FreshCheck

Final Report 02808

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1 ABSTRACT

In this project, the importance of spending time outdoors is examined and the usefulness of measuring time spent outside is analyzed. Although spending time outdoors comes with several health benefits, most people today spend more time indoors. It is often difficult to remember to go outside or spend large amounts of time outdoors and thus, FreshCheck is presented to help track this time. Through this project, the issue of insufficient time outdoors has been researched and two prototypes for a potential application have been created. The prototypes have been designed according to user-tests and through testing, it has revealed how others feel towards the importance of this project. This report will analyze the results of the tests, explore the prototypes, and discuss the importance of conducting such a project. Moreover, future possibilities and additions to the project will be mentioned.

2 INTRODUCTION

Spending time outdoors has numerous health benefits, such as keeping us active, increasing vitamin D levels, improving mental wellness and helping you get that daily dose of fresh air to keep you going. Unfortunately, in our modern society people are spending less time outdoors, as people spend a great deal of time working indoors in offices and spend their leisure time behind screens.

A series of health issues are said to be associated with the lack of physical activity. As we keep indoors, we tend to go for the activities that require little to no movement. Concerningly, this can lead to a series of health issues, such as obesity, heart disease, high cholesterol, etc. Additionally, an inactive lifestyle may lead to mental issues as well, like depression and anxiety [1]. While physical activity is important, being active does not mean that you have to do the heaviest workout routines, but rather it is adequate to simply take a walk outdoors or participate in other activities that involve movement over time.

With all of the positive effects of spedning time outdoors and the deficiency that most people have, we wanted to create a project that would handle this issue and help people spend more time outdoors. Thus, FreshCheck came to life, an app that tracks time spent outdoors.

3 RELATED WORKS

A variety of tracking tools are currently on the market. In this section a few state-of-the-art products will be described briefly.

- **Strava:** Strava is a fitness tracking app that allows users to track outdoor activities such as running, cycling, and hiking. It provides detailed analytics on their performance, including distance, speed, and elevation. [2]
- **AllTrails:** AllTrails is a hiking and trail tracking app that helps users discover and navigate trails in their area, and tracks their progress and activity while hiking. It includes trail maps, reviews, and photos submitted by users, and allows users to track and log their hikes. [3]
- **MapMyFitness:** MapMyFitness is a fitness tracking app that allows users to track a wide range of activities, including outdoor activities like running, hiking, and cycling. It provides detailed analytics on their progress, including distance, speed, and calories burned, and includes personalized coaching and training plans. [4]
- **Fitbit:** Fitbit is a wearable fitness tracking device that tracks a user's activity level throughout the day, including outdoor activities like walking, running, and cycling. It provides detailed analytics on their progress towards their fitness goals, including step count, distance, and calories burned. [5]
- **Google Fit:** Google Fit is a fitness tracking app that allows users to track their activity level throughout the day, including outdoor activities like walking and cycling. It provides personalized insights and coaching based on their goals and activity level, and includes integration with other fitness tracking apps and devices. [6]

When looking at the topic of this study, spending time outdoors, different activity-tracking tools could be used. However, it is worth noting that these applications typically prioritize tracking physical activity rather than emphasizing the outdoor aspect itself. To make users more easily engaged and willing to track their time spent outdoors, an app that solely focuses on this aspect could be developed.

4 ANALYSIS

Spending time outdoors has been shown to have a plethora of benefits for physical and mental health. Exposure to nature and natural environments has been found to reduce stress, anxiety, and symptoms of depression[18]. Additionally, spending time in green spaces has been associated with improved cognitive function, increased creativity, and enhanced attention [10];[15]. Physical activity in outdoor environments has also been shown to improve cardiovascular health, strengthen the immune system, and reduce the risk of chronic diseases, such as type 2 diabetes and obesity ([24]; [22]). Furthermore, being outside in natural light can help regulate circadian rhythms, leading to better sleep quality and overall health [16]. These findings suggest that spending time outdoors can promote both physical and mental well-being, highlighting the importance of incorporating nature into our daily lives.

4.1 Students outdoors time

For students, it can be hard to keep track of how much time is spent outdoors, especially when schedules are filled with school work and classes. In fact, a study conducted in Denmark found that 67% of university students reported spending less than two hours per day outdoors on weekdays, while 30% reported spending two to four hours per day outdoors [17]. The study shows that the majority of students are not spending enough time outdoors, which can have consequences on their mental and physical wellbeing.

As mentioned earlier, outdoor activity has been proven to help and boost our health and wellbeing. With a great deal of pressure from course work and succeeding in school, many students are not able to find the time to get outdoors and easily excuse their lack of outdoor activity by the amount of work. With half-baked excuses and the pressure of work, the cycle of being overwhelmed can cause more stress. Research has also proven the correlation between studying and physical activity, where students with better physical activity showed to have a more positive quality of life [8]. Though the study does not exclusively say anything concerning the outdoor activity of the participants, it still gives the indication that having an active lifestyle boosts quality of life. Also, it has been shown that the amount of screentime can affect the lifestyle of students [13]. Studying coupled with screentime indicate the importance of outdoor activity, with less time sitting behind the screen, and more time keeping the body active.

Most apps that take physical activity into account, tend to focus on the activity and exercise aspects of physical activity. While these are indeed important factors when it comes to well-being and quality of life, in an overwhelming and stressful time, it can seem like too much effort to start intensively exercising. While researching our idea, we found that an app solely focusing on spending time outside does not exist. Therefore, by developing an app that motivates and tracks outdoors activity, we can encourage students to get outdoors more and become aware of how much time they spend outdoors compared to indoors. Moreover, the app can hopefully improve their quality of life and stress levels. Furthermore, by not focusing on intensive exercise, FreshCheck may seem like an easier alternative or starting point for people that want to improve their physical activity levels.

A survey of Norwegian students from 2022 states that the life quality was reportedly higher than in 2021, a year plagued with a pandemic [7]. During the pandemic, student life was very restricted and people spent most of their time indoors to avoid getting sick [23]. The same survey also states that students reported to have better health in 2018, than in both 2021 and 2022, after the pandemic. Though this does not imply or mean that the numbers are entirely due to the decline in outdoors activity during the pandemic, linking the fact that outdoor activity declined during the pandemic and that there are multiple health benefits with spending time outdoors, it could be a factor to the overall decline in life quality. Although life is getting back to normal, old habits can be tough to fight. Additionally, being aware of time spent outdoors versus time spent indoors is often difficult, so having FreshCheck, which can both motivate and keep students aware of their outdoors time, is a helpful feature for students today.

