern like this goes against one of our design principles of the Four Laws (Clear, 2018) by promoting bad habits, rather than making them invisible/unattractive.
The product provides routine engagement, by having the user complete a series of tasks before going to bed, including setting an alarm and tending to their Pokémon. A system like this could be expanded to incorporate healthy habits or techniques in order to guide the user into a healthier sleep pattern & routine. The room for improvement on this particular feature, provides great recommendations for the main concept.

Chapter 4 – Prototyping

4.1 Tools

For building the prototype I utilized Unity, a game engine that I'm familiar with that can be used to develop prototypes rapidly. Unity's built-in mobile support and various in-engine simulation tools allow me to ensure compatibility across various devices and resolutions. For this project the game has been developed primarily for Android due to considerations of scope and the availability of devices for testing with my client and I. Source control for the project was done using Plastic SCM.

4.2 First Build

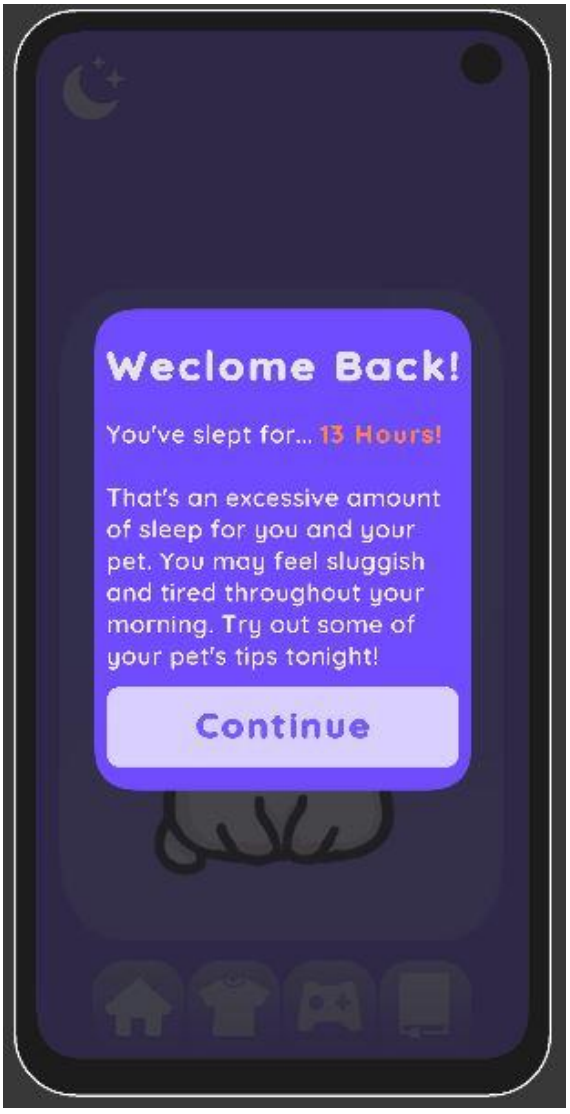

Figure 4.A: Prototype 1st version welcome back screen

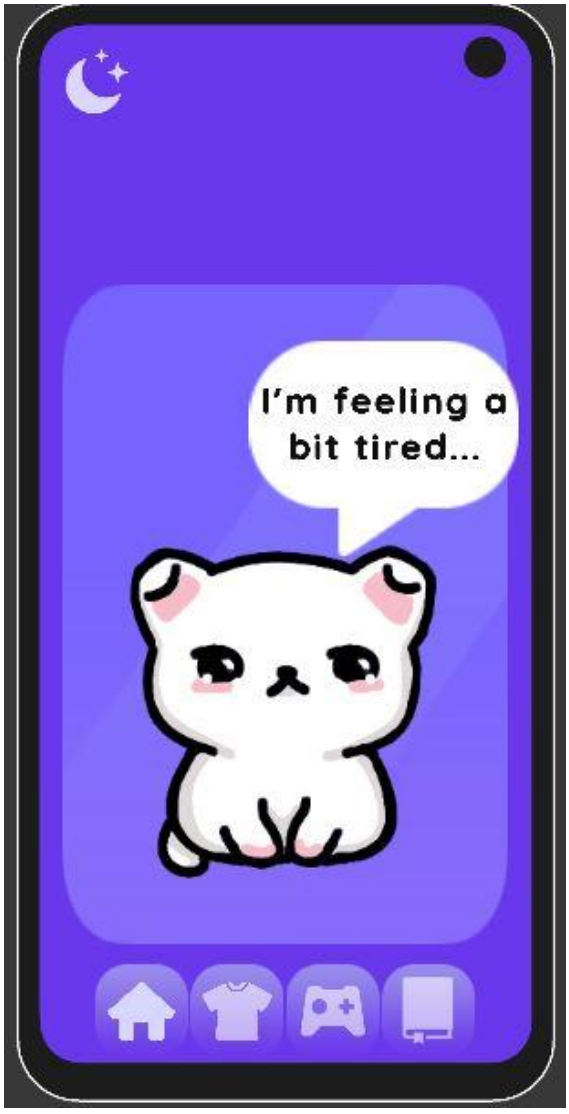

Figure 4.B: Prototype 1st version home

The application's first version contains minimal and simple features, including pet communication through text bubbles, sleep time monitoring and a simple UI layout. The goal of this build was to have a usable version of the UI that could be tested for readability and user experience, while also implementing a very basic version of sleep monitoring to determine if the concepted method is enough.
The application at first would track when the game was last closed and reopened again to determine sleep length. This left a lot of inaccuracies with monitoring sleep, something which is a common issue with sleep tracking applications (Meghna & Kolla, 2017). In order to work around this, a change was made to allow the user to input when they would typically fall asleep and hope the user would reopen the application around when they woke up. While this is not an ideal solution, it at least let me identify what areas need research in the current build and gave me directions for areas of improvement.

The first version of the product went through several iterations that explored possibles avenues that the game could be taken to best meet the needs of the target audience (Prototype Iterations). The iterations included providing more user autonomy, tips, sleep assessment & mini-games. Although the evaluation and client feedback of this version showed positive reactions, the application felt flat and as though it wanted to do too many things, while not excelling at any in particular.

4.3 Prototype Overhaul

The goal of the overhaul was to provide clearer focus for the product, making sure the product better matched the needs of the target audience. The original version was a jack-of-all trades, but a master of none. The general aesthetics of the product were left mostly intact, but the UI and styling received changes in response to feedback from a UX expert. Mockups were created to reflect the intended new changes (New Mockups)

Features such as mini-games & cosmetics were removed as they strayed from the original goal of the product too much. The introduction of mini-games stemmed from their usage in virtual pet games and some serious games, but just because they exist in other products, didn't mean it was the correct choice for this. I liked the original prospect of having them in the game as it seemingly added more levels of gamification – but this of course isn't true, as mini-games and gamification are different things. Since the mini-games didn't provide anything for sleep, habits or the user, it was decided to scrap them.

Figure 4.C: Overhaul Home Screen

The new product has a more clear and direct approach, assisting with sleep habits and building strong routines, rather than leaving the onus entirely on the user. The application now requires a target sleep time input by the user, that is used as a guide for the application to provide sleep tips and analytics from.

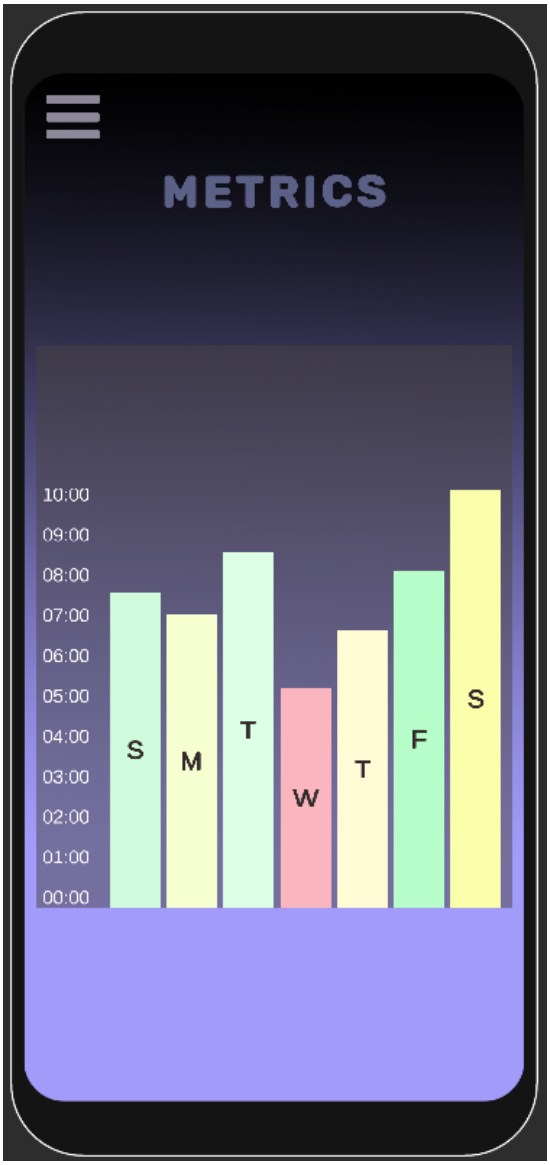

Figure 4.D: Overhaul Home Screen

The original sleep assessment feature was updated to instead provide visual insight into various parts of the user's average sleep. The metrics system evaluates the users sleep by comparing their average sleep on a given day compared to how many hours they want to sleep for. The system can provide user feedback and give suggestions for changes to their target sleep where it sees fit, while providing a visual breakdown of their current sleep trends.

One of the oldest techniques for establishing a healthy sleep rhythm is the use of an alarm. To simplify to process of creating & setting an alarm outside the application, an in-app smart alarm system was created. The system allows the user to create custom alarms that are linked with the devices alarm app. The application provides a breakdown of how much sleep the user would get if they woke up at the alarms, time based on their input target sleep time.

