Logbook
Designing a Mental Wellness App for High School Students

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Table of Contents

Acknowledgement

Timeline

September	Decide the project topic and problem. Start background research.
November	Begin experimenting with code in Ren'Py (a python based game engine). Formulate a procedure for testing the effectiveness of app Get ethics form approved Collect participants
December	Distribute the first survey to the study participants. Draft the app UI on paper, and then digitally. - Use data from survey to decide which features to add - Visualize what app screens will look like (Horizontal planning) Begin coding some features based on data from the survey. - Complex features will be completed first - Easier to code features will be completed last
January	Conduct an in-person beta app test with participants. - Collect data on if the app is visually appealing, easy to navigate, and effective for preventing/recovering burnout and reducing stress.
February	Analyze the data from the in-person beta app test. Formulate conclusion for data collected so far Outline future improvements for app collected so far. Edit app using data from first and second survey. - All features complete. Test effectiveness of app. - Observe the effect of 3 days of app use on participants.
March	Analyze the final test data. Formulate conclusion. Outline future improvements.

Topic

The topic of this project is designing an anti-burnout app for students. I chose this topic because I was inspired by anti-anxiety books and research papers I had previously read. Learning the psychology behind anxiety motivated me to design an app that made anxiety-managing strategies more accessible to people. I decided to narrow down my topic to anti-burnout rather than anti-anxiety to make my background research and app design more streamlined. I also narrowed down the user base to high school students rather than all people so that I could design the app with a specific audience in mind.

Background Research

I) Fundamental Information:

<u>Definitions</u>

Burnout is the inability to meet constant demands resulting in exhaustion and a lack of motivation (Florida National University, 2019). Symptoms can be mental, physical, or emotional. Mental symptoms include making careless mistakes, lacking confidence, snapping at others, not contributing ideas, and poor concentration. Physical symptoms include sleep deprivation, physical coping mechanisms (ex. binge eating or drinking), headaches and dizziness, frequent common illnesses (ex. Stomach flu, cold), tense or painful body. Emotional symptoms include being sensitive to criticism and negative comments and being bored by previous interests.

Stress is the overall experience of your nervous system being overwhelmed (Phillips, 2020). Causes of stress can be physical, mental, emotional, or behavioral. Physical stressors include being in a noisy, cluttered, or disturbing environment, experiencing injury or illness, change in environment (eg. transferring schools) (The Centre for Addiction and Mental Health, n.d.). Mental stressor include perfectionism, negative self-talk, pressure to succeed, or simply interpreting a stressor negatively. Emotional or social stressors include relationship difficulties, lack of social support, or feeling helpless when faced with a stressor. Behavioral stressors include substance abuse, poor diet or sleep.

Knowing common symptoms of stress can help individuals identify it early on. Symptoms can be physical, mental, emotional, or behavioral (Phillips, 2020). Examples of physical symptoms are jaw clenching, fatigue, restlessness, headaches, muscle tension, acne, and general aches and pains. Examples of emotional symptoms are feeling overwhelmed or frequently emotionally reactive. Examples of mental symptoms are forgetfulness, impaired cognitive functions, racing thoughts. Finally, examples of behavioral symptoms are poor sleep, changes in appetite or weight, substance use or abuse

Asking oneself where they feel stress in their body, and how it manifests in their life is a valuable first step in assessing stress. Next, they should try to assess the duration, frequency, and intensity of their symptoms. Ask oneself if the stressor is mild, moderate, severe, or catastrophic, and if it's acute (eg. working on a group project with unhelpful group members), or persistent (eg. consistently struggling to meet expectations in a certain subject). This can help put the stressor into perspective. Symptoms can be further categorized based on their source (eg. family, finances, school, etc.).

Stress and anxiety are both uncomfortable experiences urging you to "fix" a problem and the difference between the two terms can seem ambiguous. Stress can appear in one's lives very suddenly, but it is usually short-term. Once the source of stress is gone, the symptoms will decline. Anxiety, on the other hand, can continue even after the stressor is gone. It is more long-term and can lead to more intense responses, such as panic attacks and anxiety attacks. Another difference between stress and anxiety is that sources of stress are typically external (eg. Needing to study for a test) and sources of anxiety are typically internal (eg. One believing they are not capable of doing well on a test).

SAD is an abbreviation used in certain sections of this research. It stands for stress, anxiety, and depression. Self-Efficacy, another term in this research, refers to one's belief in their ability to meet certain expectations or achieve a certain goal. (Mofatteh, 2020)

What are some situational, psychological, and inherent factors behind anxiety and burnout in schools?

Situational factors in peoples' lives, such as stigma, academic pressure, and lifestyle can contribute to burnout (Mofatteh, 2020). Many people attach negative stigma to mental health and mental disorders, adopting a "Get over it" attitude. This lowers their chances of seeking help. Academic pressure and/or receiving low grades can also result in anxiety. This is exemplified by studies showing symptoms of SAD are higher during exam seasons. Whether SAD causes low grades or vice versa is unknown, however the two factors can combine to create a cycle of anxiety and low achievement. Exams can decrease social participation (ex. clubs) and increase competition between students. Other situational factors contributing to SAD include insufficient mastery of the subject, unrealistic expectations of a course or school, and negative or abusive relationships between peers. Life-Style is an important determinant of burnout risk. Alcohol consumption is higher among students with SAD, however it's unclear whether it is a cause or effect. Social smoking is common in students in East Asia directly correlating to SAD. This habit is very persistent and connected to peoples' psychology through behavioral patterns. Moderate to regular physical activity is a protective factor against SAD. Positive hormones are released through exercise which can improve and stabilize mood. Similarly, sleep is a protective measure against burnout.

Psychological factors related to people's mental health or behavioral patterns that can also provide insight into burnout risk. Underlying or pre-existing mental health conditions are more common among students compared to the general population. "Surveying more than 2800 students in five large American public universities demonstrated that more than half of them experienced anxiety and depression in their last year of studies." (Zivin et. al, 2009). This phenomenon is also very persistent, as more than half of the students in the study above still had high levels of SAD two years later. This may be due to persistent risk factors or lack of treatment (Mofatteh, 2020). Low self-esteem, neurotic and introverted personality, and loneliness can also result in SAD.

Inherent factors relating to SAD and burnout, such as age and gender can not be controlled using an app or any similar tool. Gender influences students' experiences with SAD. Female students have

higher prevalence of SAD, however male students have higher dropout rates due to SAD and are less likely to seek help. There is no identified correlation between age and SAD prevalence. Symptoms are present in all age groups.

Fig. 1
Relationship between stress, anxiety, and depression factors in university students
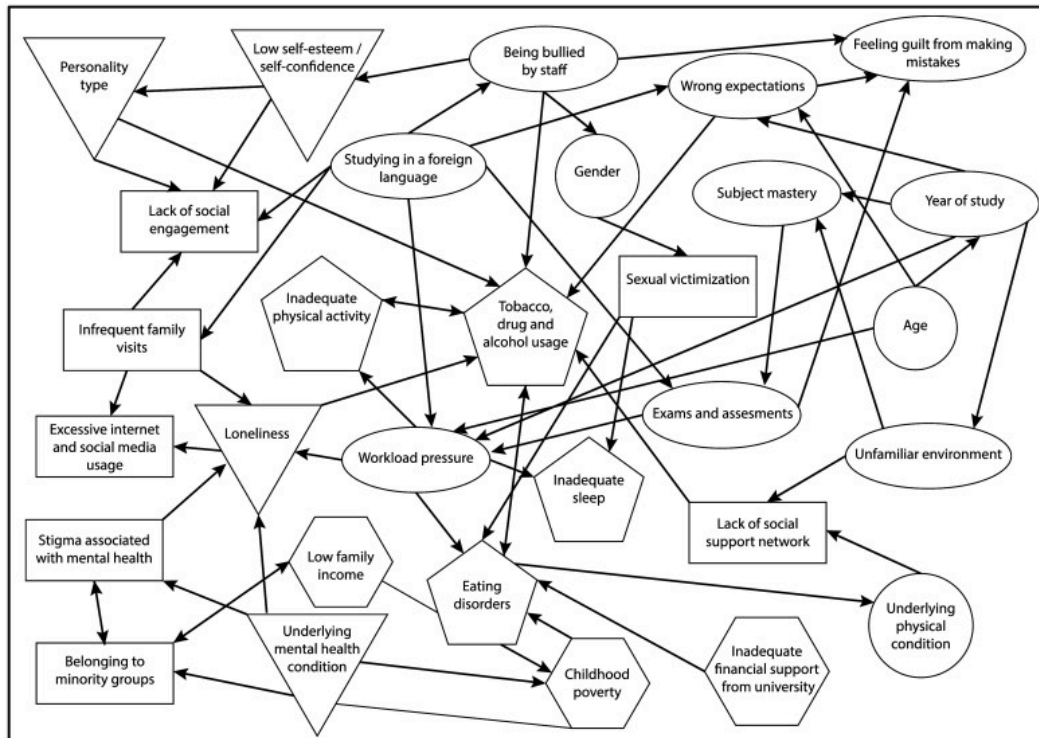
What methods are proven to be successful in managing anxiety and preventing burnout?

Time-management allows students to effectively prioritize, plan, and perform tasks, avoiding the chances of responsibilities piling up and causing mental stress. (Korzanganeh et. al, 2021)

Additionally, breaking down large projects into smaller goals gives students a sense of constant achievement and motivation rather than trying to achieve everything all at once and getting frustrated. This sense of motivation is crucial for preventing or recovering from burnout. These goals must be reasonable and students need to be honest with themselves about what they can achieve at once. A 2021 psychological study conducted by Korzanganeh et. al found that there was no significant correlation

between time management and burnout, however there were significant correlations between Time-management and self-efficacy (direct relation), Time-management and test anxiety (inverse relation), Test anxiety and academic burnout (direct relation), Self-efficacy and academic burnout (inverse relation).

A 2017 study focused on reducing and preventing school burnout in high school students found that having a positive attitude towards the future and actively planning and setting goals can significantly prevent and reduce burnout (Aypay, 2017). Individuals who plan, set goals, and are optimistic about the future are more resilient in stressful situations.

In my first participant survey, 9 out of 12 participants selected time-management as one of the most effective stress management techniques. Imagining an average school week, many participants listed time-blocking and planning as strategies they used to manage school-related stress. Out of meditation apps, time management apps, and journaling apps, time management apps were the most commonly used by the participants to manage school-related burnout. Monthly and weekly planners along with time blocking were most commonly selected as effective ways to prevent burnout, compared to 4 quadrant priority tables and pomodoro timers.

Exercise is a particularly helpful recreational activity as it releases endorphins ("happy" hormones) and strengthens your immune, cardiovascular, and digestive system to be less susceptible to physical anxiety symptoms (Mayo Clinic Staff, 2022). Exercise and sport can also act as a form of meditation, focusing your mind on your body movements, rather than on a stressful situation. If physical movement is developed as a routine, the impact of daily stressors is minimized, which can reduce mild depression and anxiety symptoms as well as improve sleep. This gives people a sense of control over their well-being and makes life feel less demanding.

Psychiatrist and author Dr. Judson Brewer emphasizes the significance of habit loops in contributing to stress and anxiety. Reward based learning is the foundation of human behavior, but in modern society, it can create addictive habits that impact physical, mental, and emotional wellness
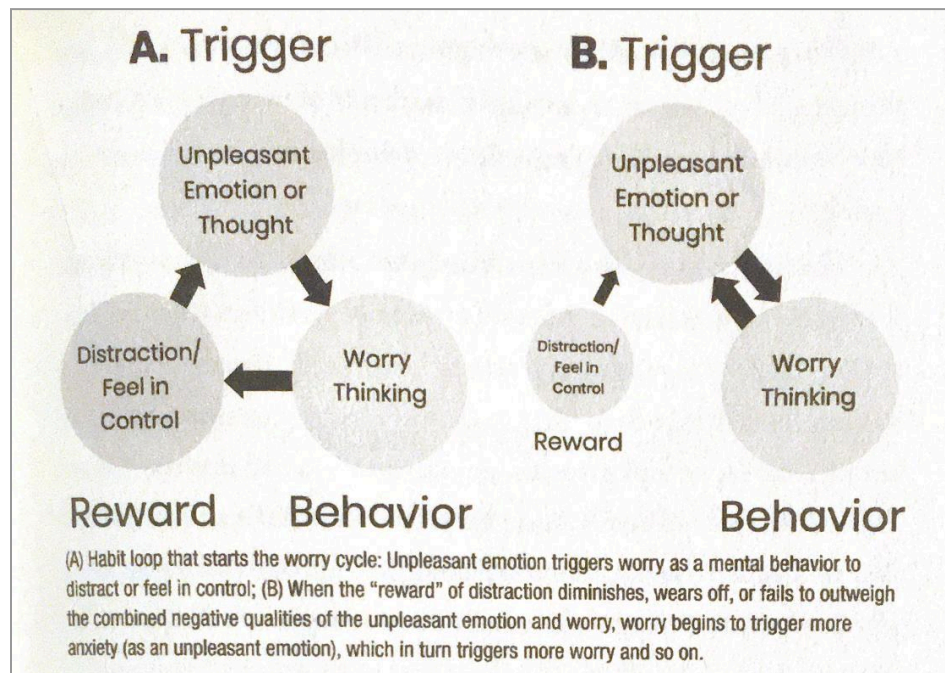
(Brewer*, 2021) For example, regularly consuming calorie-dense foods to increase dopamine and numb stressful feelings in the moment, but feeling worse about yourself and your coping habits in the long run

Habit loops consist of three components: trigger, behavior, and reward. The trigger is a stressful emotion or thought. Behavior is a coping mechanism or habit one uses to address the thought (eg. overplanning, avoidance, overindulgence). The behavior gives the person an illusion of control. Finally, the reward is either a solution to the problem, or even more stress.

Anxiety can be described as a habit loop. Stress and anxiety can become self-perpetuating habits, as certain coping mechanisms give a temporary feeling of control of relief, but are ultimately a detriment to mental and physical health (ex. alcoholism). These habit loops can be "mapped" and recognized to avoid perpetuating the cycle.

Fig. 2

Cause and Consequence of Anxiety Cycles

(A) Habit loop that starts the worry cycle: Unpleasant emotion triggers worry as a mental behavior to distract or feel in control; (B) When the "reward" of distraction diminishes, wears off, or fails to outweigh the combined negative qualities of the unpleasant emotion and worry, worry begins to trigger more anxiety (as an unpleasant emotion), which in turn triggers more worry and so on.

Willpower is not always an effective anti-anxiety method. The prefrontal cortex is the site of rational thinking and will-power. In stressful situations, this part of the brain is the first to be ignored

(simply telling yourself to "calm down" is not enough to ease anxiety). This is why willpower is not always a reliable stress or anxiety management method. Substituting one anxious habit loop for another is also an unreliable anti-anxiety method. Substituting one habit(ex. Worrying about school) with another (ex. Procrastinating ang looking at cat videos online) won't necessarily reduce anxiety. As one negative habit loop is replaced, another one is reinforced.

Mindfulness-based stress reduction (MBSR) is a reliable method of reducing stress and anxiety. Mindfulness requires one to redirect their focus inwards and build awareness of their mind's habits, building curiosity, rather than shame, about why one thinks and feels what they do. Some mindful questions to consider are: "Why am I doing this? What triggered the behavior?What reward am I really getting from this? Do I want to keep doing this?" (Brewer, 72). These questions should not be explored in an intellectual way. Instead, one should focus their attention on visceral reactions and sensations when exploring mindful questions. This awareness makes the negative impacts of one's habits more apparent. For example, one may realize cigarettes have quite a bad taste after asking themselves what reward they truly got from smoking.

Developing a curious attitude can help with managing anxiety. There are two main methods of learning from mistakes: "Look and Learn" (Brewer, 153) which is a healthy way to grow from experience, versus "Review and Regret" (Brewer, 153) which suppresses the opportunity for growth and instead criticizes one's past self. Review and Regret can be toxic for mental health, and doesn't break habit cycles. Curiosity calms the restless "do something, fix this" anxiety and replaces it with an open, expansive sensation (observing your experience). Dr. Judson Brewer elaborates on this in his book "Unwinding Anxiety" explaining how "You can get really curious about those [anxious] feelings and begin to track your habitual responses to them; in this way you can see how much they are driving your life. When you bring this curious attitude, they are much less likely to have the power they once had over you." (Brewer, 160)

Meditation is a self-regulation practice in which an individual focuses their awareness on physical sensations, thoughts, and feelings in the present and controls their mental processes. This practice helps build awareness of one's mind's habits and builds curiosity about why one thinks and feels how they do. Studies have shown that mindfulness programs can significantly reduce stress, anxiety, and depression symptoms and burnout risk in various populations (eg. white-collar workers, academics, high-school and university students) (Marais et. al, 2020). In these studies, the positive effects of mindfulness are indicated by changes in people's biological markers (eg. heart rate, stress hormone concentration in blood) and in self-reported questionnaires. Additionally, mindfulness can increase concentration and cognitive abilities, improve emotional regulation and behavioral flexibility, and increase performance at work and in relationships.

Mindfulness can work in conjunction with time management to help high-school students manage stress and prevent or recover from burnout. Time management helps students develop a positive attitude towards the *future* by planning, prioritizing, and performing tasks, whereas mindfulness helps students focus on the *present* by disengaging from task-irrelevant thinking (eg. worrying) (Marais et. al, 2020). Mindfulness can help students focus on their current task and complete it faster as well as improve their psychological flexibility, which is the ability to decide what to do based on one's life goals and values. Improved psychological flexibility reduces the pressure felt by students in response to high workloads and reminds them of their big picture goals. Psychological flexibility also correlates to lower stress, anxiety, and depression. Ultimately, both mindfulness and time-management are concerned with managing and focusing on tasks, only one is in the present, and the other is in the future.

A 2020 study by Marais et. al exploring the effect of mindfulness sessions on academics found a significant relationship between mindfulness and efficient time management and psychological flexibility, and a moderate relationship between mindfulness and well-being. Those who participated in the mindfulness sessions procrastinated and wasted time less, indicating a connection between mindfulness and self-regulation.

The study also showed how mindfulness could influence one's perspective of time. American psychologist Zimbardo's theory of time describes six ways of viewing time: PP- positive view of the past, PN- negative view of the past, PH- hedonic view of the present focused on seeking immediate pleasure, PF- fatalistic view of the present with a helpless attitude, FP- positive view of the future focused on planning and working towards goals, and FN- negative view of the future. High levels of life satisfaction and low levels of stress, anxiety, and depression correlate to high to moderate PP, PH, and FP, and low PN, PF, and FN. Mindfulness was shown to relate most closely to low PN (by not judging past experiences) and FN (by not reacting to negative inner thoughts). Mindful practices may reduce emotional reactivity to negative thoughts relating to the past or future. Another way mindfulness may impact perspective of time is by directly reducing rumination (PN) and worry (FN) resulting in efficient time use.

Another 2020 study examining the effects of mindfulness-based counseling on high school students found that mindfulness reduced high school student burnout (Susanti et al. 2020). It also noted the relationship between mindfulness and psychological flexibility, and increased well-being (which includes self-growth, independence, positive interpersonal relationships, and life purpose).

Music can have a sedative effect which helps lower stress and anxiety symptoms (Barton, 2022). Relaxing music can lower heart rate, blood pressure, and cortisol levels, and its effect is comparable to chemical sedatives ex. Valium. A psychological study of nearly 10 000 participants observing the effect of music on stress found that music lowered heart rate, blood pressure, cortisol levels, nervousness, and restlessness. Ideally, this music is 60 to 80 beats and should be listened to for 20 to 30 minutes to effectively reduce stress. However, music preferences are very subjective and no single song will be effective for everyone. Dopamine increases when you enjoy the music.

Journalling involves regularly recording personal thoughts and emotions to process and analyze life events, find solutions to difficulties, and discover oneself, among many other benefits (Dimitroff,

2016). Journal entries serve as an outlet for complex thoughts and emotions and are written without judgment or self-criticism.

In a 2016 study conducted by Dimitroff on the effect of journaling on nurses, journaling was found to significantly reduce burnout by helping participants let go of work-related pressures in a healthy way. This pressure would otherwise build up in the participants or be redirected outwards in an unhealthy way (eg. outbursts). Many participants also commented that journaling helped them articulate their emotions and anxieties. They were able to find the cause of their issues and figure out how to best respond. Journaling helped many participants view stressful situations from a new perspective, helping them make better decisions and reduce negative emotions.

Various psychology studies have shown the importance of self-compassion, gratitude, and curiosity in reducing stress and anxiety (Brewer, 2021). Focusing more specifically on preventing burnout in high school students, having an optimistic attitude can help students proactively cope with issues, reduce stress, and reduce or prevent burnout. A 2017 psychology study found that having an optimistic attitude negatively correlated with burnout (Aypay, 2017). Positive expectations helped individuals plan and set goals for the future (time management) and stay resilient in stressful situations. The study asserted that an optimistic attitude includes using proactive coping strategies to address stressors early-on and take precautions against them.

When designing an app, it is important to consider the colours used in the design, as different colours can stimulate different psychological effects. Green and white are commonly associated with soothing sensations. A 2020 colour psychology study found 39% of people associated green with content 43% of people associated white with relief (Cherry, 2022) Additionally, green is associated with nature, relaxation, and health and has been linked to stress relief, impulse control, and improved focus (Cherry, 2023).

What are the features and limitations of the coding language being used (Python) How does it compare to other languages?

Python is an easy to read and understand coding language with many built-in functions that shorten work time. One example of such a feature is the class keyword, which allows for object-oriented programming. Object oriented programming allows one to attach many different variables onto an object. Many different versions of that object can be created, and the variables can be customized for those objects differently. Another feature is python's ability to work with AI (Enterprise DNA Experts, 2023). Chatbots can be implemented in python apps and can perform a variety of tasks.

In python, features and updates can be directly added into the app even later on in the development process (Chiluka, 2022). There is no compilation process, meaning code can be run right after it is written (Novotny, 2023).. Having no complication process can also make debugging easier. Python is a widely used coding language, so there is a large amount of information and tutorials available online. The ability to edit code efficiently and the high availability of tutorials streamlines the process of programming in python.

Python apps are compatible with many different operating systems ex. Android, iOS, macOS, windows. They can also be published and distributed for free.

Some limitations of python are its speed, and RAM usage. Python is slower than C and Java And uses up much more RAM (short-term memory of computer, stored data for current apps and unsaved data) than other programs. This makes python less suitable for mobile app development due to high RAM usage.

What is Ren'Py? How is it relevant to this project?

Ren'Py is a python-based visual novel creator used to program PC and mobile apps. These apps are free to distribute and can function on a variety of operating systems, including Windows, MacOS ,

Linux, iOS, and Android. Apart from its compatibility with many devices, Ren'Py's main advantages are its customizable GUI template, intuitive syntax, built-in functions, compatibility with python code, and availability of support.

Ren'Py has a highly customizable GUI template that simplifies the process of coding an app. This template consists of basic menus, textboxes, interface colours, and buttons to help display information and navigate the app. This allows programmers to focus on the logic of their app, rather than spending many hours trying to create the basic functionality.

The syntax of Ren'Py is straightforward and readable, following a script-like format (Ren'Py, n.d.). Ren'Py also has many built-in functions to display media, create buttons, and store user input as a global variable. The media display functions are useful, when dealing with complicated apps requiring many screens. Being able to store global variables (in the form of python code) is a particularly useful feature, as it allows programmers to recall variables in different screens.

Python code can be used to outline an app's backend, or define any other complicated logic within a Ren'Py app. There are four methods of indicating python code is being used in Ren'Py: Begin a python line with a `$`, begin a python block with `python:` for code that is run in the moment, begin a python block with `init python:` for that is run during app initialization, or change the extension of the file you're coding in to say `_ren.py,` rather than the default `.rpy`.

Ren'Py has been used as a game development engine for two decades, meaning there is a large amount of support available. Additionally, many updates have been made to Ren'Py to fix bugs, add new features, and make coding easier.