5 PROTOTYPE

This section provides an in-depth analysis of the prototype development process, encompassing the entire journey from the initial stages of concept development to the creation of the final prototype.

5.1 Concept and flow

Designing a mobile application involves many elements, including the app flow, user interface (UI), and aesthetic design. While aesthetics are an important aspect of an application, it is crucial to focus on designing the app flow and concept before moving on to aesthetics. The app flow and concept set the foundation for the entire application and ultimately determine its success. Without a well-defined app flow and concept, users may become confused or frustrated, resulting in low user engagement and usage rates. By establishing a clear and intuitive app flow and concept, designers can ensure that the application meets the user's needs and expectations, resulting in increased user engagement and overall satisfaction. Only after the app flow and concept have been established should designers focus on the aesthetics, as it is the final touch to the application's functionality and usability. Therefore, it is essential to prioritize the app flow and concept over aesthetics to ensure the success and effectiveness of the mobile application [25].

The concept of the application was developed using the stage-based model created by Li Et al. [11]. Using this stage-based model, the following design considerations were made

- **Type of data:** To track the user's outdoor behavior different types of data could be selected. When looking at the state of the art, most current apps focus on outdoor activities. As we want the focus to be solely on time spent outdoors, to lower the burden and make it more accessible, the required data would be a simple collection of time measurements.
- **Data collection:** Data collection could be done both manually and automated. Whereas manual tracking could improve awareness and accountability, automated tracking could lower the burden on the user and make them more eager to self-track. As the app requires a respectively low amount of data, it was decided to use manual tracking.
- **Integration:** To make users aware of their situation and to help them reflect and take action, data visualizations should be made in the app. These visualizations should be easily understandable, and allow for exploration of trends and patterns. Goal setting could be integrated into the app to help change the user's behavior.

Using this concept a simple flow was developed showing the basic functions of the app. The app flow can be found in Appendix K.

5.2 Design considerations

After establishing the concept and the flow of the app the focus can be shifted to the design of the aesthetic side of the UI. For the design of the UI the design heuristics developed by Nielsen & Norman can serve as a useful guide. By incorporating these principles, a more intuitive and user-friendly application that effectively identifies and resolves usability issues can be designed, leading to an

Figure 1: Color palette

improved overall user experience [19]. The app was designed using the above-mentioned heuristics. In the following subsections, some of the design aspects will be discussed in more detail, to give a better perspective on how the app design has been established.

5.2.1 Color palette. As the purpose of the app is to track time spend outdoors, a fitting color palette was used shown in figure 1.

The following considerations were made in the design of this color palette:

- **Color association:** As the app is designed to track time spent outdoors, colors were picked that were associated with nature (browns and greens). Besides the association with the outdoors, the chosen colors will give the user a sense of warmth and comfort.
- **Contrast and readability:** To improve the usability of the app, a variety of colors were picked with enough contrast. A combination of light and dark colors will make it easier for the user to distinguish between different elements.
- **Simplicity:** The color palette was kept simple to avoid overwhelming the user. The chosen color palette consists of five main colors. In the app design more variations of these colors could be used (e.g. by using opacity).

5.2.2 Shapes. To continue the nature and outdoors theme discussed previously, shapes used in the design could also be more natural to improve both aesthetics and user perception. The use of natural shapes in the UI design of an application can have a positive impact on the user's experience. Natural shapes, such as those found in nature, can create a sense of harmony and balance that can help to reduce visual noise and promote relaxation. Studies have shown that exposure to natural environments can have a positive impact on mental health, reducing stress and improving overall well-being [9]. Studies have found that by incorporating natural shapes into the UI design of an application similar effects could be achieved. Thus, using natural shapes could help to create a sense of familiarity and comfort for users, which could increase engagement and satisfaction.

5.3 Figma prototype

For the initial usability evaluation, a basic prototype was developed in figma. The primary aim of this prototype was to solicit feedback on the app's concept and flow, rather than on its aesthetics. During this study the prototype has gone through several iterations, which can be found in Appendix A-F. Some illustrations of the final prototype can be seen in figure 2 and 3

Figure 2 shows two wireframes that illustrate the timing mechanism. The circle in the middle is a button that should be used to activate the timer. Once the button has been pressed it changes in
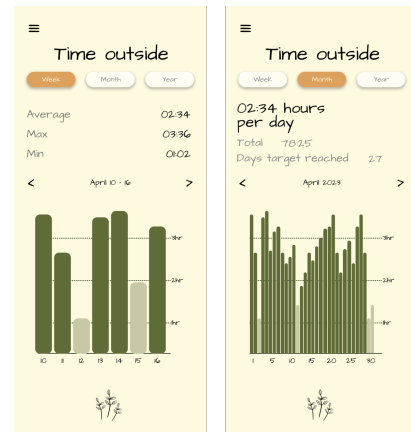

Figure 2: Timer

Figure 3: Data visualization

color (brown to green) and a timer will display surpassed time. In the middle of the circle, a flower can be seen that will start growing simultaneously. The flower will be fully grown when the daily goal has been reached.

Figure 3 shows the data visualizations. Different time ranges could be picked using the buttons on top of the screen (week, month, year). Bar charts visualize the time spent outdoors for the chosen time range.

5.4 Android Studio

After creating a high fidelity prototype in Figma, a prototype was coded in Android Studio. With the results of the user evaluations and research of peer-reviewed articles, the prototype in Android Studio was developed to include the primary principles discovered in order to engender the most usability. The prototype followed the same earthy color palette and similar flow of navigation and views as the Figma prototype. Views such as the profile page, home page with a timer, and page for data visualizations were all included in the Android Studio prototype and it was most important to have

a working timer that could save and send the data to the visualizations for the user to observe their progress. Although the timer was implemented, data was hard coded to demonstrate how data may be visualized by a user. The layout of the app is also much simpler, as it was important to start achieving some functionality, which would be helpful in projecting what the final app would look like.

The prototype in Android Studio is simple and only an initial step towards a more functional app. However, it does also include a survey for the user to document their mood for the day and the selection for the user's daily goal. The app asks for the user to rate their mood on a scale of one to four and then displays the user's mood for the past week. The bar charts are also color coded to show the moods. Lastly, an additional visual was added to display the user's progress throughout the current day. Current data has been shown to be vital in self-tracking through our research and evaluations.

6 METHOD

Throughout this study a variation of methods were used to test the usability and the design of the app. In this section the conducted tests will be described briefly.