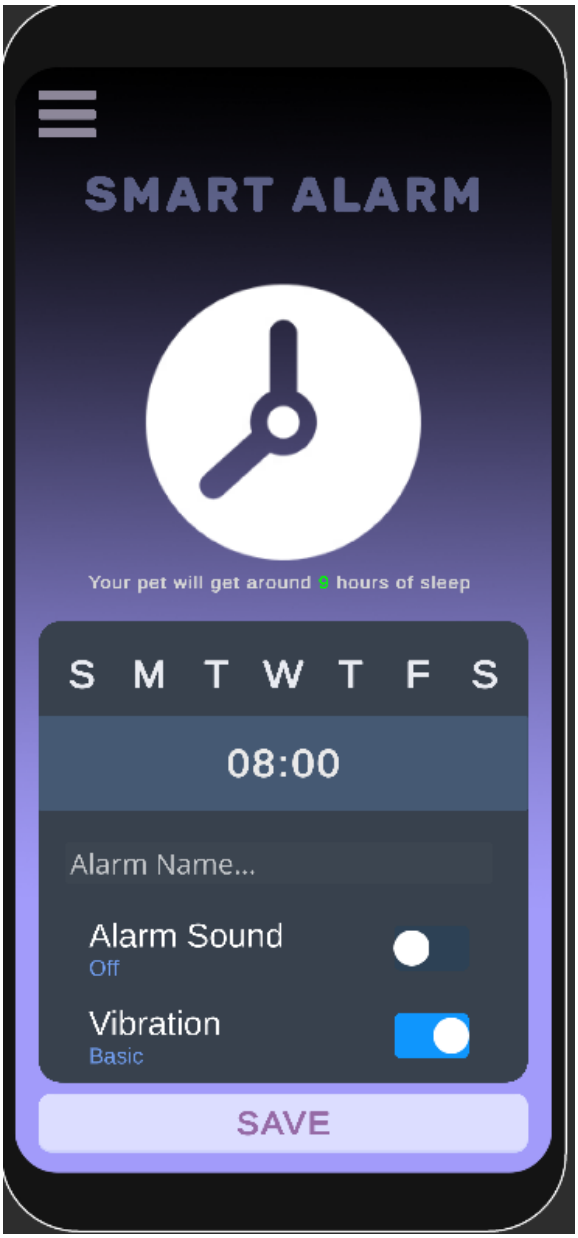

Figure 4.E: Overhaul Alarm Screen

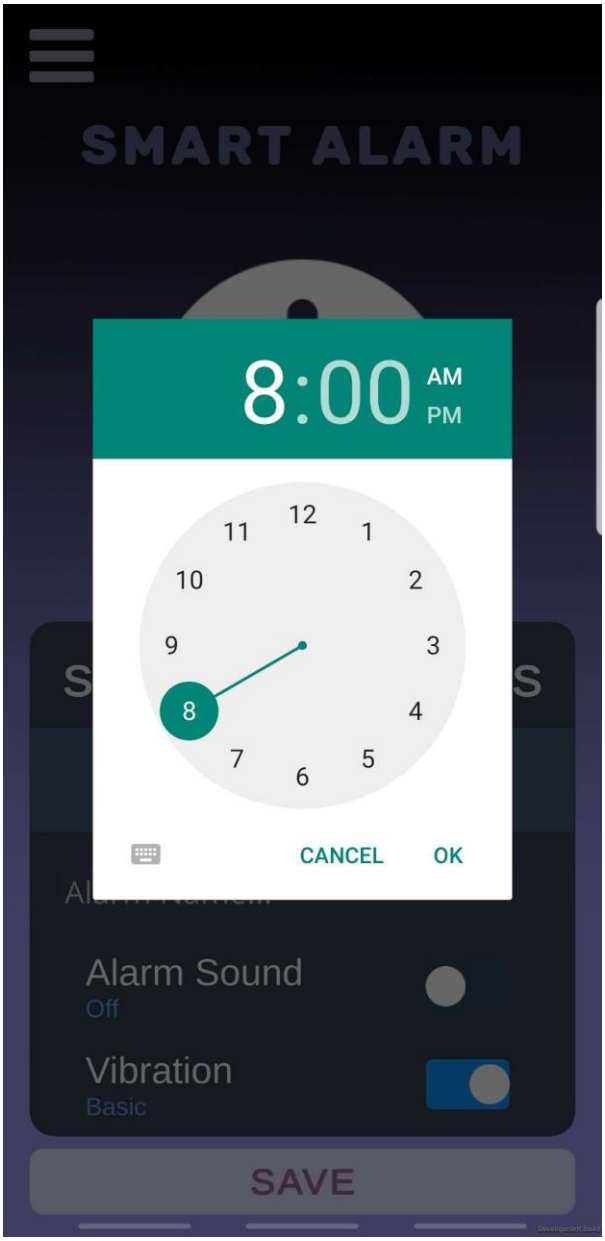

Figure 4.F: Setting alarm time

The original application relied heavily on the user for creating healthy sleep routines. To address this, a routine system was built. Each day the user will be tasked with completing several “tasks” in order to help establish a bedtime routine. Tasks such as brushing your teeth or cleaning your room are automatically created for the user. Users can expand upon the existing task by creating and saving new custom tasks which can appear in the daily routine section. The tasks that are added are stored on the user’s device. The user will have full autonomy regarding if a task has been completed truthfully or not. Completion of tasks accumulates XP for the night, the users sleep quality for the night then dictates how much of that XP will be received the following day.

Figure 4.G: Routine Screen

Figure 4.H: Creating new routine task

In the initial version of the prototype, tips were given regarding sleep, habits & ADHD. The tips were given either by interacting with the pet or through a dedicated section for them. Both of those methods of displaying tasks were removed in the overhaul and the tips were instead interlinked with the routine feature. To supplement the routine section and provide more tasks, the tip section gives helpful techniques which can be applied to provide a host of benefits to the users sleep, habits & patterns and more. The section allows the user to discover helpful tips and add them to their routines. This feature provides users who don't know what techniques they can apply to improve their sleep an amalgamation of options.

Figure 4.I: Learn Section

Post-Test Iterations

From my usability test (spoken about in the evaluation section) some iterations were needed to improve the quality of the product. The task card's present in the routines list & bedtime ritual section were difficult to use. Consideration was put in to change the form of interaction from sliding/swiping them to clicking on them, but instead the sensitivity for them to trigger was adjusted, providing an easier time for users to figure out how to interact with them. Knowing which direction to move the task cards in was also unclear, to help alleviate this the task cards now change color to represent an action.

Figure 4.J: Task cards

Figure 4.K: Color change on swipe

After the testing I had some remarks about who the project was for. After explaining the client and problem context, I noticed that although I followed techniques to incorporate brand identity into the product, such as using similar colour palettes or having a shared target audience, the product felt like it was lacking meaningful connection to the client. To alleviate this, I felt it was a great opportunity to incorporate the clients serialized comic series into the application. As a reward for increasing the pet's level through following a bedtime ritual and getting proper sleep, the user is rewarded with a new chapter of the client's comic series. For testing purposes, the comic currently being used is her Living with ADHD comic series, but the ideal case would be to have custom comic series created incorporating the virtual pet and its struggles with sleep.

Chapter 5 – Evaluation

5.1 Methods

Playtest

During the process of development, the application was tested with 5 people within the target audience group. The users were collected through the ADHD subreddit discord server (Participant) and the testers were slightly informed of the product beforehand. The user's tested out the product for three days and answered a short survey following it. Since habit change takes a lot longer to see fruition, evaluating on intention and usability became more important for me.

Post-test Survey

From the surveys (Survey Results Post Test) it became quickly apparent that the intentions were clear and that the prototype was going in the correct direction. Several points of feedback seem to stem from a lack of further development in areas that maybe should have seen more work, such as mini-games and statistical data.

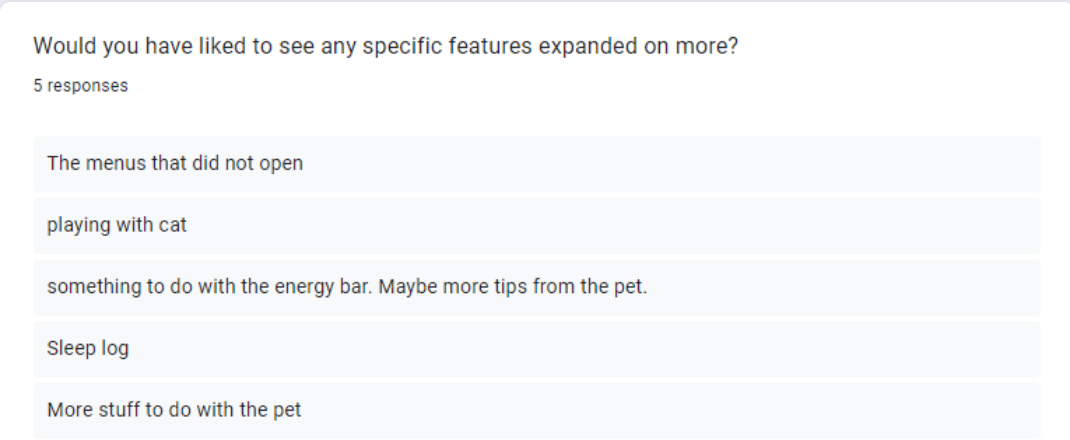

Figure 9: Fragment of survey results

The survey results showed that putting more emphasis on the pet aspects of the application and giving more to do with them, could be a great start for boosting engagement. The application seemed to lack meaningful engagement when being used and most of the excitement came from the initial login for the day. These problems could be solved through further development. The prototype came across as intuitive to use in general for most testers but suffered in some areas which were underdeveloped. Features such as the sleep log needed much more work and felt slightly out of place for a prototype that was meant to focus more on the gamification side of things.

UX Expert Review

An expert interview was held in order to gain feedback regarding the design and user experience (Expert Review). The expert gave critical feedback regarding my product and

highlighted several areas for improvement. The review provided strong recommendations for improvement in my UI layout, by utilizing encapsulation more for UI components. Insights about shortcomings with the form of gamification used were identified, giving me room to reconsider the current prototype's goals. This expert review helped form the overhaul of the prototype.

Usability Test

A usability test was done to evaluate rather the new overhauled prototype was intuitive and clear (Usability Test). The testing was done by providing members of the target audience with a task list for them to complete in the order that was presented. The test participants were then asked to think aloud so it was possible to get better insight into their mental process when using the application. Notes were taken while observing the test participants attempt to go through all of the tasks.

The test showed some promising results for the prototypes intuitiveness, but it lacked clarity in some areas. Task cards interactivity wasn't instantly recognizable and what direction they needed to be dragged wasn't clear either. A lot of the features became clear and understandable after the user had experienced it once. This provides some compelling evidence regarding the need for an introductory tutorial in the application in future iterations.

5.1 Future Recommendations

- Integrating sleep monitoring through audio recognition.
- Providing a tutorial for how the product works.
- The "learn" section could integrate user suggested tips. Allowing users to provide tips that worked for them. A form of social feature could be added through upvotes and downvotes which lets users know which tips work best.
- Custom comic based around the virtual pet and their struggles with sleep, to incorporate with the comic chapter reward feature.
- Pet customization to let the player connect better with their pet. Through the use of cosmetics, pet variance and bedroom customization for the pets.
- Possibly expand out into other habits people with ADHD struggle with such as time management or water consumption.
- Integrate the application with a smart watch, so the user can interact with their pet on the go. Also allows for better sleep monitoring with its built-in functionality.

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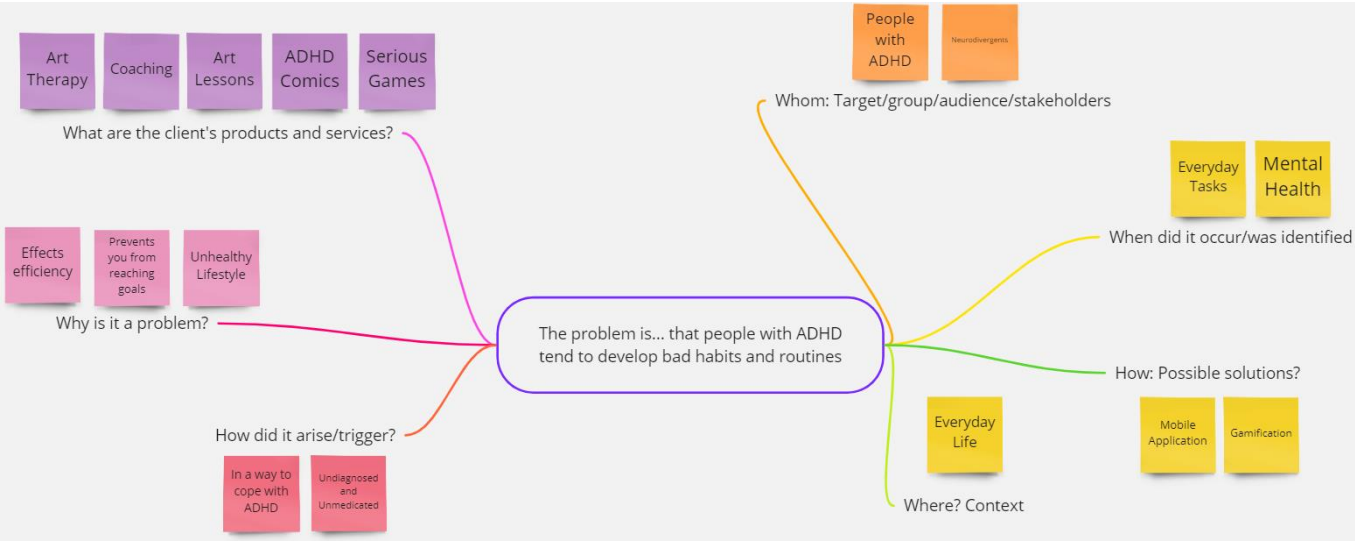
Support Documents

Evidence 1.1: Five W's

Return to report

5W1H



What

The client is an art therapist who heavily deals with neurodivergent people. The client offers art & personal development coaching sessions, serialized ADHD awareness comics and creates serious games. The client is looking to provide tools for her neurodivergent clientele in order to help them or bring awareness to issues they may not be aware of.

Why

One of the lesser explored impacts of ADHD is the development of bad habits. Habits and routines are one of the core pillars for how the human mind functions, having good habits and routines in life tends to provide better mental health and efficiency. ADHD tends to produce bad habits due to its atypical impact on everyday life (Advokat, Lane, & Luo, 2010). These habits can develop quickly as a masking mechanism for a person's ADHD, although not all bad – some habits can be damaging for the person's growth, everyday life, and mental wellbeing (Arlinghaus & Johnstone, 2018).