In a 2019 study investigating how to design a mental health app for young people, participants noted that communicating naturally, visualizing information, and gamifying the problem solving process would be helpful features (Aryana & Brewster, 2019). Ren'Py exemplifies these three features with its text display (which appears like you are conversing with a character), media display, and inherent game-like structure. The study also found that time management, habit building, and emotional

evaluation features would be valuable. The backend logic of these features can be coded in python, and the front ends display can be shown in Ren'Py. Creating a mental health app with a friendly and gamified structure can break down the stigma associated with mental health by making it less clinical and morbid.

II) Design Process:

What is the engineering design process?

The engineering design process begins with defining the problem (Indeed Editorial Team, 2023). Some questions to explore in this phase are: What are you trying to solve? What are your main goals? Who is the end-user of your product? How to measure the success of the product? How will your design improve on pre-existing products?

The second step is to conduct user research and notice opportunities for your product. Some questions to explore in this phase are: What do users want? What solutions have they already tried? How often would they use the product?

Next, brainstorm user personas, scenarios, overall vision, and collaborate with others. This will contribute to the next step, which is creating a prototype. A prototype should be similar to the final product, but can come in many different forms (video, sketch, etc.). The purpose of a prototype is to identify the weaknesses and strengths of your design based on user feedback

After analyzing the users' response to the prototype, the next step is to create a final product. Edits should be made based on previous feedback and research. Once the product is ready, there is another phase of user testing. Some questions to explore in this phase are: Did the app accomplish your goal? What should be changed?

The final step of the design process is to list future improvements that can be made to the design.

Fig. 3
Engineering Design Process
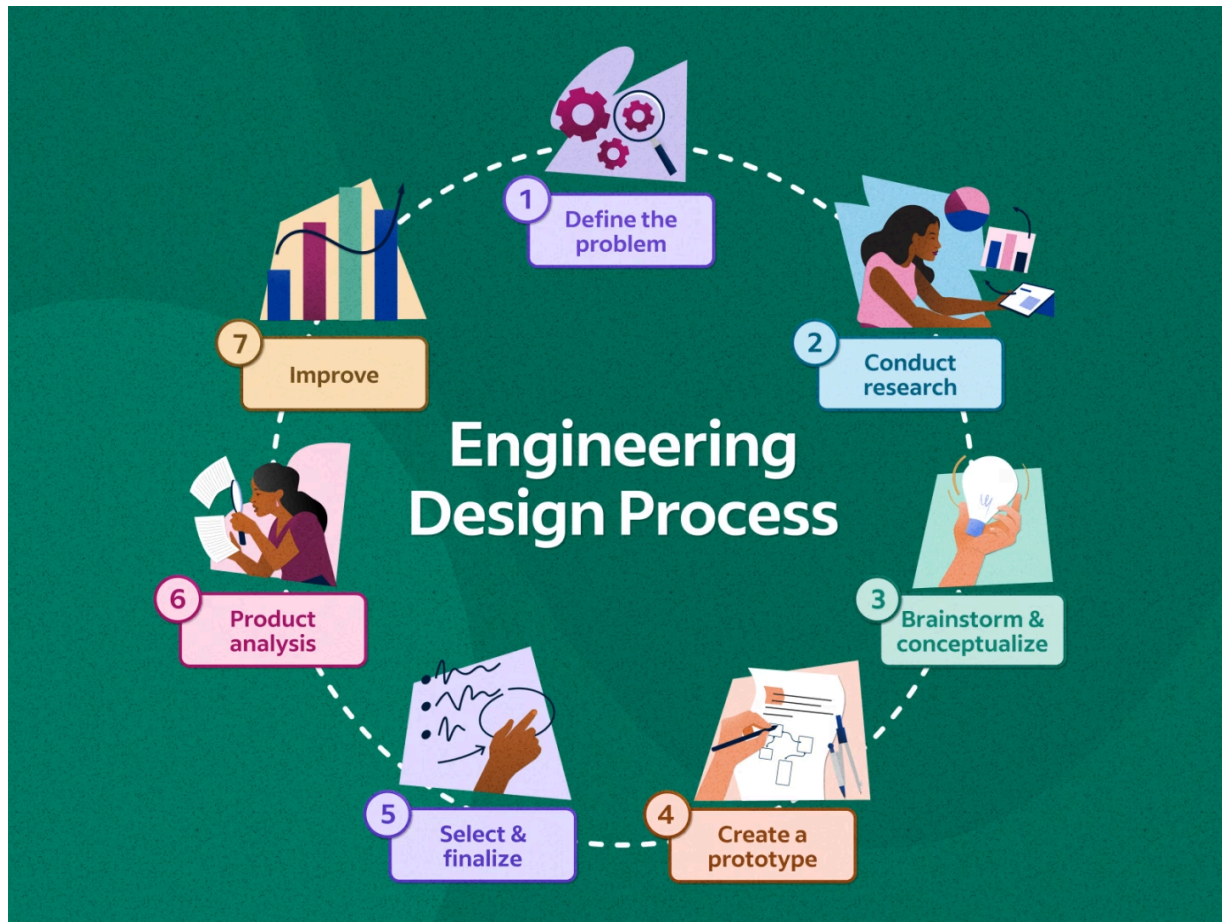
How do you construct an effective user questionnaire before developing an app?

The main objective of a user questionnaire is to know who will use the app, and what they will do with it (Sharlid, n.d.). When conducting a user survey before app development, the questions should be neither too simple nor too broad. Some Questions should not be invasive or embarrassing, in order to ensure users respond truthfully. When asking for sensitive information, surveys should be careful and indirect. Additionally, the questionnaire should show no obvious bias.

Questions can be either closed (multiple choice), open (written response), or likert scales. Closed questions are easier to analyze, because the responses of all the users can be categorized and quantified. Examples of quantitative data that can be collected are age and sex, job, or any other multiple choice questions related to the app's subject. Quantitative data, however, is harder to apply to the problem the

app is trying to solve. Open questions on the other hand result in more in-depth responses. In-depth responses are important in early stages of app development because they help establish user patterns and broadly answer the problem the app is trying to solve. A downside of open questions is that they are harder to analyze because every user's response is unique. Likert scale questions ask if users strongly/somewhat agree/disagree with certain statements. This type of question offers a range of responses measuring the attitude of users. Likert scale data is also easy to analyze.

What are the benefits and drawbacks of designing an app v.s. a website?

Apps are a standard way of displaying highly interactive and specialized content. They are meant to be used regularly, and are typically very personalized (Summerfield, n.d.). Apps can be used without an internet connection, can send push notifications, and can interact with a device's native operating system (useful for storing and retrieving data). Some drawbacks of apps are that they are more expensive and time-consuming to build and maintain, and can be difficult to download and update.

The main benefit of websites is their broad accessibility. They can be instantly accessed through a browser using a variety of devices, and are easy to find using a search engine. This accessibility also makes websites easy to share. Other benefits of websites are their long "shelf-life" (can't be deleted from a device like an app) and easy updating process. Some drawbacks of websites are that they require an internet connection, can't send push notifications, and are typically less specialized or personalized than apps.

III) Coding Information:

Fig. 4
Table of Common Ren'Py and Python Terms

Term	Function
Jump	Ren'Py function which jumps to a label of code.

Label	Ren'Py function used to label a certain block of code. Buttons within the app can jump to different labels of code.
Show	Ren'Py function which shows a certain screen.
Hide	Ren'Py function which hides a certain screen.
Screen	Ren'Py function in which GUI components are displayed or hidden.
Class	Used to write a blueprint for creating objects (known as instances) with related but different data (known as fields) and functions that can use the data (known as methods) (Socratica, 2017).
For Loop	Repeat a block of code a certain number of times.
CSV File	Comma separated variables file. Stores data which can be imported and exported from the app.
Textbutton	Ren'Py function that can create buttons with a custom function (jump, show, quit, etc.)

What are some common Python functions?

Lists are ordered and changeable collection of data objects of different types, unlike an array which is objects of the same type (Network Chuck, 2023). Lists always need opening and closing brackets. Objects in the list can be individually referenced in other variables. Variables can be set to equal a list of items as shown below:

```
Camping_stuff = ["tent", "marshmallows", "sleeping bag"]
Camp_site = ["Site 1, "True", "29"]
```

Objects in the list can be assigned to other variables. Each object is assigned an index of 0, 1, 2, and so on. This index can be used to assign the object to a variable. Below, the object `marshmallow` is being assigned to variable `Me` using the number 2 or -2.

```
Me  = [2] or Me = [-2]
Print(Me) = marshmallows
```

The range keyword is a way to generate a list of numbers. The last item in a list is not included, as shown below:

```
Range(6)
     [0, 1, 2, 3, 4, 5]
Range(2, 6)
     [2, 3, 4, 5]
```

The number the range increases by can be changed by adding a third value in the range brackets, as shown below:

```
Range(0, 8, 2)
        [0, 2, 4, 6]
```

For loops can be used to repeat a block of code a certain number of times (Khan Academy, 2011). In the example below, everything in the range refers to `i`. In the code below, for each `i` in the range, t is printed until there are no values left to print.

```
for i in range (5):
    print i
    0, 1, 2, 3, 4
```

In the code below, a variable `sum` is set to equal 0 and everything in the `range(3)` refers to `i`. First time through the loop, `i` refers to 0. $Sum = 0 + 0 = 0$. Next time through the loop, `i` refers to 1. $Sum = 0 + 1 = 1$. The loop finishes when all objects in the range have gone through:

```
sum=0
for i in range(3):
    sum= sum+i
    print sum
    0, 1, 3, 6
```

The class keyword can be used to write a blueprint for creating objects (known as instances) with related but different data (known as fields) and functions that can use the data (known as methods) (Socratica, 2017).

```
Class Task:
    """A docstring is a string inside triple quotes that
    describes the class. It's a good idea to add a docstring to
    ensure you understand your code in the future or can
    explain it to someone else."""
    #Start with keyword and name of class
    def __init__ (self, time, name):
        self.time = time
        self.name = name
        # Used to refer to the specific characteristic again
    def some_function(self):
        self.time = time= 2*self.time = tim
        # This function doubles the time of the task and can
        be used in later code (b001, 2023).
        # Function inside a class is called a method (Socratica,
        2017)

    some_task = Task()
```

```
# some_task is an instance or object of the user class
some_task.time= "2"
#name of object dot name of variable equals name creates a
field. They should be lowercase and have underscores for
readability.
some_task.name = "Homework"
#Time and name attached to an object (some_task) are called
fields.
```

Getter and Setters are useful for object oriented programming (Ramos, n.d.). Getters let you retrieve an object attribute and setters let you change or modify that attribute. See how getters and setters are used below:

```
Class Task:
     Start with def __init__ (self, time, name):
          self.time = time
          self.name = name
     def set_time(self, newstring):
          self.time = newstring
     def get_time(self):
          return self.time
```

III) Miscellaneous:

How to apply a paired T-test?

A paired T-test is a method of statistical analysis used to determine whether two means have a significant difference. The sample used to calculate the two means must involve the same individuals, and all subjects are assumed to be independent from one another. There are nine values needed to apply a T-test, as listed below:

Value	Relevant Information or Formula
(p) p value	The p value quantifies the data against a null hypothesis The null hypothesis is a prediction that there is no significant difference between two means. For example, a p value of 0.05 represents a 95% inconsistency with the null hypothesis, suggesting that an alternative hypothesis is true. (Mcleod, 2023)
(α) Significance value	The significance value is a threshold used to determine whether the p value is significant or not. For example, an α a value of 0.05 means the p value must be less than or equal to 0.05 in order to be significant.

(S$_D$) Standard deviation	"Width" of the data set in relation to the mean; measure of the variability of the data. For large data sets, this can be found using an online software, such as excel.
(t) t value	$$t = \frac{XD}{\frac{SD}{\sqrt{n}}}$$
(X$_D$) Mean difference between pairs	$$X_D = \frac{Sample\ 2\ average - Sample\ 1\ average}{2}$$
(S$_{XD}$) Standard deviation of differences between pairs	$$S_{XD} = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (XDi - XD)^2}$$
(n) Number of values in one data set/one sample	
d.o.f.: Degrees of freedom	d.o.f. = n-1
Critical value	The critical value may be found using an online t-table generator or excel. It is found by aligning the appropriate d.o.f. row with the selected α value column. The value that occurs at their intersection is the critical value.

If t is greater than the critical value at the selected significance level, then the averages are significantly different. If t is less than the critical value at the selected significance level, then the averages are not significantly different.

Problem

This project aims to design an app that helps students proactively manage their stress to prevent or recover from burnout. Stress and burnout among high school students is a complicated and wide-spread issue, with 49% of high school students reporting significant daily stress (James, 2015) and 42% of teenagers reporting they were not doing enough or didn't know if they were doing enough to manage their stress. (Bethune, 2014). A survey of Ontario schools found that 95% of schools needed more support in maintaining students' mental health and wellbeing (People for Education, 2022). The success of this will be based on whether the app features help lower students' stress and burnout risk when used for 3 consecutive days. Additionally, the app should be functional, easy to navigate, and visually appealing.

Method

Development Tools

- Renpy (Python-based game design engine)
- Visual Studio Code
- Google Forms
- Google Slides (Used to design UI elements for app)

Prototyping Materials

- Paper
- Marker
- Diagrams.net

1. Background Research

I began this project by researching the psychology behind stress and burnout and effective methods of addressing their symptoms. Additionally, I researched how these methods could be implemented in a digital tool.

2. Collecting Participants

I collected 13 students from grade 9 to 12 to participate in mental health surveys and app tests.

3. Collecting Data on Participants' Needs

Using an anonymous Google form, I collected information about the participants' current mental health needs, their previous experience with mental health and time management apps, and tools that they previously used to manage school-related stress. This preliminary information, along with my background research, helped me decide which app features would effectively address the needs of the participants and differentiate my app from existing ones.

4. Horizontal Prototype

I began designing the app by drawing how various app screens would look on paper. This method, known as horizontal prototyping, focused on how features would be arranged in the app and allowed me to draft many screens in a short amount of time. Using an online diagram software, I recreated the most intuitive screen layouts to serve as a blueprint for coding.

5. Coding Beta Version of App

I decided to code in the Python-based game design engine Renpy because of its compatibility with many operating systems, customizable user interface templates, and ability to work in conjunction with Python code, which would help store, retrieve, and organize user input. I began by coding menus and labels to navigate the app. In order to adapt Renpy's UI template into a mental health app, I deleted unnecessary features and picked calm and simple colours and fonts. I added three main features to the app:

1) A <u>guided journal feature</u> in which the user generates writing prompts focused on self reflection, mindfulness, gratitude, self-compassion, and optimism. Next, the user types their response to the prompt and their journal is saved on their computer and can be viewed within the app. Previous entries can be viewed through an in-app journal library, with each entry titled by the user.

   I coded this with three main screens: One for naming the entry, one for viewing previous entries, and one to generate prompts and write a new journal entry. In the backend, I defined a python class for different journal entries. The class defined various methods, which allowed the app to:

   - Create text documents on the user's device and organize them in a folder named 'Journal'
   - Set the document's name to what the user inputs as their journal entry title
   - Write the user's selected journal prompt and response in the text document.
     - And verify the file exists before writing
   - Retrieve each file name, so they previous entries can be viewed within the app
   - Retrieve the contents of each file, so previous entries can be read within the app

2) A <u>weekly planner</u> in which the user is prompted to select a priority level and duration for each task they input. When the tasks are displayed in the planner, they are organized and colour-coded by priority level with their respective duration listed to the right. This feature aims to effectively implement prioritization, planning, and time blocking into the app.

   I coded this with seven main screens: One to view all the weekly tasks, one to add a new task name, one to select a new task priority, one to input a new task duration, and three more to edit previous task's name, priority, or duration. In the backend, I defined a python class for different tasks. The class defined various methods, which allowed the app to:

   - Set a new task's name, priority, and duration based on user input.
     - And verify that each input exists and is in the correct format (eg. time is 1 not "one")
   - Store task information in a csv file.
   - Retrieve tasks from the csv file and display them on the main planner screen.
     - Display tasks with highest priority at the top and lowest at the bottom.
   - Edit task priority, name, and duration based on user input.
   - Delete a task from the csv file so it is no longer visible on the main planner screen.

- Clear all tasks from the csv file so they are no longer visible on the main planner screen.

3) A <u>meditation feature</u> in which the user can choose between deep breathing, square breathing, or nature meditation. All the meditations are accompanied by a video. The user can practice each type of meditation and discover which type works best for them.

I coded this with a menu where the user selects a type of meditation, followed by some instructions, a screen to show an animation of the user's selected meditation, and finally a positive message to conclude the meditation.

6. Collecting Data on Effectiveness of Beta App Design

I conducted an in-person app test, along with an anonymous Google form, to evaluate my beta app. For the in-person app test, I gave participants 5 minutes to explore the app while I took notes on their thoughts, and recorded any errors that occurred in the app (for example, if a button was not clear or visible enough to the user, and they were unsure where to click). Next, I gave the users three tasks to do and timed how long it took them to complete each task. This gave me quantitative data pertaining to how easy or difficult the app was to navigate. I continued to record the user's thoughts and any errors that occurred during the tasks. Finally, the users completed an anonymous Google form regarding their satisfaction with the appearance of the app and effectiveness of its features.

7. Editing Beta App

I analyzed the data from the beta app test and compiled a list of which features I needed to edit and how. Additionally, the anonymous Google form gave me a general idea of the user's first impressions of each app feature. During the editing phase, I also began adding an <u>activity feature</u> with stress, anxiety, burnout, and time management information. Each activity relays information interactively, prompting the user to make choices and answer questions. This information is paired with a game that explores a real-life scenario, prompting the user to apply their knowledge about mental health or time management to advance a story.

8. Testing Effectiveness of Final App

The final app was tested over a three-day period. First, the participants completed a pre-established stress questionnaire known as the Perceived Stress Scale (Cohen & Williamson, 1988). The wording of the questionnaire was adapted to follow a three-day timeline, rather than 1 month. Next, they downloaded my mental health app on their devices and used it for a minimum of five minutes a day for three days. On the final day, the users completed the Perceived Stress Scale questionnaire again. They also answered questions about the app's functionality, visual appeal, and ease of navigation. Data collected in this trial was used to evaluate the effectiveness of my final app.

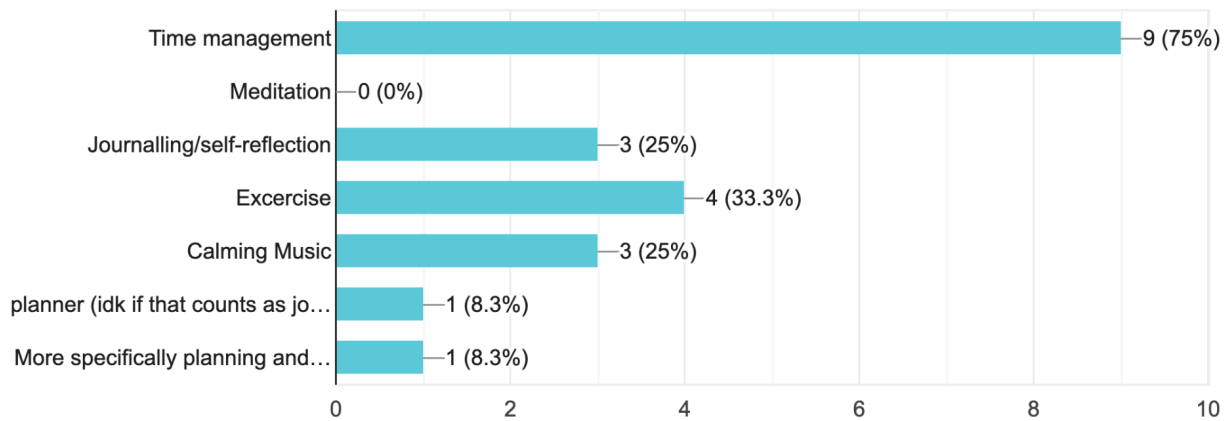## 9. Statistical Analysis of Perceived Stress Scale

Finally, a paired T-test was performed on the stress scores from the 3-day trial to determine whether the app lowered the participants' stress levels, or if it was just random chance. A paired T-test is a method of statistical analysis used to determine whether two means have a significant difference. The sample used to calculate the two means must involve the same individuals, and all subjects are assumed to be independent of one another.
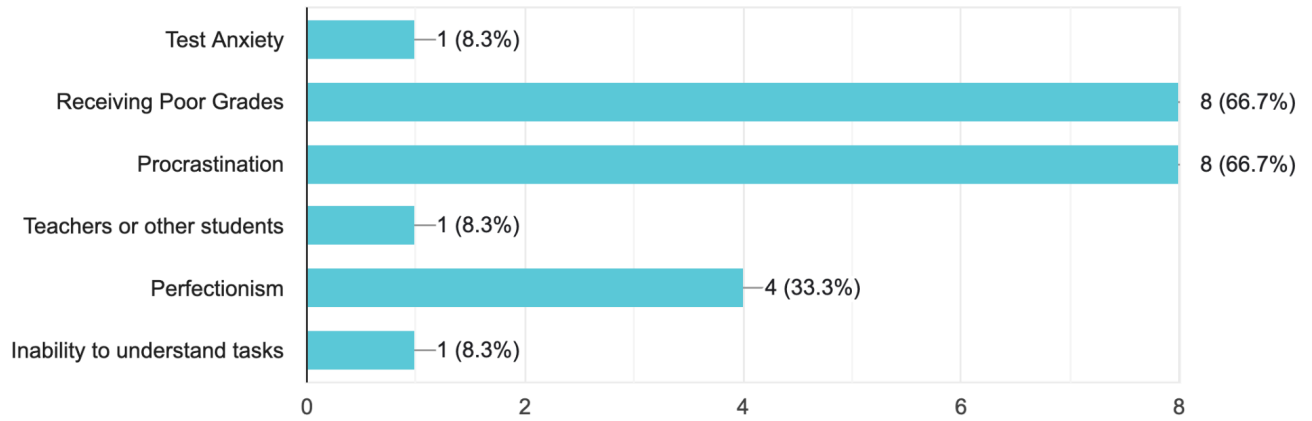
Data:

Survey 1:

Which of these stress management techniques do you find the most effective? (Pick up to two options)
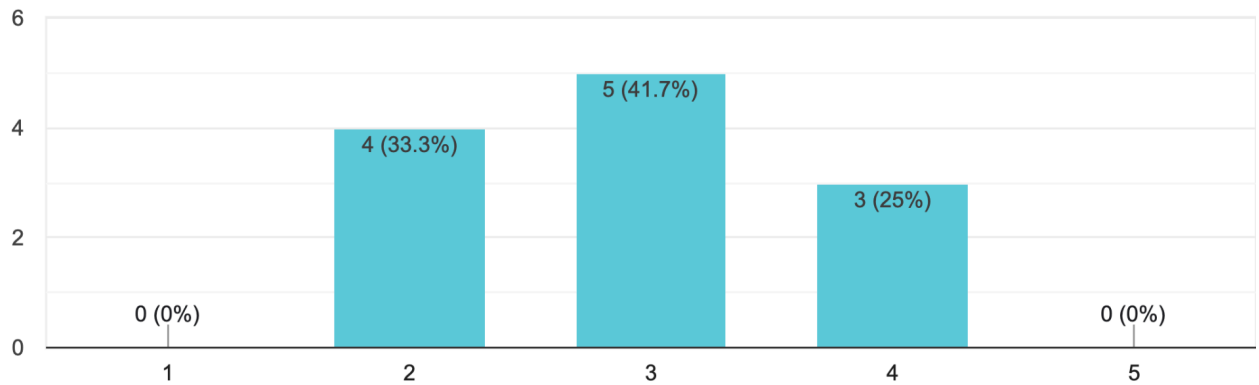
12 responses

Which of the following do you find most stressful? (Pick up to two options)
12 responses

Category	Count
Test Anxiety	1 (8.3%)
Receiving Poor Grades	8 (66.7%)
Procrastination	8 (66.7%)
Teachers or other students	1 (8.3%)
Perfectionism	4 (33.3%)
Inability to understand tasks	1 (8.3%)

On average, how difficult is it for you to manage school-related stress?
12 responses

Rating	Count
1	0 (0%)
2	4 (33.3%)
3	5 (41.7%)
4	3 (25%)
5	0 (0%)

Imagining an average school week, list out everything you do to manage school-related stress:

11 responses

I'll allocate time in my spares to catch up on things. If I do badly on a test, I study harder for the next one.