6.1 Initial usability evaluations

The goal for the initial testing was to acquire feedback on the concept and the flow of the application. Usability testing was used to evaluate how well the users would interact with the product and their initial thoughts on the concept [21]. For the initial usability evaluation, both the concept and a minimum viable product (MVP) were tested. The MVP is used to help the participant get a better understanding of the concept, as well as test the usability of the initial design and app flow. A semi-structured interview has been used for a good balance between structure and flexibility. The full usability test (including requirements, set-up, and questions) can be found in Appendix H.

6.2 Design features

For the next design phase, more feedback was required on the app design. For the testing of different design features and aesthetics A/B testing was used, as it would allow for quantitative feedback. A/B testing, also known as split testing, is a commonly used method in user interface design to compare two different versions of an interface or design and determine which one performs better. A/B testing has been shown to be an effective method for improving user engagement and satisfaction with digital products [20]. For this A/B testing two versions of different designs were made. Using an online survey the different versions were tested, by simply asking the participant to pick their preference. Though the survey only required the participant to pick one answer, a text box was provided for additional feedback. The full A/B testing can be found in Appendix I.

6.3 Usability evaluations

After developing a high-fidelity prototype more usability testing should be done. By conducting these tests, designers can identify areas where the UX could be improved and make data-driven decisions about changes to the design. This can ultimately lead to a
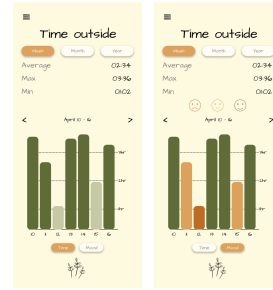

Figure 4: Additional feature in data visualization

more user-friendly and effective application. [14]In this stage of testing the focus is on the usability of the app, which is measured through clicks needed to perform certain tasks and error rates. The usability test was followed by a small semi-structured interview to get more qualitative feedback on the (concept) design. The full set-up of this test can be found in Appendix J.

7 RESULTS

7.1 Initial usability evaluations

The usability testing yielded helpful results for both the concept of the app and the design. In the initial usability testing, the participants showed interest in the idea behind the application and the results were generally positive. Most participants noted that they would possibly use it, but would be even more interested if other features could be added. Participants suggested ideas for additional features such as being able to add friends and then being able to compare and challenge your friends.

7.2 Design features

Through the A/B testing, users provided helpful feedback on the design of the application. Users seemed to prefer a simple, yet playful design, choosing a timer that displays a growing flower as the time increases, rather than a simple progress circle showing the proportion of time passed. Additionally, participants preferred a bar chart view of the data over a calendar view where each day was color coded with the time spent outside. However, it was stated that more additional data should be shown in these visualizations, as the visualizations used for the testing were lacking some detail. The users preferences follow along with current practices in self-tracking apps, so it seems users are more likely to prefer and be more comfortable with ideas they already know. Changes in the application were made according to the results of the testing. Some extra wireframes were created for future possibilities, which can be seen in appendix #. An example of these extra features is the mood-tracker. With this mood-tracker the user inputs their mood every day through a simple questionnaire. The daily mood of the user is displayed together with the amount of time spent outdoors, as can be seen in figure 4. This extra function adds more depth to the application, as it could show the user how spending time outdoors could influence their mood.

7.3 Usability evaluations

Lastly, watching participants complete certain tasks on the prototypes, it was found that participants recognize most icons and were able to easily navigate the app. There was a low error rate during the usability testing and the prototype showed promise for the designs and flow. Though the results of usability testing are looking promising, more testing should be done over longer periods of time. Testing the prototype for a longer time span will provide more information on possible errors that might show up, as well as user perception.

8 DISCUSSION

Through multiple usability evaluations, the idea and implementation were developed for a simple prototype for an app that helps users track their time outdoors. Firstly, the idea behind the app was analyzed by evaluating whether people would be interested and engage in an app such as FreshCheck. It was important to understand the target audience for the app and gage how useful users perceive the idea of tracking time outdoors. As mentioned in our results, the concept received good feedback overall. Participants were interested, which motivated further work on this idea. Although the idea is simple, it is the simplicity that creates some of the motivation to use it. An overly complicated application with too many features would easily tire the user and demotivate the usage of the app. Whether the users from the usability evaluations were aware of the benefits of spending more time outdoors, all were interested in the idea of FreshCheck and understood the concepts in the app. Users also found the simple designs to be more effective during the A/B testing.

While the app's simplicity motivates the usage of the app, it does impose some limitations. The app does require energy from the users to input their information; users will have to start and stop the timer manually in order to record their time. With just one way of collecting data and one that requires effort from the user, the app sacrifices a bit of usability by decreasing convenience, which is highly valued by users. Additionally, the app does not take into account external factors such as weather, location, and schedules. For instance, a student using the app would not be able to compare their time spent outside with how busy their classwork is during a specific period of time.

As mentioned in the results, more testing is required to further develop the app. More testing is needed to test the usability over longer periods of time and with the knowledge gained from the prototypes created here, it would be helpful going forward to plan more rounds of testing. In Appendix K the set-up for a final usability test can be found. A large amount of information was gained from the initial user testing and A/B testing, so multiple rounds of further testing and experimentation would help build upon the results and generate more ideas that would make the app more functional and engaging.

From a technical perspective, the concept of the app is feasible, since the idea was to create a simple app with clear motivation and purpose. With just a few features, the app is simple, yet focused on the main motivation, tracking time outdoors. A prototype in Android Studio was able to be created with the basic features of the app implemented, including the timer, profile page, and the visualizations of the time spent. The prototype started simple, which was a decision made, as new technology was being learned (Android Studio, Java). With the minimum features included, the app starts to be functional and can be worked on further. It would be very feasible to continue developing the prototype in Android Studio into a complex working application.

9 FUTURE WORK

With our initial simple prototype, there are many possibilities for future improvement including the addition of new features and further evaluation and experimentation. One aspect that would be important in the next steps of development would be to alert the user when they are not meeting their goals and finding ways to help the user meet their goals. Adding features to help users be aware of their goals would improve the maintenance phase of reflection [12]. Features that could assist in helping the user reach their goals are challenges that allow the user to earn a badge as incentive, or a network that allows users to connect with friends. Challenges with friends may also help users meet their goals and improve consistency in the use of the app. Another possible incentive to implement, would be the possibility for users to develop and grow their own garden, as they receive more flowers for the more time they spend outside.

Additionally, supporting different ways of collecting data would be important for the improvement of the discovery phase of reflection. For the future, it would be helpful to have a GPS tracker that automatically starts timing how long the user is outside when the GPS notes them in an outdoor location. With a button to start the timer and an automatic start using GPS, two different ways of collecting data would be supported and it would also be possible to carry out an experiment, testing which of the data collection tools is more effective.