Who

While the target group for this product is neurodivergent individuals, specifically people with ADHD. This doesn't mean that everyone with ADHD shares the same bad habits and routines. Therefore, it is imperative to identify the specific subsections within the broader target group, in order to generate reliable data and provide authentic validation for our product. The target group for this project will primarily be users with undiagnosed ADHD that are suffering from sleep issues.

Where
The struggles with habits and routines can be seen in people with ADHD in all areas of their daily life. Impacts are prevalent in work, school and social life (Advokat, Lane, & Luo, 2010).

When
The client's problem and opportunity were identified during art therapy sessions she held. It became apparent that there were reoccurring issues highlighting poor habits. Jennifer could only offer advice in these situations and noticed the opportunity to provide products which could help identify or assist with these habits.

How
The goal of the assignment would be to create a digital interactive product that can help alleviate bad habits and routines for those with ADHD. Providing guidance for breaking these habits or steering the user into healthy coping routines. With the use of gamification, which is proven to have the ability to create or replace habits (Hsu & Chen, 2021) it is possible to provide ways to help those that struggle with ADHD, set up strong and effective habits and routines.

Evidence 1.2: Key Word Ideation

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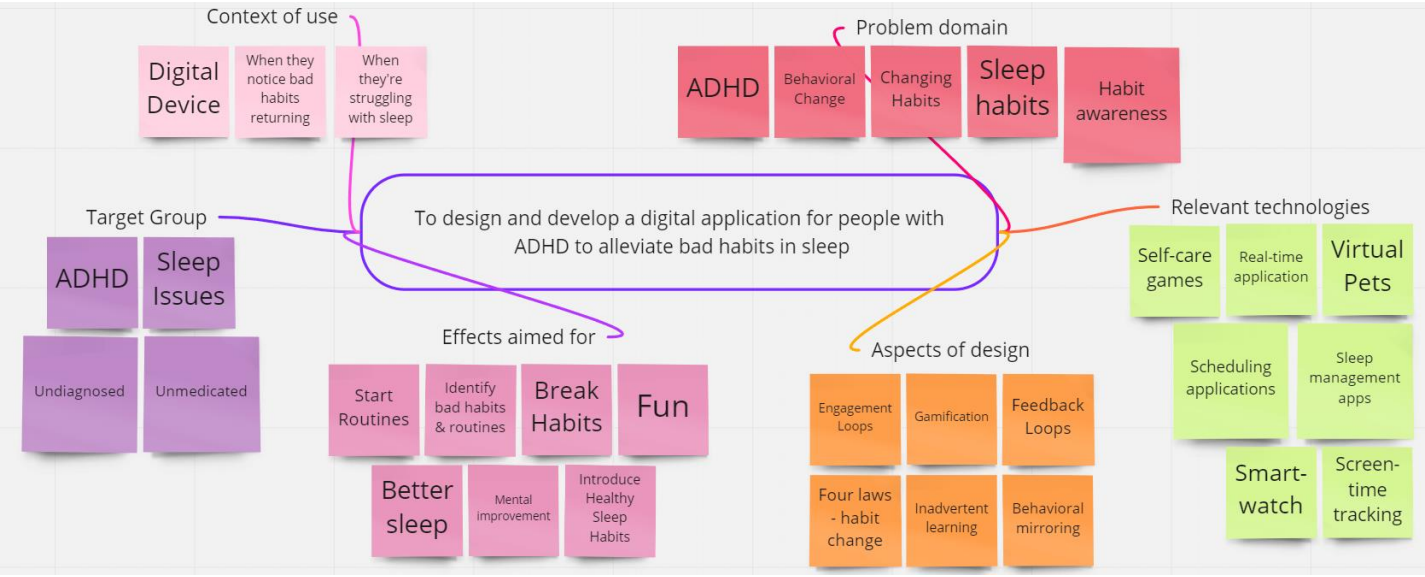


Problem Domain
The project has a clear set of terms that need to be worked with within the project domain. Most of the core fundamentals link back to a combination of ADHD, sleep and habit change.

We want to identify the wishes and needs of our target audience and what issues are causing the problems they have. Researching into habit science and behavior change lets us create a foundation for our design that can help meet our target audience's desires.

Target Group
The key terms used for the target group are scoped in on the sub-section that needs to be examined and whose needs have to be met. A tighter target demographic like this allows us to get more accurate wishes, needs and results for our audience.

Context of Use
With sleep problems being a core habit we want to alleviate, the digital solution would be used as a means to counter-act bad sleep habits through intrinsic motivation. When the users are noticing struggles in their sleep, the application will be of use and an opportunity to deal with the problem(s).

Effects aimed for
The goal of my client and I is to produce a product which can help alleviate bad habit issues – but this statement is broad and can be broken into more succinct key terms. The overall goal is to provide ways in which bad habits can be identified, broken down and replaced with healthy routines and/or habits to counteract aforementioned issues. A desired effect of this would be that people with ADHD have a stronger grasp on the bad habits that affect their lives. One of the design requirements given by my client was to incorporate fun into the product – emphasizing utilizing gamification and light-hearted visual direction.

Aspects of design
Here is mostly focused on gamification and relating them to habit and behavior change. Utilizing behavioral change techniques picked up in my preliminary research – I can combine them with elements of gamification from research and produce designs for mechanics, systems, and overall basis for my product.

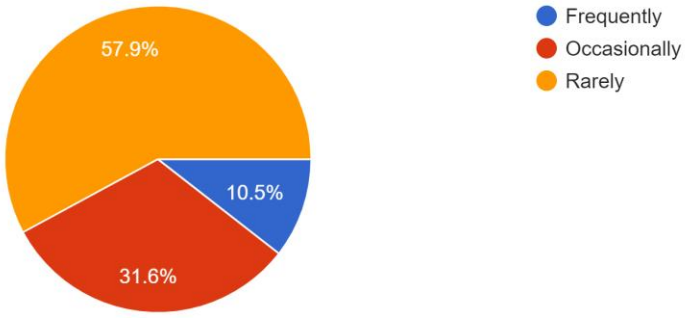
Relevant Technologies
The key terms specified stem from my preliminary research. These key terms can be used as pointers for areas to be researched into for my possible solutions.

Evidence 2.1: Survey results 1 – ADHD & Sleep

Return to main text

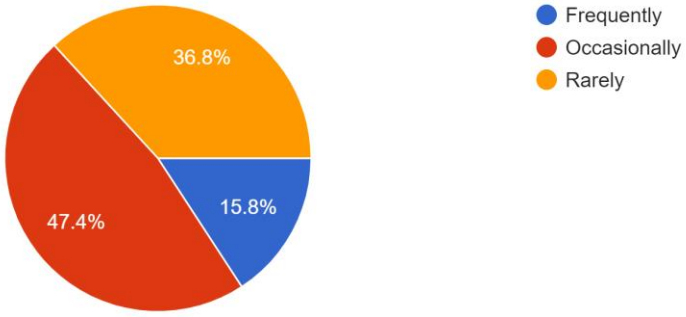
How often do you fall asleep before midnight?

19 responses



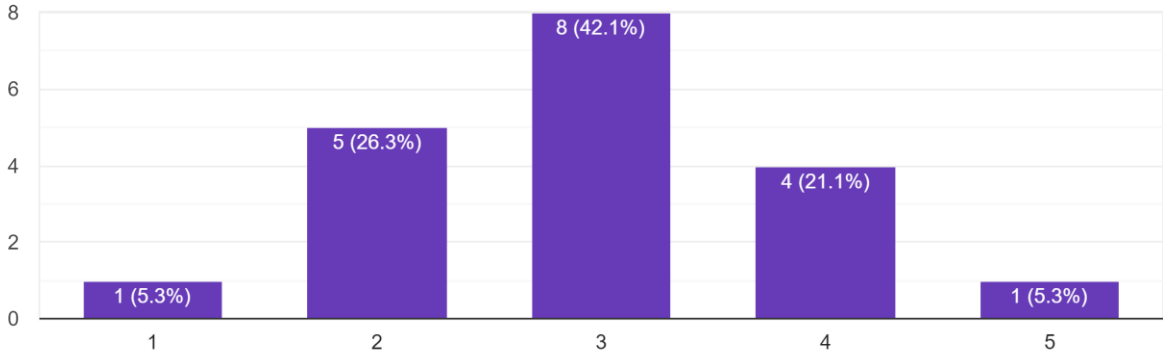
How often do you get 6-8 hours of sleep a night?

19 responses



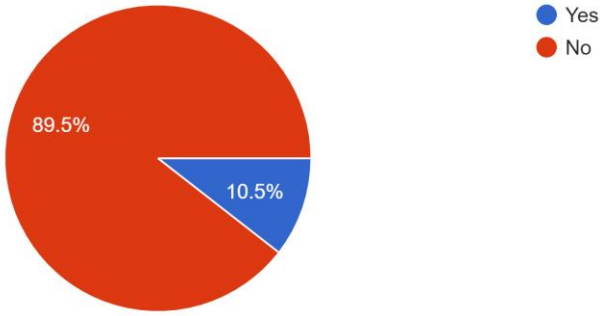
How much much do you think your sleep is being affected by your ADHD

19 responses



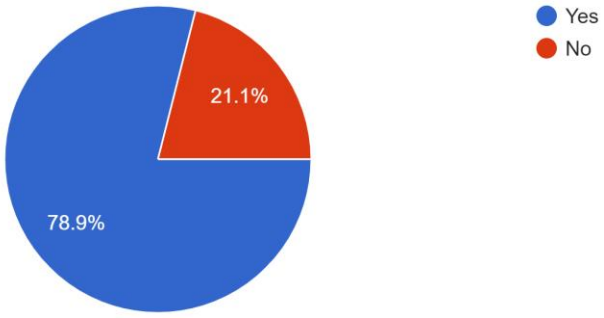
Do you use any existing products to assist with your ADHD or sleep

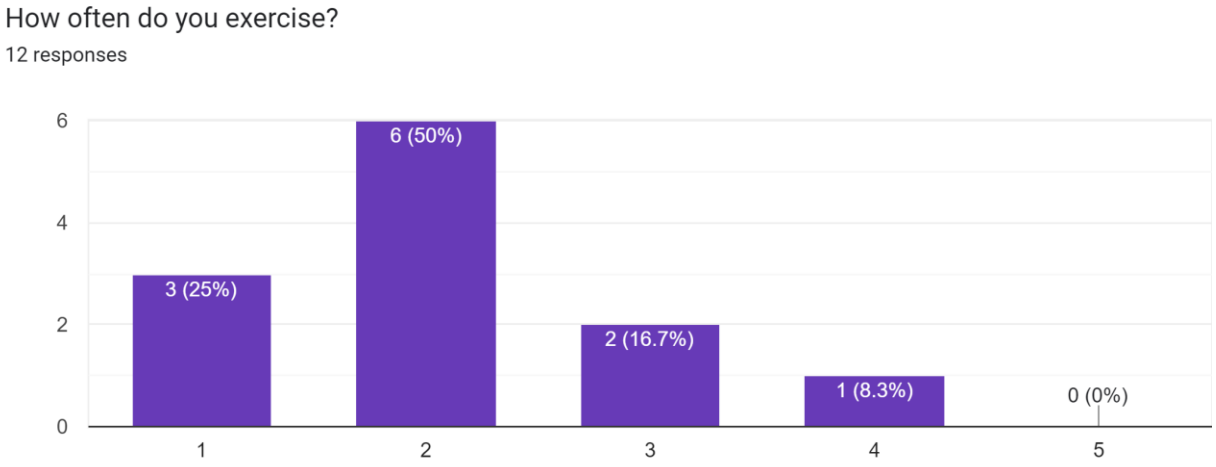
19 responses

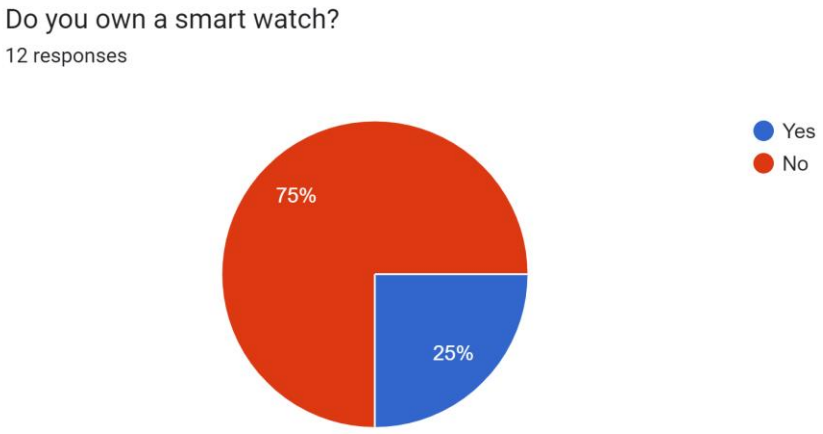


Do you use your phone while in bed/trying to sleep?