Study, study, study, study, study, do homework, study, study

I go through each subject, and look at what have homework for so I can manage what I need to prioritise. After organising my work, I start on what I need to do so I can be ready for due dates.

Other things I do include talk with close friends about stress and play video games.

make a calendar, make a to-do list, find a quiet space to work, print off things to avoid distractions on computer, have a system for taking notes, sleeping lots

I very rarely try to manage my stress, usually it just stays with me

I schedule my time in my planner to figure out how to accomplish homework, I go on tons of walks, I ask for help when I don't understand concepts, I keep my assignments and paper organized in my backpack/binder.

Go to the gym, listen to music, read books, clean up around the house, hang out with friends, study at the library, meet with my tutor.

Walk, do work

I try to list out a list of to do's of things I need to get done in the upcoming week. To manage the stress I try to plan out the order of the tasks in order of which ones are causing me the most stress. Another thing I do to try to manage stress is to take breaks while I'm doing something. If I am getting frustrated with trying to work a problem out, I will take a break (usually watch a Youtube video and eat a snack) before I try to attempt the problem again.
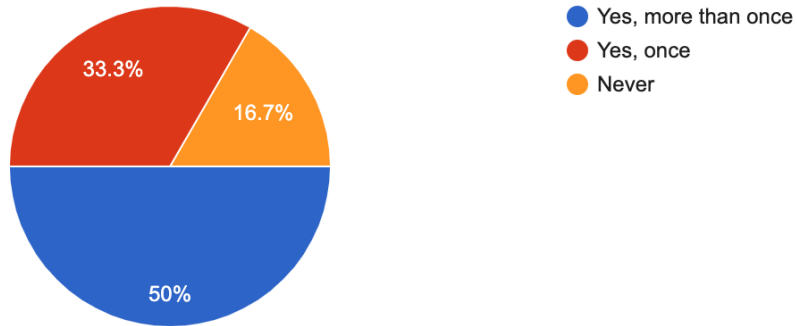
I hand write everything I need to do in a list, and then think through what I need to do to accomplish those things. For more important/urgent or stressful things I will write out the steps to get there as well. I also put everything into a calendar, a paper one for just the big stuff (like a test or the due date of a unit project) and an online one with everything in it.

- Space out assignments evenly and try to get work done in school
- Make to-do lists to help prioritize
- Focus on getting things done "earlier rather than later"
- Reward myself with free time after finishing important tasks
- Make sure to relax almost every weekend - try to finish assignments before the week ends!

Burnout is an inability to meet constant demands resulting in exhaustion and a lack of motivation. Have you experienced school-related burnout?   Copy
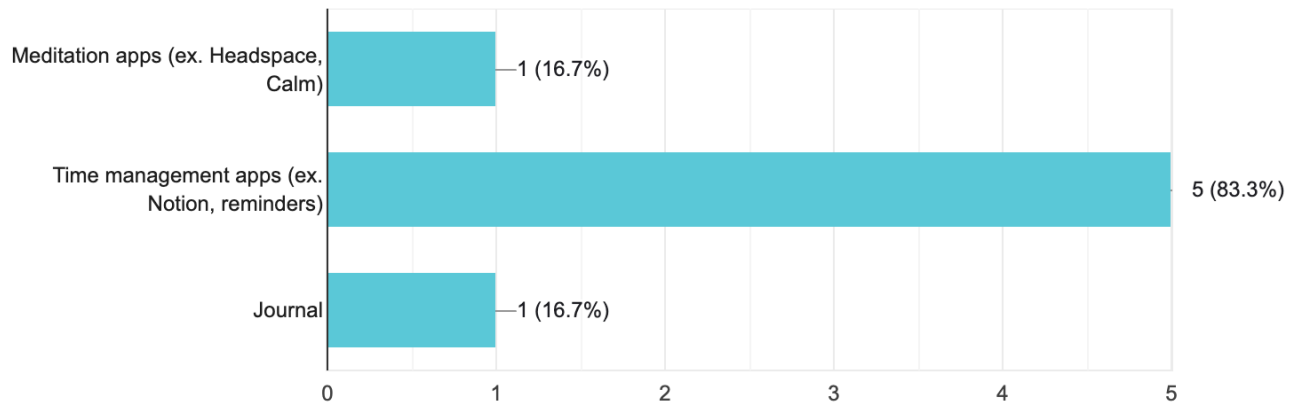
12 responses

- Yes, more than once
- Yes, once
- Never

33.3%
16.7%
50%

Which of the following tools have you used to address school-related burnout, if any?   Copy

6 responses

Meditation apps (ex. Headspace, Calm) — 1 (16.7%)
Time management apps (ex. Notion, reminders) — 5 (83.3%)
Journal — 1 (16.7%)

Do the tools you selected above meet your needs? Why or why not?

8 responses

no because i'd use them for a bit then forget they exsist

I have never used any of those.

Notion does its job

Yes, especially to do list and reminder apps. To do lists de stress me a lot because everything is organized in one place. Reminders are helpful so I don't worry about forgetting things.

Yes. Mainly because these apps help to create a stable thought out plan for me to follow through with whenever my schedule or day to day life becomes too overwhelming.

though I do use reminders, I like the physical feeling of actually crossing off things on a to do list. It actually gets me more motivated to get to satisfyingly cross it off instead of simply pressing a screen.

Yes. I have all my to-do lists, reminders, and some upcoming dates in my journal. I will occasionally use a meditation app called Breathr, which I find helpful most of the time that I use it. I will say I don't use it enough for it to have a longer term effect, though.

For me, it is best for me to rest and relax before or during when I am burnt out. This way, I can quickly regain my pace without stretching my burn out over a long period of time. Even though I may fall behind on some assignments, I usually try to do the most important things so work doesn't snowball.

Of these meditation techniques, which do you find the most effective to prevent burnout? If you have never meditated before, please skip this question. (Pick up to two options)

6 responses

Technique	Value
Guided meditation	3 (50%)
Breathing meditation	5 (83.3%)
Walking meditation	1 (16.7%)
Gratitude meditation	0 (0%)
Mantra (repeated phrases) meditation	0 (0%)
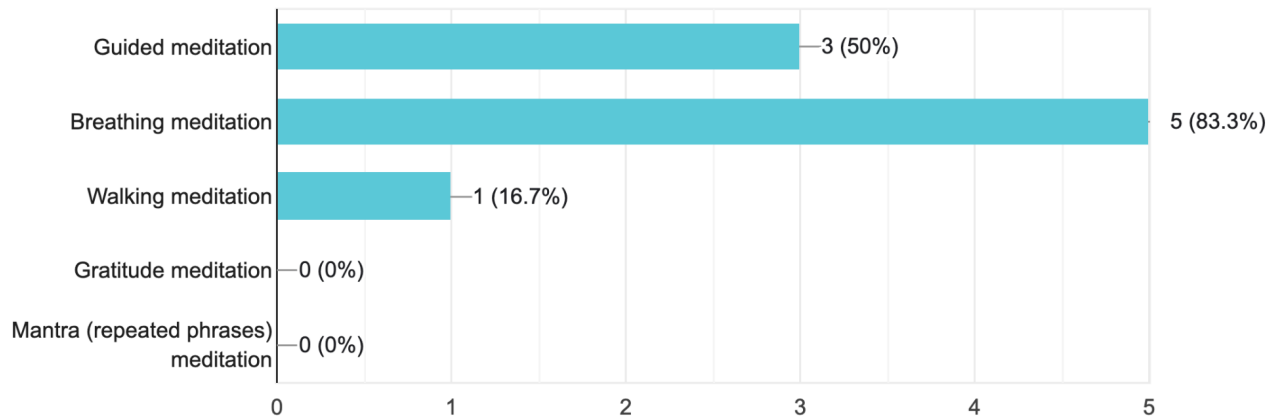
What features of a mental health app would motivate you to use it regularly? (i.e. if you have used a mental health app before, what did you like?)

12 responses

reminders

Something without any sort of quiz-based grade for where you're at now. Something that doesn't care where you're at, just wants to help you get better.

For me, the motivation comes from building up a streak and keeping that streak. The idea of breaking that streak eventually becomes a very saddening thought

Organization, time management

Proper explanations of where you should mentally be and definitions of terms. I did not know I had been experiencing burn out until I read up on the definition.

Something where you would rate yourself on a scale and give an example of what value from 1-10 would be or make the scales very specific with multiple scales. With this information give advice.

An emergency resource tab (hotlines, websites, being able to add custom links for each user)

Having to maintain a streak of some sort (I have never used a mental health all before but this is what I would imagine would motivate me)

I like it when it tracks which days I use it. That way, I'm motivated because I don't want to break my streak.

Having positive reminders set up to pop up on my phone, or having the app look appealing to the eye.

Virtual incentives (currency, etc.)

something like a daily prize or reward like every day you open the app you can unlock something (digital pet or a sticker). Completing a mental health goal could also be one of the factors to unlock these things. It doesn't even need to connect to other apps just be a tab that has your "prize" gallery or something. I have not used a mental health app before but apps that I use daily or often usually have some kind of reward system or a goal to work towards.

On apps before, I have enjoyed a place to write my thoughts and look back. I also think it would be beneficial to have optional notifications, or optional reminders to use the app.

An all-in-one mental health app that can help you keep track of assignments, meditate, journal, etc. is what would be best! That way, you don't have to spread out your stress management over many apps and it can all be found in one.

What features would demotivate you from using a mental health app? (i.e. if you have used a mental health app before, what did you not like?)

12 responses

when half of the stuff is locked behind a paywall

Opposite to my motivation, something that scores you on mental health seems like you'll only be more stressed about it.

The one mental health app I used was mostly blocked behind a paywall, so most of the strategies that it gave to improve your mental health were unreachable unless you were willing to pay actual money

Hard to navigate

Collects information or knows anything related to my phone number or address. I would never want that linked to me.

Incessant notifications, just a few to remind me

I don't like when it sends me constant notifications, which can be annoying.

Too much content for me to go through to make schedules, simple templates work well for me.

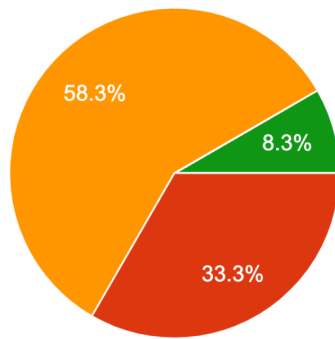No option to toggle notifications, ugly widgets

honestly if the app aesthetic is boring and too complicated. I would get motivated to use it more if its simple.

If the app had notifications that couldn't turn off or were difficult to turn off, that would demotivate me. Also if the app wasn't easy to get around, it would make it more difficult to use, so simpler is better.
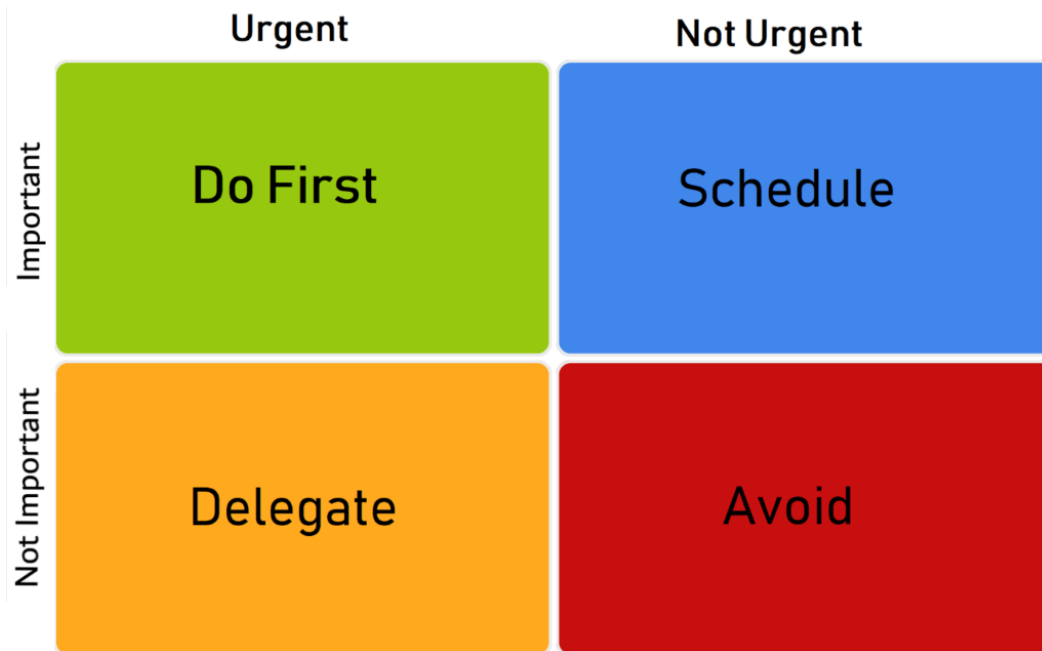
Difficult interface and/or having a steep "learning curve" to use an app.

If you were to use an anti-burnout app, how often would you envision yourself using it?
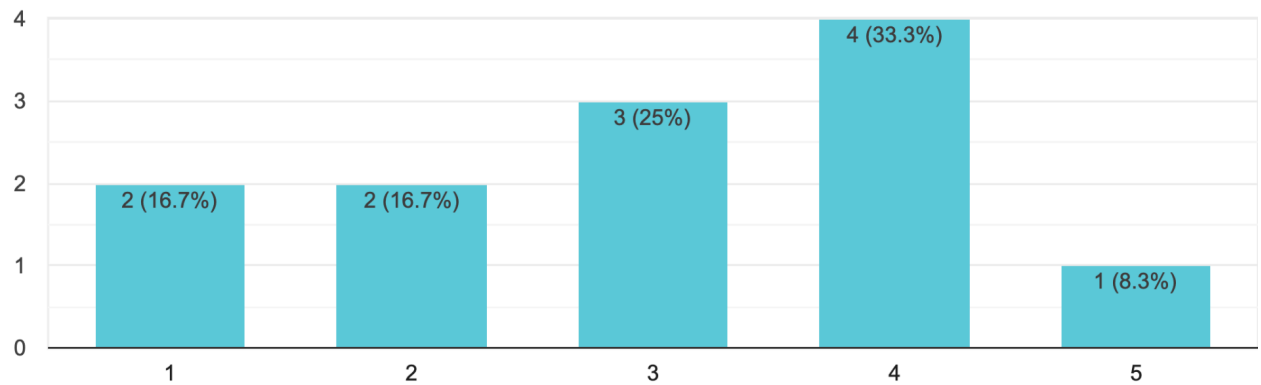12 responses

Legend:
- Multiple times a day
- Once a day
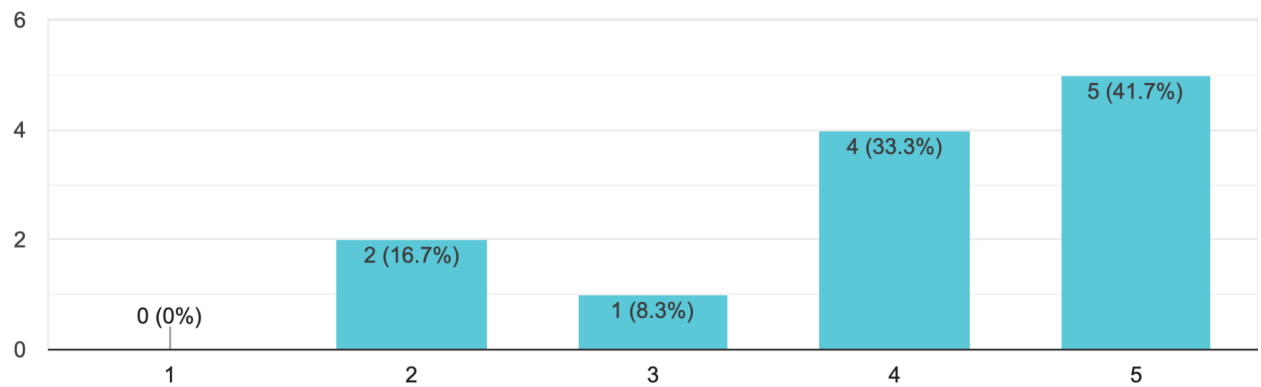- Few times a week
- Once a week
- Once a month or less

Pie chart values:
- 58.3%
- 33.3%
- 8.3%

	Urgent	Not Urgent
Important	Do First	Schedule
Not Important	Delegate	Avoid

Do you believe a priority table (shown above) is an effective way for you to prevent burnout?
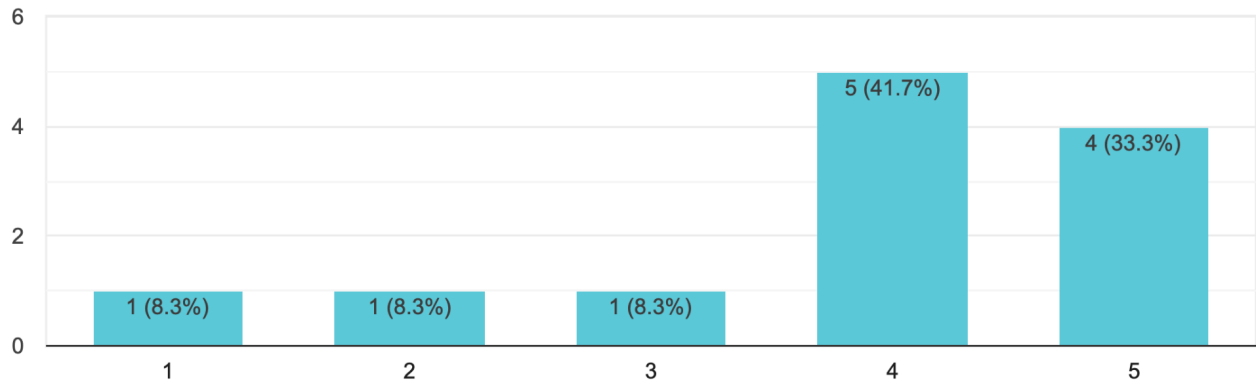
12 responses

Do you believe using a monthly calendar is an effective way for you to prevent burnout?
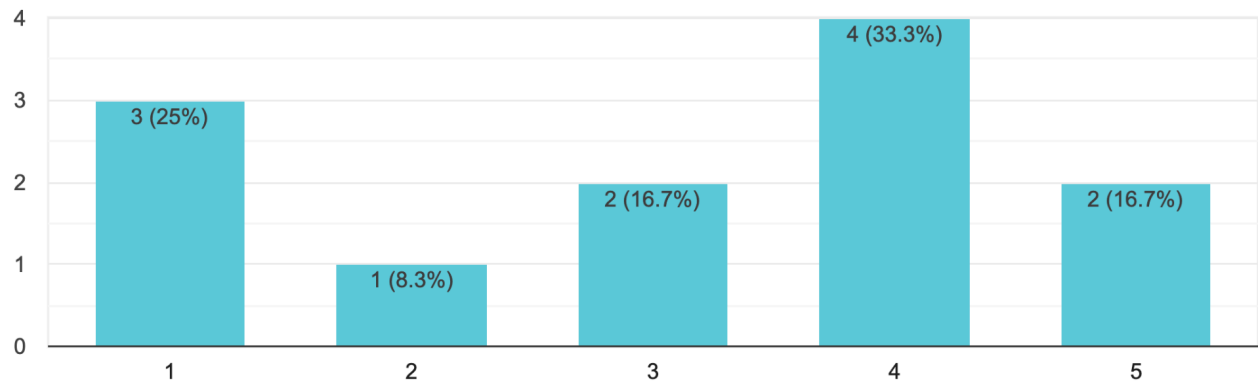
12 responses

Do you believe using a weekly/daily planner is an effective way for you to prevent burnout?
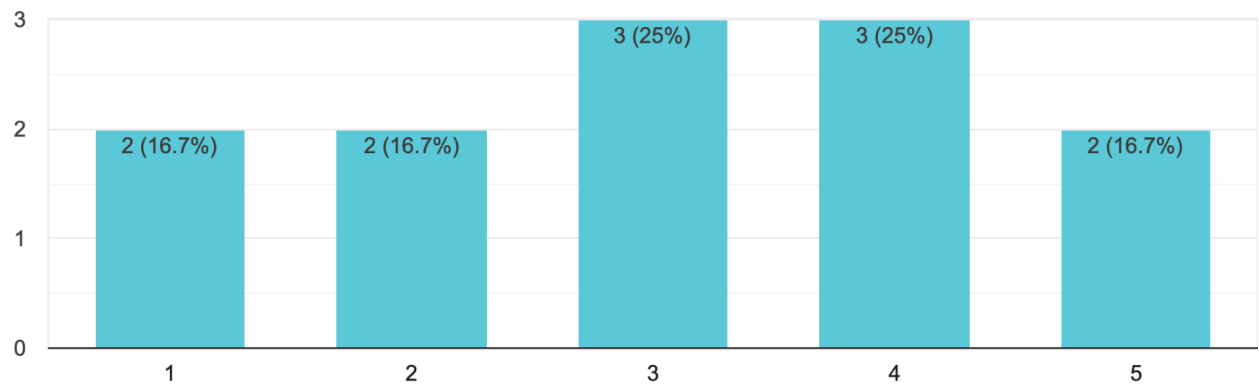12 responses

Do you believe Blocking your time is an effective way to prevent burnout (ex 6-7 pm for extracurriculars, 8-9 for school work, 9-10 to relax) is an effective way for you to prevent burnout?

12 responses

Do you believe using a pomodoro timer is an effective way to prevent burnout (ex. Intervals of 30 minutes work, 5 minutes rest)

12 responses

Beta App Test (Participant names hidden) :

Survey 2 - Beta App Test

Participant Name:

[handwritten top right: Bigger buttons | Task descriptions]

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	go to start thinking that the features can be very helpful views → tools first → no specific reason
How many times does the user try to do something they can not do?	1 Text editor can't click to edit
How many times does an error occur?	User makes error but recovers: 0 User makes error and needs help: ○
How many times does the user ask for clarification?	0

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 4 seconds Number of app crashes: ○ Number times user makes error but recovers: ○ Number of times user makes error and needs help: ○
Starting from the main menu, find the planner and add a new task.	Time taken: 42 seconds Number of app crashes: ○ Number times user makes error but recovers: 1 Number of times user makes error and needs help: ○
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 15 Number of app crashes: ○ Number times user makes error but recovers: 1 Number of times user makes error and needs help: ○

Is the app functional?	
How many times does the app crash in total?	0

Other: Instead of back, make it ⟵   change Menu

Activities
1) Helpful
2) Helpful
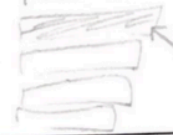3) Good thing, not often practiced
4) Helpful

and other shortcuts → Make Main Menu return more clear

Make Task priority more clear

Survey 2 - Beta App Test

Participant Name:

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	Minimalistic good colour Like how you can time in how many mins. Go to start. Good intro, nice interface. Add boxes around next back
How many times does the user try to do something they can not do?	‖ Enter instead of click
How many times does an error occur?	User makes error but recovers: ⭘ User makes error and needs help: ○
How many times does the user ask for clarification?	ǀ

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 11 s Number of app crashes: ○ Number times user makes error but recovers: ○ Number of times user makes error and needs help: ○
Starting from the main menu, find the planner and add a new task.	Time taken: 38 s Number of app crashes: ○ Number times user makes error but recovers: ǀǀ Number of times user makes error and needs help: ○
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 15 s Number of app crashes: ○ Number times user makes error but recovers: ǀ Number of times user makes error and needs help: ○

Is the app functional?	
How many times does the app crash in total?	○

Other:

1) Explaining help you plan better
2) Complements tools
3) good clean
4) Change name

Survey 2 - Beta App Test

Library
Open

Participant Name:

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	– Clean – Easy to navigate : minimal # of buttons – Back arrow image is better
How many times does the user try to do something they can not do?	0
How many times does an error occur?	User makes error but recovers: 0 User makes error and needs help: 0
How many times does the user ask for clarification?	0

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 15 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0
Starting from the main menu, find the planner and add a new task.	Time taken: 20 seconds Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help: 1
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 12 seconds Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:

Is the app functional?	
How many times does the app crash in total?	1 Stuck because of meditation

Other:
1) Applicable, many struggle on a daily basis
2) Applies to First
3) Applies to first
4) ↓

Change Help → continue
specify click
to continue
on input   *okay*

Titles   *add a*
Activity   *description*
Tools   *to menu*

Survey 2 - Beta App Test

Participant Name: ...