Along with a GPS tracker and adding incentives for users, the app could also improve from more connections to other apps. By connecting the app to other apps on the phone, the user is given more context to their results and in turn, can add more meaning to the results. For instance, the app could be connected to a health app, such as Apple Health, Garmin, or Fitbit. Fitness data would give more meaning to the data of the time spent outside by allowing users to see how time outdoors directly impacts their physical health and how active they are outdoors compared to when they are indoors. Another round of usability evaluations with these added features would be immensely helpful in understanding how effective the features are and where further improvement can be made.

10 CONCLUSION

Desk research has highlighted the importance of spending more time outdoors for the well-being of individuals, particularly students. The positive feedback received from participants during user testing demonstrates the potential of the app to encourage outdoor activities. However, further testing is necessary to assess the app's functionality, database performance, and user experience over extended periods of time.

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11 CONTRIBUTIONS

	FG	NL	PJ
Introduction			x
Related work	x		
Analysis	x	x	x
Prototype	x	x	
Methods	x	x	x
Results	x	x	x
Discussion	x	x	x
Future work		x	
Conclusion	x		
Figma prototype	x		
Android studio prototype		x	x

Appendix A: Final prototype (Figma)

Appendix B: Prototype - MVP

Profile

Name: Floortje
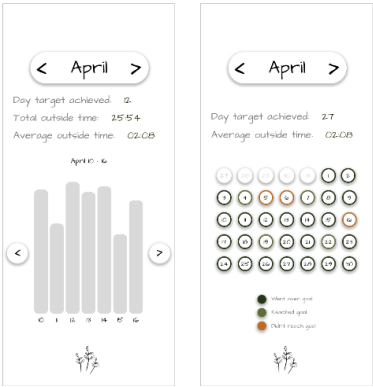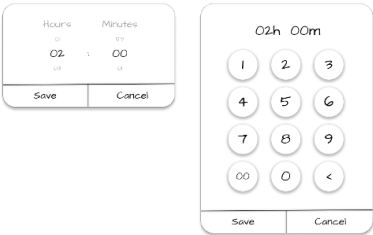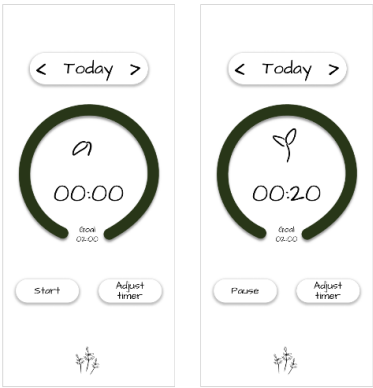
Goal: 02:00:00

Edit

Time spent outdoors:
00:00:00

Start

Time spent outdoors:
00:01:23

Stop

Appendix C: Prototype - Iteration 1

PRESS PLANT TO STOP TIMER

TIME OUTSIDE
00:05

PRESS PLANT TO STOP TIMER

TIME OUTSIDE
00:30

< Today >

00:00

Goal
02:00

Start | Adjust timer

< Today >

00:20

Goal
02:00

Pause | Adjust timer

Hours	Minutes
0	59
02	00
01	01
Save	Cancel

02h 00m

1	2	3
4	5	6
7	8	9
00	0	<

Save | Cancel

< April >

Day target achieved: 12
Total outside time: 25:54
Average outside time: 02:08

April 10 - 16

< >

< April >

Day target achieved: 27
Average outside time: 02:08

Went over goal
Reached goal
Didn't reach goal

Appendix D: Prototype - Iteration 2

PRESS PLANT TO START TIMER

GOAL:
< 01:00 >

PRESS PLANT TO STOP TIMER

TIME OUTSIDE
00:05

PRESS PLANT TO STOP TIMER

TIME OUTSIDE
00:30

PRESS PLANT TO STOP TIMER

TIME OUTSIDE
00:45

PRESS PLANT TO STOP TIMER

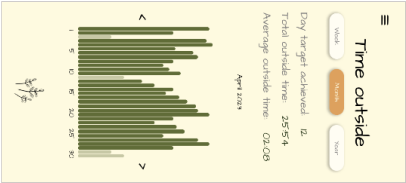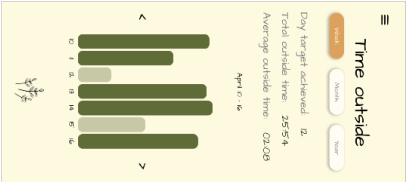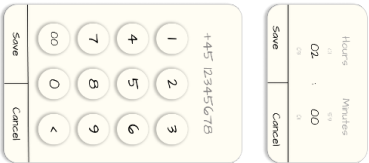TIME OUTSIDE
01:00

Appendix E: Prototype - Iteration 3
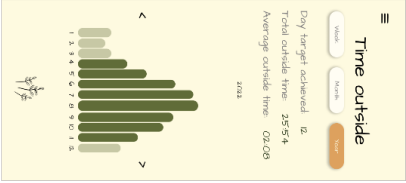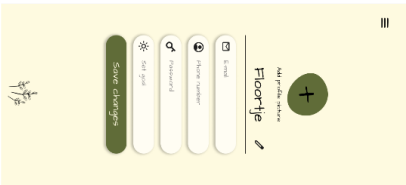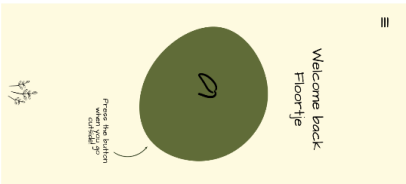
Appendix F: Prototype - Additional features

Bouquet (data visualization)

Add friends

Scoreboard

| Week | Month | Year |

Nicole	12:26:10
Pantea	10:54:43
Floortje	09:21:12
John	08:23:47
Emma	08:02:28
Jan	06:52:11

Moodtracker

Time outside:
02:00:00

How are you Feeling?

Floortje

| Plants grown | Friends |
| 116 | 12 |

April 2023

Friends

| Nicole |
| Pantea |
| Jan |
| John |
| Emma |
| Gaby |
| Martin |
| Nils |

Time outside

| Week | Month | Year |

Average	02:34
Max	03:36
Min	01:02

April 10 - 16

| Time | Mood |

Time outside

| Week | Month | Year |

Average	02:34
Max	03:36
Min	01:02

April 10 - 16

| Time | Mood |

Appendix G: Consent form

FreshCheck

This study aims to evaluate the usability of FreshCheck, an app designed to track users' time spent outdoors. Spending time outdoors has been shown to have significant mental and physical health benefits. However, it is observed that many individuals, particularly young adults, do not spend sufficient time outside. By tracking time spent outdoors, this app aims to raise awareness and encourage behavior change.

