LightLock

Glow Hard or Go Home

Mats van Deijck
Eindhoven University of Technology
Faculty of Industrial Design
2050862
m.j.j.v.deijck@student.tue.nl

Jeanneke Smeets
Eindhoven University of Technology
Faculty of Industrial Design
1991396
j.e.smeets@student.tue.nl

Camila Vicent Perez
Eindhoven University of Technology
Faculty of Industrial Design
1974491
c.vincent.perez@student.tue.nl

Tanya Yesurajan
Eindhoven University of Technology
Faculty of Industrial Design
2021242
t.yesurajan@student.tue.nl

word count: 5003

ABSTRACT

For this project within the Industrial Design faculty of Eindhoven University of Technology, healthier smartphone usage among university students (18-25) was explored and eventually a physical-digital hybrid prototype designed to enhance productivity and minimize smartphone distractions during study sessions was developed.
Guided by the Reflective Transformative Design Process (RTDP) [7], the project has its main focus on qualitative and descriptive research (through surveys and observations), iterative prototyping, and user validation/testing (through interviews and product testing in controlled settings). Our research identified the need for a social intervention to raise awareness and encourage healthier smartphone habits. The result is LightLock, a tangible solution integrating physical and digital elements to address smartphone overuse in campus study spaces. Developed in collaboration with FitPhone (Fontys Eindhoven), this project reimagines existing solutions by incorporating engaging feedback and intrinsic motivation–key factors often missing in conventional app blockers.

Figure 1: Jeanneke, Mats, Camila, and Tanya on Demo Day.

Index

INTRODUCTION

With the growing dependency on smartphones among young adults, distractions from, primarily, social media apps often outweigh the benefits of these devices.

Research indicates that young adults aged 18-25 spend over six hours a day on their smartphones, with an average of 2-3 hours dedicated to social media apps like TikTok and Instagram. This excessive screen time directly impacts attention spans, reducing productivity and augmenting procrastination in academic settings. Beyond academics, it also affects their personal lives, preventing them from engaging in activities they enjoy [4].

The challenge lies in designing a solution that fosters healthier smartphone habits while retaining the advantages of technology. In partnership with FitPhone, a 5-year-long project from Fontys Eindhoven, we began developing a solution tailored to university students who struggle with self-discipline in digital environments. Recognizing that solutions like app blockers (f.e. Brick [3]) often fail due to the lack of intrinsic reinforcement or engaging feedback, was key to driving the design toward an innovative approach that combined already exiting solutions (f.e. Forest [5]), and a new vision to solve the issue.

After conducting user research, including a survey, interviews and user testing, it was clear that a social intervention is key to increase awareness of smartphone usage and actively promote behavioural change.

LightLock is the tangible solution that emerged from this process, combining physical and digital components.
By tackling smartphone overuse in campus study spaces, this project addresses a critical issue affecting students today. While the current focus is on productivity, the design holds potential for future and broader applications, including improving digital well-being and supporting mental health in other contexts [16].

Throughout this report, coloured lines will be used to annotate text related to the 5 different expertise areas within the Industrial Design faculty of TU/e. These expertise areas have guided our personal and professional development throughout the project.

User and Society

Creativity and Aesthetics

Business and Entrepeneurship

Technology and Realization

Math, Data, and Computing

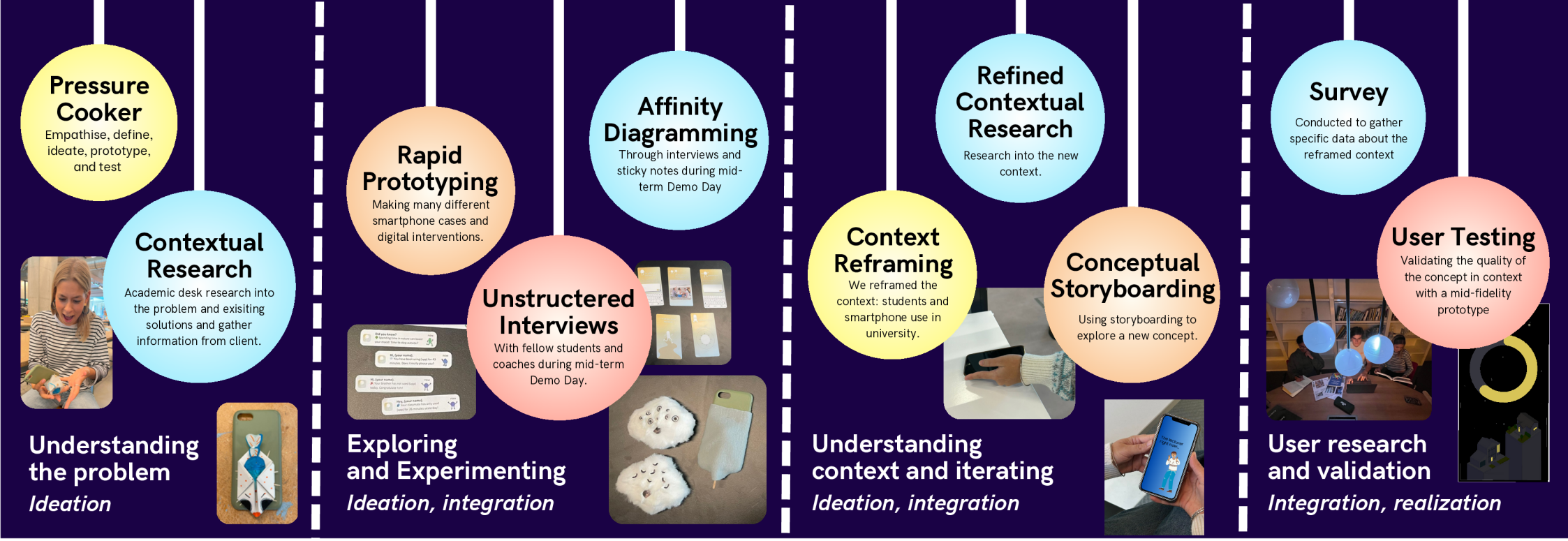


Figure 2: The design (research) process in chronological order.

Envisioning and Transforming
Analysing and Abstracting
Sensing, Perceiving, and Doing
Validating quality

METHOD

The process followed throughout the project can be described using the Reflective Transformative Design Process (RTDP), a flexible and iterative approach to design. Central to this process is finding a solution to the design brief through continuous reflection, ideation, integration, and realization (see *Appendix 9*). The RTDP emphasizes ongoing evaluation and adaptation, refining the approach as new insights emerge [7].

Throughout the project, we applied several design/research methods, each serving different purposes in gathering information that informed the ideation, integration, and realization of our final solution. These can be categorised within the four activities in the RTDP. These include 'Envisioning and Transforming', 'Analysing and Abstracting', 'Sensing, Perceiving, and Doing', and 'Validating quality', which were woven together in a non-linear, flexible process, enabling us to adapt to new findings and insights.

For an overview of the used design/research methods and corresponding iterations in chronological order, see the provided visual representation (*Figure 2*). In the following sections, we will outline our design (research) process in four phases, starting with understanding the problem and culminating in validating the final concept.

Pressure Cooker

Understanding the problem

The first phase involved understanding the problem. The first method employed after receiving the design brief was a '**Pressure Cooker**,' a rapid ideation session based on our shared knowledge and vision, with minimal prior research. During this phase, we first empathized with the target audience, understanding that many 18–25 year-olds are motivated to reduce screen time but often struggle to break free from the addictive nature of smartphones. Next, we defined our goal: to create opportunities for smartphone-free moments and help users develop healthier habits around smartphone use. This would involve raising awareness of excessive screen time and encouraging users to take regular breaks.

It was then time for ideation, where various concepts were brainstormed (*Figure 3*). Many different concepts were explored, such as wristbands and a phone-free zone cage. The 'final' idea was a smartphone case with a puffer fish that inflates when screen time limits were exceeded (*Figure 4*). Also, the (blue) baby puffer fish would be taken out and would guide the user to a place away from their smartphone. Parts of the idea we were enthusiastic about included its creativeness, the social factor of shame, and the prompt to create opportunities for smartphone-free moments.

Contextual Research

After it was quickly prototyped, scenario roleplaying was conducted, and various pictures (including those from *Figure 4*) were incorporated into a storyboard (*Appendix 11*) to present the concept. Through the 'Pressure Cooker,' we were able to quickly iterate on ideas and explore different possibilities, while also recognizing the need for contextual research to ensure our solution would emerge from a deeper understanding of the problem and the users' needs.

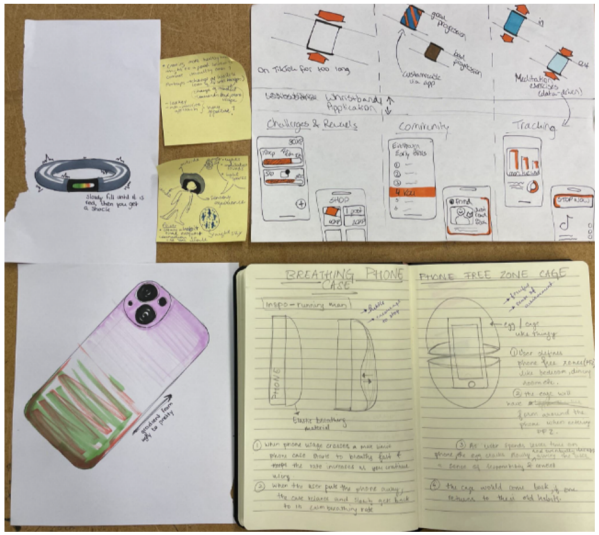


Figure 3: Visualizations of different ideas.