19 responses







Evidence 2.2: CRAAP Chart

Return to main text

Scoring from 1 – 5 with 1 being least effective and 5 being most effective.

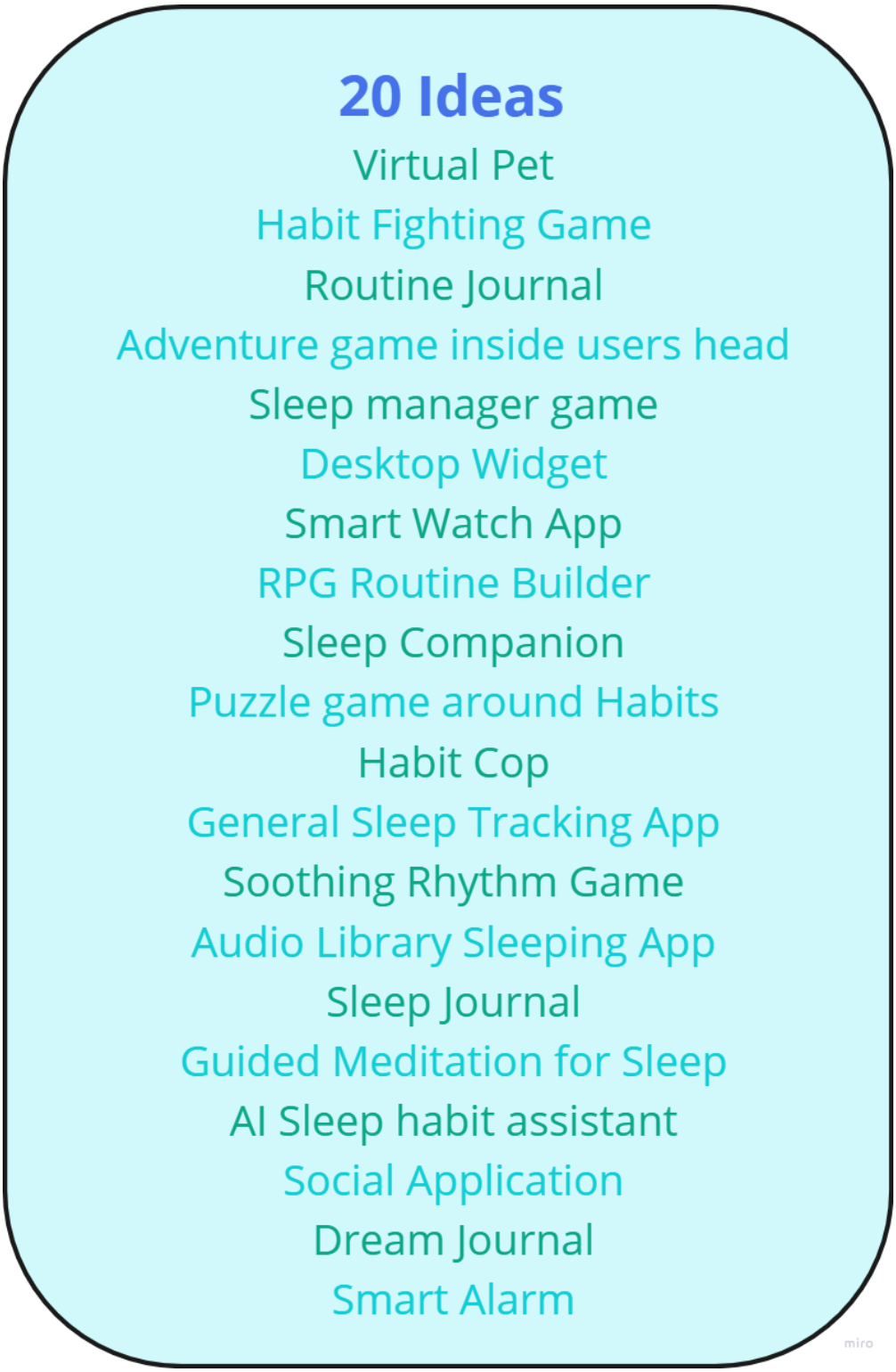
Source	Currency	Relevance	Authority	Accuracy	Purpose
College Students With and Without ADHD: Comparison of Self-Report of Medication Usage, Study Habits, and Academic Achievement	2	3	4	5	3
The Importance of Creating Habits and Routine	4	5	4	4	5
Cognitive Behavioral Therapy for Sleep Disorders	2	4	5	3	5
Time, Consumption and Everyday Life	2	1	2	2	4

5 Effective Habit changing techniques you should use in 2020 to become resilient and successful	5	3	1	2	5
Virtual Pet: Trends of Development	4	5	2	3	5
Data and Statistics About ADHD	5	4	5	5	4
Atomic Habits	4	5	3	3	4
Complexity and memory-based comparison of the brain activity between ADHD and healthy subjects while playing a serious game	5	4	5	4	4
The feeling of the shame in children and adolescents with ADHD	3	3	3	2	4
What Is Attention-Deficit Hyperactivity Disorder (ADHD)?	2	5	5	5	5
Advocating recycling and encouraging environmentally friendly habits through gamification: An empirical investigation	5	2	5	4	5
An Exploratory Study of Health Habit Formation Through Gamification	4	5	3	4	5
The Effect of Task Complexity on Eye Movement and Multitasking Performance in Students With and Without ADHD	5	2	3	3	4
nocturnOWL: Sleep-monitoring Virtual Pet Mobile Application	4	5	3	4	5
Theories for Gamification in Learning and Education	4	4	5	4	5
Video Games in ADHD and Non-ADHD Children: Modalities of Use and Association With ADHD Symptoms	5	2	5	5	5

Apps and fitness trackers that measure sleep: Are they useful?	4	2	2	3	3
ADHD and Sleep	5	5	2	4	5
How To Effectively Integrate Your Brand Into All Aspects Of Your Business	5	1	2	3	3
Using Mobile Health Gamification to Facilitate Cognitive Behavioral Therapy Skills Practice in Child Anxiety Treatment: Open Clinical Trial	4	2	5	4	4
Theory: Zileas' list of game design anti-patterns	3	1	3	3	3
The Role of Gamification in Health Behavior Change: A Review of Theory-driven Studies	5	2	5	4	5
Gamification for the Improvement of Diet, Nutritional Habits, and Body Composition in Children and Adolescents	5	2	5	4	5
Cognitive Behavioral Therapy for Chronic Insomnia	3	1	4	5	5
Sleep disorders in patients with ADHD	4	5	5	5	5

Evidence 3.1: 20 Idea's

Return to main text



Evidence 3.2: Concept 1 Mockup Gamified Sleep RPG

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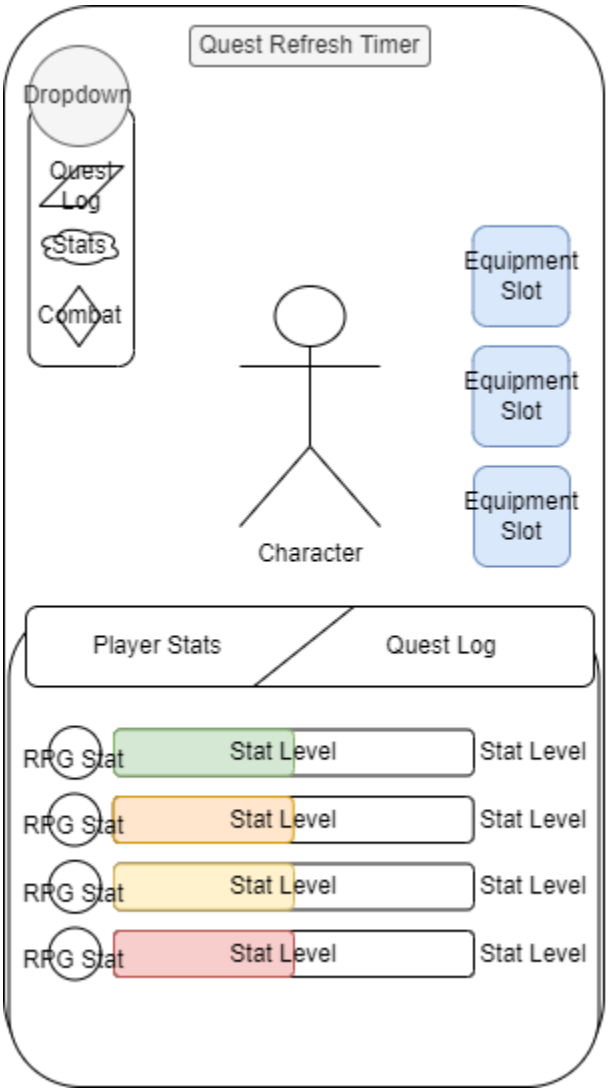

Evidence 3.3: Concept 2 Smart Watch App

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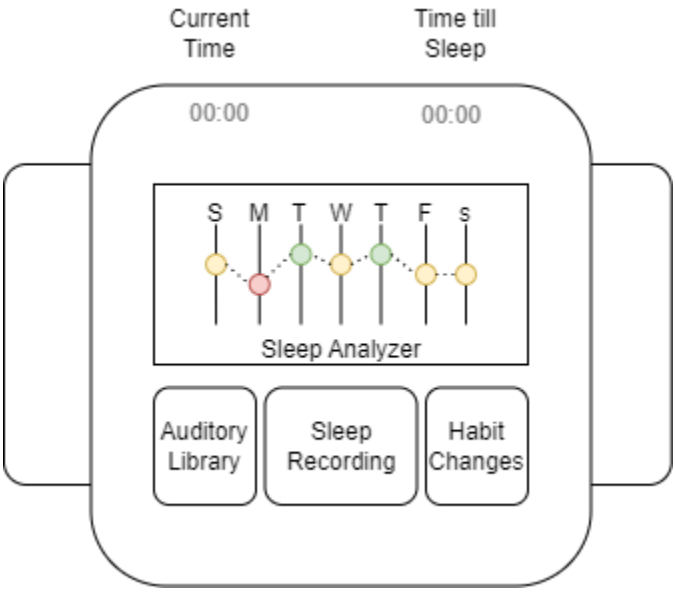