Study Procedures: During this usability test, participants will engage in a semi-structured interview session about the FreshCheck application. No video or audio recordings will be made; however, the observer will take notes to capture relevant information. All collected data will be anonymized during the analysis process.

Purpose of the Study: The purpose of this usability test is to gather qualitative feedback on the design of the application, including the concept and aesthetics. The feedback received will be carefully analyzed, and any necessary changes will be made to enhance the overall user experience of the app.

Potential Risks: Participating in this study involves minimal risks. The study solely entails answering questions during the semi-structured interviews. Participants may also be asked to contribute to brainstorming sessions for app design improvements.

Confidentiality and Data Handling: All collected data will be treated with strict confidentiality. Personal information will be anonymized, and any identifying details will be removed to ensure participant privacy. The data collected will be used solely for research purposes and will be securely stored in accordance with data protection regulations.

Voluntary Participation and Right to Withdraw: Participation in this study is entirely voluntary, and participants have the right to withdraw their consent at any time without providing a reason. Participants can choose not to answer specific questions or discontinue their participation in the study without facing any negative consequences.

Contact Information: If you have any questions, concerns, or require further information about the study, please feel free to contact the researcher, Floortje van der Geest, at s220011@student.dtu.dk.

By signing below, you acknowledge that you have read and understood the information provided in this consent form. You voluntarily agree to participate in the FreshCheck App Usability Test and consent to the procedures described.

Participant's Name: _____

Participant's Signature: _____

Date: _____

Appendix H.1: Usability Evaluation #1

<u>Objective</u>

With the first usability evaluation the goal is to get a first round of rapid feedback from possible end-users, preferable with an user-experience background. During the first usability evaluation the concept of the app will be discussed.

<u>Target-group</u>

Designing the application with a specific user group in mind will make for a smoother design process, as accessible design will be of lesser importance. Since (university) students are one of the groups that tend to spend a small amount of time outdoors, it was decided to keep this as our main target group for the project.

<u>Set up</u>

- Participants: +/- 5 students, preferably with a user-experience background, varying ages (18-30), varying study lines
- Ethical aspects: Inform participants about the aim of the test and guarantee user privacy. Participant should know they are free to withdraw from the test at any time
    - Make participants sign consent form before testing
- Test objects: Concept & low-fidelity prototype (MVP)
- 1 interviewer, 1 observer (take notes)
- Semi-structured interview to test the concept
- Open discussion / unstructured interview / testing of heuristics for low-fidelity prototype

<u>Interview questions (concept)</u>

- Do you understand the concept of the app?
    - If not, what seems to be the problem? *Help create a better understanding*
- Do you think this app will or will not help the end-user spend more time outdoors?
- What would you say or the benefits and drawbacks of this app?
- How would you track the user data? (*Automatic input through GPS, manual input, ...*)
- Would you use this app yourself?
    - Why / why not?
- Are there any aspects you would add?
    - What would you add?
    - How would you implement this?

Appendix H.2: Results

Participant #1
- Participant showed a good understanding of the concept
- Why would people use this app instead of similar apps like Strava?
    - *The goal of this app is to help people spend more time outside, there is not necessarily the need to be active. Sitting in the sun would also count towards fulfilling the users daily goal. This might make the application more desirable to use than apps like strava, as the objective does not require any physical activity. There is just one goal: Be outside.*
- What kind of people would use this app? Won't it share the same target group as the activity apps?
    - *More research and user interviews are needed to make a statement about this, but it would be very interesting to research*
- Overall good idea, I think most people know they should be spending more time outside but might be unaware of the time they actually are outdoors. Is possibly lower than they expect.
- Could be a good idea to have pop ups / texts with the possible benefits of spending time outside
- Aspects that could be implemented in the future:
    - Restart button
    - Adjust timer
    - End of timer notification
    - Profile
    - Settings
    - Personalisation

Participant #2
- Participant showed a good understanding of the concept
- Dont similar apps already exists?
    - *Not really. It was found that most similar apps are very focused on activity tracking; going for runs, hikes, bike rides etc. With this app we want to focus on being outdoors, not necessarily being active. Sitting outside in the sun can still be beneficial. People have used other tracking apps to track outdoor time, however, there is no app specifically made for this incentive.*
- Sounds like a good idea. Might need some more features to make it more fun / interesting to use. I think finding a good and simple way to visualise the data and set goals would also be of big help.
- Have you thought about implementing something social? So people can connect with friends for example?
    - *Yes we've thought about it, however, right now we're still focussing on the basic features of the app. Do you have any good ideas on what to add as a "social feature"?*
    - Can't think of anything at the moment
- Have you though about how you would visualise the data afterwards? How will the user be able to track his progress?
    - *We're still working on the best way to do this*

Participant #3
- Do you understand the concept of the app?
    - Participant has a good understanding of the application. Asks if it will only be used for tracking of time spent outdoors.
- Do you think this app will or will not help the end-user spend more time outdoors?
    - It might help the user get a better understanding of how much time they're spending outdoors, however, not sure if it will help them increase their time spent outdoors. Maybe if notifications are being send throughout the day to remind them to go outside.
- What would you say or the benefits and drawbacks of this app?
    - "I guess there are plenty of health benefits to spending more time outside, so that would be one of the benefits"
    - Drawback could be that the user constantly has to remind themselves of turning on / off the timer
    - Drawback could be that it is depressing to see the results
- How would you track the user data? (*Automatic input through GPS, manual input, …*)
    - Probably simple data visualizations, maybe something similar to what other apps are using
    - Look at how stepcounters visualize their data
- Would you use this app yourself?
    - Maybe for a while to see if there is something to improve, but if I see that I spent enough time outside I would probably stop using it
    - Might forget to use it all the time
- Are there any aspects you would add?
    - Maybe sent notifications whenever someone should spend more time outside

Participant 4
- Do you understand the concept of the app?
    - Participant has an alright understanding of the app
    - Asks about how it differs from apps that are currently on the market
    - Asks if there aren't any other timer apps that could be used instead
- Do you think this app will or will not help the end-user spend more time outdoors?
    - Depends on if the user is willing to make changes
    - Maybe reminders are needed to help the user change their behavior
- What would you say are the benefits and drawbacks of this app?
    - Benefits would be spending more time outside
    - Drawback might be that it takes a lot of effort to track, user will have to turn on and off the timer all the time
- How would you track the user data? (*Automatic input through GPS, manual input, …*)
    - I think using automatic input through GPS could be better
    - GPS would improve usability in my opinion, as I don't have to remind myself all the time to turn on / off the timer
- Would you use this app yourself?
    - Depends, would have to see the app when it's developed further
- Are there any aspects you would add?
    - For sure the GPS input

Appendix I.1: Design features

<u>Objective</u>
Improve the design (aesthetics) of the application

<u>Method</u>
- Online survey that compares two versions of different function (A/B testing)
- Send survey to peers
- Analyse results

<u>Survey</u>

Welcome to the FreshCheck prototype testing survey! We greatly appreciate your willingness to help us improve our prototype.