After completing the 'Pressure Cooker,' focus shifted to **contextual research**, reviewing academic literature and consulting our client, Herm Kisjes, an expert in psychology and (smartphone) addiction. Our goal was to deepen our understanding of the target group, the problem, and existing solutions, laying the groundwork for ideation.

Figure 4: Two of the storyboard pictures presenting the 'Puffer Fish' smartphone case.

We discovered that males aged 16–24 spend slightly less time on internet-connected devices than females (7 hours and 4 minutes versus 7 hours and 32 minutes daily [4]). Gen Z college students, in particular, experience information overload and brain fatigue, making screen time management challenging [12]. We then considered these insights and statistics about the target group sufficient, partially because we are also part of this target group.

A literature review on smartphone addiction confirmed that it arises from dopamine-driven instant gratification, with features like endless scrolling and notifications creating a cycle of engagement [2]. To combat this, we focused on designing interventions that would avoid these disruptive habits and encourage mindful usage.

We also identified limitations with our initial smartphone case concept (*Figure 4)*, particularly its inability to fully block smartphone use. To achieve this effect, we determined that incorporating a smartphone app would be necessary. Our research also revealed several effective smartphone application intervention strategies: social support is a powerful motivator, with group-based interventions being particularly successful [11]; blocking mechanisms that limit usage after a set time are effective in reducing screen time [8]; and gamification, particularly with rewards and community sharing, increases engagement [14]. We also encountered the Fogg Behavior Model [6], which emphasizes motivation, ability, and prompts in driving behaviour change and guided many design decisions to effectively influence the target audience's behaviour (*see Appendix 16*).

A key insight from our meeting with Herm Kisjes was the importance of considering different emotions, especially for users prone to addiction. He also emphasized the need for interventions that contrast life with and without a smartphone to raise awareness. This psychological perspective was taken into account when rapidly prototyping. Most importantly, Herm encouraged us to create a range of interventions to design for varying user preferences and allow for experimentation.

We faced challenges agreeing on a definitive design, with some team members suggesting a companion-like case that users would care for, while others proposed a more subtle, vibration-based case. We also explored a variety of smartphone screen interventions, such as full-screen limits, character-based experiences, and social elements. Therefore, after extensive contextual research, we decided to explore and experiment with these ideas to visualize and experience the potential interventions.

Exploring and Experimenting

This phase started with **rapid prototyping**, quickly creating various prototypes to test different concepts and refine the ideas. We experimented with two distinct smartphone case designs: a fluffy, character-based case that aimed to foster emotional engagement and a 'breathing phone case' that gently expanded and contracted, providing a soft, tactile nudge to encourage users to put away their phones (*Figure 5*). Alongside the cases, we designed several smartphone screen interventions, including pop-up messages like motivational appraisals, and socially comparative and humorous messages. We also prototyped full-screen interventions, such as a 30-digit-input task and reflective questions (*Figure 6*).

These prototypes were strongly influenced by our contextual research. For example, the 30-digit-input lockout task was inspired by a study that showed it encouraged 50% of users to close an app [9]. Additionally, research showed that combining different nudging strategies could maintain both feasibility and efficacy [13]. Our client's emphasis on emotional stability also guided the development of emotionally supportive designs. However, there were moments when our prototypes deviated from the research to test concepts, we felt were intuitive, like the fluffy case and humorous messages, which were less explicitly supported by the literature.

This method allowed us to test and refine our ideas and visualize a wide range of potential designs. We ultimately aimed to present these prototypes to our fellow students and coaches, inviting feedback and discussions.

Figure 5: Two smartphone case explorative prototypes.

Unstructured Interviews

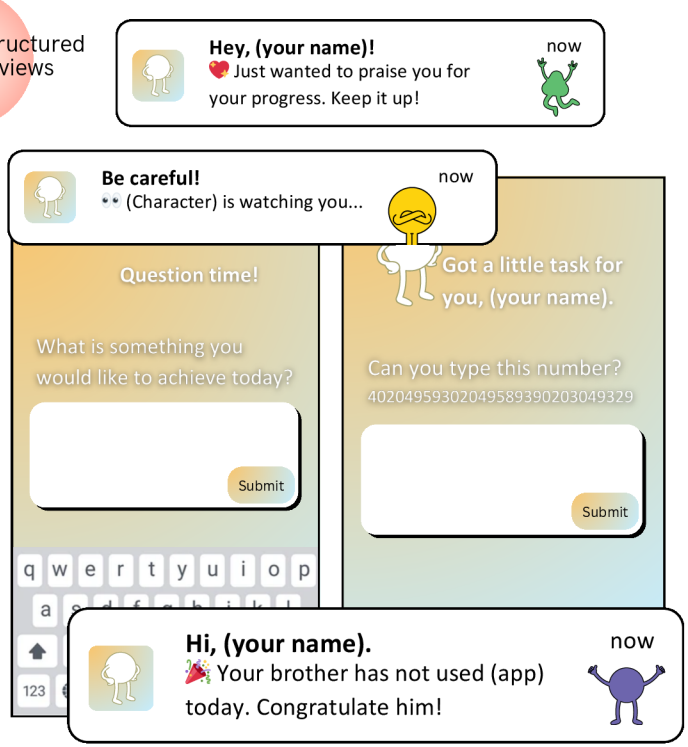


Figure 6: Examples of the full-screen and pop-up smartphone screen interventions.

Affinitiy Diagramming

During the mid-term Demo Day, organized by the Health and Inclusive Design Squad, we sought valuable feedback to refine our concept. To facilitate this, we displayed the variety of prototypes on our table, including the smartphone cases and printed digital interventions (*Figure 7*).

Visitors, including fellow Industrial Design students and coaches, were encouraged to engage with the prototypes and share their thoughts. For instance, they could place their hand on the "breathing phone case" to feel its subtle movement, and the digital interventions were demonstrated by placing cardboard messages over visitors' phone screens to mimic pop-ups and full-screen prompts.

We collected feedback primarily through **unstructured interviews**, engaging visitors in open-ended conversations to explore their perceptions, preferences, and critiques in depth. At the same time, we wrote down feedback on sticky notes, capturing both qualitative insights and recurring themes (*Figure 8*). The interviews revealed a range of perspectives; some visitors recommended aligning the messages with the user's environment to make them feel more relevant, while others questioned whether the phone case alone could effectively raise awareness of smartphone usage. Many praised the combination of physical and digital interventions, finding it innovative and engaging.

Figure 7: Mid-term Demo Day setup, with the smartphone cases, printed smartphone interventions on the table.

Figure 8: Conducting an unstructured interview, while feedback is written down on sticky notes (on the table).

To synthesize and analyse the feedback we collected during the mid-term Demo Day, we used **affinity diagramming**. Using Miro to cluster the sticky notes into themes and adapt their sizes according to the quantity allowed us to systematically organize and synthesize the feedback into clear patterns and actionable insights, guiding our next steps in the design process (see *Appendix 2* for the entire affinity diagram).

One of the most significant recurring feedback points was that pop-up messages

Context Reframing

Redefined Contextual Ressearch

were commonly disliked. Participants found them ineffective, as they could be easily dismissed with a swipe. This insight led us to focus exclusively on designing full-screen interventions, which were perceived as more impactful.

Additionally, feedback emphasized the importance of tailoring the digital messages to the context of the user. It was suggested to incorporate the user's environment-specific prompts or align messages with the user's current activity or the apps they were using. We were, however, not directly sure how to integrate this in our existing concept.

Regarding the phone cases, the feedback was mixed. While some participants appreciated the concept of having something tactile or interactive on the back of their phones, others raised practical concerns. The "companion" design was seen by some as too childish, and issues such as practicality and the overall effectiveness of a phone case in raising awareness were frequently questioned.

Considering the feedback, we worked to integrate the insights into our designs. While the smartphone screen interventions offered numerous possibilities, the phone case concept proved more challenging. Unable to agree on its final form and functionality, we decided to discard the phone case idea altogether, marking a turning point in our process.

Feedback suggested, and we also wanted to tailor prompts to be more context aware. We shifted our attention to reframing the project's context.

Understanding context and iterating

Feedback during the mid-term Demo Day emphasized the importance of tailoring messages to the user's context, including their location, current activity, and app usage. To address this, we recognized the need to reframe the project's context and provide a more specific scope for our designs. Since our target group was already university students, we decided to focus on healthy smartphone use on campus.

This **context reframing** provided a structured environment to explore how our interventions could adapt to diverse student scenarios, such as studying in the library, attending lectures, socialising, or time between classes. It also allowed us to design more targeted and impactful solutions, ones that align with the unique needs and challenges students face in their academic lives. This redefined context highlighted the need for further refined contextual research to better understand the specific behaviours, needs, and challenges related to smartphone use on campus.

With a reframed context, we conducted **refined contextual research** into research papers on study habits, breaks, and motivational strategies, with the goal to better understand the habits, challenges, and motivations of students. One key finding from this research was that study sessions are more effective and appreciated when their duration and breaks are systematically pre-determined. For example, one study highlighted the effectiveness of study blocks lasting either 15 or 30 minutes, paired with breaks of 3 or 6 minutes, respectively. Additionally, the research revealed that during breaks, the second and third most common activities were checking social media and messages on a smartphone [1].

In addition, we looked for ways to maintain user motivation (Fogg Behavior Model) during study sessions. We drew inspiration from successful apps like Forest and Duolingo, which effectively engage users through gamification features such as streaks and the visual growth of trees. These simple yet engaging features were proven to maintain users' attention and commitment. Our literature review also highlighted that the perceived effectiveness of rewards, specifically food rewards, is not necessarily tied to their quantity, but rather to their timing and relevance [10].