Evidence 3.4: Main Concept Mockup

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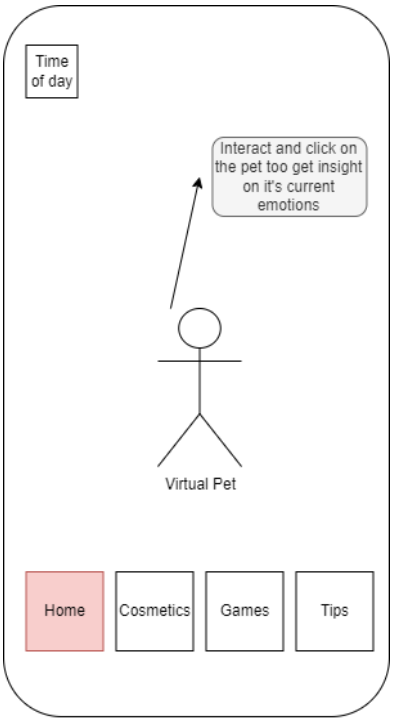
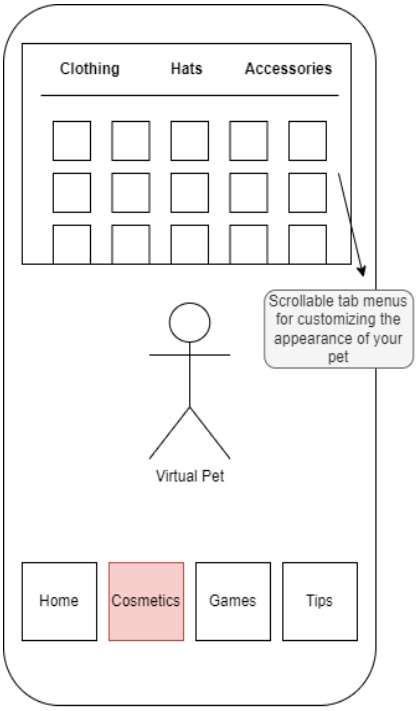
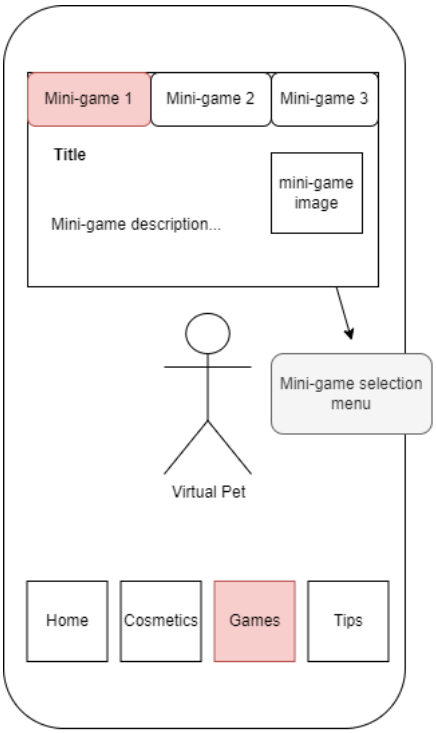


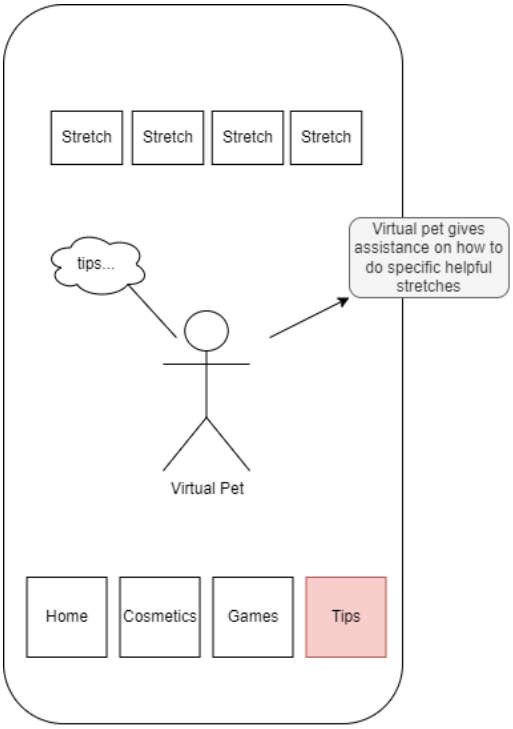
Home Screen



Cosmetics Menu



Games screen



Tips screen

Evidence 3.5: Competitive Analysis Chart

Return to main text

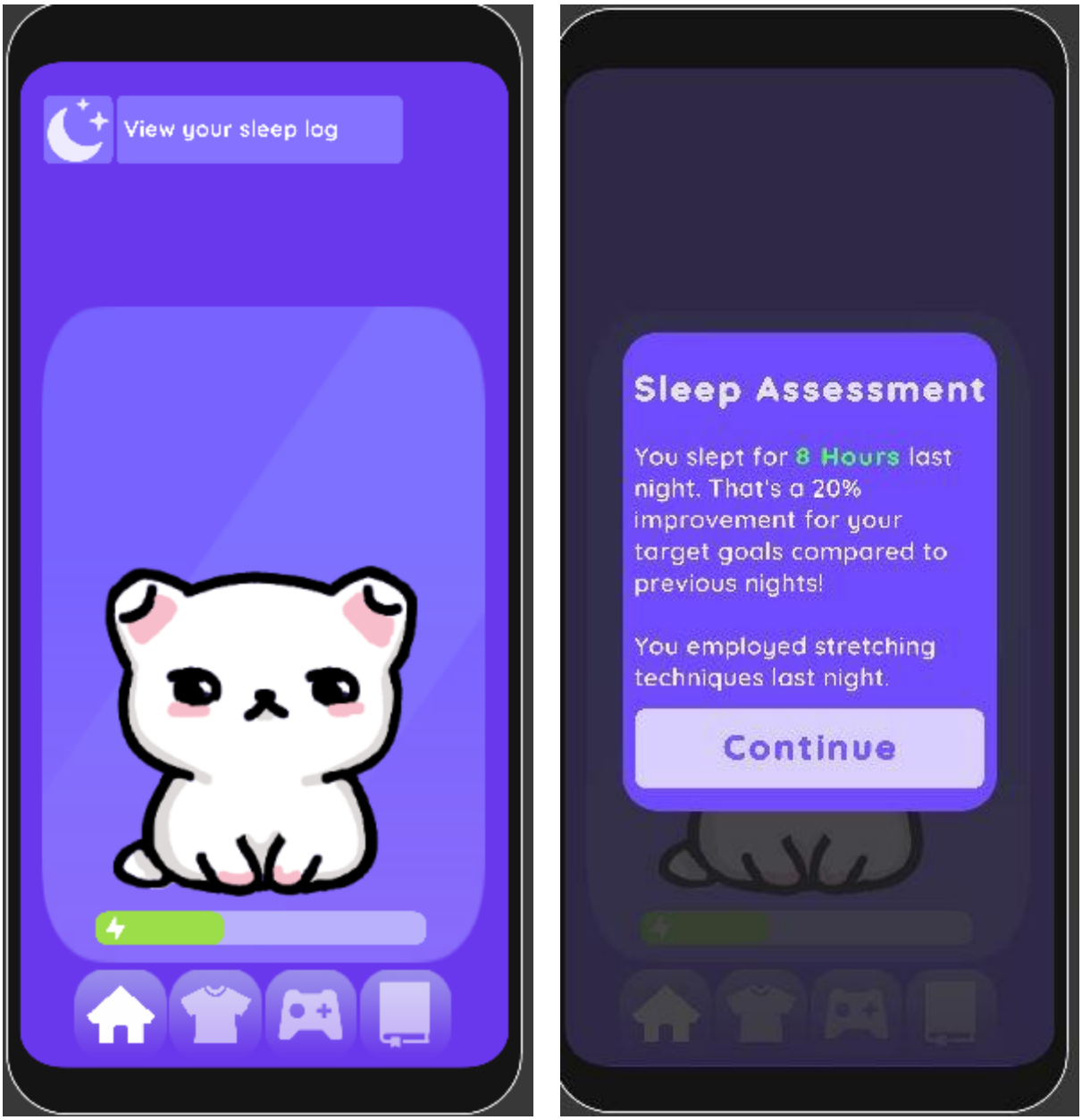
Evidence 4.1: First Prototype Version Iterations

Return to main text

The first build of the prototype gave clear indications on what areas needed improvement. The process of monitoring sleep effectively proved to be quite the struggle; to alleviate this, screen monitoring was explored to identify when the phone was locked for a long period of time. This lets the application get a much clearer estimation of when the user was sleeping and didn't assume they would always go to sleep at the same time each night. This feature is tricky to implement effectively across all devices due to how Unity determines what is considered phone activity. To support this feature, the application allowed an option for the user to manually input the amount of sleep they got that night in case the automatic tracking was not accurate. To expand on the feature, a sort of health bar was given to the user's pet that is determined by the amount of sleep the user had gotten that night. This sleep bar could be incorporated into a mini-game feature in the future to allow more interactivity between the player and their pet while also providing more incentive to return to the application. Due to the limited scope of the project, working out specific mini-games and implementing them would be unwise, but is something which should be heavily considered if further development was brought to the application.

One of the important design requirements was to give multiple possibilities for changing habits. Currently the application only has the option to track the amount of sleep the user had gotten that night. To expand the capabilities of the application a feature to have the user's pet exercise with them was prototyped. This feature gives helpful tips, stretching methods and exercises to do before bed in order to relax your body and have a healthy sleep. These exercises are commonly utilized to promote healthy sleep hygiene for cognitive behavior therapy (Trauer & Qian, 2015). Due to art and time limitations, most of the exercise guidance is text based, which is less than ideal, but something workable with for future iterations and development. To further incentivize interaction with the virtual pet, it could be clicked on to give tips and techniques to help improve the users sleep.

After some testing, the icon in the top left corner that was used to represent time of day lacked any form of significance and felt redundant. To bring some purpose to the area of the screen, a feature to display information about your current sleep hygiene and habits was implemented. This provided a detailed analysis of the user's time spent sleeping and what techniques they employed through the use of the application. This insight can be used to allow the user to know what practices were working and what areas could be improved on.