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	go to start — went to tools first ↳ more applicable. good text speed. size and location of text makes sense. ↳ bold key words. went to planner ↳ More applicable
How many times does the user try to do something they can not do?	1 Typed h for hours (duration)
How many times does an error occur?	User makes error but recovers: 1 User makes error and needs help: 0
How many times does the user ask for clarification?	0

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 6 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0
Starting from the main menu, find the planner and add a new task.	Time taken: 29 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 1 priority won't change colour
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 19 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0 took some time to find "open"

Is the app functional?	
How many times does the app crash in total? or becomes dysfunctional in any way	1 Stuck in meditation when clicking back on tools menu (minor) → 2 ellies on activity tool screen

↗ drop downs   Meditation reminder

Other:
Activities → change name   Hesitates at journal submit
1) necessary to understanding
2) Good   and another for
   remove   activities
3) "all about"
explain how 4) Add situations (story things you don't   Back continue Read...
its   ↳ More intersting revisit ↗ tell others
valuable
Make a free journal → more gen. Trying to click continue
   prompts about day

— maybe a place with website links (like bookmark)

Survey 2 - Beta App Test
Participant Name:

add prompt to read library
meditation length not functioning
└ maybe add slides instead of input
own time

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	Initial — looks like slideshow Start — looks like game
How many times does the user try to do something they can not do?	
How many times does an error occur?	User makes error but recovers:	*doesn't know how to exit library* User makes error and needs help: || *where to go next after naming entry*
How many times does the user ask for clarification?			how to exit app? *priority not changing colour* *empty screens after meditation*

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 5 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0
Starting from the main menu, find the planner and add a new task.	Time taken: 43 seconds *make error message pop up earlier* Number of app crashes: 0 Number times user makes error but recovers:	*forgets to input priority* Number of times user makes error and needs help: 0
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 14 seconds Number of app crashes: 0 Number times user makes error but recovers:	*clicks on entry not open make bigger* Number of times user makes error and needs help: 0

Is the app functional?	
How many times does the app crash in total?	0

OPEN

Other:

1) Good to understand
2) Good
3) Good
4) Wouldn't click, what is it about?

box for text input Enter ▯ or padding
— make bottom buttons bigger
move and make bigger
skip button

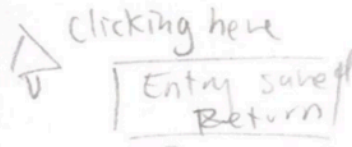# Survey 2 - Beta App Test

Participant Name:

please ensure... okay

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	- elephant is cute - nice comments ↳ "reminder that..." ↳ explanation
How many times does the user try to do something they can not do?	1 clicks outside of error message insted of clicking okay
How many times does an error occur?	User makes error but recovers: User makes error and needs help:
How many times does the user ask for clarification?	
Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 7 seconds Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:
Starting from the main menu, find the planner and add a new task.	Time taken: 54 second Number of app crashes: Number times user makes error but recovers: 1 *didn't see durartion entry* Number of times user makes error and needs help: 1 *clicks preferences*
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 11 seconds Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:
Is the app functional?	
How many times does the app crash in total?	

Other:

1) All are good
2)
3)
4)

Activities — games for incentive ⎫ like
topics challenges, move up rank ⎭ duolingo

Survey 2 - Beta App Test

Participant Name:

clicking here
Entry saved
Return
- cap time @ 24 hours
- Prompt of the day

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	- Like the elephant - clicking to advance - unclear "click again once you're done" - small things: more clarity
How many times does the user try to do something they can not do?	
How many times does an error occur?	User makes error but recovers: 1 where to click after User makes error and needs help: entry saved
How many times does the user ask for clarification?	

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 6 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0 *doesn't click*
Starting from the main menu, find the planner and add a new task.	Time taken: 19 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0 *skip button*
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 15 seconds - hard to find Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0

Is the app functional?	
How many times does the app crash in total?	

Other:

1) Good topics
2)
3)
4)

- legend for colours
- encourage user to set goals
  ↳ streak
  ↳ guided

hesitate @ blank screen
click outside of
error to exit

Survey 2 - Beta App Test

Participant Name:

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	
How many times does the user try to do something they can not do?	1 *click back button on journal*
How many times does an error occur?	User makes error but recovers: User makes error and needs help:
How many times does the user ask for clarification?	

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 5 *seconds* Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: ◯
Starting from the main menu, find the planner and add a new task.	Time taken: 14 *seconds* Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 11 *seconds* Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:

Is the app functional?	
How many times does the app crash in total?	◯

Other:
1) Shorten title *understanding*
2)
3)
4)

– add tasks to more than 1 day at once

How many minutes
← center

Bigger back button

Survey 2 - Beta App Test

Participant Name:

Is the app intuitive? (3 minutes free clicking)	— familiar planner (like paper planner) meditation
User's thoughts while interacting with the app	- feels friendly - variety of exercises - elephant is nice ↳ visual - nature meditation is quiet (good thing) - journal nice to have a record
How many times does the user try to do something they can not do?	-
How many times does an error occur?	User makes error but recovers:	How to go back from User makes error and needs help: activity menu?
How many times does the user ask for clarification?	

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 5 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: ○
Starting from the main menu, find the planner and add a new task.	Time taken: 56 seconds Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:	
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 17 seconds Number of app crashes: Number times user makes error but recovers:	clicks entry instead Number of times user makes error and needs help: of open

Is the app functional?	
How many times does the app crash in total?	

Other:

1) valuable
2) Help Gets rid of stress
3) self care, important for
4) connects to mindfulness

- good colour scheme

make whole box clickable

Survey 2 In-Person Beta App Test

1. categories Title can be shorter
2. are good. understand Stress, Anxiety, Burn out
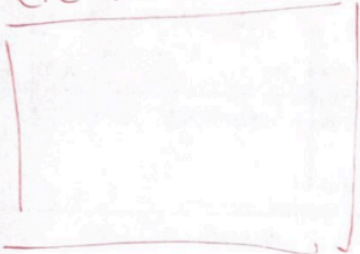4. Seperated well, more broad topics.

Participant Name:

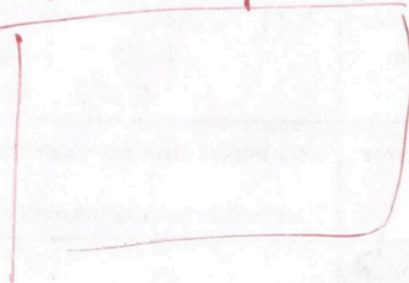| Is the app intuitive? (3 minutes free clicking)	covers all the bases
User's thoughts while interacting with the app	Elephant is very cute Calming interface w/ calming colours. Top is too empty.
How many times does the user try to do something they can not do?	IIII click back arrow to go back click back istead of return to tools menu 0:02 time OKAY button @ journal for planner not obvious (error)
How many times does an error occur?	User makes error but recovers: User makes error and needs help:
How many times does the user ask for clarification?	

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 4 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0
Starting from the main menu, find the planner and add a new task.	Time taken: 15 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 13 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0

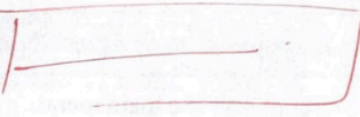| Is the app functional?	
How many times does the app crash in total? or is otherwise dysfunctional	I

Going back to tools page is too clunky to navigate
⇒ Add edit feature for journal

Interface change

Buttons instead of text ⇒ whole button

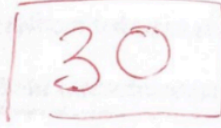Create a new entry | Read a previous entry

January — to — Todays date is |———————

Like the priority levels.

Different way to input time in planner

⅓ meditation

| 9 | : | 30 |

Scroll (like iphone)

Make consistent meditation graphics

Press enter to go next on screens

Survey 2 In-Person Beta App Test

1)
2)
3)
Like the topics.

Like colours, 4)   Like elephant, look helpful
soothing   friendly

Participant Name:

Is the app intuitive? (3 minutes free clicking)	Like planner layout Like movement of deep breathing
User's thoughts while interacting with the app	Like how it shares features step by step circle Like the tool options
How many times does the user try to do something they can not do?	
How many times does an error occur?	User makes error but recovers: User makes error and needs help:
How many times does the user ask for clarification?	How to click (Text not button)

Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 8 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0
Starting from the main menu, find the planner and add a new task.	Time taken: 50 seconds Number of app crashes: Number times user makes error but recovers: 11 Number of times user makes error and needs help:
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 23 seconds Number of app crashes: 0 Number times user makes error but recovers: 1 Number of times user makes error and needs help: 0

forgot to add time
tries to click enter
to submit

open can be more obvious
clicks button not text

Is the app functional?	
How many times does the app crash in total?	0

Harder to see time

doesn't show previous priority

Survey 2 In-Person Beta App Test

1) Great
★2) Great   Good topics
3) Good
4) Good

Random videos
Nature
meditation

Participant Name:

Is the app intuitive? (3 minutes free clicking)	
User's thoughts while interacting with the app	
How many times does the user try to do something they can not do?	
How many times does an error occur?	User makes error but recovers: 1 clicks enter → goes to read previous entries User makes error and needs help:
How many times does the user ask for clarification?	1) Back "Just go back." How to return 2) New prompt shows up → where to click?
Is the app easy to navigate? (5 minutes)	
Starting from the main menu, find the list of activities.	Time taken: 7 seconds Number of app crashes: 0 Number times user makes error but recovers: 0 Number of times user makes error and needs help: 0
Starting from the main menu, find the planner and add a new task.	Time taken: 15 seconds Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:
Starting from the main menu, find the guided journal and read a previous journal entry.	Time taken: 9 seconds Number of app crashes: Number times user makes error but recovers: Number of times user makes error and needs help:
Is the app functional?	
How many times does the app crash in total?	0

More clear how to go back to menu (after meditation click to continue instead of blank screen.
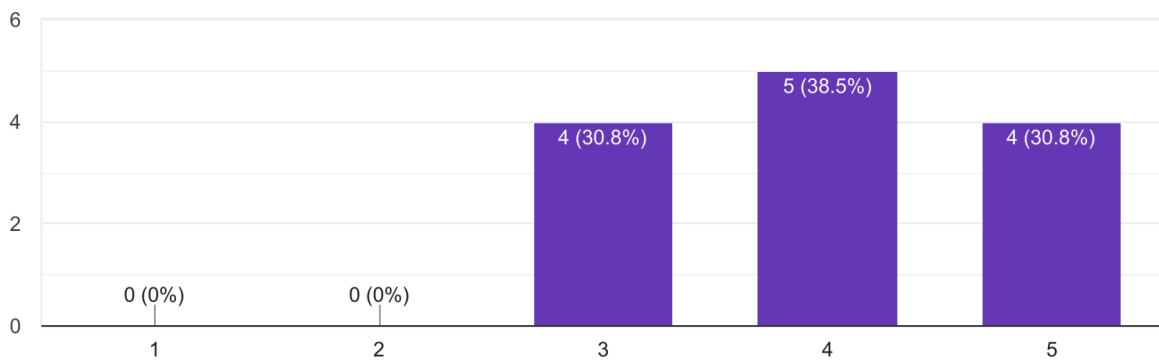
Survey 2:

Agree or disagree: The colors and layout of the app are visually appealing
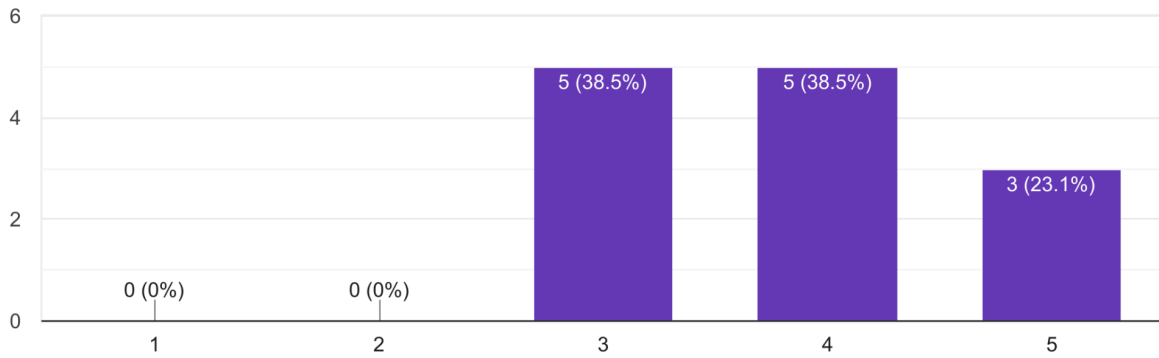
13 responses
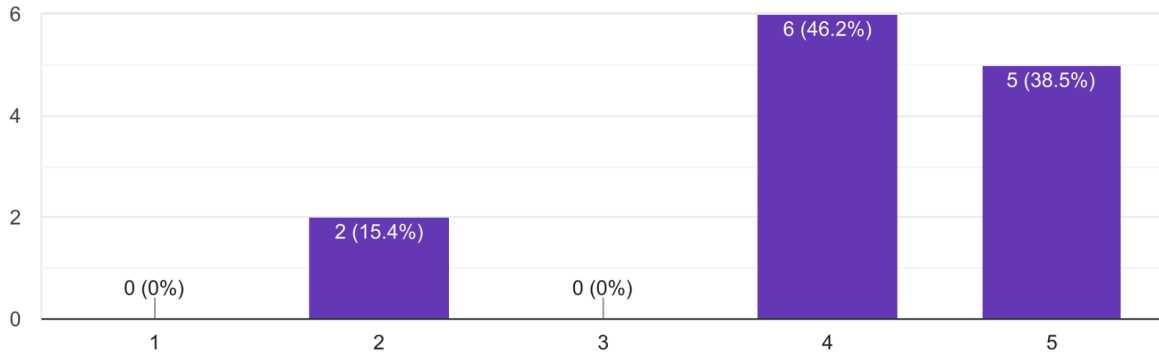
Agree or disagree: The time management feature is effective for preventing or recovering from burnout. (Burnout is an inability to meet constant ...g in exhaustion, a lack of motivation, and cynicism)
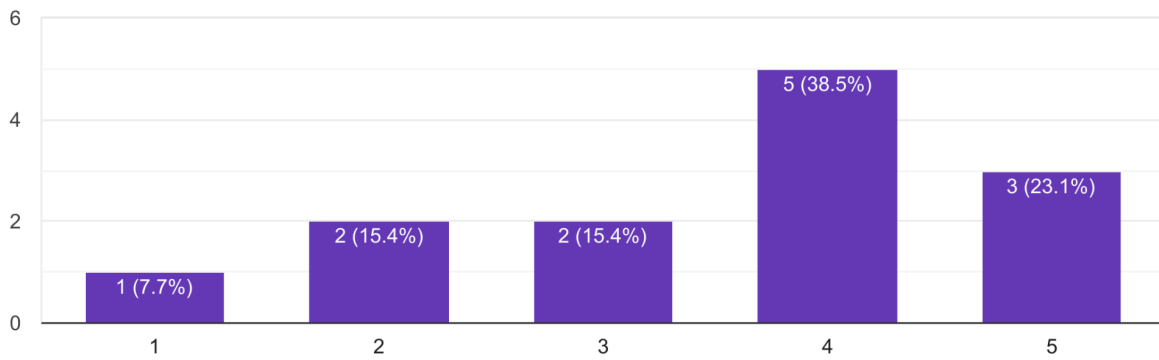
13 responses

Agree or disagree: The time management feature is effective for reducing stress
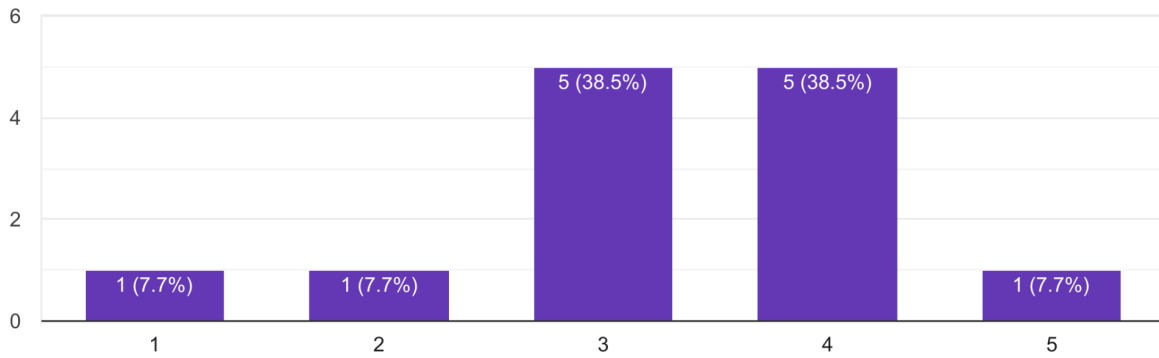
13 responses

Agree or disagree: The meditation feature is effective for reducing stress.
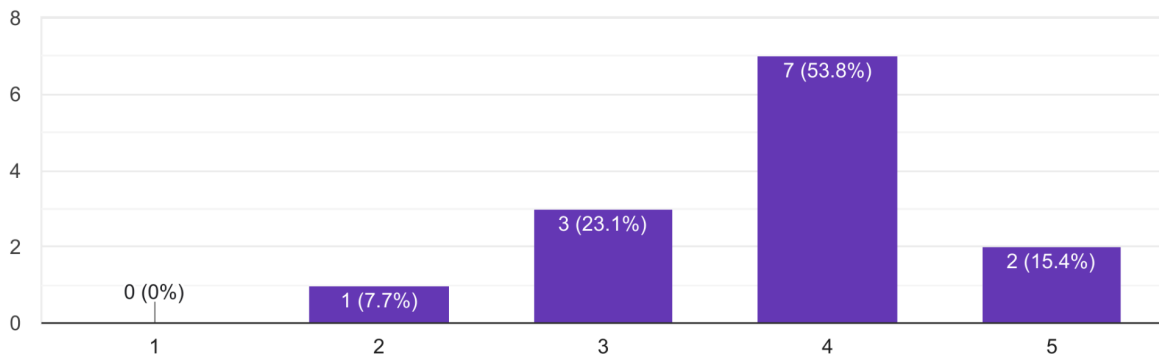
13 responses

Agree or disagree: The meditation feature is effective for preventing or recovering from burnout.
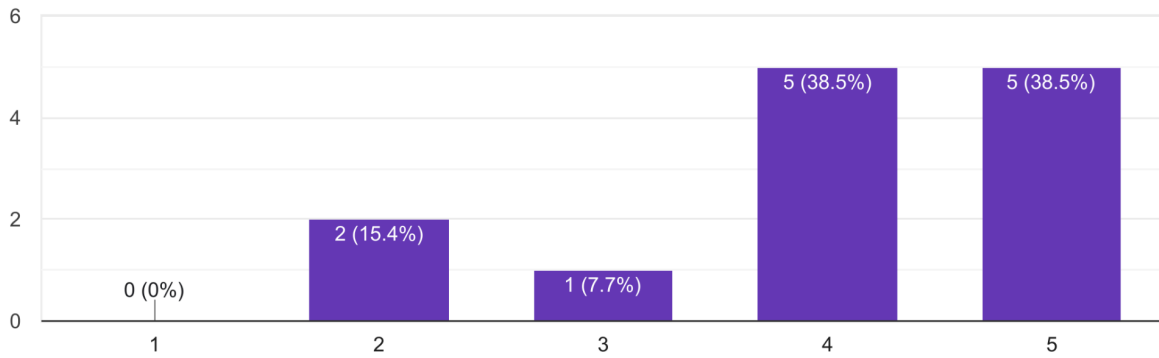
13 responses

Agree or disagree: The guided journal feature is effective for reducing stress.
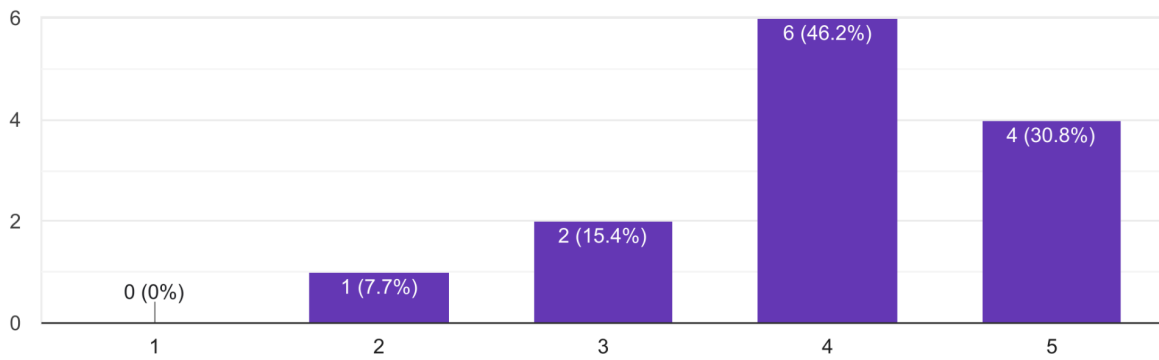
13 responses

Agree or disagree: The guided journal feature is effective for preventing or recovering from burnout.
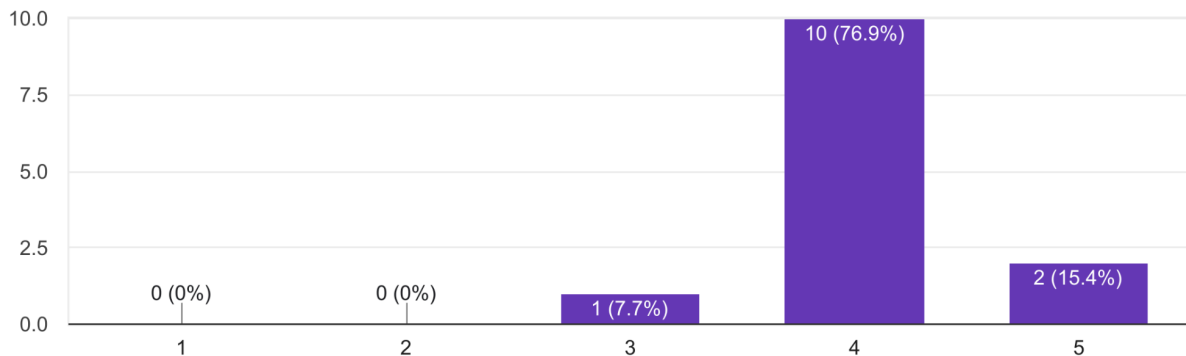
13 responses

Agree or disagree: The activities features will be effective for reducing stress.

13 responses

Agree or disagree: The activities features will be effective for preventing or recovering from burnout.

13 responses

How can the existing app features be improved?

8 responses

As of now, many of the buttons to navigate only work when the text is clicked. To make it more accessible, the whole button should work.

I think specific questions to answer for the journaling would be nice. I struggle sometimes knowing what to write when I journal, so it would be nice to have structure.

I think the journal could be improved by having a "prompt per day", where it cycles through a list of generated prompts (e.g 1/day of the year), and when it goes through the cycle again, you can see your progress from whenever you last completed said prompt.