Our contextual research also extended to existing physical designs aimed at reducing smartphone distraction. Since we had already discarded the smartphone case idea, we examined solutions such as Brick (*Figure 9*), a block that temporarily disables distracting apps and notifications when scanned [3]. We decided to build upon the core of this idea—minimizing distractions through scanning in—but adapt and tailor it to fit our newly redefined context of promoting healthy smartphone use on campus.

Through the refined contextual research, we developed a concept combining digital and physical elements and used conceptual storyboarding to visualize and refine the user journey and interactions.

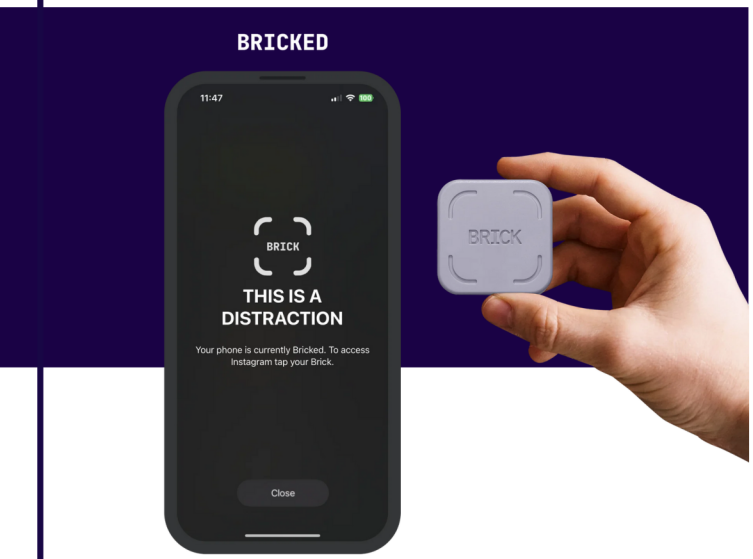


Figure 9: Brick. From getbrick.app [3].

We used **conceptual storyboarding** to visualize our design concept and explore its interactions within the context of healthy smartphone use on campus. This involved creating and acting out scenario-based pictures. One central scenario involved a pole located at the entrance of a lecture hall where students could check in their smartphones, effectively locking them away in the duration of the lecture (*Figure 10*).

Creating the storyboard scenarios proved invaluable for refining the design, helping us generate and eliminate design ideas. Through this process, we developed several additions to the design, including lock screen widgets, various focus modes, and external motivators like "spar points," with the "spar points" being further supported by literature findings in incentive theory [10].

Additionally, the storyboard served as a communication tool, allowing us to present our concept to our client and coaches. Feedback from these discussions was important for our next steps. Our client stressed the opportunity to create a new norm for smartphone usage in study spaces, encouraging a broader cultural shift in student behaviour. It was also pointed out that, despite our extensive research, we had not yet engaged in direct user research to validate our assumptions and design decisions.

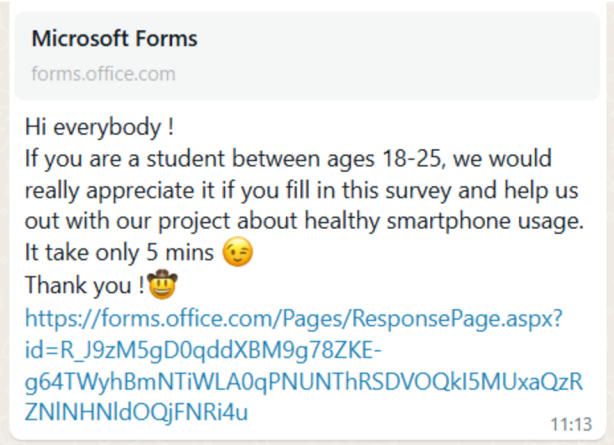
Figure 10: Part of conceptual storyboard.

User research and validation

Taking this feedback to heart, it was decided to conduct a **survey** as our first user research method. We distributed a digital Microsoft Forms survey to our network of university students via WhatsApp (*Figure 11*) and received 53 responses. Rather than seeking feedback on our concept, we focused on understanding students' needs, motivators for reducing smartphone use, and experiences with apps designed for this purpose. The survey included open- and closed-ended questions.

The survey results, both quantitative and qualitative (the latter analysed and grouped to reveal recurring themes), revealed several important insights.

Figure 11: The WhatsApp message that brought in the 53 participants.



These were not only guiding for this design process, but can also provide a strong foundation for related projects. The most important survey results will now be discussed. All the visualizations of the quantitative and qualitative survey results can be found in Appendices 5 and 6.

First, our survey showed that participants spend an average of approximately four and a half hours per day on their smartphones (*Figure 12*), with 86% of the participants (maybe) expressing an interest in reducing their smartphone usage (*Figure 13*). These results again ensure a need for projects tackling unhealthy smartphone use to take place.

Because of the redefined context, our survey specifically focused on students to help improve their productivity during study sessions. This focus was reinforced by the survey responses. More than 90% of the participants found their phone usage during study session to be a bit to highly distracting (*Figure 14*). Furthermore, the most mentioned reason to decrease smartphone use revolved around getting things done, followed by mental health and having more free time (*Figure 15*). These results again reinforced us to focus on smartphone usage at universities, with increasing productivity as the driving force.

Figure 12: Results of question: "On average, how many hours per day do you use your smartphone?"

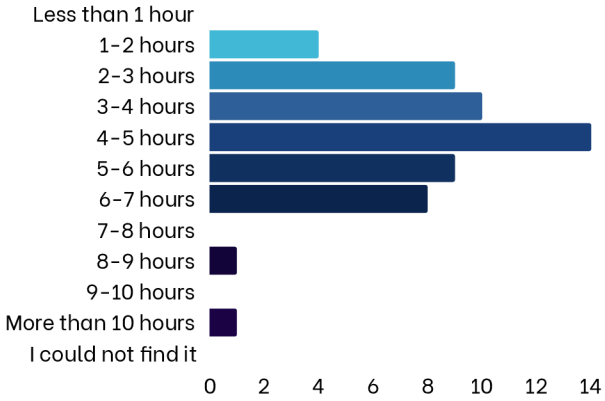


Figure 13: Results of question: "Do you want to reduce your smartphone use?"

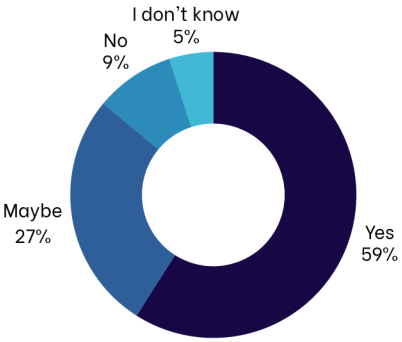


Figure 14: Results of question: "How distracting do you consider your current average smartphone use to be while studying (or doing other academic related activities)?"

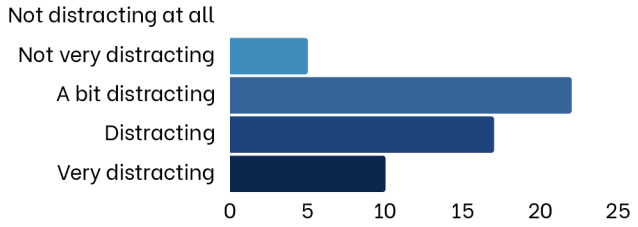


Figure 15: Results of question: "What would be reasons for you to use your smartphone less and why?"

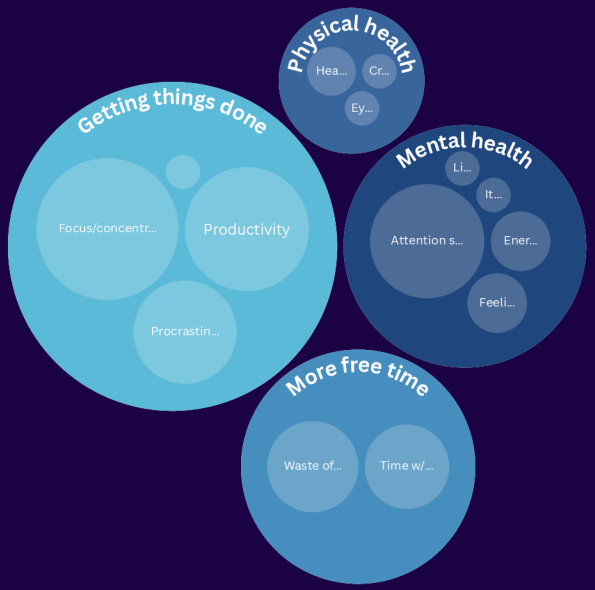
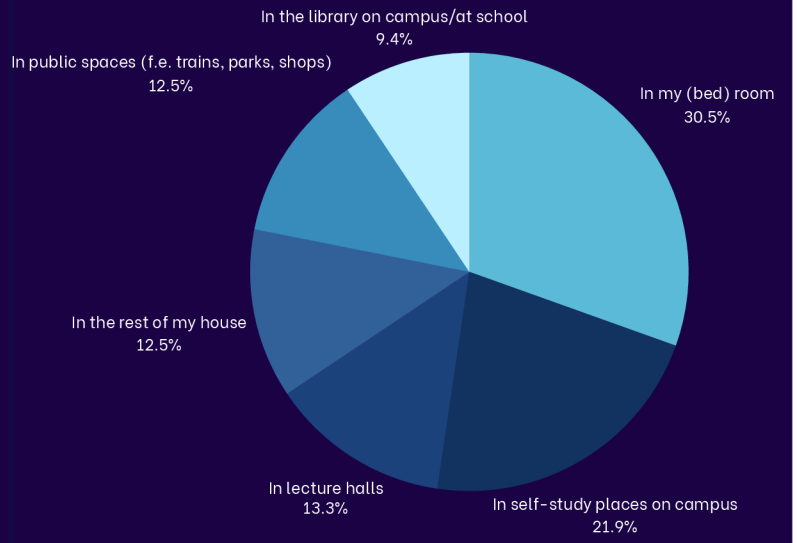


Figure 16: Results of question: "Where do you consider your smartphone use to be the most unhealthy?"