This survey is about FreshCheck: An app that will help users track their time spend outdoors. Spending time outdoors can be greatly beneficial to both mental- and physical health. However, it was found that a lot of people, and especially young adults, do not spend enough time outside. Tracking time spend outdoors could make people more aware of their current situation and change their habits.

Please answer the following questions to help us get a better view on the survey results. The survey will be fully anonymous, and participation is voluntary. The survey will take around x minutes.

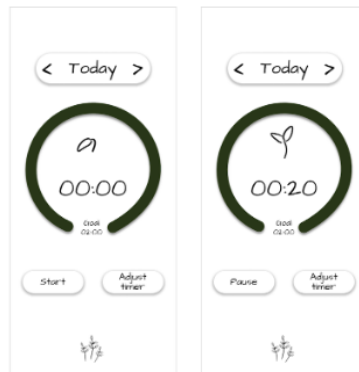General questions
- What is your age range?
    - Under 18
    - 18-24
    - 25-34
    - 35-44
    - 45+
- What is your gender?
    - Female
    - Male
    - Non-Binary
    - Prefer not to say
- What is your level of education?
    - High school
    - Under-graduate
    - Graduate
    - PHD
- What is your current employment status?
    - Employed full-time
    - Employed part-time
    - Student
    - Unemployed
- Have you previously used applications to track your activity?
    - Yes
    - No
    - Mayb

Questions about design
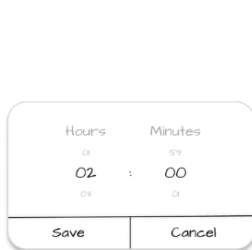
- For each of the illustration:
    - Which of these options do you prefer?
        - Option A
        - Option B
        - Neither
        - No preference
    - Any additional comments or feedback on these illustrations?
- Do you think you would use FreshCheck?
    - Yes
    - No
    - Maybe
    - Not sure
- Any comments on why you would or wouldn't use FreshCheck?

PRESS PLANT TO STOP TIMER

TIME OUTSIDE
00:05

PRESS PLANT TO STOP TIMER

TIME OUTSIDE
00:30

Option A

< Today >

00:00

Goal
02:00

Start   Adjust timer

< Today >

00:20

Goal
02:00

Pause   Adjust timer

Option B

Hours   Minutes
01   59
02   :   00
03   01
Save   Cancel

Option A

02h 00m

1   2   3
4   5   6
7   8   9
00   0   <

Save   Cancel

Option B

Option A

< April >

Day target achieved: 27
Average outside time: 02:08

27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

● Went over goal
● Reached goal
● Didn't reach goal

Option B

< April >

Day target achieved: 12
Total outside time: 25.54
Average outside time: 02:08

April 10 - 16

<   10   11   12   13   14   15   16   >

Appendix I.2: Results

What is your age range?

17 responses

Legend:
- Under 18
- 18-24
- 25-34
- 35-44
- 45+

52.9%
41.2%
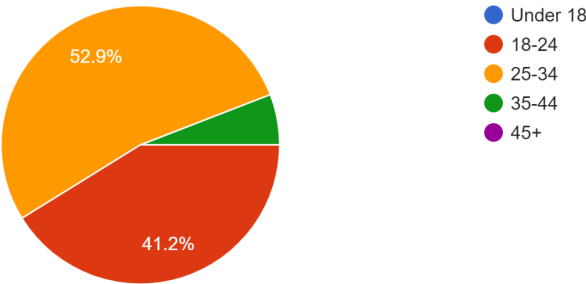
What is your gender? Choose the option that applies best to you

17 responses

Legend:
- Female
- Male
- Non-Binary
- Prefer not to say

64.7%
35.3%
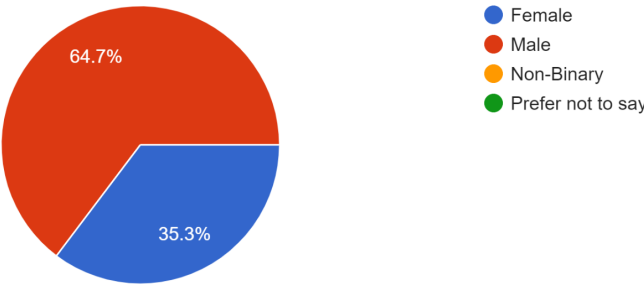
What is your level of education?

17 responses

Legend:
- High School
- Under-graduate
- Graduate
- PHD

23.5%
58.8%
17.6%

What is your current emplyment status?
17 responses

- Employed full-time
- Employed part-time
- Student
- Unemployed

58.8%

23.5%

17.6%
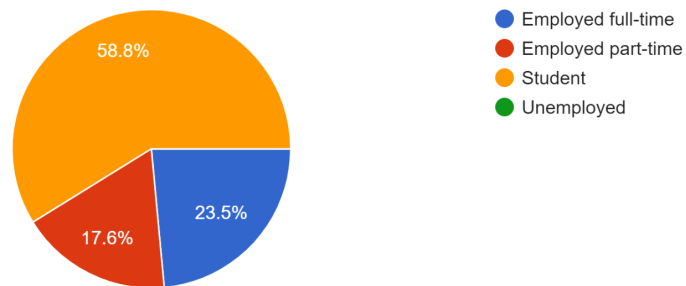
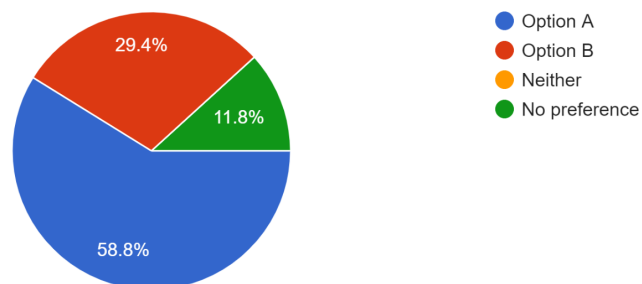## Have you previously used applications to track your activity (step count, running distance, sleep tracking, etc...)
17 responses