The meditation is good, but I think its a little bit difficult to understand. Especially right before the meditation actually starts. It's a little bit unclear as to what you should do in some parts

The time management feature is good. I wouldn't say it would prevent burnout, but it would definetely reduce stress by having all of your priorities laid out in front of you

More obvious button for opening previous journal entries

maybe add videos for the guided meditation? Other than that I really love the way you set the app up. It looks amazing.

making the buttons more clear; different colored 'cushions' around them, to make them more visible without looking for them

General improvement of AI and being able to get around the app (instead of having to go back to the main menu each time).

I think all the features are really well done and don't need much improvement.

What new features would you add to the design, if any?

7 responses

Bigger buttons that more people could understand. In a tool like this, accessibility features are very important. I would also add a font selector so you can choose accessibility fonts like OpenDyslexic.

I think the existing features are wonderful and wouldn't add more!

Having a more 'step by step' approach to walk you coach you through some things would be nice. I reccomend checking out the app "Fabulous", which does this in a very good manner

Also a goal setting feature would be nice. It'd be cool to set certain goals such as "I will check my calendar every day", and be able to check that off every morning to get a visual reminder of a streak you have

Maybe like a streak for completely your daily tasks?

a tool/activity that outlines and describes effective study techniques and habits for exams, maybe even with a timer or additional mini schedule for the additional techniques.

A "pull out tab" that lets you jump from feature to feature.

Any other comments regarding the app design or effectiveness?

4 responses

I love how calming and easy to navigate the app design is!

N/A

Nope, overall the app is very good! It's already useful for work scheduling, but I feel it could be made eeeeeeven better!

I did not have enough time to test the meditation feature in it's full capacity so I did not give a fully accurate grading on it! (Not sure where else to put this).
The app design is a great beta test and the features balance managing stress and recovery of burnout well for an app designed for students.
Quality of life improvements and/or aesthetic improvements can be made as development continues but they are minute!

maybe a daily reflection section where there are just a couple things you could check off for the day. how are you feeling 1-10 or how well did you manage stress today. something that can just be a small reflection and awareness of any stress that occurs during the day.

Analysis

Survey 1

Note: Graphs for survey 1 can be found in the data section of the logbook. Because survey 1 was conducted over Google forms, the graphs were automatically created by Google using the data.

The data from survey 1 shows participants have a strong preference towards **time management** as a stress management technique (selected by 75% of participants), followed by exercise (33.3%), journaling (25%), and calming music (25%). 0% of participants consider meditation to be the most effective technique. Although studies have shown both time-management and meditation effectively manage stress, there is a large discrepancy in their rankings in this survey. A possible explanation for this discrepancy is that time management is commonly taught and practiced in school settings, whereas meditation is not. Participants may have selected time management as an effective strategy because they have more experience with it, compared to meditation.

Receiving poor grades (66.7%) and **procrastination** (66.7%) are the two most significant stressors among the participants , followed by perfectionism (33.3%). A small percentage of participants considered test anxiety, teachers or other students, or the inability to understand tasks to be significant stressors.

On average, the participants find it **neither very difficult nor very easy** to manage school related stress. In order to manage their school-related stress, the participants prioritize tasks using to-do lists or planners, spend time doing schoolwork, and make time for self-care activities such as gaming, socializing, and proper sleep.

50% of participants reported **feeling burnt out more than once** in response to school. 33.3% reported feeling school-related burnout once, and 16.7% reported never feeling school-related burnout. Out of time management apps, meditation apps, and journaling, **time management apps** were the most commonly used burnout management tools, selected by 41.6%. 50% of participants reported not using any of the three aforementioned tools.

Participants found that **to-do list apps and reminder apps** helped them de-stress, and provided a stable plan to follow. Others commented that time management apps, meditation apps, and journaling did not meet their needs because they forget about them over time, or don't use them enough to show a long-term effect. One participant noted a preference for physical to-do lists, as crossing off a task in real life is more satisfying than pressing a button. Another participant noted that they preferred to relax when experiencing burnout, even if they fell behind on some assignments. This wide array of responses indicates that no single method of de-stressing or preventing burnout works for everyone. The app should follow a more holistic approach and offer a variety of strategies for the users to choose from.

Out of different meditation techniques, participants reported a preference for **breathing meditation** (5/12 participants), followed by **guided meditation** (3/12).

Many participants noted that **optional reminders** and **virtual incentives** such as streaks would motivate them to use a mental health app. Participants may have reported these features as being motivating because they are commonly used in educational apps (e.g. Duolingo). Other factors that would motivate the participants to use the app were organization, time management, journaling, mental health information and check-ins, an emergency resource tab, and having a variety of features included in a single app. Time-management being a motivating factor is reasonable, because it was considered an effective stress-management technique by participants. 33.3% of participants envisioned using a mental health app once a day, 58.3% envisioned a few times per week, and 8.3% envisioned once a week.
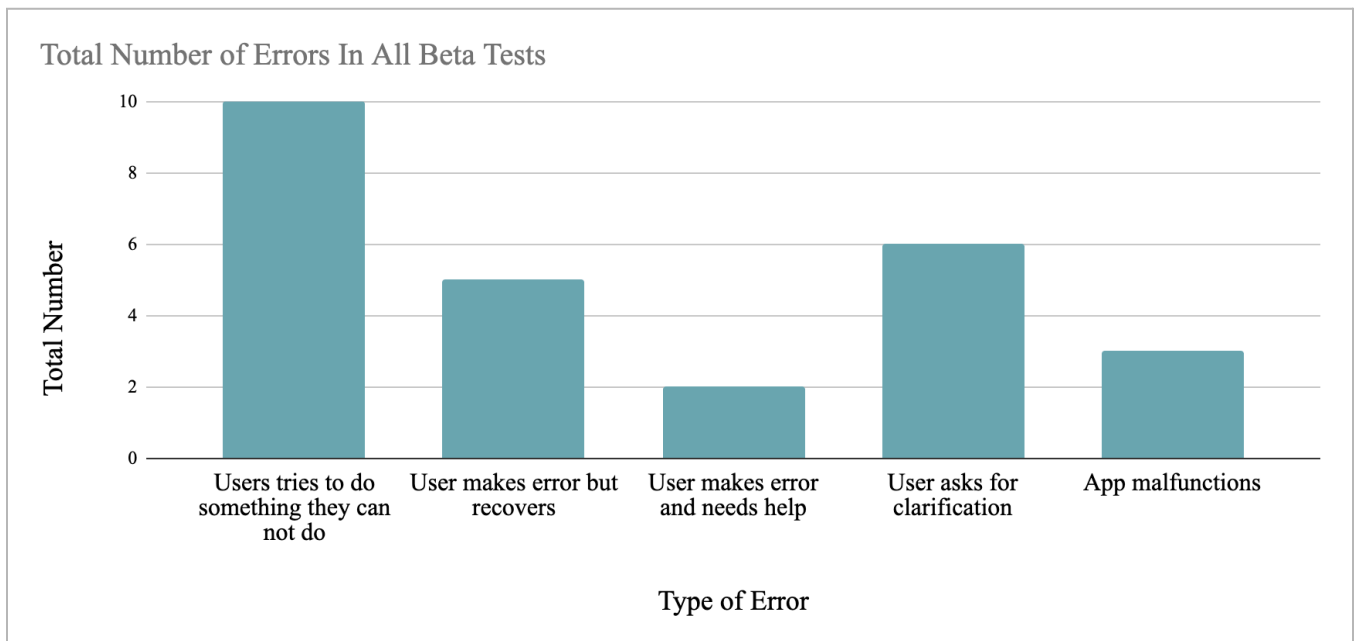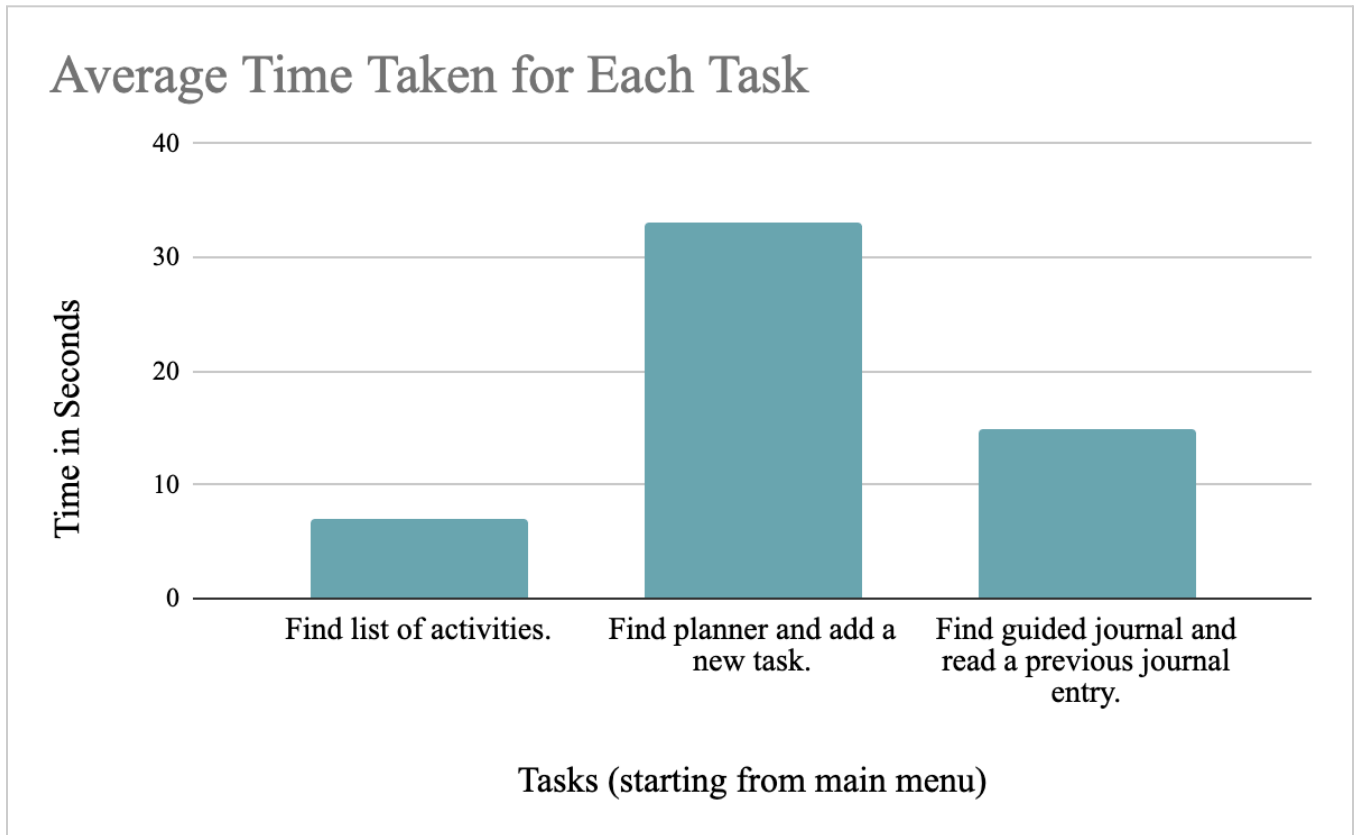
Many participants noted that **incessant reminders** and **unappealing or overly complicated user interface** would demotivate them from using a mental health app. Other factors that would demotivate the participants were paywalls and lack of privacy. This is most likely because these features make the user feel burdened, instead of assisted by the app.

From a scale of 1 (strongly disagree that this technique is effective in preventing burnout) to 5 (strongly agree that this technique is effective in preventing burnout), **monthly calendars** had an average rating of 4/5, and **weekly/daily planners** had an average rating of 3.8/5. Priority tables, time blocking, and pomodoro timers had lower ratings nearing 3/5 This could be because calendars and planners are generic time-management tools and are more widely applicable, compared to the lower ranking tools.

In summary, time management (to-do lists, optional reminders, calendars, and planners), breathing meditation, and a simple and appealing user interface should be implemented in the mental health app. Participants emphasized the importance of time-management when responding to many of the survey questions. The app should also address the stress associated with procrastination and receiving poor grades.

Beta-App Test:

Averages of Quantitative Data

Average Time Taken for Each Task

(Bar chart — Y-axis: "Time in Seconds" with values 0, 10, 20, 30, 40; X-axis: "Tasks (starting from main menu)")

- Find list of activities. — approximately 7 seconds
- Find planner and add a new task. — approximately 33 seconds
- Find guided journal and read a previous journal entry. — approximately 15 seconds

Total Number of Errors In All Beta Tests

(Bar chart — Y-axis: "Total Number" with values 0, 2, 4, 6, 8, 10; X-axis: "Type of Error")

- Users tries to do something they can not do — 10
- User makes error but recovers — 5
- User makes error and needs help — 2
- User asks for clarification — 6
- App malfunctions — 3

Combined Table of Qualitative Data From All Beta Tests

Category	Feedback

UI	- **Colours and interface are pleasant, clear, and calming.**
	- Back arrow image is more intuitive than "back" textbutton
	- Step by step description of features in good
	- Variety of tool options is good
	- **Elephant is cute and friendly**
	
	- Main menu looks like a slideshow
	- Bold keywords in descriptions
	- **Bigger buttons**
	    - **Make the whole box clickable, not just the text**
	    - More obvious bottom buttons
	    - More obvious open button in library
	- Change journal buttons to be more clear
	- Change all menus to have same format
	- Add descriptions to menu items
	- Add padding or a box for text input to be more obvious
	- Top of screen is too empty at the beginning
	- Use scrolling wheel to input time, similar to iphone alarm interface

Navigation	- Minimal # of buttons makes the app easy to navigate - Make return to main menu more clear along with other shortcuts - Specify click to continue after inputting information - **Error message screens can not be exited until the user clicks "okay", resulting in confusion.** - Add shortcut to go next on screens when enter is clicked - Drop down menu - **There is an error with returning to the activities and tools menu after meditation.**

Activities	- **Topics are helpful**
	    - Stress, anxiety, and burnout lesson is very applicable. Many struggle with it on a daily basis. Same goes for the rest of the lessons.
	    - Time management lesson will help deal with stress
	    - Meditation is good to learn and not often practiced
	    - Meditation lesson connects with gratitude and self-compassion lesson
	
	- Can have games, challenges, and ranks for incentive (like duolingo)
	- **Shorten titles (eg. Remove "Understanding" from "Understanding Stress, Anxiety…") and make the topics more broad**
	- Make dropdowns
	- Add situations/story to explain how the information is applicable (this also makes activity more interesting to revisit)

	- Wouldn't click the 4th option → topic is unclear
Meditation	- "Reminder that this sense of calm…" message is pleasant - Deep breathing animation is good - Quietness of nature meditation is nice - Like the open-ended time options - Unclear what to do to start meditation video - **Meditation length is not functioning** - Maybe make buttons (1, 2 ,5 minutes) instead of inputting custom time. - Centre number input area - Nature meditation videos can be randomized - Make meditation graphics have a consistent design - Blank screen after meditation can say "click to continue" instead - Add guided meditation
Journal	- Good to have a record of previous entries - Allow cursor to jump around to edit previous lines of text - Add a prompt of the day feature - Make prompts visible in journal library - **Journal library is difficult to find** - Make one buttons to create new entry and another to read a previous entry - Make a free journal with more general prompts about your day/things you don't tell others - New prompt is generated when entry is submitted, resulting in confusion - Add feature to edit previous journal entries
Planner	- Planner UI is familiar and similar to paper planners - Priority levels are good - Good features. Helps reduce stress, but not necessarily burnout. - Add feature that allows user to add a task description - Change header to say first and last day of week along with today's date - Cap duration at 24 hours - Be able to add tasks to multiple days at once - Add colour legend for priorities - **Duration screen is easy to miss, resulting in error in task input.** - Edit task feature doesn't show task's original priority
New Features	- Existing features are well-done and don't need much improvement - The beta app is great and the features balance managing stress and recovery of burnout well for an app designed for students. - Quality improvements and/or aesthetic improvements can be made as development continues, but they are minute - Option to use OpenDyslexic font - Place with custom website link (bookmarks page)

	- **Encourage users to set goals. Goals can be guided and contribute towards a streak.** - Use a more step-by-step approach, such as the Fabulous app - Activity or feature that outlines exam study tips with a timer or mini-schedule for the additional techniques - Pull out tab to navigate faster - Daily reflection section (stress check-in)

Note: Bolded sentences are suggestions that have been brought up frequently.

Many suggestions were brought up in the beta app tests. The users liked the green and white **colour scheme** of the app because it was simple and calming. This connects to my background research on colour psychology, stating that green and white are commonly associated with soothing sensations. The elephant mascot was also liked by the users because it seemed cute and friendly. Many users thought the **activity topics** (1. Understanding Stress, Burnout, and Anxiety, 2. Time Management Strategies, 3. All About Mindfulness, 4. Importance of Gratitude and Self-compassion) were applicable to many people, and would help them reduce stress and prevent/recover from burnout. However, some participants note that the activity titles should be more broad and avoid using extra words such as "Understanding" or "All about".

One of the most common suggestions from the app test was **increasing the button size and adding colorful padding** around the button text. Currently, the buttons are all text buttons, making some of them difficult to locate within a screen. Also, there is no padding around the text that the users can click on, making the user interface harder to navigate. This issue can be fixed by changing all the text buttons into large image buttons with padding.

There were two specific instances where the text buttons were confusing for the beta testers. Firstly, it was not immediately clear how to **find the journal library,** and secondly, it was not clear how to **exit an error message**. Both of these issues occurred because the button required to perform the function was a small text button, and not a large image button.

Another part of the UI that was difficult for users to notice was the **task duration input** in the planner. Many users accidentally skipped this part of the task input process, resulting in an error message. They likely skipped it because the sentence explaining what to do was not visible enough or the area to input the number was unclear because it was indicated only by a small flashing cursor. This could be improved by adding some padding around the text input area accompanied by a short label (i.e. "input duration:") rather than relying solely on the sentence and flashing cursor to explain what to do.

Accessing the activities and tools menu after using the meditation feature was the only major error during the beta test. After completing a meditation, it was impossible for the user to return to the activities and tools menu. In the planner or journal features, the user could click the back button to return to the activities and tools menu. If the user tried to click the back button after meditating, however, the meditation video would replay and the activities and tools menu would be impossible to access. If the user clicked anywhere else on the screen after meditating, they were able to access the tools menu, but

this menu included only the tools (planner, journal, meditation) not the activities (1. Stress, burnout, and anxiety, 2. Time management, 3. Mindfulness, 4. Gratitude and self-compassion).

This happened because the meditation feature was coded using labels, whereas the journal and planner features were coded using screens. When the back button was pressed after meditating, the app jumped to the previous line of code which was the meditation video. When the back button was pressed on the planner or journal screen, the app jumped to the previous line of code which was the tools menu. Then, the user could click the back button one more time to access the activities and tools menu.

This error could be fixed by coding the meditation feature with screens, rather than labels. Alternatively, the menu that the app jumps to after meditation when the user clicks anywhere on the screen other than the back button could be the activities and tools menu, instead of the tools menu. A short explanation would be required to make this understandable for the user (i.e. "Click to view activities and tools menu").

Another error in the meditation feature was the **custom meditation length** not working. Instead of pausing the meditation video for the user's desired meditation duration, the app waited until the video was finished and then paused for the user's desired duration. This happened because an incorrect code function was used to pause the video.

The final suggestion commonly brought up by the beta testers was adding a **goal setting or goal streak feature**. The goal setting feature would offer a more guided and personalized approach to help users build stress and burnout management habits. A goal streak (i.e. open the app and click a checkbox every day you complete your goal) would motivate users to build these habits. This connects to the information collected in survey 1, where many participants noted that streaks would motivate them to use a mental health app.
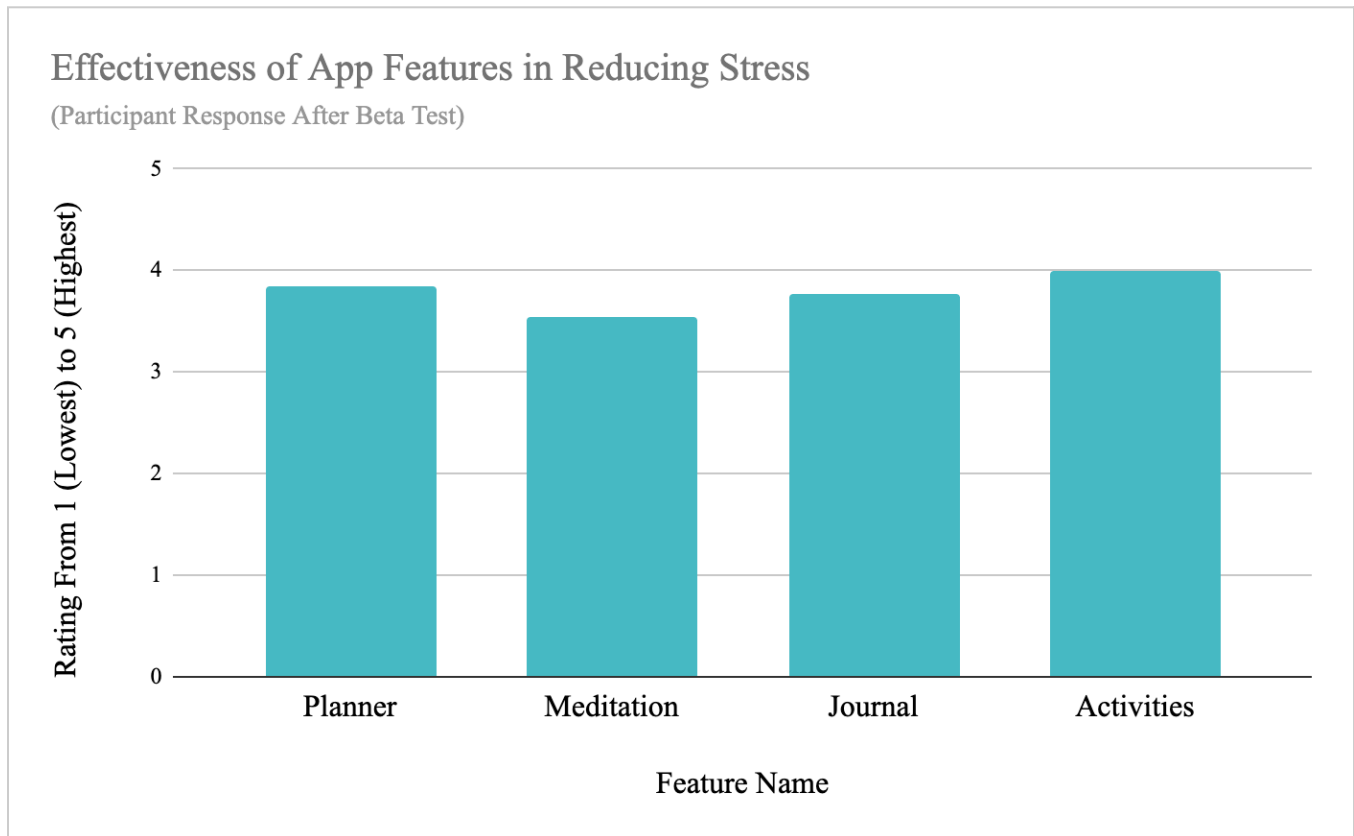
The average times taken for the participants to complete the three tasks showed that the app was relatively straightforward to navigate. The activities menu was found very quickly by users, taking an average of 7 seconds. The planner was also found very quickly, but it took some users a few tries to input the task information correctly. This is because many users forgot to input the task duration, resulting in an error message. The average time to find the planner and add a task was 33 seconds. Finally, the previous journal entries were found very quickly, but it took some users a few seconds to realize they had to click the open button to view the full entry. The average time to find the previous entries and open an entry was 15 seconds.
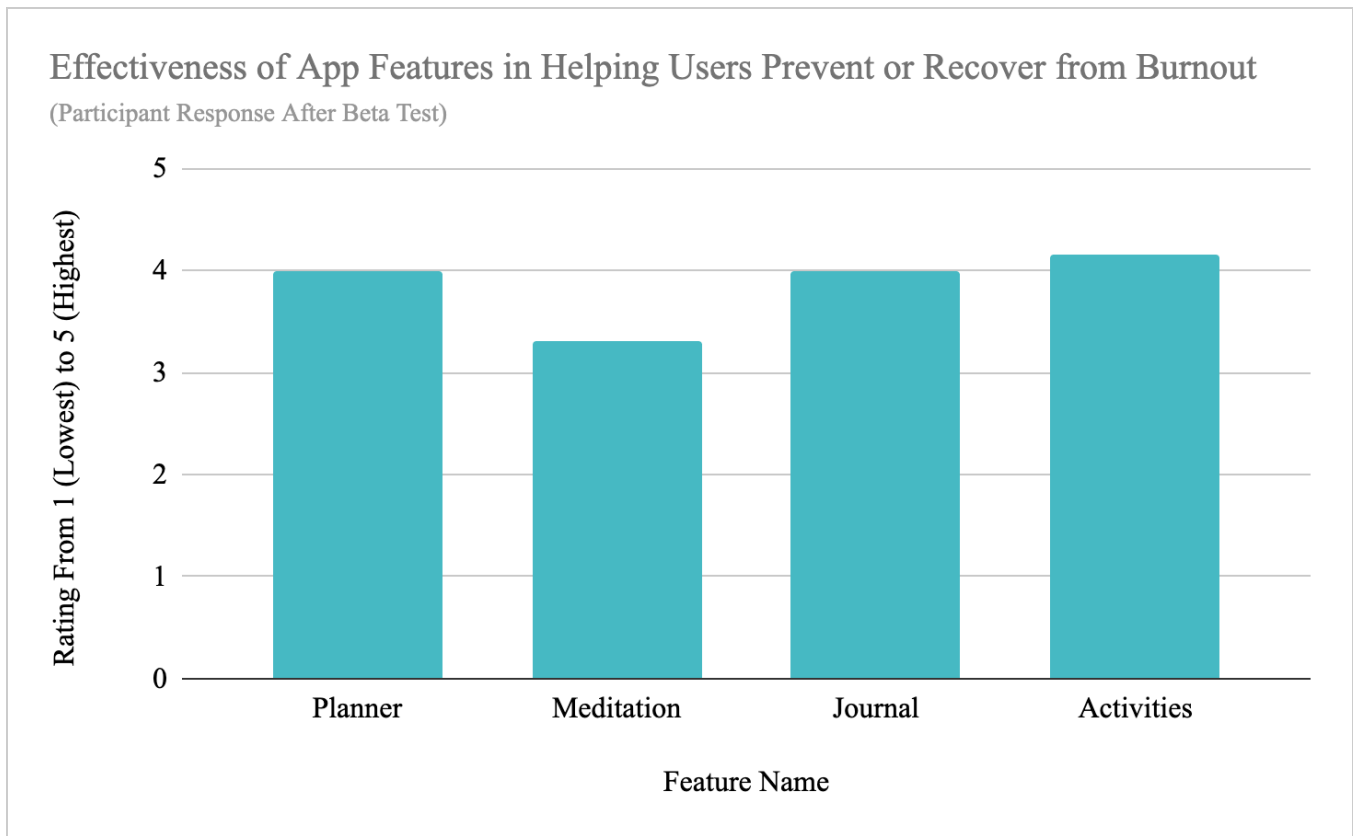
The most common type of error in the beta test was the user **trying to do something they were unable to do**. This was expected, as the participants were navigating the app for the first time and were still exploring how each feature worked. Also, the app was still in its beta phase, so many actions the participants wanted to do were not programmed yet. In some errors, the user could recover on their own, but more frequently, the users asked for help or clarification. This may indicate a disadvantage of conducting an in-person app test. Because I was present during the app test, the participants may have felt inclined to ask me for help instead of solving the issue on their own. Alternatively, this may mean