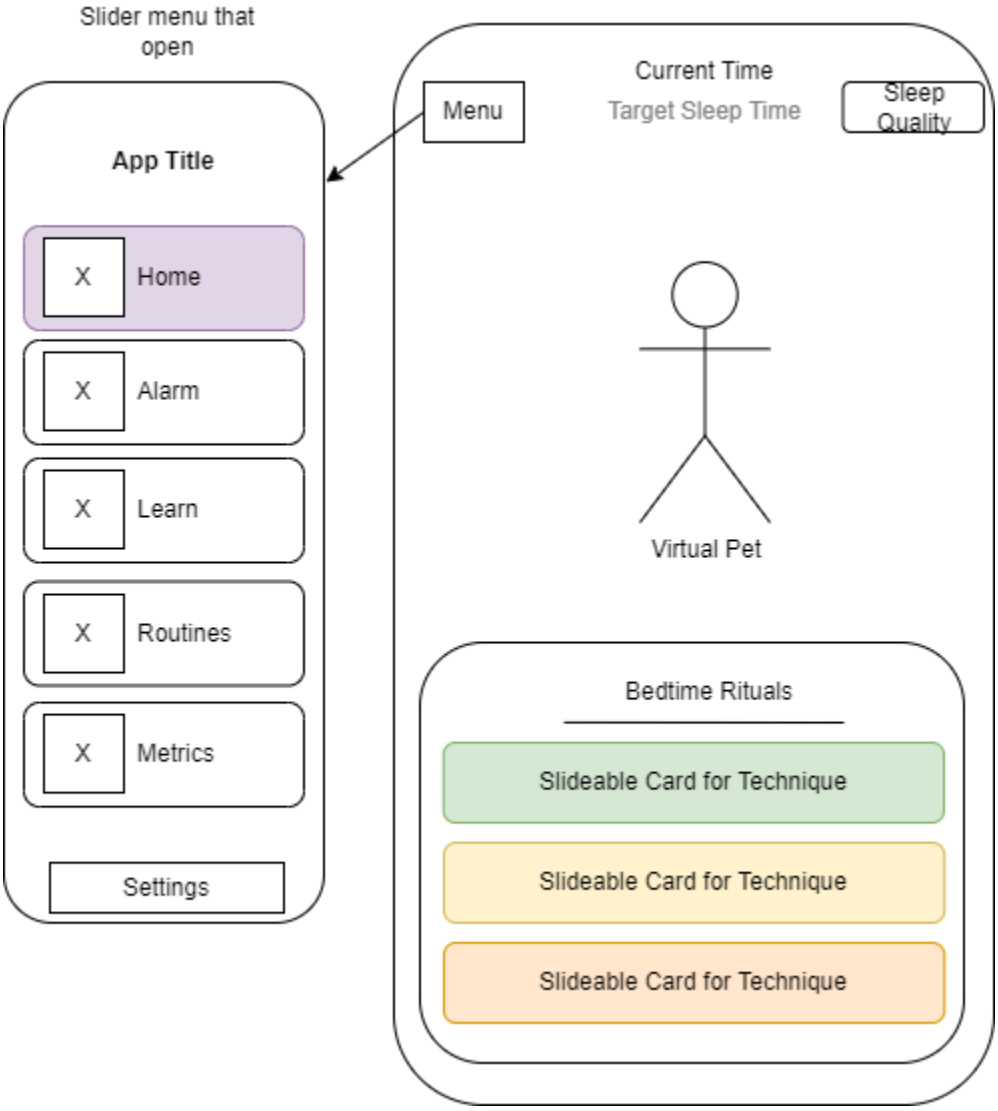


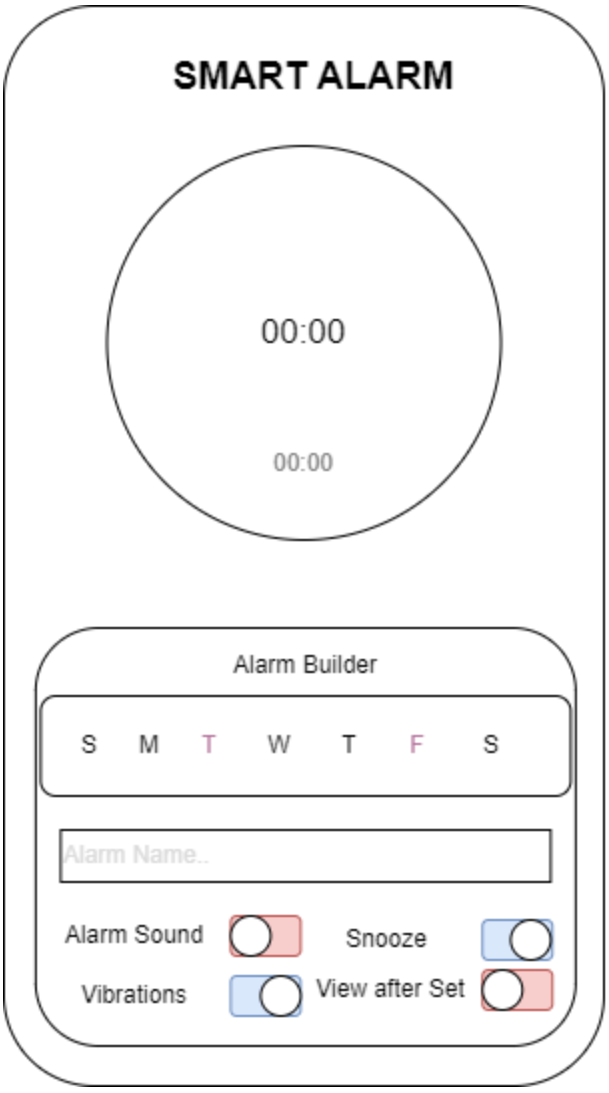
Mini-games were implemented to provide stronger gamification elements and have additional things to do in the application. The mini-game was a slow beat based game where the user had to click on their pet when a faded out version of them fully eclipsed the pet. The user would be rewarded with points & rejuvenation of the pets energy based on how well they done.


0
Select Gamemode

Evidence 4.2: Overhaul Mockups

Return to main text

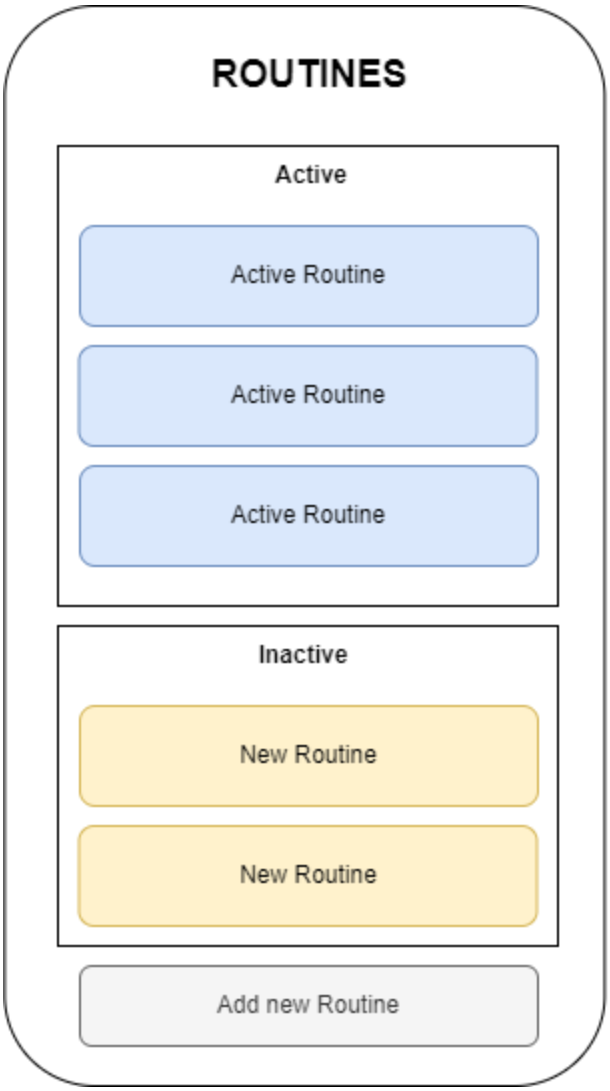




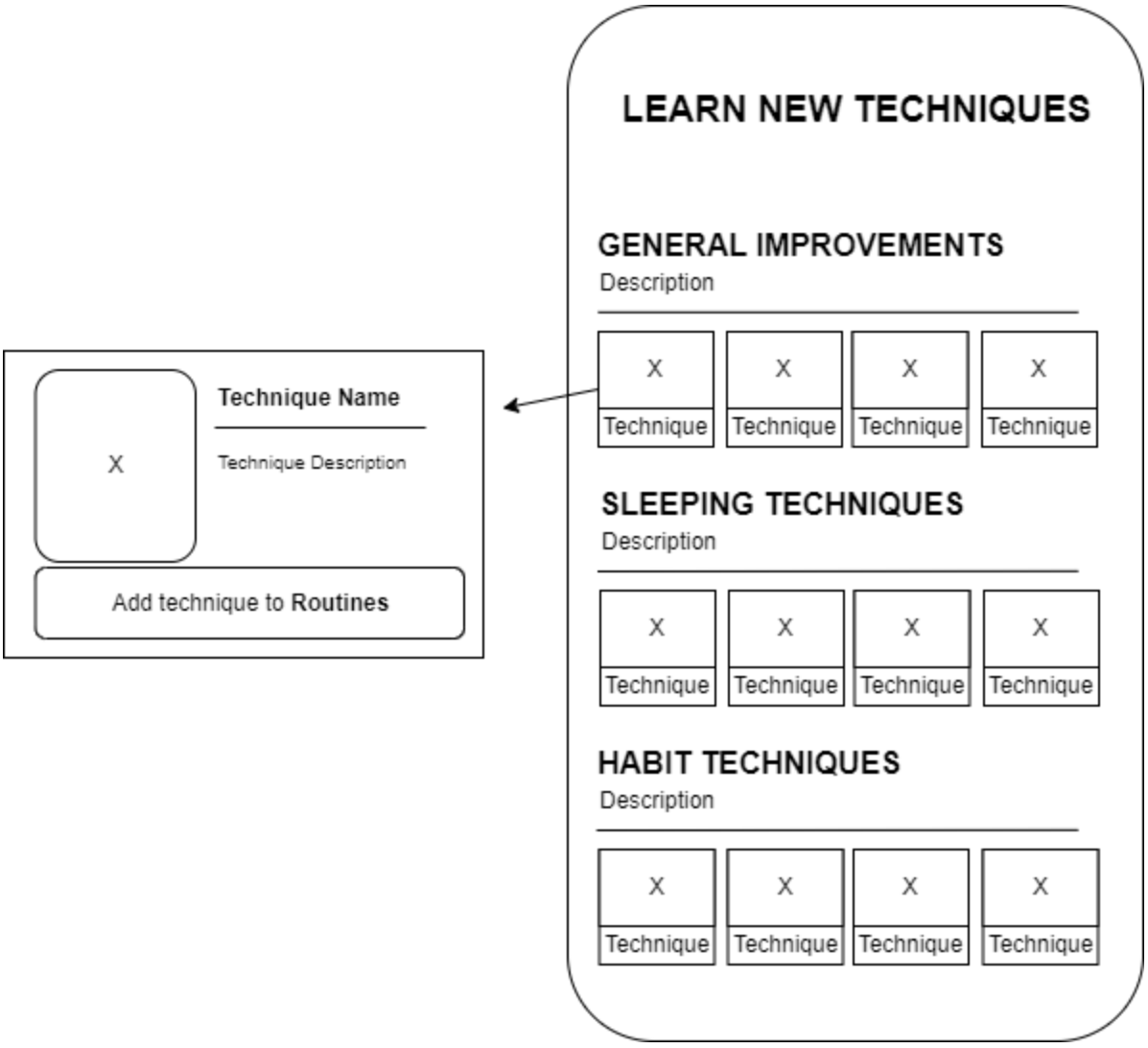
Alarm Time

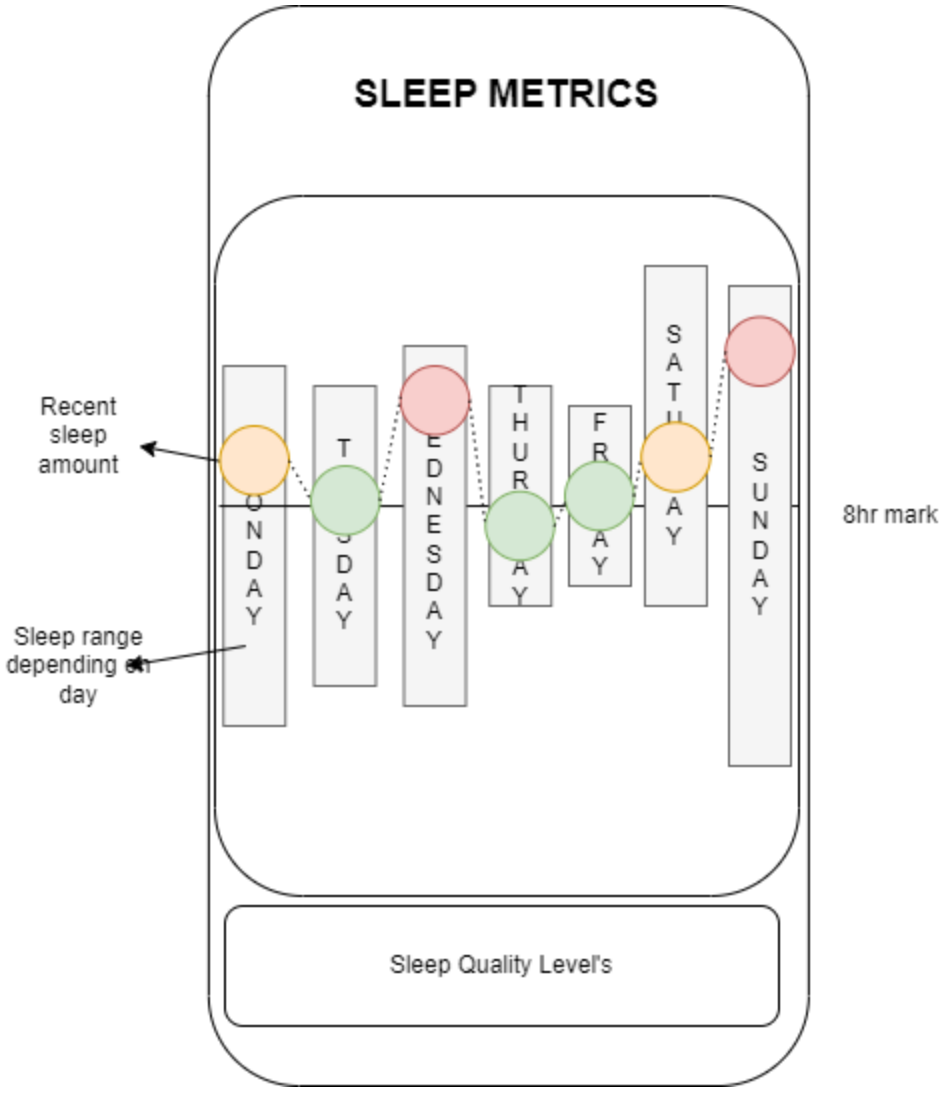
Hours you would sleep based on target sleep time