- Yes
- No
- Maybe
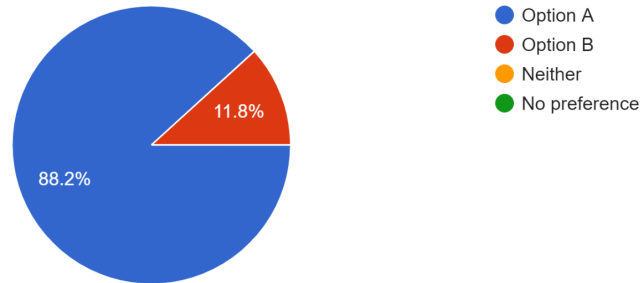
94.1%
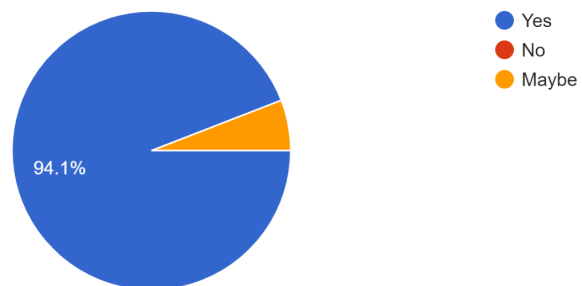
These are two versions of how the timer could look like. Which of these options do you prefer?
17 responses

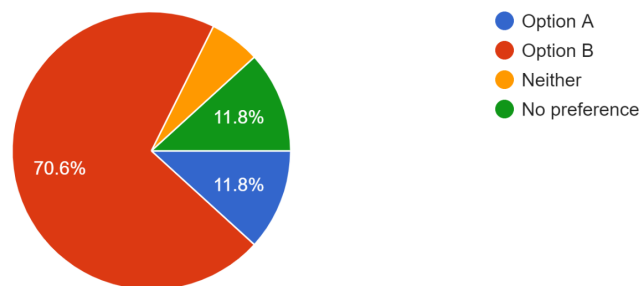

- Option A
- Option B
- Neither
- No preference

29.4%

11.8%

58.8%

These are two versions of how the user could adjust the timer (to set a goal), which one do you prefer?

17 responses

- Option A
- Option B
- Neither
- No preference

88.2%
11.8%

These are two versions of how the data could be visualized, which one do you prefer?

17 responses

- Option A
- Option B
- Neither
- No preference

70.6%
11.8%
11.8%

Do you think you would use FreshCheck?

16 responses

- Yes
- No
- Maybe
- Not sure

31.3%
31.3%
25%
12.5%
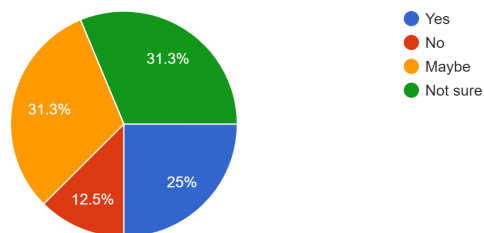
Additional comments:
- Adjustment of timer in option B is a bit confusing
- Add more detail do data visualizations: Color used in version A is good, same coloring could be used in version B to improve the visualizations

Appendix J.1: Usability evaluation #2

The second usability evaluation consists of two parts. First the usability is tested by measuring error rates and clicks needed to perform an action. The user is asked to perform simple tasks, as can be found in table below. No other instructions should be given. During this test the observer should measure the clicks needed for each tasks, error rates, and write down additional comments. After this usability testing the participant will be asked several questions on their perception of the app using a semi-structured interview.

Target-group

Designing the application with a specific user group in mind will make for a smoother design process, as accessible design will be of lesser importance. Since (university) students are one of the groups that tend to spend a small amount of time outdoors, it was decided to keep this as our main target group for the project.

Set up
- 1 interviewer, 1 observer (take notes)
- Participants: +/- 5 students, preferably with a user-experience background, varying ages (18-30), varying study lines
- Ethical aspects: Inform participants about the aim of the test and guarantee user privacy. Participant should know they are free to withdraw from the test at any time
    - Make participants sign consent form before testing
- Test objects: high fidelity prototype, table with tasks
- Link to prototype
- Semi-structured interview, observer will take small notes during the interview of useful comments

Part 1 - Usability testing:

Task	Clicks needed objective	Clicks needed during test	Error rate	Additional comments
Adjust the goal timer - Prototype should be on profile page - Participant needs to **click on "set timer"** - Participant needs to click on the time/numbers to **adjust the goal** - Participant needs to click **accept**	3 to 5	4	0	
Start timer - Prototype should still be on profile page - User should move to **home screen.** Either by	2 to 3	3	0	

clicking "save" or by using the sidemenu - User needs to **press the button to start the timer**				
Pause and unpause - User needs to pause and unpause the timer by pressing the button	2	2	0	
Go to data visualization and switch time range to month - User needs to open the **sidemenu** - User needs to **click on "data visualizations"** - User needs to **click on the "month" button**	3 to 4	5	1	Error opening side menu / looking for how to navigate to data visualizations

Part 2 - Semi structured interview:
- What is your opinion on the concept?
- Would you add / remove any features? (*if yes, which)*
- What is your opinion on the design of the app?
- Did you find anything confusing while using the app? (*if yes, what)*
- What is your opinion on the app design?
    - Go more in detail if needed
- What is your opinion on the app flow?

Appendix J.2: Results

<u>Participant #1</u>
<u>Part 1 - Usability testing:</u>

Task	Clicks needed objective	Clicks needed during test	Error rate	Additional comments
Adjust the goal timer - Prototype should be on profile page - Participant needs to **click on "set timer"** - Participant needs to click on the time/numbers to **adjust the goal** - Participant needs to click **accept**	3 to 5	5	0	
Start timer - Prototype should still be on profile page - User should move to **home screen.** Either by clicking "save" or by using the sidemenu - User needs to **press the button to start the timer**	2 to 3	2	0	
Pause and unpause - User needs to pause and unpause the timer by pressing the button	2	2	0	
Go to data visualization and switch time range to month - User needs to open the **sidemenu** - User needs to **click on "data visualizations"** - User needs to **click on the "month" button**	3 to 4	3	0	

<u>Part 2 - Semi structured interview:</u>
- What is your opinion on the concept?
    - Sounds interesting
    - Do you think people will keep using it over time?
    - Is there a specific target group besides students?
- Would you add / remove any features? (*if yes, which*)
    - Maybe adding friends, so you could compare / race
    - Have you though about connecting it with apps / smartwear? Could be connected with smartwatch for example
- What is your opinion on the design of the app?
    - Looks alright
    - UI looks fine, good use of heuristics
    - Good color contrasts, color palette makes sense for the application
    - Good use of icons / recognizable features
- Did you find anything confusing while using the app?
    - Not anything that I could think of
- What is your opinion on the app flow?
    - Looks fine
    - Quite simple, which is good
    - Makes sense to have the sidemenu