the app design was not intuitive enough for the participants to solve the issue independently. Three app malfunctions occurred, however the same thing occurred in each app malfunction: the **activity and tools menu was inaccessible after meditation.**

Survey 2

Note: Some graphs for survey 2 can be found in the data section of the logbook. Because survey 2 was conducted over google forms, the graphs were automatically created by google using the data.

Effectiveness of App Features in Reducing Stress
(Participant Response After Beta Test)

Effectiveness of App Features in Helping Users Prevent or Recover from Burnout
(Participant Response After Beta Test)

Survey participants expected **activities** to be the most effective feature to reduce stress and prevent/recover from burnout, although it was not implemented into the app yet. The participants rated the feature an average of 4/5 in reducing stress, and 4.1/5 in preventing/recovering from burnout. This may be because the activities will directly address stress and burnout to help the user learn mental health strategies. The feature provides information different from what the user already knew before using the app. The planner, meditation, and journal features, on the other hand, don't directly give the user mental health information. Instead, they offer a place for the user to practice mental health strategies

The second most effective feature in reducing stress and preventing/recovering from burnout was the **planner** feature tied with the **journal** feature . The participants rated these features an average of 3.8/5 in reducing stress, and 4/5 in preventing/recovering from burnout. The effectiveness of the planner corresponds with the information collected in survey 1, where many participants noted that time management was a helpful stress and burnout management strategy. The effectiveness of the journal could be because of the wide range of prompts offered. The prompts relate to time-management, mindfulness, gratitude, and self-compassion, all of which have been supported by research as being effective mental health strategies.

The lowest rated feature in reducing stress and preventing/recovering from burnout was the **meditation** feature. The participants rated this feature an average of 3.5/5 in reducing stress, and 3.3/5 in

preventing/recovering from burnout. This is probably because many participants did not have an interest in meditation or view it as an effective stress or burnout management strategy, as indicated in survey 1. The low rating could also be because the meditation feature was the least developed compared to the other features. The quality of the meditation could be improved by adding audio, fixing the meditation duration bug, and offering a wider variety of meditation videos. The low rating could also be because users did not have the sufficient time or a comfortable environment to meditate during the beta test. They may enjoy meditation more when they are alone in a calm environment.
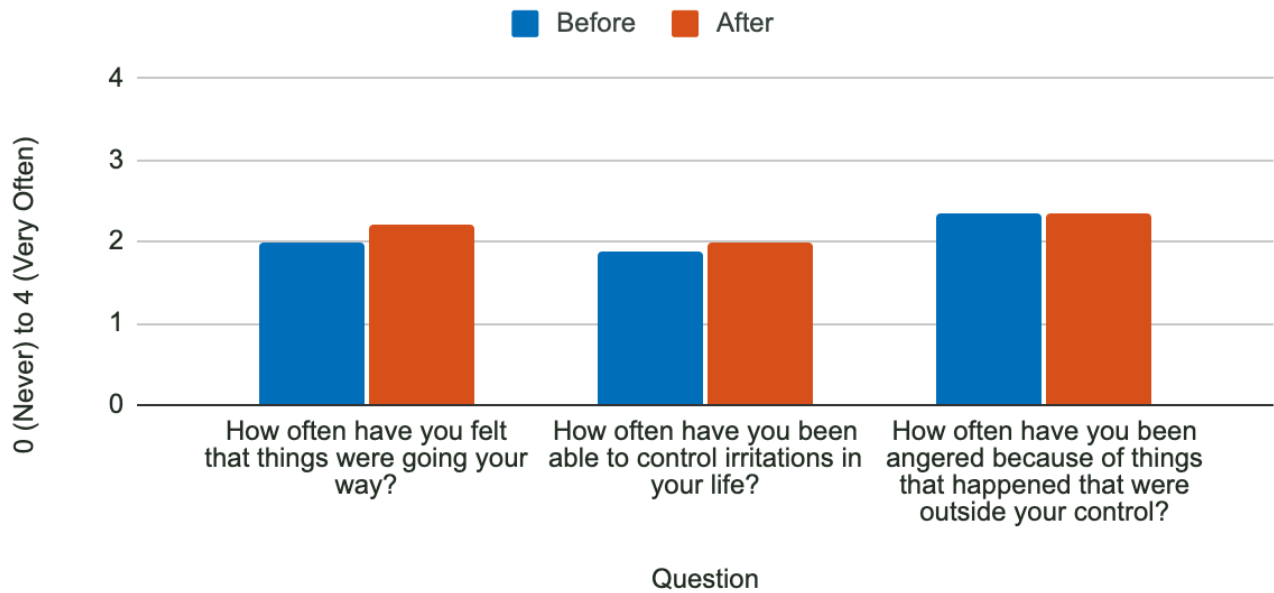
The users reported the colours and layout to be visually appealing, rating it an average of 4.1/5. The colours and elephant mascot most likely contributed to this score. The score could be improved by changing the app's small text buttons into larger and more colorful buttons.
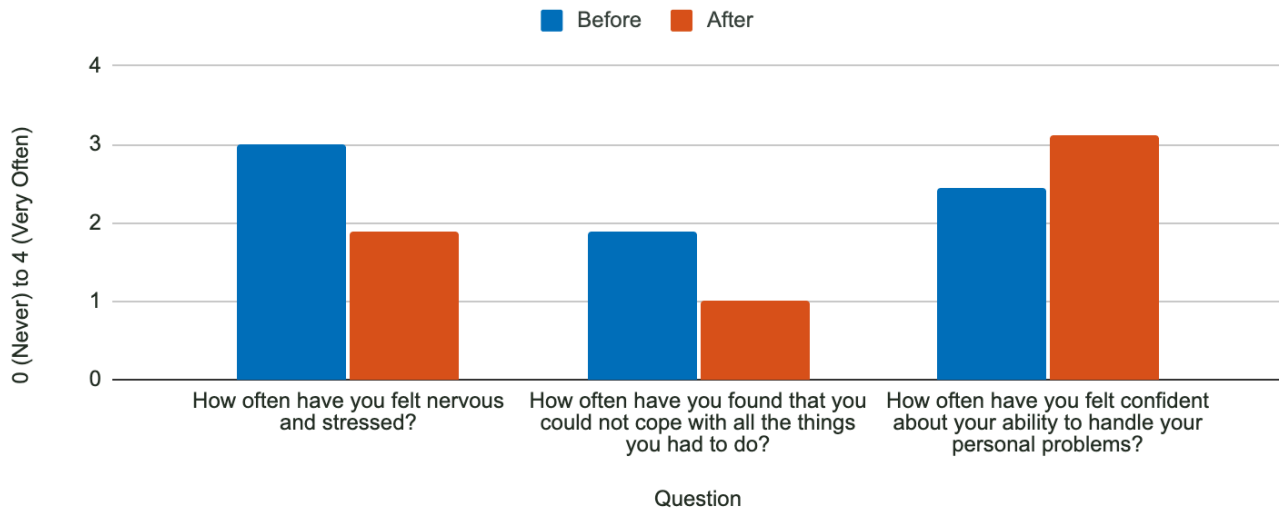
Final 3 Day App Trial
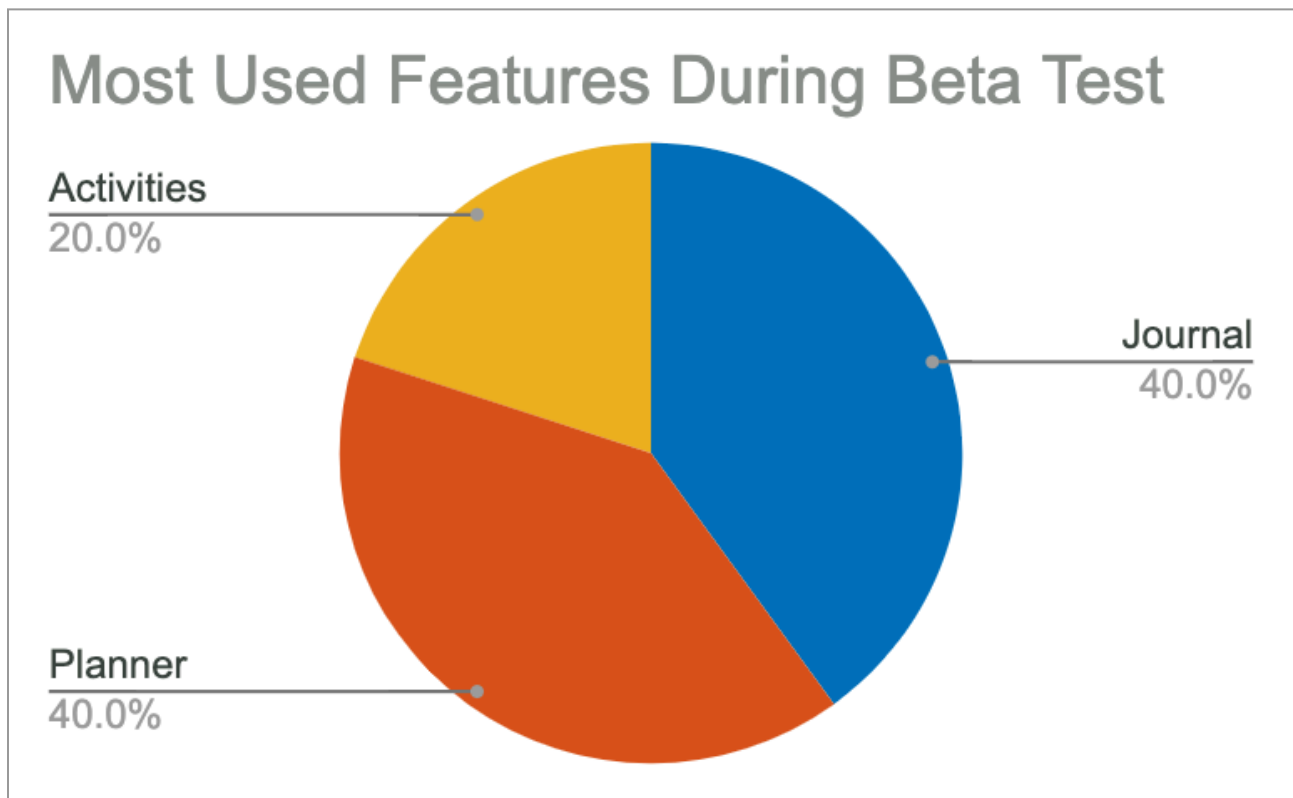
Most Used Features During Beta Test

Activities 20.0%

Journal 40.0%

Planner 40.0%

Participant Response to Perceived Stress Scale Questions Before and After 3-Day App Trial

Top 3 Lowest Changes

Before / After

Questions:
- How often have you felt that things were going your way?
- How often have you been able to control irritations in your life?
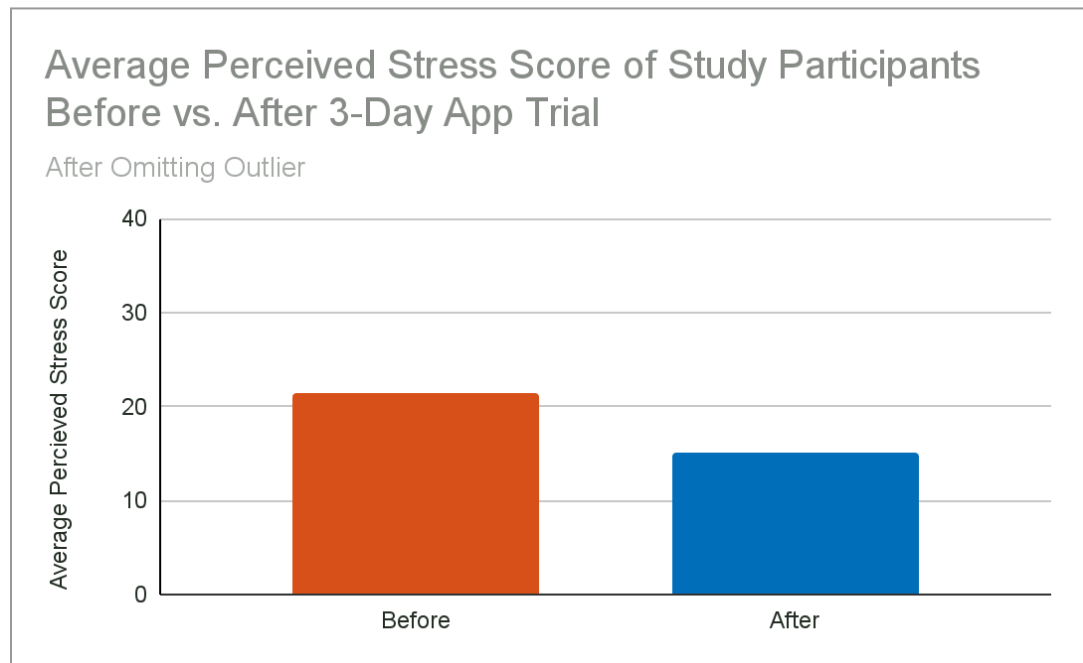- How often have you been angered because of things that happened that were outside your control?
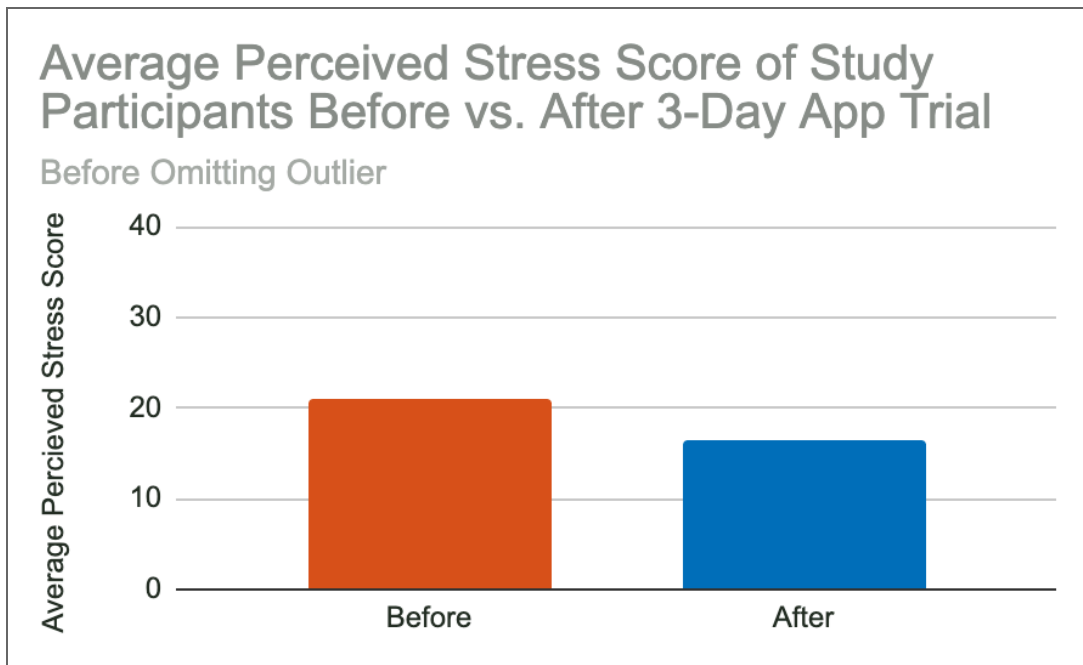

Participant Response to Perceived Stress Scale Questions Before and After 3-Day App Trial

Top 3 Biggest Changes

Before / After

Questions:
- How often have you felt nervous and stressed?
- How often have you found that you could not cope with all the things you had to do?
- How often have you felt confident about your ability to handle your personal problems?

Average Perceived Stress Score of Study Participants Before vs. After 3-Day App Trial

Before Omitting Outlier

Average Perceived Stress Score of Study Participants Before vs. After 3-Day App Trial

After Omitting Outlier

Prior to the app test, the average stress level of the participants was 21.3, out of a total score of 40. This value was calculated using the Perceived Stress Scale's scoring metric, which sums up the 0-4 number value of all ten questions*. Scores ranging from 0-13 indicate low stress, 14-26 indicate moderate stress, and 27-40 indicate high stress. Because the participants had an average score of 21.3, they were in the moderate stress category.

After using the app for 5 minutes for 3 days, the average stress level of the participants dropped to 16.4. This value shows that the participants still had a moderate stress level after using the app, but were now much closer to a low stress level. All but one of the participants had a higher post-app-trial score compared to their pre-app-trial score. In the final survey, this participant wrote that "external circumstances may have swayed my answers on various questions, so they may not have been truly accurate compared to a three-day trial under more normal circumstances". Their data was considered as

an outlier, and the average stress levels were recalculated without their results, yielding a new average pre-app trial score of 21.5 and a post-app trial score of 15. When this data was run through a T test, the averages were found to be statistically different, with only a 0.07% that the stress levels decrease due to random chance.

T-Test Calculations

Pre-App-Trial: 28, 10, 20, 16, 30, 9, 35, 22

Post-App-Trial Scores: 16, 8, 11, 16, 16, 7, 29, 17

Degrees of Freedom:
d. o. f. = n - 1
      = 8-1
      = 7

X_D Value:
X_D = 21.25 -15 = 6.25

S_D Value:

$$S_D = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (XDi - XD)^2} \approx 4.7104$$

t value:

$$t = \frac{XD}{\frac{SD}{\sqrt{n}}}$$

$$= \frac{6,25}{\frac{4.7104}{7}}$$

$$= 3.7529$$

Significance level:
$\alpha = 0.01$

P value:
p = 0.0071
Found using https://www.graphpad.com/quickcalcs/pValue2/. This means there is a 0.71% chance that the null hypothesis is true.

T-distribution table:
Generated using https://www.mathportal.org/calculators/statistics-calculator/t-test-calculator.php

Table of critical values for one tailed test

d.o.f.	0.05	0.01	0.001
1	6.314	31.82	318.3
2	2.92	6.965	22.33
3	2.353	4.541	10.21
4	2.132	3.747	7.173
5	2.015	3.365	5.893
6	1.943	3.143	5.208
7	1.895	2.998	4.785

Critical value:
Critical value = 2.998
$t >$ critical value, therefore there is a significant difference

T-test Summary:
Table adapted from https://www.mathportal.org/calculators/statistics-calculator/t-test-calculator.php

	Group 1	Group 2
Mean	21.25	15
Variance	77.1875	41.5
Standard Deviation	8.7856	6.442
n	8	8
t	3.7529	
d.o.f.	7	
Critical value	2.998	

The participants' responses regarding the functionality, ease of navigation, and appearance of the app were fairly positive. Participants noted that they liked the simple app aesthetic, elephant mascot, and

colour coded planner. They also thought that the app's navigation was simple and everything was easy to find. Most participants noted no issues with the app's functionality.

There were also some concerns and suggestions brought up by the participants in the final app survey. One participant wanted the option to change the app colour scheme because green was not their favorite colour, and another noted that the blue colour of the deep breathing meditation was jarring. As for navigation, some areas of the app had difficult to navigate UI. One user struggled with the back/forward navigation and had to exit to the main menu several times. Finally, there were two difficulties with the functionality of the app. The meditation screens were slow and glitchy for some users, and some users encountered errors trying to set task priorities on the planner. One user responded "There is a visual bug when making a task in the planner directly after making another task, wherein the urgency option will appear to have been already selected." This is likely why the task priority was difficult for some users to set.

A possible source of error in this test could be a placebo effect in which the participants' stress levels were biased because they wanted to believe the app reduced their stress. Additionally, there is no guarantee that all the participants used the app for the required amount of time, as their usage was not monitored. The app trial was also conducted over a fairly short period of time, and if it had gone on for longer, the stress scores may have followed a different trend. Similarly, there may have been more navigation, appearance, and functionality issues if the participants had more time to use the app. Finally, the participants may have forgotten to report certain errors in the final app survey. In the beta app test, both major and minor errors were taken note of as they occurred, but in the final app survey, the participants likely only reported major errors.

*Note: The value of some questions had to be subtracted from 4, because having a *lower* number indicated a *higher* stress level. For example, when asked "How often have you felt that things were going your way?", responding with 0 (never) would indicate a high stress level, so before being added to the final stress score, the number 0 must be changed to 4. Likewise, a score of 1 would be changed to 3, a score of 2 would remain as 2, and so on.