Selector for repeating days



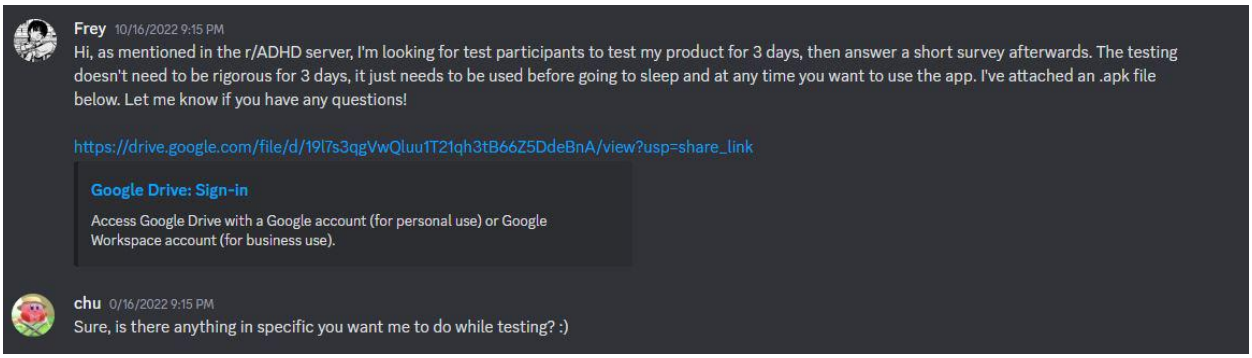
Cards can be moved between active & inactive sections


LEARN NEW TECHNIQUES
GENERAL IMPROVEMENTS
Description
X
Technique
SLEEPING TECHNIQUES
Description
HABIT TECHNIQUES
Description
Technique Name
Technique Description
Add technique to Routines


SLEEP METRICS
Recent sleep amount
Sleep range depending on day
8hr mark
Sleep Quality Level's

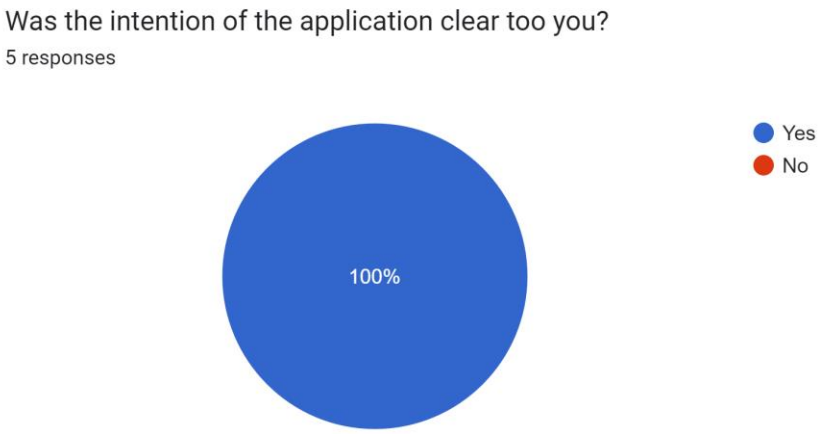
Evidence 5.1: Requesting playtest participant

Return to main text



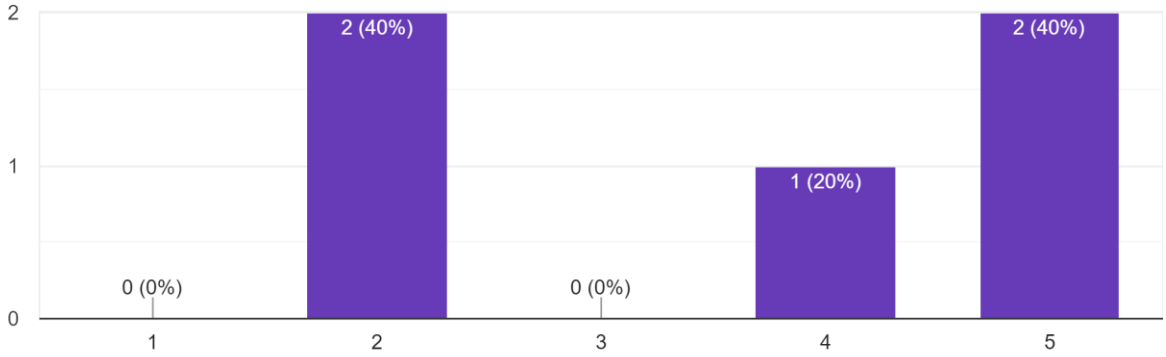
Evidence 5.2: Survey Results 2 – Post-testing

Return to main text



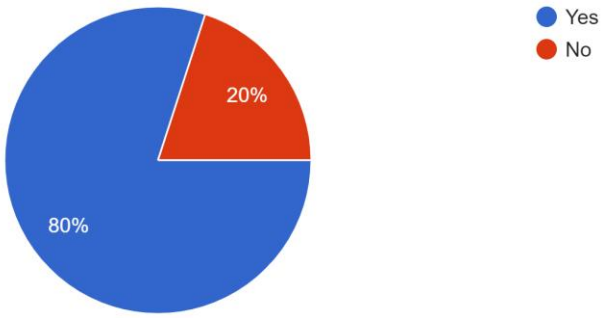
How intuitive were the mechanics within the application to use?

5 responses



Did the inclusion of the virtual pet feel meaningful?

5 responses



What techniques from the application did you apply to assist with your sleep?

5 responses

Tips

when click the cat the help it gave with getting better sleep

sleeping for 8 hours a night and not eating before bed

Sleeping enough

Using the tips from the pet

Did any features feel redundant or poorly executed?

5 responses

Exercises
some buttons did not work
the pet didn't do much, the energy bar didn't seem to have any reason to be there?
Sleep log only appeared on the last day and wasn't very clear
The pet didn't do much other than give tips for sleeping better

Would you have liked to see any specific features expanded on more?

5 responses

The menus that did not open
playing with cat
something to do with the energy bar. Maybe more tips from the pet.
Sleep log
More stuff to do with the pet

Evidence 5.3: Expert Review – UX

Return to main text

Expert

The expert approached for this interview/review is an educator from Cork Education and Training Board, they teach Sociology, Computing and Design at the institute. The expert has a BSc in information technologies in education. The expert has been teaching across several institutes for over 30 years. The expert didn't fully agree to the consent form, so to uphold anonymity, they will be referred to by initials J.C.

Goal

The goal of this interview was to get professional input on the design & layout of the first prototype from an industry expert and apply the feedback to create a more cohesive & user-friendly design.

Results
The problem domain, graduation structure & initial prototype were first explained to J.C., the conversations were mostly centered around the project as a whole for the start, so no feedback was recorded here.

Screenshots of the prototype were passed along and J.C. began deconstructing them and providing feedback across screenshare. Notes and some screenshots (with permission) were taken during this session:

Home Screen

- Lots of negative space on the home screen, negative space is meant to provide breathing room visually. Since there is so little happening on screen, it's unnecessary and makes it seem like the application doesn't have much content.
- The currency icon is very out of place, it stylistically doesn't match with the rest of the design and the color tint is ugly.
- If currency isn't a major part of the application/game then it shouldn't be displayed on the home screen, it should be coupled with its corresponding mechanics. The home screen should be reserved for only the essentials.
- Make sure UI elements are aligned correctly, some elements are shifted slightly.
- Virtual pet providing tips when interacted with feels uncanny and crossed the suspension of disbelief. Consider using a sperate entity to provide tips for the pet instead of the player.
- UI buttons for menus don't need to always be on display if they're not main features of the application. Unless the player should be interacting with all the menus frequently, they should be compartmentalized.
- Gamification elements are lacking focus. Unclear what the pet's involvement is? No real gamification of habits. Currency & energy are tightly related enough to what the focus needs to be.

Sleep Monitor Popup

- The sleep monitoring allowing the user to adjust time is a "nice touch", but the UI is lacking. Both the adjusting time button and continue button are too similar. Distinction between them with color and scale adds a lot.
- The adjusting time UI is cumbersome. Using buttons to increase/decrease the time adds a lot of unnecessary button clicks. If the player is doing this before bed or when they wake up, they'll just close the app out of frustration.
- Having a default time for the adjusting time UI can be a great addition as it more likely to be closer to 8 hours than 0 hours.

Gamemodes screen

- The gameplay screen has no clarity, iconography is fine to use, but it need to be very clear. Maybe make icons for the actions the player will be doing in the game? If keeping

icons is important. Otherwise titling and descriptions helps a lot. Consider giving information for the user on what doing these mini-games gives you?
- The dots to represent the number of times the player passed or failed is unclear. It's intrusive how it pops up, appearing around where the play is playing makes it seem like the player should interact with it.
- The currency being added from completing a game is unclear. Color, glow, incrementing effects are all ways to improve it instantly.

Evidence 5.4: Usability Test

Return to main text

Test Setup

- Android Phone with modified version of the prototype installed too reset all data when started, allowing for easier usability testing
- A modified .apk for the prototype in situations where the user wants to test on their own device.
- Digital consent form to provide evidence for testing participants and allowing for processing of data. (Consent Forms)
- Laptop to write notes while observing the test session.
- Task List for the test participants to follow.

Task List & Justifications

The justifications labeled with an asterisk (*) were not visible to the test participants.

A. Input their desired sleep time
**Identifying if the initial input that is asked for is clear.*

B. Set an alarm for 2PM, that repeats everyday
**Identifying if it is clear to the user how to navigate across menus. The first major task isn't apart of the Home screen, so in this case I'm expecting the task to take slightly longer to complete as the user will need to find the screen. 2PM was chosen as the time, not for realism sake, but because it's in the PM specifically and not AM. The input for entering when the user want's their alarm to go off defaults to AM, thus the user must actively swap this.*

C. Learn a new technique for improving sleep
**Potentially less intuitive than other tasks. I want too see if the user would know where to look and what to look for on the prototype if they wanted to seek out knowledge on improving their sleep.*

D. Add the newly learned technique to your routines
**The process of doing this should be easier if the user was able to successfully complete the prior task. If they couldn't, this may prove challenging. I want to see if the user is able to add routines based on information they found in the application. There is technically 2 possible*

ways to complete this task and it will be interesting to find out which proves to be more intuitive.

E. Create a custom routine task
**This will test how intuitive the process of adding your tasks to the routine list is.*

F. Delete a routine task you no longer want to use
**The routine task cards in the prototype require swiping to interact with them, swiping the object in either direction will delete the task. I want to see if this process of interaction is intuitive enough to not need further clarity.*

G. Confirm that you've completed todays Bedtime rituals
**Similarly to task F this will test rather the user understands how to interact with the swiping feature for the task cards. In this case, the task can be swiped left to remove it or right to confirm its been completed.*

Test Results
Pictures from the usability tests are available in the appendix (Usability Test Pictures)

Participant 1:
A. Input their desired sleep time:
The participant understood the task and promptly entered a value for their desired sleep time.

B. Set an alarm for 2PM, that repeats everyday:
The participant intuitively knew to go to the menu buttons in the top left, they clicked on the alarm section and set the alarm for 2AM, not swapping the time too PM. They struggled too figure out how to repeat the alarm each day until eventually interacting with the letter buttons. Once the letter buttons (representing the days of the week) lit up, they knew to set them all on.

C. Learn a new technique for improving sleep:
The participant questioned the task at first, but promptly found the menu section for Learn in the application after opening the menu slider back up. They weren't sure when they were considered to have "learned" the techniques. The participant clicked the "add routine" button, adding the current technique to their routine list.

D. Add the newly learned technique to your routines:
The participant paused for a while, only to realize they had completed this task while attempting the previous task. This showed some promise in its intuitiveness.

E. Create a custom routine task:
The participant explored around the learn section for a while trying to find a button that would let them add a routine. It wasn't until they reopened the menu slider in an attempt to find the button, that they found the menu titled Routines. After opening the new section, they quickly added a new routine almost instantly.

F. Delete a routine task you no longer want to use:
The participant again tried finding a button to do the task. They reopened the task creator, but couldn't find any way to delete it. The clicked on the task card several times and tried holding it down in hopes of a popup. The participant couldn't find a way to delete it, so they moved on.