Our survey also revealed that participants found their smartphone use most unhealthy in their (bed)rooms, followed by self-study places on campus (*Figure 16*). Also, we found that almost as much studying is done at home as at university (*Figure 17*). Because of our refined context, we decided for this project to focus on university study spaces only.

Other questions were more valuable for design decisions. For example, it became clear that the types and number of apps students need during study sessions vary widely between individuals. This reinforced earlier research suggesting that customizability would be an important feature of our design, something that we kept in mind when designing the application.

Participants also showed most preference to app features such as hard interventions and motivators (*Figure 18*). This insight led us to use full screen blocking interventions for the app. After designing our final concept (more information follows), this led to our slogan: "Glow hard, or go home," referring to our use of hard interventions only.

Another key insight emerged when respondents highlighted a preference for reward systems as a motivator to reduce smartphone use (*Figure 19*). While a point-based system to win food, like "spar points" was appealing to them, we dismissed it due to concerns about potential costs, complexity of involving external companies, and short-term behavioural change.

Figure 17: Results of question: "Where do you usually study?"

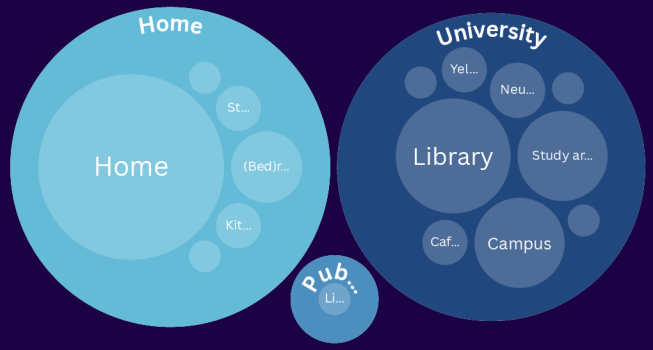
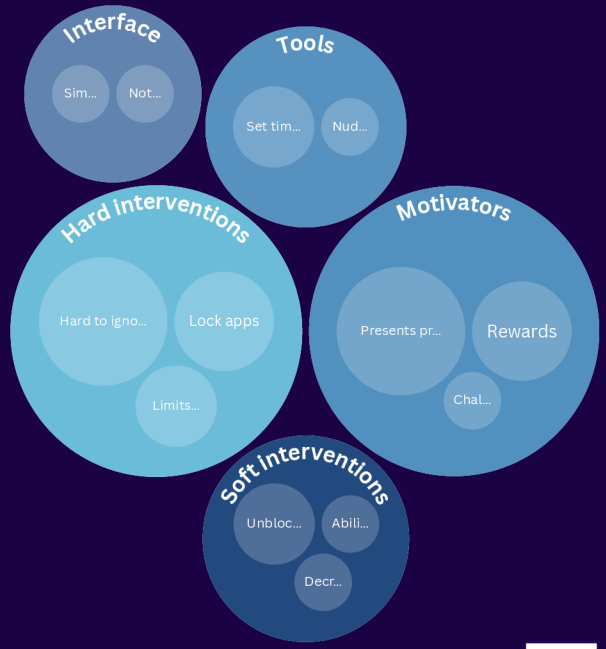


Figure 18: Results of question: "What do/would you like about apps that control your phone use?"



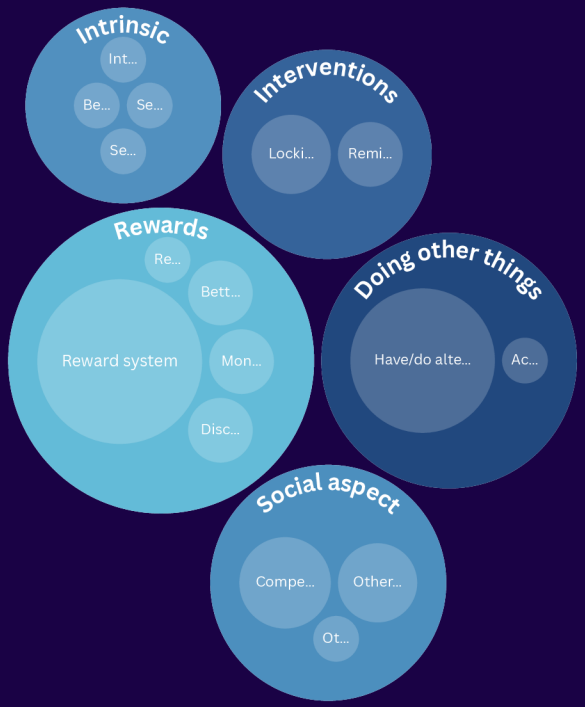


Figure 19: Results of question: "What would be a motivator for you to use your smartphone less and why? "

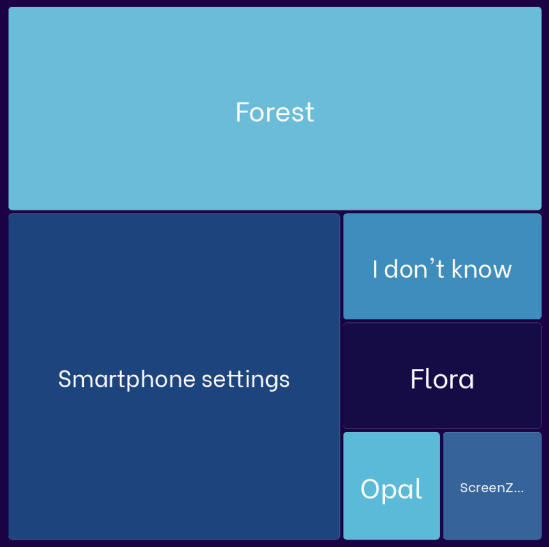


Figure 20: Results of question: "If you have ever used an app/apps that help(s) control your smartphone usage before, can you share the name of the app(s)?

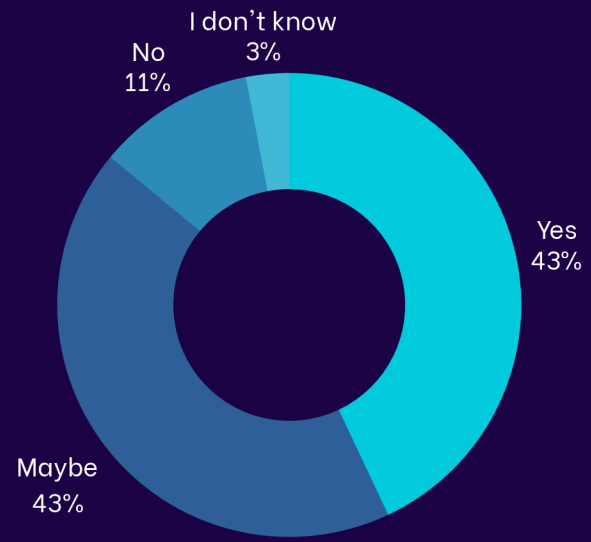


Figure 21: Results of question: "Would it motivate you knowing and seeing how other students are actively trying to improve their smartphone use?"

Therefore, inspired by the app Forest, which was the most used app in this category by the respondents (*Figure 20*), we adopted a digital visual rewards system that would promote more durable behaviour change among students.

Reflecting on the Fogg Behaviour Model [6], we aimed to strengthen the motivators even more. We therefore focussed on reflective questions as intrinsic motivators when apps are opened, a strategy our client emphasized as essential for overcoming smartphone addiction.

Drawing from our previous smartphone concepts, we aimed to enhance the pole design with visual cues. The survey revealed a preference for a social motivator (*Figure 19*), but also that 86% of the participants indicated they would (maybe) be more motivated if they could see the progress of other people (*Figure 21*). Therefore, through ideation, we came up with a lamp that dims when a student enters a study space while using their phone, adding a visual cue to the previous pole design. The app's timer would automatically turn the lamp back on, removing the need for a check-in.

Additionally, we then envisioned the app's visual rewards as houses that light up, strengthening the connection between the physical and digital aspects of our concept.

With survey insights grounding our concept, we developed the 'final' idea, LightLock. We then began the realization phase, working on the lamp's electronics and designing the app prototype in Figma (*see Design for the final result*). Simultaneously, to validate the concept and confirm it would effectively achieve its purpose, we planned a user test in a controlled environment.

For this **user testing**, several survey participants who had expressed interest in future research were invited. Four students participated in the study, which took place in a controlled environment. The setup was intentionally darker than typical study spaces, so our three lamps could be placed in the centre of the table and would stand out immediately (see *Figures 22 & 23* for the setup).

To test the concept's intuitiveness, we chose not to provide any verbal instructions before the study session. This approach aligned with our vision for the final design, where we imagined that QR codes could explain the system in a study space. Therefore, we provided the participants with a QR code on the table, which they scanned to access the instructions (see *Appendix 4*).