Conclusion:

Overall, the app design is successful in addressing stress and burnout, and is functional, easy to navigate, and visually appealing. Some improvements can be made to the user interface and app features.

The three-day app trial was shown to significantly reduce the participants' stress level, with only a 0.71% chance that their stress was reduced by random chance. Burnout, however, could not be viably tested during this trial because the time period was too short. Instead, data from the anonymous survey from the beta test (which occurred before the three-day trial) was used to evaluate the app's ability to address burnout. In this survey, users reported that all the app features, except for meditation, had an effectiveness near 4/5 in reducing stress and preventing/recovering from burnout. Meditation had a lower score nearing 3/5. This is likely because the users were disinterested in meditation, as zero out of twelve participants selected meditation as the most effective stress management tool in the initial survey.

After the three-day app trial, most users reported that the app was easy to navigate and everything was easy to find, although one user had difficulties with the back/forward function. In the

in-person beta test, all the timed tasks took an average of less than 35 seconds, further supporting that the app features could be found with ease.

Similarly, many participants reported that there were no issues with the app's functionality. Some noted that the meditation feature was laggy, and that it was difficult to set task priorities on the planner. In the beta-app test, there were two issues with the meditation features, but they issue were both fixed before the three-day trial.

Finally, many users reported in the final survey that the app was visually appealing, and that they liked the simple UI and elephant mascot. In order to make the app more appealing, one participant suggested the option to set a custom colour scheme. Another noted that the blue background of the deep breathing meditation could be changed to a less jarring colour.

Applications and Future Improvements:

The app created in this project is applicable to **high school students** all around the world who need support in managing their school-related stress and burnout. These students could either be **seeking help** because they are struggling with their mental health, or be seeking a tool to **maintain their positive mental health**. Students who participate in in-person treatment (eg. counseling) can also use this app as a **supplementary tool** between treatment sessions.

A 2018 study involving American students found that **44% of students used online apps** and resources to manage their stress, 2.54% used school resources, and 33% did nothing (After School, 2018). This underscores the importance of developing accessible and approachable online tools for students, because school resources are used by a small minority.

In Canada, 75% of youth requiring mental health support do not access it (RBC, n.d.). Factors that contribute to this are long wait times for accessing mental health help (6 to 12 months), stigma attached to mental health, and geographical, demographic, and financial inequality. The design of this app considered the needs of students who **do not have access** to mental health resources and those who **do not feel comfortable** seeking in-person resources. The app can support youth who are waiting for treatment, youth who are uncomfortable seeking in-person treatment, or youth who face systemic barriers from accessing help. Although the app is not a replacement for professional treatment, it can be a helpful first step in dealing with mental health challenges. **Personal information**, such as email, phone number, or name are not required to use the app. The app also doesn't require a **Wi-Fi connection,** or any form of **payment** apart from owning a laptop, computer, or phone. The privacy and affordability of the app can make it accessible and appealing to many high school students.

The stress and burnout management techniques implemented in this app will help improve students' **self-efficacy**, setting them up for success when they face bigger challenges in their university or career. Academic performance typically improves along with mental wellness, making it critical for students to manage their stress and burnout levels in order to reach their academic goals. Positive mental health can also help students make better decisions, build relationships, and develop many other skills that will help them in adulthood (k12, n.d.)

The app can be used not only by high school students, but also **younger students** (elementary and middle school) who wish to build their mental health skills early on, or **older students** (university) who wish to use the app the same as high school students.

Some improvements that can be made to the app are 1. Editing the meditation videos to match the colour scheme of the app, 2. Allowing users to set a custom colour scheme (e.g. dark mode), and 3. Fix the bug in the planner where the task priority seems to be selected before it is clicked. Additionally, the meditation videos can be changed to an easier-to-process format to reduce lagging. Also, further in-person testing can be done with users to determine where the back/forward buttons are causing issues.

Some long-term edits that can be made to the app include adding a **goal setting feature** and **monthly calendar** to the app, and creating a mobile version of the app. The goal setting feature will help users build positive habits by encouraging them to maintain a streak, the monthly calendar would offer a big-picture view of the weekly planner, and the mobile version would make the app more accessible. Also, the **activities, meditations,** and **journal prompts** can be steadily updated over time to provide users with a variety of mental wellness resources.

Daily Logs:

September

- Decide on a problem to solve: How do you create an effective mental health app to address and prevent high school student burnout?
- Part one of background research completed, addressing:
    1) Situational, psychological, and inherent factors behind anxiety and burnout in schools
    2) Methods proven to be successful in managing anxiety and preventing burnout
    3) Features and limitations of the coding language being used (Python)

Nov 10

Created a new Renpy app and began writing code.
Added Journal Feature to code

- Wrote code for naming, creating and storing new text files in application files. Currently, the files can only be created on my computer.
- Added randomized journal prompts
    To explore in future: How to generate prompts with ChatGPT in the application?

```python
python:
    file = renpy.input("Name your entry. (Previous journal entries can be found in app files)", length=32)
    $ file = open("/Users/ishaaulakh/Documents/Calm Academy/Game/"+(file)+".txt","w")
    $ rd_quotes=renpy.random.choice(quotes)
    p "[rd_quotes]"
    $ file.write(renpy.input(""))
    $ file.close()
    jump next
```

Edited Basic GUI

- Added journal background and main menu background

- Edited fonts

Nov 11

Outlined Time Management Feature
- Created time management menu
    - In order to figure out which time management method to use, a user survey will be conducted.
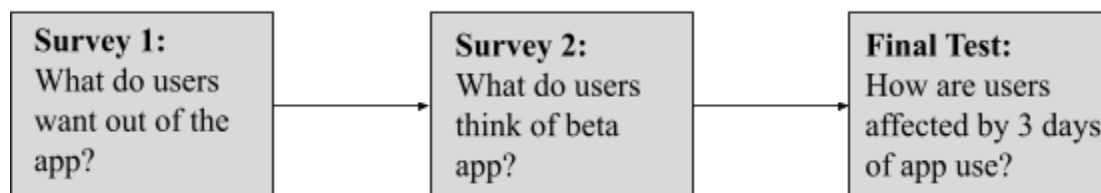
Nov 17

Editing Journal Feature
- Code edited so that new journal text files can be created on any computer for any user

```python
import os
filename = renpy.input("Name your entry. (Previous journal entries can be found in app files)", length=32)
directory = os.path.abspath(os.path.join(config.basedir, "Game","Journal", filename))
file = open(directory+".txt","w")
```

Nov 30

- Ethics and due diligence form submitted for approval, along with sample informed consent form.
- In order to verify the effectiveness of the app, user surveys and tests will be conducted.

Survey 1: What do users want out of the app? → **Survey 2:** What do users think of beta app? → **Final Test:** How are users affected by 3 days of app use?

Dec 1

- Ethics and due diligence form approved
- Data must be kept confidential

Dec 11

- 10 research participants collected so far
    - 1 grade 9s
    - 7 grade 11s
    - 2 grade 12s

Dec 12

- Researched survey methods (see background research part II Design process)

Dec 13

- Began creating survey

Dec 19

- 8 more participants collected
- Survey 1 completed and distributed to 11 participants
    - Link: https://forms.gle/SrFYZvLDVds3Y4mG8
- Mix of multiple choice, written response, and Likert scale questions
- 3 responses collected so far

Dec 21

- 4 more participants collected

Dec 22

- 8 permission forms received
- 6 survey responses collected so far

Dec 23

- 7 survey responses collected so far
- Began drafting UI on paper
    - Main menu (password and user feature)
    - Meditation screen with time options
    - Time management screen
        - Planner
            - Difficult: Save current week's data on a file along with two upcoming weeks. Update current week every seven days.
            - Simple: One week of data, refresh manually.
        - Time block
            - Define time blocks for different days. Very similar design to calendars but less specific.
            - May be unnecessary
    - Journal screen
        - Guided: Integrate Chat GPT to outline habit loops (see background research for more info on habit loops)
        - Free: No prompt but there will be a blurb to show the purpose of the journal (self-reflection)
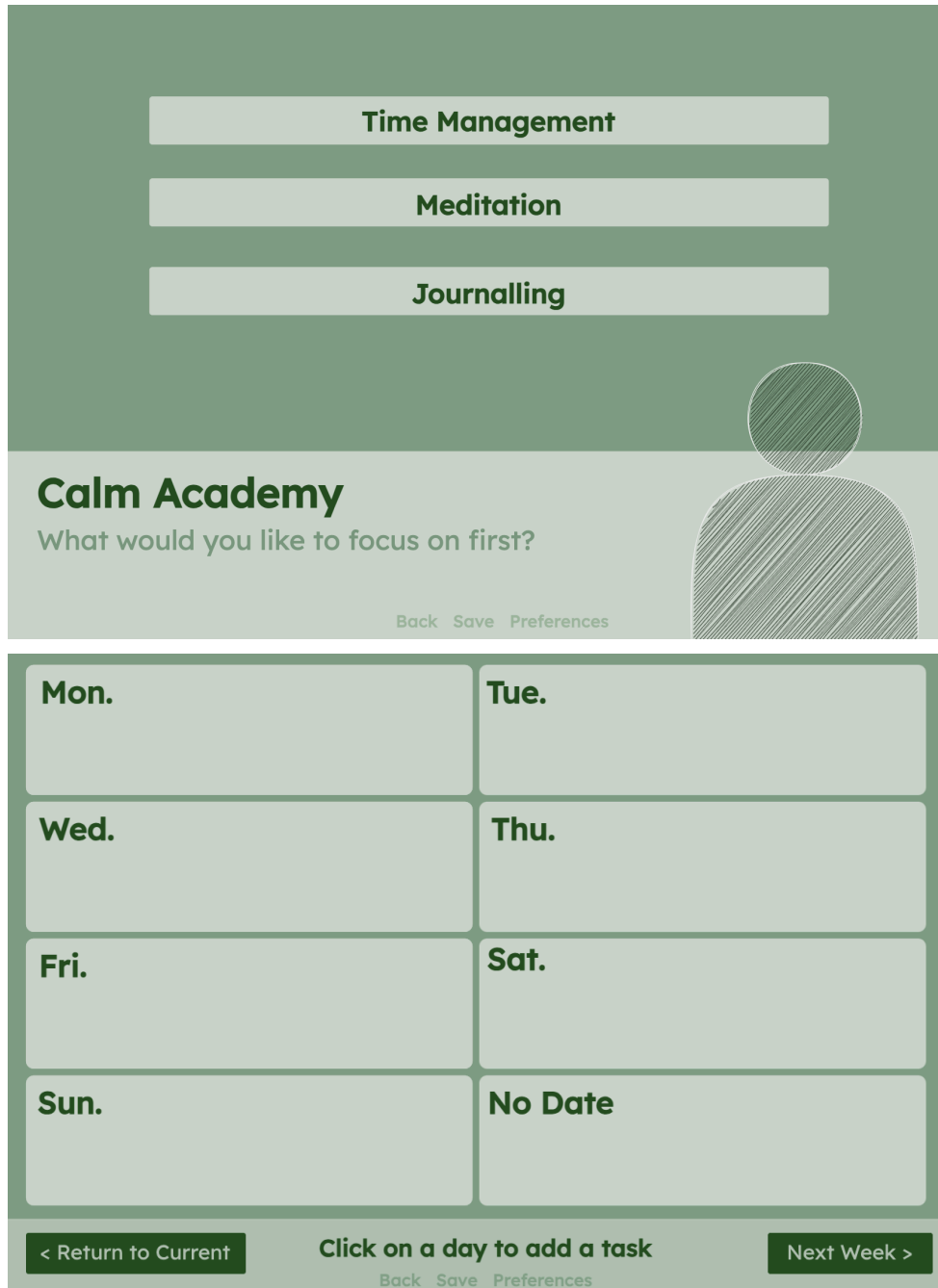
Dec 24

- Researched music and mindfulness (in background research)
- Began creating horizontal prototypes of different screens using diagrams.net

- Not functional, but shows what the screen will look like

Dec 25

- Continued creating horizontal prototypes of different screens using diagrams.net
- Images shown below are 1) main menu and 2) time management planner
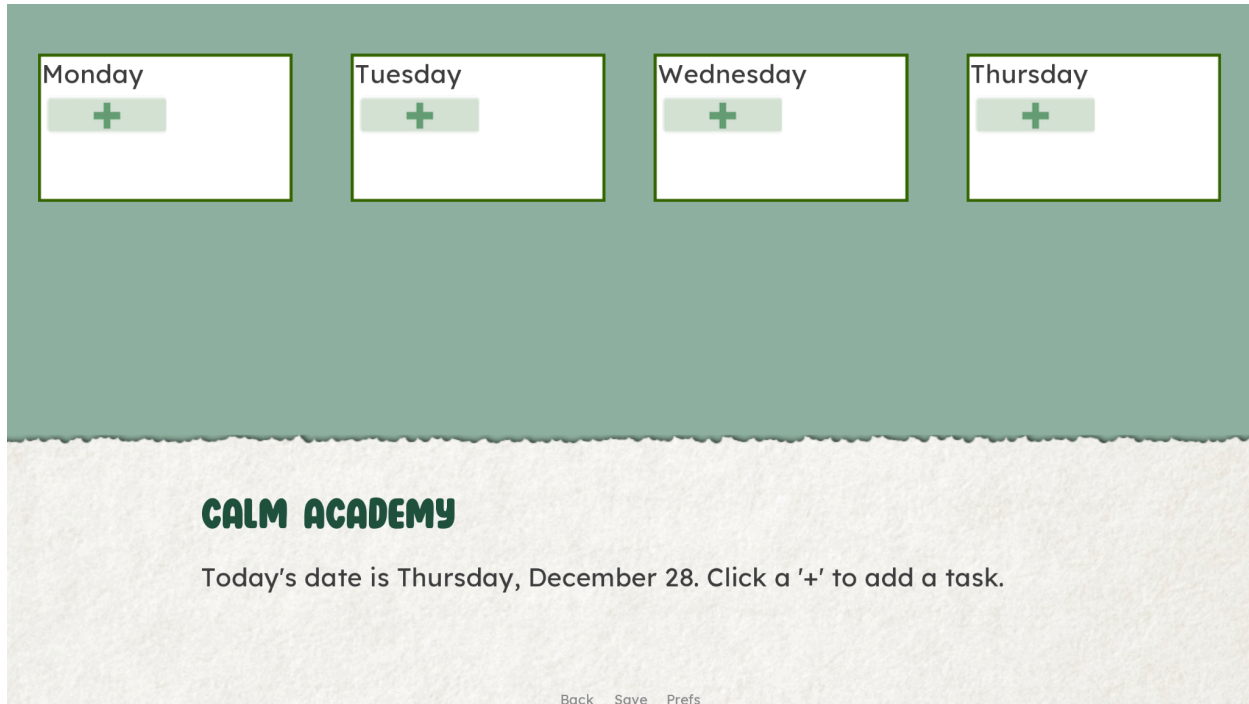

- Changed time management plan
    - Weekly planner
    - Click on buttons
    - When buttons are clicked, you can input the tasks you need to complete. Calm Academy will provide tips on how to prioritize your work.

Dec 26

- Finished creating horizontal prototypes of different screens

Dec 27

- Created buttons for each day on the time management screen

Dec 28

- Elaborated on user needs and how this app will be different from existing apps
    - 📄 SF App Design Thinking
- Revised app design
    - I am going to add lessons that teach stress-management strategies along with the time management, meditation, and journaling tools. The lessons will introduce users to new strategies and equip them with knowledge different from what they knew before using the app.
- Edited the planner buttons so they lead to a new screen which accepts user input.
- The new screen is different for each day of the week, however it appears identical.

Monday
Enter Task Name
Enter Task Priority
Enter Task Time
Back
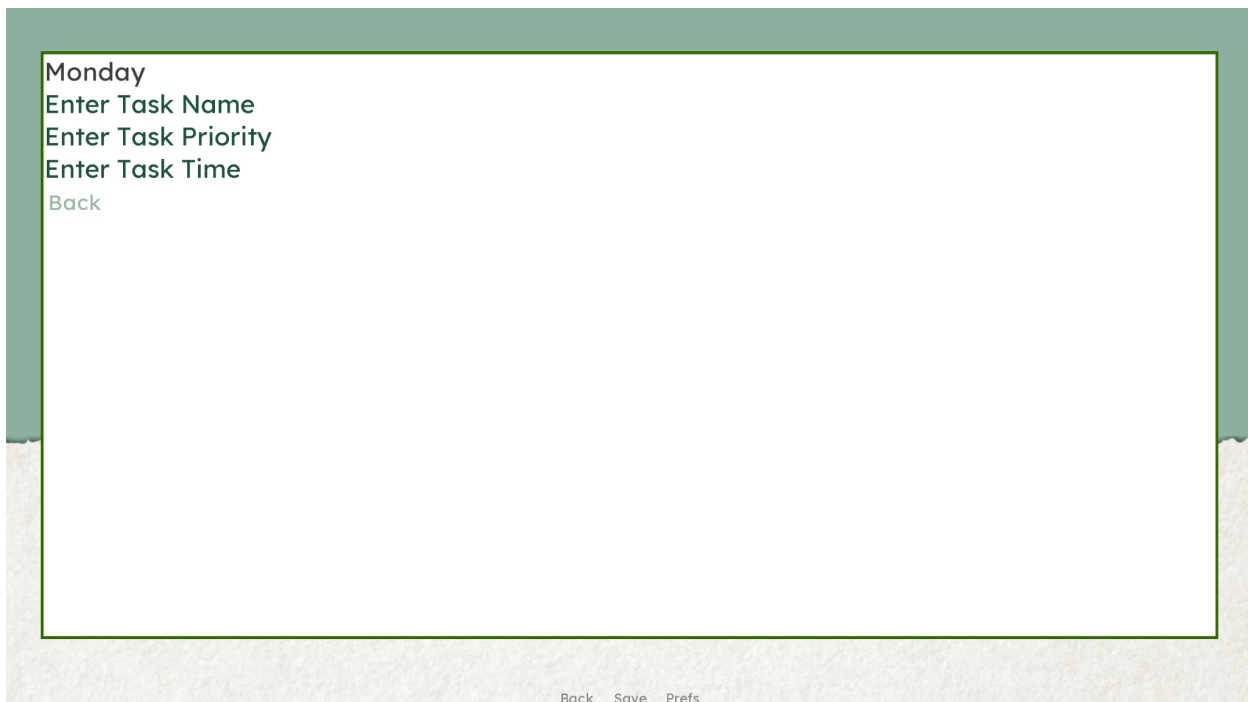
```
screen taskDashboard(parameter):

  zorder 999

  frame:

    xalign 0.5 ypos 50

    xsize 1200

    ysize 600

    vbox:

      text "[parameter]"


      # Input elements for task name, priority, and time

      input default "Enter Task Name" id "task_name_input"

      input default "Enter Task Priority" id "task_priority_input"

      input default "Enter Task Time" id "task_time_input"




      textbutton _("Back") action Hide("taskDashboard")


screen planner:
```

```
frame:
  xalign 0.04
  yalign 0.1
  xmaximum 800
  ymaximum 150
  has vbox
  text "Monday"
  imagebutton:
    idle "planner.png"
    hover "planner.png"
    clicked "planner.png"
    action Show("taskDashboard",parameter="Monday")
    xalign 0.3
    yalign 0.3
frame:
  xalign 0.35
  yalign 0.1
  xmaximum 800
  ymaximum 150
  has vbox
  text "Tuesday"
  imagebutton:
    idle "planner.png"
    hover "planner.png"
    clicked "planner.png"
    action Show("taskDashboard",parameter="Tuesday")
    xalign 0.3
    yalign 0.3
      #and so on for Wednesday and Thursday
```

Dec 29

- Used python to define task variables

- Object-oriented programming
- Variables (name, priority, duration) are oriented around the class Tasks
- Defined various functions to set and get Task variables

Dec 30

- Tasks are visible on planner screen
  - Ranked and colour-coded by task priority
- Added "edit task properties" and "clear" buttons
  - Properties that can be edited: Task name, priority
  - Bug: Task duration is possible to edit, but the edits are not visible on the planner unless you go to the previous screen and then return to the planner
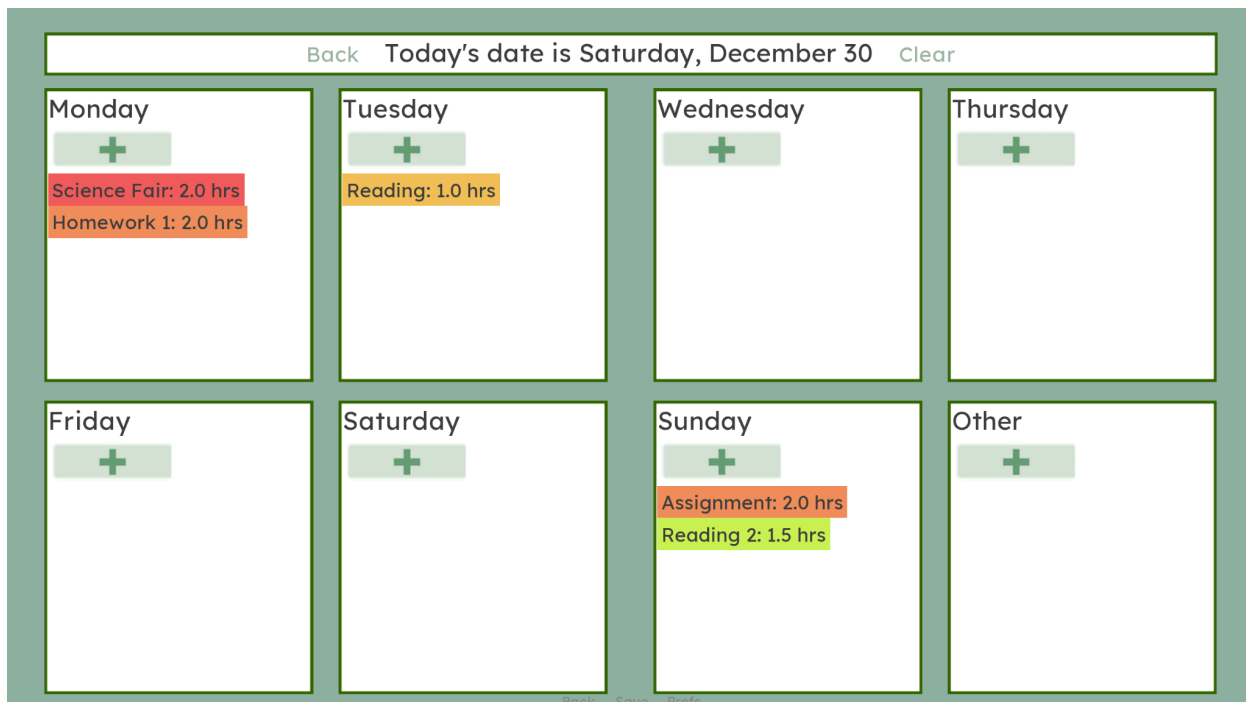
Dec 31

- Editing bugs in planner
  - Previously, text input was only functional if the user was hovering over a certain area. Now it is functional regardless of where the user's mouse is hovering.
    - Previous (with bug): Button with no action (nulAction), took user input

```
- hbox:
-       text "Enter Task Name: "
-       button:
-           id "task_name_input"
-           xysize (250,25)
-           action NullAction()
```

```
add input hover_color "#3399ff", size 28, color "#000", default "", changed
renpy.store.task_to_add.set_name length 50
```

- New (without bug): No button, only takes user input

```
hbox:
        text "Enter Task Name: "
        input id "task_name_input" hover_color "#3399ff" size 28 color "#000" default ""
changed renpy.store.task_to_add.set_name length 50
```

- Another minor bug which squished priority level buttons to the left was fixed by increasing the width of the vbox which contained the buttons.
- Bugs that still need to be fixed
    - Priority buttons do not change colour when clicked.
    - When task duration is edited, the changes don't appear until the user goes to a different page and then returns to the planner.
- Created error message that appears if text name is not entered, priority level is not selected, or duration is not a float value.