Participant #2
Part 1 - Usability testing:

Task	Clicks needed objective	Clicks needed during test	Error rate	Additional comments
Adjust the goal timer - Prototype should be on profile page - Participant needs to **click on "set timer"** - Participant needs to click on the time/numbers to **adjust the goal** - Participant needs to click **accept**	3 to 5	4	0	
Start timer - Prototype should still be on profile page - User should move to **home screen.** Either by clicking "save" or by using the sidemenu - User needs to **press the button to start the timer**	2 to 3	3	0	
Pause and unpause - User needs to pause and unpause the timer by pressing the button	2	2	0	
Go to data visualization and switch time range to month - User needs to open the **sidemenu** - User needs to **click on "data visualizations"** - User needs to **click on the "month" button**	3 to 4	4	0	

<u>Part 2 - Semi structured interview:</u>
- What is your opinion on the concept?
    - I'm not sure if I understand the concept of the application. How does this differentiate from applications like stepcounters etc?
        - This app will focus on spending time outdoors only, not activities. With stepcounters etc you're still supposed to be active (in order to activate the application). The objective of this app is thus to just spent time outdoors and get more fresh air, sunshine, etc.
    - In that case, the concept of the app makes sense. Aren't there any applications already on the market with the same function?
        - We could not find anything, so if it does exist it is not used by many people
- Would you add / remove any features?
    - Maybe automatic tracking with GPS
    - Something like adding friends could be an option, think something similar is being used in activity tracking apss (samsung health, strava)
- What is your opinion on the design of the app?
    - I love the design of the app
    - Very playful with the shapes and colors
    - Instantly associate it with nature, which might help users think of going outside
- Did you find anything confusing while using the app?
    - Not in the current prototype
- What is your opinion on the app flow?
    - Current prototype looks good
    - Keep it simple, experience with other apps using too many functions making it very confusing

Participant #3
Part 1 - Usability testing:

Task	Clicks needed objective	Clicks needed during test	Error rate	Additional comments
Adjust the goal timer - Prototype should be on profile page - Participant needs to **click on "set timer"** - Participant needs to click on the time/numbers to **adjust the goal** - Participant needs to click **accept**	3 to 5	4	0	
Start timer - Prototype should still be on profile page - User should move to **home screen.** Either by clicking "save" or by using the sidemenu - User needs to **press the button to start the timer**	2 to 3	3	1	Not sure on how to navigate to the correct screen. Found it by opening the side menu
Pause and unpause - User needs to pause and unpause the timer by pressing the button	2	2	0	
Go to data visualization and switch time range to month - User needs to open the **sidemenu** - User needs to **click on "data visualizations"** - User needs to **click on the "month" button**	3 to 4	4	0	

Part 2 - Semi structured interview:
- Design looks good so far. Think the colour scheme works really well. Feels natural and vibes with the concept.
- Good contrast between colours for background and text, everything is very readable
- Could be an idea to test out different flowers / plants
    - *Do you think the user should be able to personalise the flower / plant?*
    - Personalization could be a cool idea. I wouldn't add too many options as you want to keep it simple
- I think maybe some changes could be made in the timer. I like that the current design is simple, however, maybe a different way of displaying the time spend outdoors could be designed
- Concept of the application sounds good, you should think about how you'll get people to use the app (and to keep using the app over time)
- Had some confusion on how to navigate through certain screens. Once you get used to the sidemenu it makes sense. Maybe more instructions for first time users are needed, or more buttons on the main screen (so that you don't have to open the sidemenu).

Participant #4

Part 1 - Usability testing:

Task	Clicks needed objective	Clicks needed during test	Error rate	Additional comments
Adjust the goal timer - Prototype should be on profile page - Participant needs to **click on "set timer"** - Participant needs to click on the time/numbers to **adjust the goal** - Participant needs to click **accept**	3 to 5	3	0	
Start timer - Prototype should still be on profile page - User should move to **home screen.** Either by clicking "save" or by using the sidemenu - User needs to **press the button to start the timer**	2 to 3	3	0	
Pause and unpause - User needs to pause and unpause the timer by pressing the button	2	2	0	
Go to data visualization and switch time range to month - User needs to open the **sidemenu** - User needs to **click on "data visualizations"** - User needs to **click on the "month" button**	3 to 4	3	0	

Part 2 - Semi structured interview:
- Concept of the app is good. I notice myself that I do not spend a lot of time outside, or at least I'm not really mindful about it. Would be interesting to see how an app like this might influence my behavior
- I like the design of the app. Colours fit well with the concept and are not too 'loud'
- Maybe change the flower / plant illustration. Could also vary between different plants over time or have the user pick a specific plant / flower / tree to personalise the app.
- How will the user be notified that they have reached their goal?
    - There will be a small animation and probably a notification
- Concept for now looks good, interested to see other aspects implemented in later stages. Nothing else to improve on right now (apart from adding more features). Think about adding the following:
    - Friends
    - More things to track

Appendix K: Final usability test

<u>Objective</u>

Test if using the app is beneficial to time spend outdoors

In this final test we will test in using the app will result in an increased time spend outdoors. For this group a large group of participants will be needed, as we are looking for quantitative results. During the experiment the participants will be using the app for a month. The participants are only asked to track their time spend outdoors using the app, not given any instruction about increasing their time spend outdoors nor information about the possible benefits of increasing their outdoors time. After a month the changes in time spend outdoors will be analyzed.

A few important notes about factors that could influence the results:
- As we are still focussed on targeting students it would be beneficial to have students make up for all / most of the participants during the experiment. If possible, different groups could be added. However, during the data analysis the difference in participants should be acknowledged and taken into account. (For example, participants with a 9-5 job could have a different result than students studying, as students often have a more flexible schedule).
- It would be beneficial for the researchers to keep track of the weather, as there is a high probability that this influences the time spend outdoors. To decrease the impact of weather on the results it could be decided to have participants located in different regions / countries, however, this would require a large amount of participants and might not be feasible.

<u>Preparation</u>
- Have a working version of the app that will store & upload the collected data (to be used for analysis)
- Recruit participants, preferably students of different age groups and from different study lines / universities
    - Inform participants of their rights and have them sign a consent form
    - Have participants fill in a short question
    - Give participants a brief introduction to the app and help them with installation

Appendix L: App flow