Three researchers acted as fellow students at the table. Meanwhile, one controlled the lamps, turning them off when a participant entered and back on when they set a timer using their smartphone (*Figure 24*). Participants used their own smartphone to manage timers and app usage.

The other two researchers monitored their smartphone use, mimicking app features. We printed app screen designs on thick paper, replicating the mid-term Demo Day approach. If participants opened restricted apps,

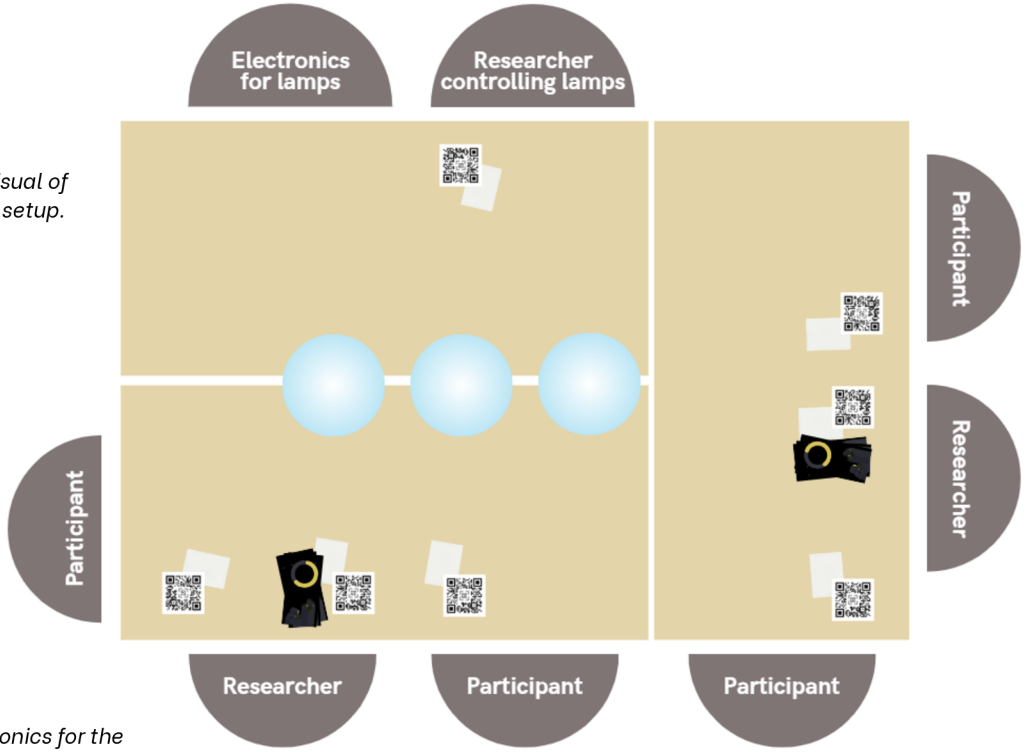


Figure 22: A schematic visual of the user test setup.

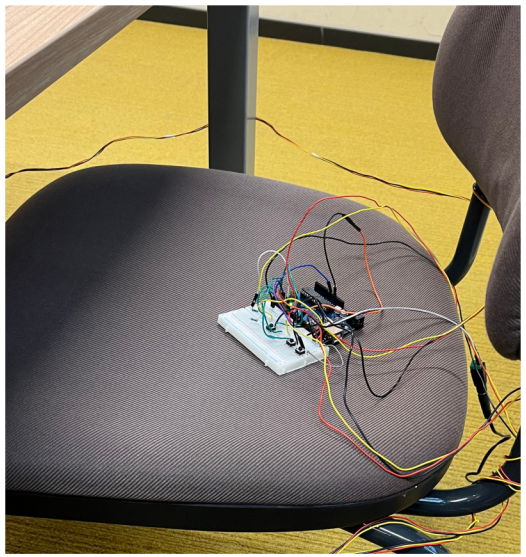


Figure 24: The setup of the electronics for the lamps, placed on a chair next to a researcher.

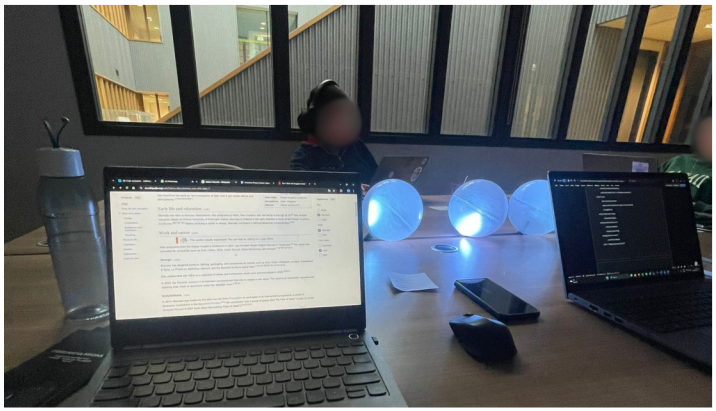


Figure 23: The setup of the table through the point of view of a researcher during the user test.

progress screens were displayed (*Figure 25*); for allowed apps, which were pre-determined and written down on a paper, reflective questions appeared for 10 seconds to encourage mindful use (*Figure 26*).

After the session, the fourth researcher conducted short semi-structured interviews outside the room, recorded and later transcribed them (see *Appendix 15*).

Figure 25: Progress screens printed and used during the user test.

Figure 26: Screens with reflective questions printed and used during the user test.

There were a few key insights reported amongst various participants. The first key insight was that many participants were initially confused about the lamp's functionality. While the app's features were straightforward, the lamp's role was less intuitive. Though this confusion was expected, clear communication of the lamp's purpose would be critical for launch.

The study session lasted about 30 minutes per participant. They confirmed that scheduled breaks were important, aligning with their suggestions to help maintain focus. Their feedback reinforced the relevance of this feature. Furthermore, participants felt a sense of social pressure, which helped them to focus, further validating our expectations.

Another insight was that participants did not consistently notice the lamp turning off. Suggestions such as flickering lights, sounds, or colour changes were proposed to make the feature more noticeable. We incorporated a flickering effect but recognized concerns about distractions in shared study spaces. Time constraints prevented further exploration in alternative physical designs, but these insights were noted for future improvements. For the same reason, we were not able to take into account the finding that participants found the darker study environment to be beneficial to their productiveness of studying on a laptop.

Overall, all participants reported productive sessions. With this initial validation, final adjustments were incorporated into our design and the product was realised in preparation for Demo Day, where LightLock would be presented to coaches, clients, fellow students, and visitors.

DESIGN

LightLock is a design concept intended for shared study spaces in universities, such as MetaForum or Neuron at Eindhoven University of Technology. We aimed to redesign these study environments to minimize smartphone distractions. Our prototype features a group of lamps (*Figure 27*) powered by WS2812B Digital 5050 RGB LEDs that are already lit when someone enters the study area (*Figure 28*). If a person walks in without starting a timer on the accompanying app, one of the coded lights will turn off (Wizard of Oz method). Adding a flickering effect to the light makes it more evident to the others that someone else has entered without a timer aiming to provide a form of social push to encourage students to set a timer.

The app prototype made with Figma (*see page 15*) would also restrict access to all applications except those selected by the user while the timer is running. It includes built-in breaks based on the total study time. For example, after studying for 24 minutes, users are prompted to take a 6-minute break. The app allows users to track their progress using a visual representation of lit houses and provides rewards in the form of recognition.
If a user tries to access an app on their phone, a full-screen intervention appears with the timer, making it impossible to use the app (*Figure 29*). Additionally, for the apps the user has approved upon, a 10-second reflective prompt will ask whether it is truly necessary to use that app at that moment.

See a LightLock User Scenario Storyboard on page 16 and an explanatory video [5] (*Appendix 17*). Also, see Appendices 12, 13, and 14 for additional final Demo Day visuals.

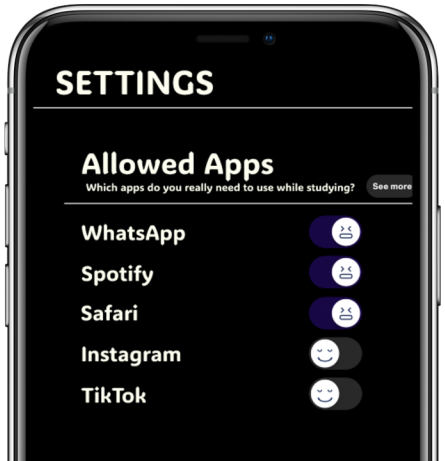
We believe LightLock is effective for several reasons. First, the lights serve as an environmental cue, helping to create a focused atmosphere for students. Since students depend on each other for the brightness level, it also creates a sense of social accountability. The app includes gamification elements, where students can track their visual progress and are rewarded with recognition which creates a sense of achievement and motivates them. During user testing, we observed that the environment created a distraction-free zone, significantly increasing productivity. If users do get distracted, there are digital interventions that encourage reflection and when someone is on their phone while others are studying, it acts as a social nudge. We believe combining all these factors, makes our design engaging and effective.

Figure 28 : LightLock lamps in a study area.