Jan 1

- Experimented with Renpy's drag and drop feature
    - May use as a time management practice activity
    - Users drag and drop different tasks to organize them on 4 quadrant time manager or circle of control

Jan 2

- Edited journal screen to have a larger space for the user to write
- Added generate new prompt button

```
init python:
  renpy.store.prompt_backend = [
    "Reflect on your current time management strategies. Are you breaking down your tasks into
smaller goals, or do you find yourself trying to achieve everything all at once?",
    "How can you incorporate more self care and leisure activities into your routine? How would
you expect this to effect your mental health?",
    "What unproductive habits do you have that inhibit time management? How would you go
about unlearning these habits?"

  ]
  renpy.store.random_prompt = ""
```

```
screen journal:
  python:
    renpy.store.random_prompt = renpy.random.choice(renpy.store.prompt_backend)
  modal True
  frame:
    xalign 0.5 ypos 0.1
    xsize 1200
    ysize 150
    vbox:
      text "Prompt: [random_prompt]"
      textbutton _("Generate New Prompt") action SetVariable("random_prompt",
renpy.random.choice(renpy.store.prompt_backend))
```

Prompt: How can you incorporate more self care and leisure activities into your routine?
How would you expect this to effect your mental health?
Generate New Prompt

My Response:
Submit

Back   Save   Prefs
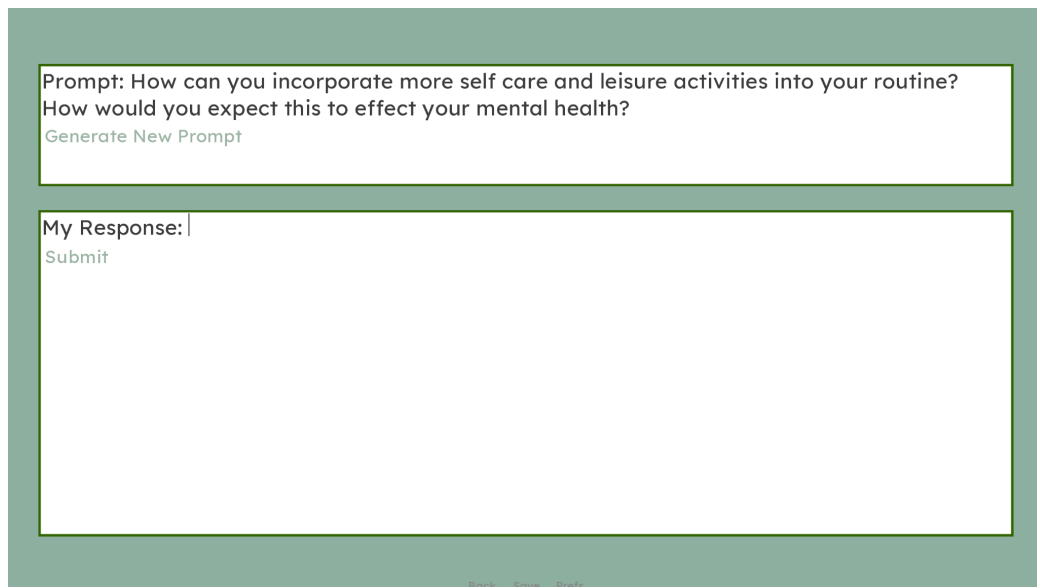
- Screen is quite plain. Maybe I will add some small images to make it visually appealing.

Jan 3

- Fixed buttons on journal screen. Submit button is functional now.
- Coded backend for journal entries to be saved on user's device

Jan 4

- Coded scrollable library screen for users to view their previous journal entries in the app.

Jan 5

- Added more journal prompts focused on gratitude and self-compassion
- Added 3 meditation videos
    - Box breathing
    - Deep breathing
    - Nature
- Bug: When returning to the tools menu, the meditation menu is missing. If the tools menu were turned into a screen rather than a label, this issue could be fixed.

Jan 6

- Tools menu bug fixed by creating a new screen with text buttons rather than label with menu.
- User is now able to decide meditation length with some bugs:

```renpy
label deepBreathing:

    python:

        def is_positive_integer(value):

            try:

                temp = float(value)

                return temp.is_integer() and temp > 0

            except ValueError:

                return False


    while True:

        meditation_length = renpy.input("Nice pick! How many minutes would you like to meditate for?")


        if is_positive_integer(meditation_length):

            meditation_length = int(meditation_length)

            break

        else:
```

```
-           renpy.say("Calm Academy", "Please enter a valid positive integer.")
-       hide ellie4
-       show ellie
-       t "Got it, [meditation_length] minutes. Find a comfortable place to sit and click
whenever you're ready to begin."
-       t "You may click again while meditating to finish early."
-       $renpy.movie_cutscene("deepBreathing.webm", delay=[meditation_length])
-       stop movie
-       t "Meditation complete! Remember that you can return to this sense of calm whenever
you need it."
-       hide ellie
-       show l_ellie
-       jump tools
```

Jan 7

- Meditation length bugged fixed
    - Previously, user input was being interpreted as unicode instead of a number
- Added back button and fixed alignment and size of journal library

Jan 8

- Conducted 4 beta surveys (see data section)
    - Many users wanted bigger buttons
    - Meditation_length is still buggy.
        - When 0.1 minutes is input, it doesn't stop after 6 seconds.
        - Maybe I can turn it into fixed times (ex. 2, 3, 5 minutes) instead of asking for user input. This would also offer clearer options to the user, as one beta tester commented they didn't know the recommended length to meditate.
- Edited some minor issues that were common among all beta testers.
    - Made certain buttons bigger
    - Fixed priority select bug
    - Added button to return to main menu without visit preferences menu
    - Added back arrow instead of back in planner and journal

- The reason I fixed these bugs is because I don't want the remaining testers to struggle with them because they are all quite simple to fix.

Jan 9

- Conducted 1 more beta survey (see data section)

Jan 17

- 12 beta-app surveys conducted
    - 10 responses collected for survey 2
- 12 responses collected for survey 1
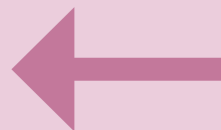- Began creating activity 1 (understanding stress, anxiety, and burnout)

Jan 18

- Continued creating activity 1
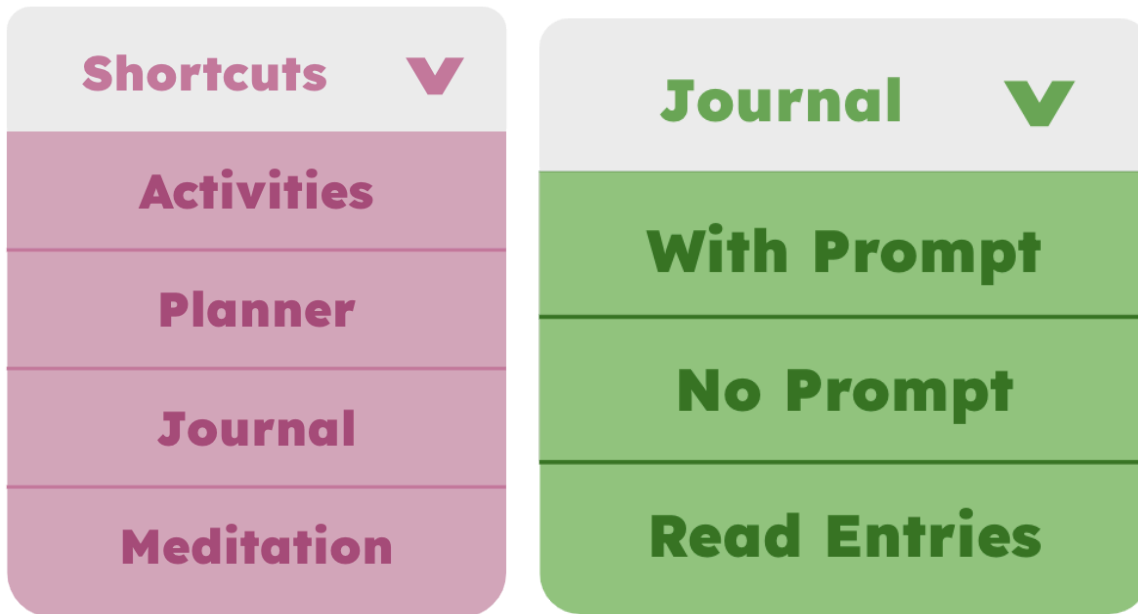
Jan 25

- Design new buttons for app
- Examples:

Shortcuts ∨	Journal ∨
Activities	With Prompt
Planner	No Prompt
Journal	Read Entries
Meditation	

Feb 1

- Analyze beta test data and make graphs (see data and analysis)

Feb 2

- Scan ethics and consent forms and add to logbook
- Analyze survey 2 data and make graphs (see data and analysis)
- Re-format research into APA style paragraphs

Feb 3

- Finish formatting research

Feb 6

- Finish research citations

Feb 7

- Write analysis paragraphs for survey 2 and beta app test
- Write conclusion
- Write analysis and future improvements

Feb 12

- Continued researching stress, anxiety, and burnout for activity 1

Feb 13

- Finished researching stress, anxiety, and burnout for activity 1
- Started to change text buttons into image buttons

Feb 14

- Began researching time-management strategies for activity 2
- Continued to change text buttons into image buttons
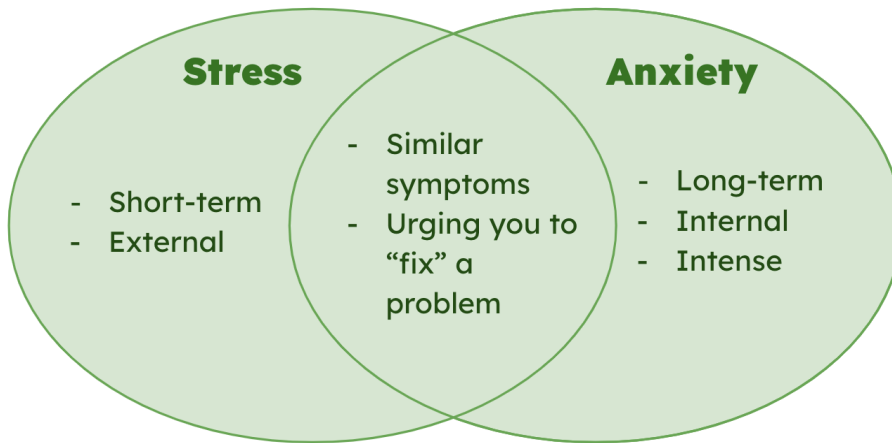
Feb 15

- Continued to change text buttons into image buttons

Feb 16

- Finished changing text buttons into image buttons

Feb 17

- Began implementing activity 1 research into an activity in the app
- Began creating graphics to accompany the information

Stress
- Short-term
- External

- Similar symptoms
- Urging you to "fix" a problem

Anxiety
- Long-term
- Internal
- Intense

Feb 18

- Continued implementing activity 1 research into an activity in the app

Feb 19

- Added audio to app
- Drew "Artist Ellie" sprite for activity 1
- Finished implementing activity 1 into app
- Formulated way to test app (Decided to test using a modified Perceived Stress Scale)

Feb 22

- Began implementing activity 2 into app

Feb 23

- Continued implementing activity 2 into app

Feb 24

- Finished implementing activity 2 into app
- Made google form with modified Perceived Stress Scale questions

Feb 25

- Uploaded app on github and wrote instructions for download (MacOS and Windows)

Feb 25

- Received 6 pre-app test surveys
- 5 successful app download with participants
    - 1 did not work because the participant had a chromebook (not apple or windows)

Feb 27

- Received 6 pre-app test surveys
- 5 successful app download with participants
    - 1 did not work because the participant had a chromebook (not apple or windows)

Feb 29

- 2 more successful downloads

Feb 30

- Received 6 post-app tests

Feb 29

- 2 more successful downloads
- Received 2 more pre-app test surveys

Mar 1

- 2 more successful downloads (10 total)
- Received 2 more pre-app test surveys (10 total)

Mar 3

- Received 1 more post-app test survey (7 total)

Mar 4

- Received 2 more post-app test survey (9 total)

Mar 5

- Received 1 final post-app test survey (10 total)

Mar 7

- Analyzed pre and post app trial data on google sheets
- Determined that there was one outlier
- With the outlier removed, the results are statistically significant.

Mar 8

- Wrote analysis of 3-day app trial

Mar 10

- Wrote conclusion and future improvements

References

After School. (2018, February 21). 45% of Teens Say They're Stressed "All the Time," Turn to Online

    Resources and Apps for Help Says Poll on Stress and Mental Health. GlobeNewswire. Retrieved

    February 8, 2024, from

    https://www.globenewswire.com/news-release/2018/02/21/1372739/0/en/45-of-Teens-Say-They-

    re-Stressed-All-the-Time-Turn-to-Online-Resources-and-Apps-for-Help-Says-Poll-on-Stress-and

    -Mental-Health.html

Aryana, B., & Brewster, L. (2020). Design for mobile mental health: Exploring the informed

    participation approach. *Design for mobile mental health: Exploring the informed participation*

    approach. 10.1177/1460458219873540

Aypay, A. (2017, April 25). A Positive Model for Reducing and Preventing School Burnout in High

    School Students. 10.12738/estp.2017.4.0173

b001. (2023, October 25). *Python Classes in 1 Minute!* YouTube. Retrieved January 6, 2024, from

    https://www.youtube.com/watch?v=yYALsys-P_w

Barton, A. (2022). *Wired for Music: A Search for Health and Joy Through the Science of Sound*.

    Greystone Books Limited.

Bethune, S. (2014, April 1). Teen stress rivals that of adults. American Psychological Association.

    Retrieved January 7, 2024, from https://www.apa.org/monitor/2014/04/teen-stress

Brewer, J. (2022). *Unwinding Anxiety: New Science Shows How to Break the Cycles of Worry and Fear*

    to Heal Your Mind. Penguin Publishing Group.

The Centre for Addiction and Mental Health,. (n.d.). *Stress*. CAMH. Retrieved January 6, 2024, from

    https://www.camh.ca/en/health-info/mental-illness-and-addiction-index/stress

Cherry, K. (2022, November 29). *Color Psychology: Does It Affect How You Feel?* Verywell Mind.

    Retrieved January 6, 2024, from

    https://www.verywellmind.com/color-psychology-2795824#toc-the-psychological-effects-of-col

or

Cherry, K. (2023, November 20). *What Does the Color Green Mean?* Verywell Mind. Retrieved January 6, 2024, from https://www.verywellmind.com/color-psychology-green-2795817

Chiluka, V. (2022, November 25). *Is Python good for making apps?* Tutorialspoint. Retrieved September 20, 2023, from https://www.tutorialspoint.com/is-python-good-for-making-apps

Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), The social psychology of health: Claremont Symposium on applied social psychology. Newbury Park, CA: Sage.

Dimitroff, L. J. (2017, November 9). *Change your life through journaling--The benefits of journaling for registered nurses*. Retrieved January 4, 2024, from https://www.researchgate.net/profile/Lynda-Dimitroff/publication/308956936_Change_your_life_through_journaling--The_benefits_of_journaling_for_registered_nurses/links/59354f69458515 53b6f3c7eb/Change-your-life-through-journaling--The-benefits-of-journaling-

Enterprise DNA Experts. (n.d.). *How to Use ChatGPT for Python: The Ultimate Guide*. Enterprise DNA Blogs. Retrieved September 21, 2023, from https://blog.enterprisedna.co/how-to-use-chatgpt-for-python/

et. al, K. (2021, March 16). *The Relationship between Time Management and Academic Burnout with the Mediating Role of Test Anxiety and Self-efficacy Beliefs among University Students*. Brieflands. Retrieved January 3, 2024, from https://brieflands.com/articles/jme-112142

FNU Admin. (2019, August 20). *How to Prevent Student Burnout*. Florida National University. Retrieved September 15, 2023, from https://www.fnu.edu/tips-preventing-student-burnout/

GraphPad. (n.d.). P value calculator. GraphPad. Retrieved March 10, 2024, from https://www.graphpad.com/quickcalcs/pValue2/

Harr, S. L. (n.d.). *TIME MANAGEMENT, STRESS, AND BURNOUT*. Retrieved September 15, 2023, from

https://www.physics.utoronto.ca/~dfvj/SideFrame%20Links/Teaching/PHY151/Coping%20with

%20Burnout.pdf

Indeed Editorial Team. (2023, July 31). The 7 Steps of the Engineering Design Process. Indeed.

Retrieved December 16, 2023, from

https://www.indeed.com/career-advice/career-development/design-process

James, C. (2015, August 11). NYU Study Examines Top High School Students' Stress and Coping

Mechanisms. NYU. Retrieved January 7, 2024, from

https://www.nyu.edu/about/news-publications/news/2015/august/nyu-study-examines-top-high-s

chool-students-stress-and-coping-mechanisms.html

JMP Statistical Discovery. (n.d.). Paired t-Test | Introduction to Statistics. JMP. Retrieved March 9,

2024, from https://www.jmp.com/en_ca/statistics-knowledge-portal/t-test/paired-t-test.html

K12. (n.d.). Students' Mental Health in School. K12. Retrieved March 4, 2024, from

https://www.k12.com/student-safety/mental-health/

Khan Academy. (2011, June 30). *For Loops in Python*. YouTube. Retrieved January 6, 2024, from

https://www.youtube.com/watch?v=9LgyKiq_hU0

Kordzanganeh, Z., Bakhtiarpour, S., & Hafezi, F. (2021, March 16). *The Relationship between Time*

Management and Academic Burnout with the Mediating Role of Test Anxiety and Self-efficacy

Beliefs among University Students. Brieflands. Retrieved September 18, 2023, from

https://brieflands.com/articles/jme-112142.html

Mayo Clinic Staff. (2022, August 3). *Exercise and stress: Get moving to manage stress*. Mayo Clinic.

Retrieved September 18, 2023, from

https://www.mayoclinic.org/healthy-lifestyle/stress-management/in-depth/exercise-and-stress/art

-20044469

Mcleod, S. (2023, October 13). Understanding P-Values and Statistical Significance. Simply

Psychology. Retrieved March 10, 2024, from https://www.simplypsychology.org/p-value.html

Mitchel, J., & Novotny, J. (2022, March 23). *A Programmers' Guide to Python: Advantages & Disadvantages*. Linode. Retrieved September 21, 2023, from

> https://www.linode.com/docs/guides/pros-and-cons-of-python/

Mofatteh, M. (2020, December 25). *Risk factors associated with stress, anxiety, and depression among university undergraduate students*. NCBI. Retrieved September 18, 2023, from

> https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7870388/

NetworkChuck. (2022, April 15). *What is a List in Python?* YouTube. Retrieved January 6, 2024, from

> https://www.youtube.com/watch?v=1KLgcBcWCsE

People for Education. (2022). Principals sound the alarm about students' mental health. People for Education. Retrieved January 7, 2024, from

> https://peopleforeducation.ca/report/principals-sound-the-alarm-about-students-mental-health/

Petrović., M. (n.d.). T-Test Calculator with step by step explanation. Math Portal. Retrieved March 9, 2024, from https://www.mathportal.org/calculators/statistics-calculator/t-test-calculator.php

Phillips, L. (2022, January 26). *Stress vs. anxiety vs. burnout: What's the difference? - Counseling Today*. Counseling Today. Retrieved January 6, 2024, from

> https://ct.counseling.org/2022/01/stress-vs-anxiety-vs-burnout-whats-the-difference/

Ramos, L. (n.d.). *Getters and Setters: Manage Attributes in Python – Real Python*. Real Python. Retrieved January 6, 2024, from https://realpython.com/python-getter-setter/

RBC. (n.d.). How Mental Health Apps Can Help Youth: What You Need to Know. RBC. Retrieved February 8, 2024, from

> https://www.rbc.com/en/future-launch/resource-type/research-insights/how-mental-health-apps-can-help-youth-what-you-need-to-know/

Ren'Py. (n.d.). *Why Ren'Py?* Ren'Py. Retrieved February 6, 2024, from https://www.renpy.org/why.html

Sharlid, E. (n.d.). *The Design Process: Data Gathering* [CPSC 481 Human-Computer Interaction I].

Socratica. (2017, June 14). *Python Classes and Objects || Python Tutorial || Learn Python*

Programming. YouTube. Retrieved January 6, 2024, from

https://www.youtube.com/watch?v=apACNr7DC_s

Summerfield, J. (n.d.). Mobile Website vs. Mobile App (Application) – Which is Best for Your

Organization? Human Service Solutions. Retrieved March 4, 2024, from

https://www.hswsolutions.com/services/mobile-web-development/mobile-website-vs-apps/

Susanti, P. D., Wibowo, M. E., & Mulwarman, M. (2019, September 27). *View of The Effectiveness of*

Acceptance and Commitment Therapy Counseling and Mindfulness-based Cognitive Counseling

to Reduce School Burnout. Retrieved January 3, 2024, from

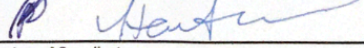https://journal.unnes.ac.id/sju/index.php/jubk/article/view/34352/14294

Ethics and Consent Forms

CYSF

CALGARY YOUTH SCIENCE FAIR

ETHICS AND DUE CARE FORM
Form 2A

This form must be filled in for all projects that involve the use of animals or humans in any manner whatsoever. For details on use of animals and humans in a project see www.cysf.org, Determination of Project Risk – your project needs to meet both our regulations and the national regulations. *This form must be sent in before any experimenting begins.* Entrants/Coordinator will be contacted once this form has been reviewed.
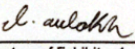
	Exhibitor 1	Exhibitor 2
Exhibitor's Name(s)	Isha Aulakh	
Exhibitor's Email(s)	aulakh.is @wcs-g.com	
Phone Number(s)	825 - 431 - 2525	
School	Westmount Charter School	
School Phone Number	403 - 217 - 9427	

Coordinator's Name	Heather Lai	Coordinator's Email	heather.lai @ wcs-g.com

Exhibit Title	Imroving Mental Health through Technology: Designing an Anti-Burnout App for Students

Grade Level	11	Where will experiments take place?	At school or online

Human participants? (YES) NO (circle one) Animal experiment? YES NO (circle one) Animal species:

If you circled "yes" for human participants, you must now assess the risk factor of your project. Final determination of risk will be made by CYSF.

Read **Determination of Project Risk** at www.cysf.org, determine if your project is "Low" or "Significant" Risk, then circle one box below.

Low Risk	1. Please send this form 2. Please send copy of your survey form (if applicable) 3. Please send copy of your Informed Consent Form 2C (if applicable).	Significant Risk	1. Please send this form 2. Please send Significant Risk Form 2B 3. Please send copy of your survey form (if applicable) 4. Please send copy of Informed Consent Form 2C 5. Please send copy of your Letter of Information.

Purpose of your experiment	Coding a mental health app to prevent highschool student burnout and reduce stress.
Brief description of your experiment	Coding a python app for time management and mindfulness and testing its effectiveness with student input. Students will be involved in 1. SURVEY - Questions about your mental health and what you want out of the app. 2. BETA APP SURVEY - Questions about effectiveness of app so far. 3. FINAL APP TEST - one week test of how daily app use impacts your mental health.

I hereby certify that the information given above is correct and to the best of my knowledge the above project complies with the guidelines for use of human subjects and animals supplied to me by the Society.
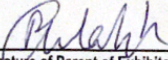
_____
Signature of Coordinator

_____
Signature of Scientific Supervisor (if applicable)

_____
Signature of Exhibitor 1

_____
Signature of Exhibitor 2

_____
Signature of Parent of Exhibitor 1

_____
Signature of Parent of Exhibitor 2

Please make sure you have all required signatures and the form is completely filled out before sending!

Email it to: safety@cysf.org.

IMPORTANT:

In order to respect the privacy of my study participants, their informed consent forms are not in this logbook. I have a saved copy of each of their consent forms.