G. Confirm that you've completed todays Bedtime rituals:
The participant was confused as to where the Bedtime rituals section was. They mentioned that it should be in the routines section, but it wasn't. After looking in the other menus/sections and going back and forth for a bit, they finally went back to the home screen. After finding the section, they tried clicking the task cards frustratedly. They held the card too long and noticed that it could move. They then slide the task card for all of them and went back to the routine section to do the same.

Participant 2:
A. Input their desired sleep time:
The participant had opened and input their target sleep time already before reading through their task list. They didn't pick up on the fact they had already entered their target sleep time, as they looked around for where to enter it. The accessed the menu and tried going to different areas they would assume it was such as the metrics section or Learn section. The participant noticed on the home screen that a time was recorded on the top and came to the conclusion that it was "probably" entered in.

B. Set an alarm for 2PM, that repeats everyday:
Knowing the menu layout, they quickly moved to the alarm section. The user tried interacting with the clock on the screen in order to edit the alarm time and was wondering why it wasn't working. The participant then clicked on the time displayed in the lower box in order to edit their alarm wake up time. The user changed AM to PM and set the time to 2PM. The user tried looking in the radio/toggle buttons area for a switch that would let them have the alarm repeat daily. After a small bit of time they clicked all of the letter buttons and set the alarm.

C. Learn a new technique for improving sleep:
Knowing where the Learn section was, they moved to the section. The participant viewed techniques within the improving sleep learn section.

D. Add the newly learned technique to your routines:
The participant clicked one of the learn tasks and added it to their routine list.

E. Create a custom routine task:
The participant tried looking for where to add new tasks within the learn section, before moving to the routine screen. When at the routine screen they quickly identified the button to add new routines and added one.

F. Delete a routine task you no longer want to use:

The participant clicked on the task cards several times, and eventually tried swiping/moving it. Once finding out it could be moved like this, they slid it to a side and removed it from the list.

G. Confirm that you've completed todays Bedtime rituals:
Remembering where the section was, the user went back to the Home screen and swiped the task cards.

Conclusions
A. Input their desired sleep time:
I was expecting this task to be a filler task that wouldn't provide much information, but one of the participants skipped over this feature and I noticed a missed opportunity in the prototype to allow the user to change their target sleeping time. Overall though, the input was intuitive.

B. Set an alarm for 2PM, that repeats everyday:
Accessing the alarm screen was simple for all participants, showing the use of iconography for the menu button was a good choice. Where to go to set the time of the alarm proved a bit difficult as some participants assumed it would be in a different place. The need to swap between PM and AM was a bit unclear, but it's hard to draw conclusions on with a small sample size. A button to instantly toggle all days to repeat might be something worth adding, as the act of manually having to click each day could be excessive.

C. Learn a new technique for improving sleep:
The process to do this seemed very intuitive to each participant. Some information on how to actually do each tip might be worth adding.

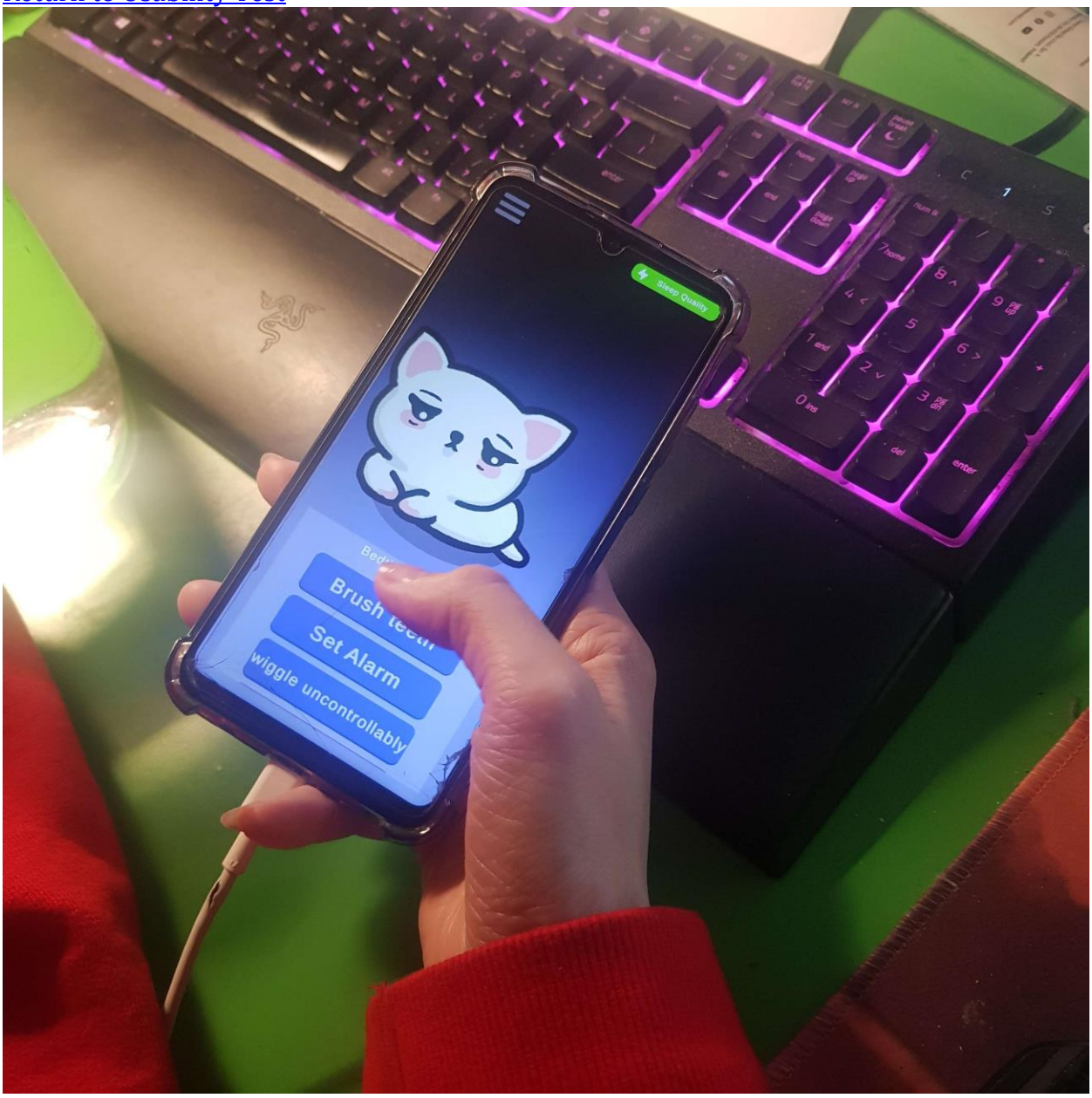
D. Add the newly learned technique to your routines:
The process seemed intuitive, but may be skewed by the fact that the users would have seen where and how to add the technique by complete the previous task.

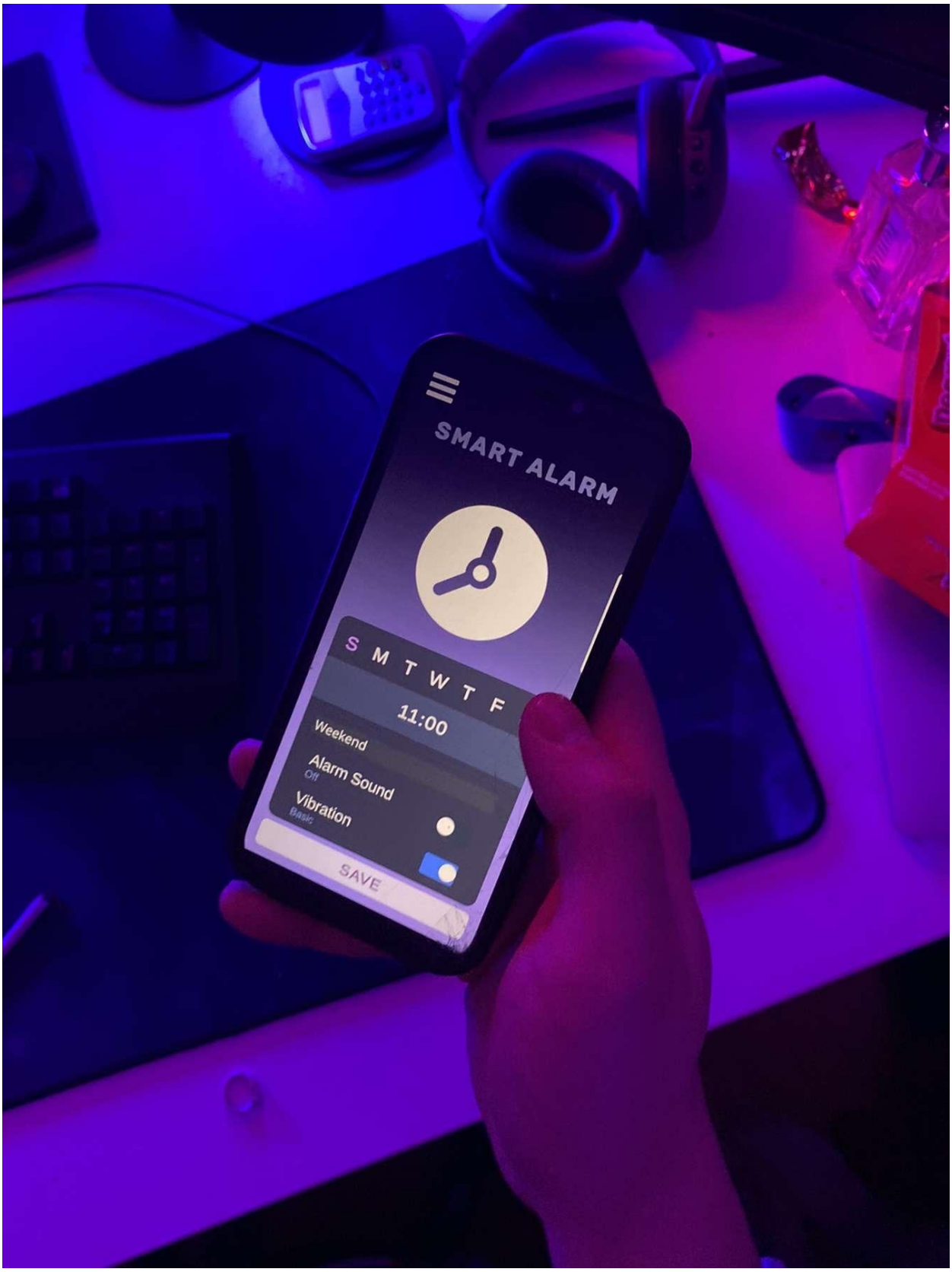
E. Create a custom routine task:
This seemed to be the most intuitive of all. All participants were able to quickly recognize the iconography button for adding new tasks to the routine list.
F. Delete a routine task you no longer want to use:
This proved to be one of the more difficult tasks for participants. The need to slide the task card doesn't intuitively come across. Tutorials could provide help for this, but the reconsidering how the interaction occurs may be worth considering.

G. Confirm that you've completed todays Bedtime rituals:
Similar too F regarding the task cards. The actual section for bedtime rituals is a bit unclear and probably needs a prompt or tutorial section to provide more clarity.

Evidence 5.5: Pictures from Usability Tests

Return to Usability Test




SMART ALARM
S M T W T F
11:00
Weekend
Alarm Sound
Off
Vibration
Basic
SAVE

Evidence 5.6: Consent forms

Return to Usability Test

Informed Consent Form

Usability test for a graduation assignment at Hanze University of Applied Sciences

Test

This test will be conducted to evaluate the usability of a prototype's design. You will be following a list of tasks within the application and notes will be taken regarding your design making, processes and what you say during the test session.

Data

The data collected during this test will be analyzed and used for iterating the current prototype. By signing this form, you agree to allow the processing, observation and recording of the data within this test session. The content of this test will only be as an analysis piece by the conductor of this test, while the results will be shared with lecturers at Hanze University of Applied Sciences.

Participant Right

As a participant you have the right to end the test session at any time, any further recording of data will halt immediately. Any data up to that point will still be used for evaluation.

Date: 10/03/2023

Conductor: Luke Tobin

Signature .....

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