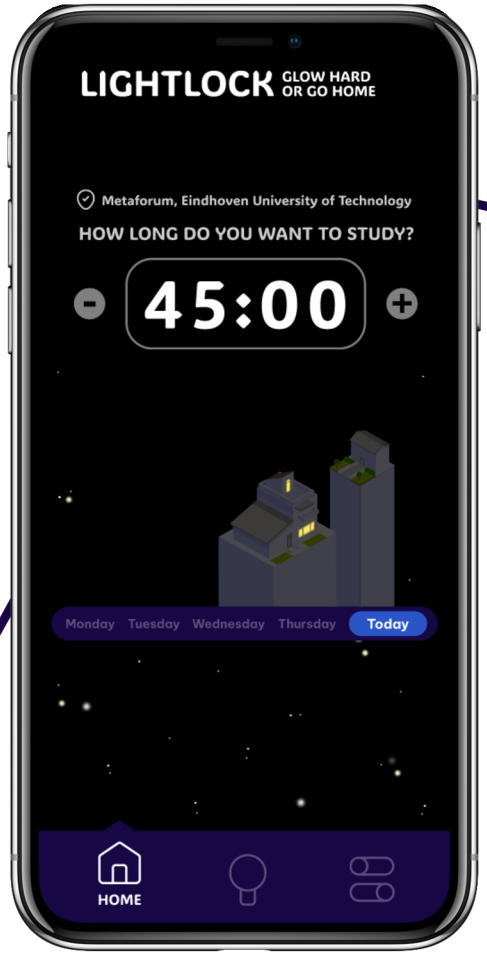
Figure 27 : LightLock lamps.

Figure 29 : Opening a blocked app during a study session.

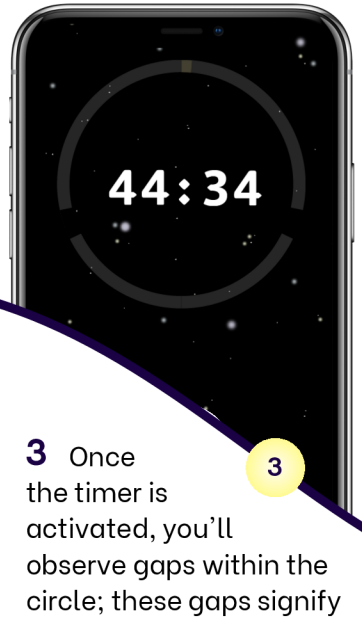
LightLock Application Runthrough



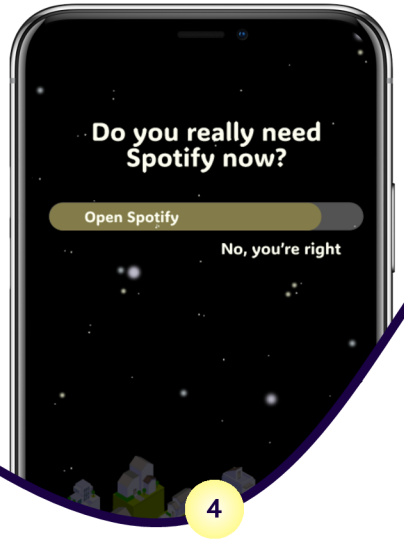
1 Initially, the user launches the app and selects the applications they require for studying. The selected apps will be accessible with a 10-second intervention, as shown in (4). The apps that are not selected will be locked, and when they are opened, (3) will be displayed.



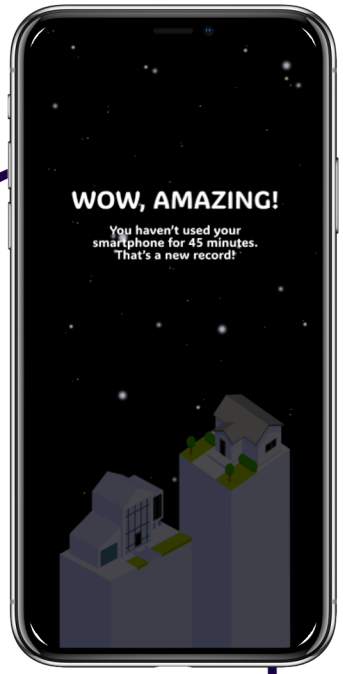
2 Next, they set a timer for studying. On this page, you can also view the lit houses you've earned throughout the week.



3 Once the timer is activated, you'll observe gaps within the circle; these gaps signify study breaks. You'll also notice your house gradually becoming illuminated.



4 This reflective intervention activates when you attempt to use other applications on your phone, requiring you to pause for 10 seconds to reflect.

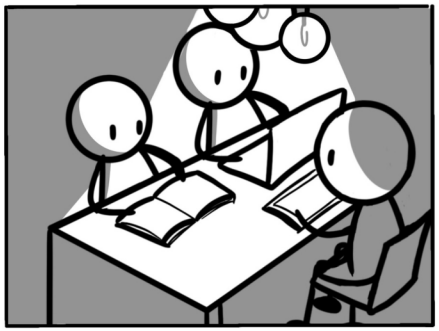


5 After finishing your study session, you'll be able to see how many lit houses you've earned.

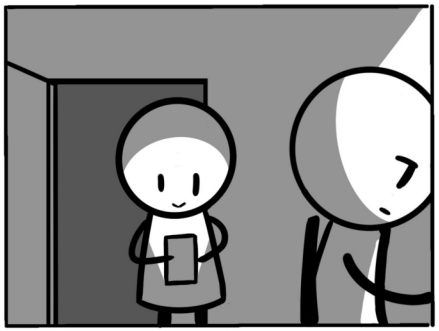
6 You can also earn lit houses together with your friends or family!

LightLock User Scenario Storyboard

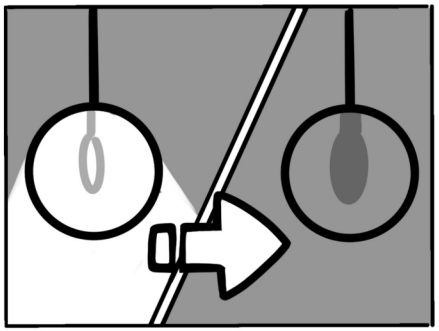
Illustrations by Lu Jinlin



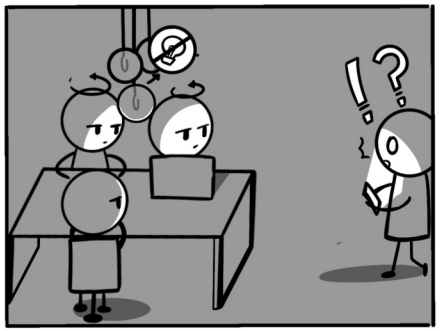
Students are concentrating on their studies with the help of LightLock.



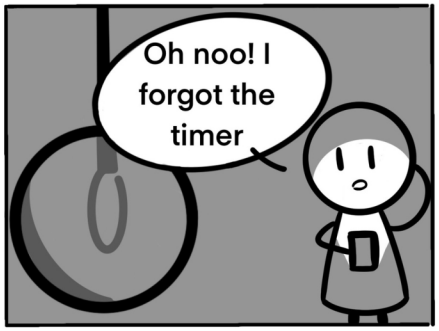
Max enters, chatting on his smartphone.



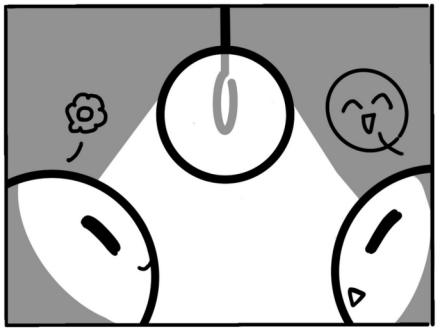
A light flickers and turns off.



Everyone turns to look at Max and he feels ashamed.



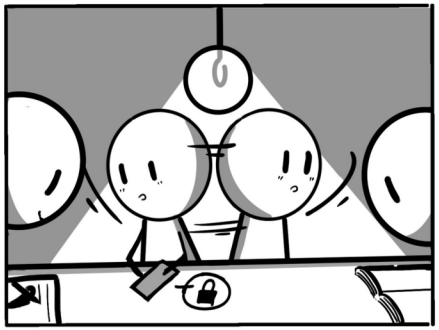
Max opens the LightLock app and starts a timer.



The light turns on again. Time to study with focus, like his peers.

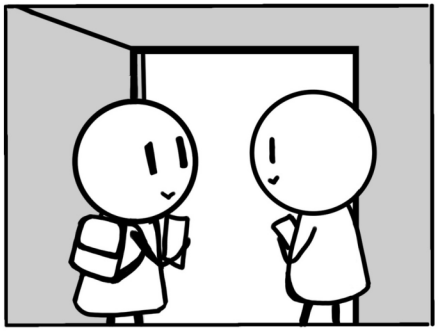
Oh, oh, Max is distracted, he wants to chat again.

The LightLock app makes him wait for 10 secs.



Max looks at his peers, and puts his smartphone away.

Max has completed his study session and has earned 2 lit houses.



DISCUSSION

The final concept of LightLock integrates physical and digital interventions to promote healthier smartphone use in study environments. The combination of light-based feedback and app-based restrictions provided a structured approach to minimizing distractions and encouraging focus. A key strength was the social accountability mechanism, where the flickering light subtly reminded users of smartphone use. User testing confirmed its effectiveness, with students appreciating its non-intrusive nature.

These findings align with research showing that young adults spend over six hours daily on smartphones, with 2-3 hours on social media, which impacts productivity and increases procrastination in academic settings [4]. While existing solutions like app blockers (Brick [3]) aim to reduce distractions, they often lack engaging feedback or intrinsic reinforcement. LightLock addresses this gap by combining digital restrictions with a physical intervention, enhancing user engagement.

Another strength was the gamified approach to digital well-being, with structured study sessions, break reminders, and progress tracking motivating students to build healthier study habits. This aligns with Fontys FitPhone's mission of increasing awareness and promoting better smartphone choices through digital interventions. Our user research also reinforced that social interventions can play a crucial role in behavioural change.

However, some users questioned the need for a dedicated app, preferring app-free alternatives such as leveraging existing phone settings or integrating with university infrastructure. Scalability also remains a challenge, as widespread implementation requires investment. Despite this, LightLock provides a strong foundation for tackling smartphone overuse in study spaces, with potential applications in digital well-being and mental health [16]. By blending physical and digital solutions, it aligns with FitPhone's goal of fostering awareness and conscious decision-making.

CONCLUSION

This project explored the challenge of promoting healthier smartphone use among university students through an iterative design process, guided by the Reflective Transformative Design Process [7]. Research methods such as surveys, user testing, and expert feedback played a key role in shaping design decisions.

Early concepts included smartphone cases and app-based restrictions, but user feedback highlighted a preference for an intervention embedded in the study environment. This led to the development of the light-based feedback system, emphasizing social accountability and environmental cues to reduce distractions.

The final outcome, LightLock, successfully combined physical (flickering lights) and digital (app-based study sessions and restrictions) interventions. User testing confirmed its effectiveness, with students finding it intuitive and helpful for maintaining focus. While challenges remain in scalability and reliance on a standalone app, the project provides a strong foundation for future research and FitPhone's digital well-being initiatives.

Looking ahead, future iterations could integrate LightLock with existing study environments, reduce app dependency, and refine the light-based intervention for broader implementation. The project demonstrates the potential of behavioural nudging combined with technology to support sustainable digital habits, paving the way for further innovation in digital well-being solutions.

Acknowledgements

We would like to express our gratitude to our coach Maarten Houben, and the other coaches in the Health and Inclusive Design squad: Jim Steenbakkers, Jun Hu, Emilia Barakova, Daniel Tetteroo, and Sander Lucas for their valuable guidance and insightful feedback throughout the project.

A special thanks to the Health and Inclusive Design (HID) squad for providing a collaborative environment and resources that supported our development throughout the process.

Finally, we extend our appreciation to our client Herm Kisjes from Fontys Eindhoven for the trust, input, and continuous support in bringing this project to life.

REFERENCES

[1] Biwer, F., Wiradhany, W., oude Egbrink, M. G. A., & de Bruin, A. B. H. (2023). Understanding effort regulation: Comparing 'Pomodoro' breaks and self-regulated breaks. British Journal of Educational Psychology, 00, 1–15. https://doi.org/10.1111/bjep.12593

[2] Bidwell Brook and Tyler Santos. 2023. The Temptation of Instant Gratification: A Double-Edged Sword. J Addict Res Ther 14, 564. https://doi.org/10.2196/38370

[3] Brick - Do more of what matters: https://getbrick.app/

[4] DataReportal. 2022. Digital 2022: Time Spent with Connected Tech. https://datareportal.com/reports/digital-2022-time-spent-with-connected-tech

[5] Forest. 2025. Forest: Stay Focused, Be Present. Retrieved February 16, 2025, from https://www.forestapp.cc/

[6] Brian Jeffrey Fogg. 2024. Behavior Model. https://behaviormodel.org/

[7] Caroline Hummels and Joep Frens. 2009. The reflective transformative design process. In CHI '09 Extended Abstracts on Human Factors in Computing Systems (CHI EA '09). Association for Computing Machinery, New York, NY, USA, 2655–2658. https://doi.org/10.1145/1520340.1520376

[8] Jaejeung Kim, Hayoung Jung, Minsam Ko, and Uichin Lee. 2019. GoalKeeper: Exploring Interaction Lockout Mechanisms for Regulating Smartphone Use. Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. 3, 1, Article 16 (March 2019), 29 pages. https://doi.org/10.1145/3314403

[9] Jaejeung Kim, Joonyoung Park, Hyunsoo Lee, Minsam Ko, and Uichin Lee. 2019. LocknType: Lockout Task Intervention for Discouraging Smartphone App Use. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19). Association for Computing Machinery, New York, NY, USA, Paper 697, 1–12. https://doi.org/10.1145/3290605.3300927

[10] Peter R. Killeen. 1985. Incentive theory: IV. Magnitude of reward. Journal of the Experimental Analysis of Behavior 43, 3 (1985), 407–417. https://doi.org/10.1901/jeab.1985.43-407

[11] Minsam Ko, Subin Yang, Joonwon Lee, Christian Heizmann, Jinyoung Jeong, Uichin Lee, Daehee Shin, Koji Yatani, Junehwa Song, and Kyong-Mee Chung. 2015. NUGU: A Group-based Intervention App for Improving Self-Regulation of Limiting Smartphone Use. In Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing (CSCW '15). Association for Computing Machinery, New York, NY, USA, 1235–1245. https://doi.org/10.1145/2675133.2675244

[12] Jiang, S. (2022). The Roles of Worry, Social Media Information Overload, and Social Media Fatigue in Hindering Health Fact-Checking. Social Media + Society, 8(3). https://doi.org/10.1177/20563051221113070

[13] Olson, J.A., Sandra, D.A., Chmoulevitch, D. et al. A Nudge-Based Intervention to Reduce Problematic Smartphone Use: Randomised Controlled Trial. Int J Ment Health Addiction 21, 3842–3864 (2023). https://doi.org/10.1007/s11469-022-00826-w

[14] Fety Ilma Rahmillah, Amina Tariq, Mark King, and Oscar Oviedo-Trespalacios. 2023. Evaluating the Effectiveness of Apps Designed to Reduce Mobile Phone Use and Prevent Maladaptive Mobile Phone Use: Multimethod Study. J Med Internet Res 2023;25: e42541. https://www.jmir.org/2023/1/e42541

[15] Jeanneke Smeets. 2024. LightLock. YouTube. https://www.youtube.com/shorts/71DkUBi0M6o

[16] Samatha Tang, Aliza Werner-Seidler, Michelle Torok, Andrew J. Mackinnon, and Helen Christensen. 2021. The relationship between screen time and mental health in young people: A systematic review of longitudinal studies. Clinical Psychology Review 86, (Mar. 2021), 102021. https://doi.org/10.1016/j.cpr.2021.102021

[17] Michelle Teresa Wiciak, Omar Shazley, and Daphne Santhosh. 2022. An observational report of screen time use among young adults (Ages 18-28 years) during the COVID-19 pandemic and correlations with mental health and wellness: international, online, cross-sectional study. JMIR Formative Research 6, 8 (Jul. 2022), e38370. https://doi.org/10.2196/38370

[18] Huayu Yang, Haiyun Guo, Zhihui Zhu, Guojing Yuan, Xueqing Zhang, Kexin Zhang, Xiaoyan Lu, Jianghui Zhang, Jun Du, Haiyan Shi, Guifang Jin, and Zhihua Zhang. 2023. Intervention of Internet Addiction and Smartphone Addiction: An Umbrella Review of Systematic Reviews and Meta-Analyses. Curr Addict Rep 11, 125–148 (2024). https://doi.org/10.1007/s40429-023-00536-w

APPENDICES

Appendix 1- Personal contributions

Camila

- Research
- Making prototypes (iteration 1: pufferfish, Iteration 2: phone case)
- Coding LEDs for the lamp prototype and system logistic
- Soldering
- Sketches, mind maps, posters
- Demoday pitch
- Stakeholder management
- Making survey
- Physical documentation

Jeanneke

- Research
- Literature research on influence of phone usage
- Making the prototypes (lamps, stand, mid-term Demo day phone cases)
- Sketching
- Making the infinity diagram with the Demo day results
- Making the survey
- Analyzing the results in relation to our concept
- Making and doing the interviews for the user testing
- Making the business cards
- Soldering the lamps
- Working on the demo-day pitch
- Making the lamps and stand

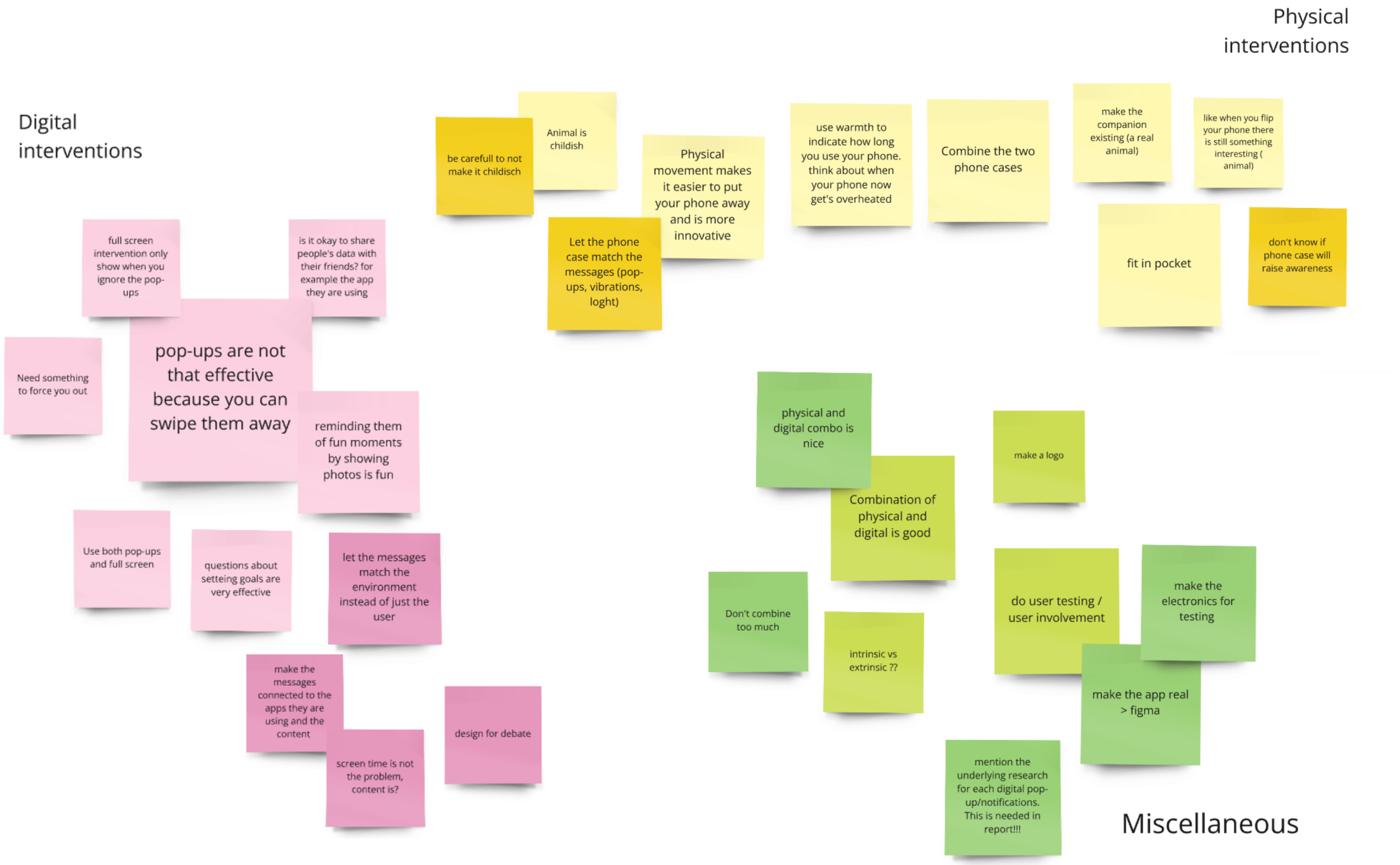
Mats

- Literature research on app interventions, apps to limit screen time, and study breaks
- Designing the range of (cardboard) app interventions
- Designing the conceptual storyboard and presentations
- Contact with client
- Making the survey
- Analyzing the qualitative survey results
- Making the lamps and stand
- Designing the interactive app prototype in Figma
- Making the information sheets for Demo Day
- Filming the video

Tanya

- Literature research on incentives, rewards, behaviour change models, addiction interventions and cping methods.
- Brainstorming through brainwriting
- Making initial storyboards
- Experience prototyping phone cases
- Soldering and electronics
- Digital documentation and reasoning for every design direction
- Making the survey
- Video editing
- Making the lamps and stand
- Making posters
- Demoday Pitch and setup

Appendix 2- Affinity Diagram through unstructured interviews during mid-term Demo Day.



Appendix 3- Introduction of the survey.

Healthy smartphone use amongst young adults

Hello! We are currently designing to help young adults with reducing their smartphone use. As a part of the design squad 'Health and Inclusive Design' at the TU/e, we aim to help **18-25 year old students** to have a higher productivity and more time off their phone on campus. If you are a student, we would really appreciate if you could answer several questions about your smartphone usage, your context when studying and more! Your participation in this study involves completing this online questionnaire, which will take approximately 20 minutes. There is no known risk to your participation. This study will be completely anonymous, and the data obtained from the study will not be traceable to you.

By continuing this questionnaire, you are indicating that:

- You are sufficiently informed about the research project. You have read and understood the above information.
- You take part in this research project voluntarily. There is no explicit or implicit pressure for you to take part in this research project. It is clear to you that you can end participation in this research project at any moment, without giving any reason. You do not have to answer a question if you do not wish to do so.

If any questions may arise during the survey, you can reach out to Mats (m.j.j.v.deijck@student.tue.nl)
Thank you!

1. I agree that I am a student (age 18-25) and that my information may be used anonymously for study purposes. *

- ◯ Yes ✓
- ◯ No

Appendix 4- User Testing explanation.

Hey! Did you notice the light go out?

If you want to turn it on again, please set a timer on your smartphone after reading this message...

You should at least study for this amount of time, otherwise the lamps will go off again.

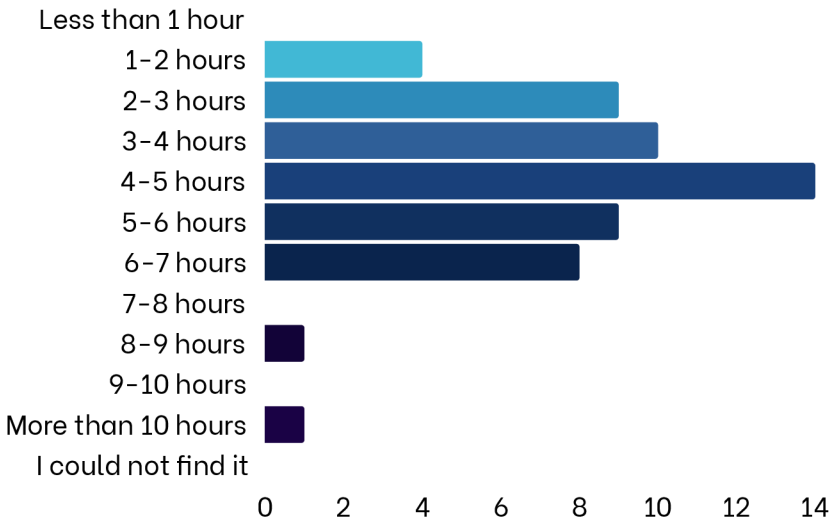
During this time, you cannot use the apps on your phone, apart from the timer app. If you want to be able to use more apps during the study session, you should write down the names of these apps on the backside of the qr-code now.

During the study session, we will be putting cardboard frames on top of your smartphone. Imagine that these are app features.

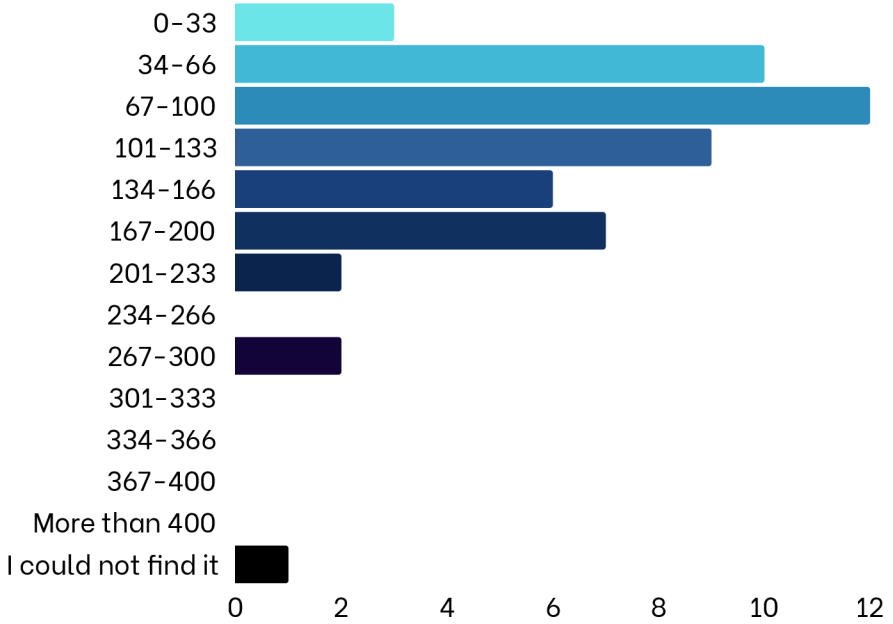
You can set a timer now. Enjoy your phone-free study session!

Appendix 5- Quantitative survey results

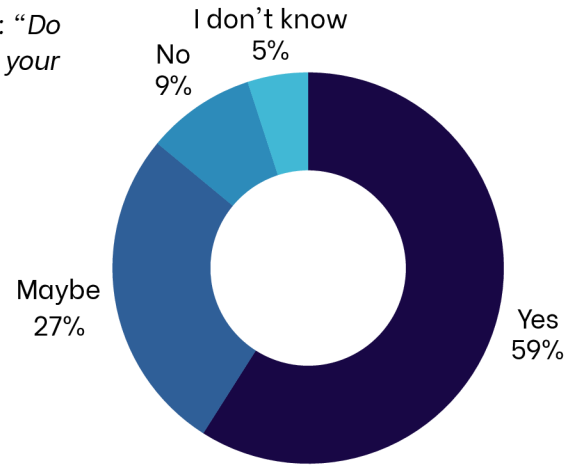
Results of question: "On average, how many hours per day do you use your smartphone?"



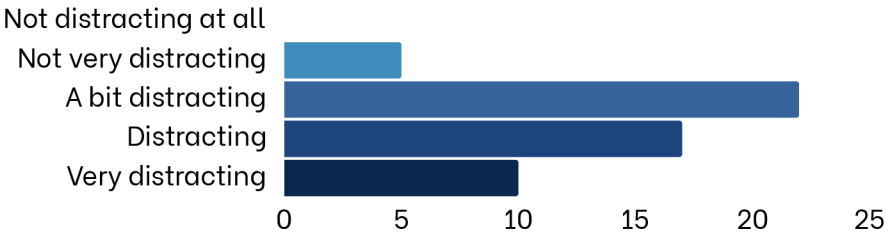
Results of question: "On average, how many times per day do you pick up/unlock your smartphone?"



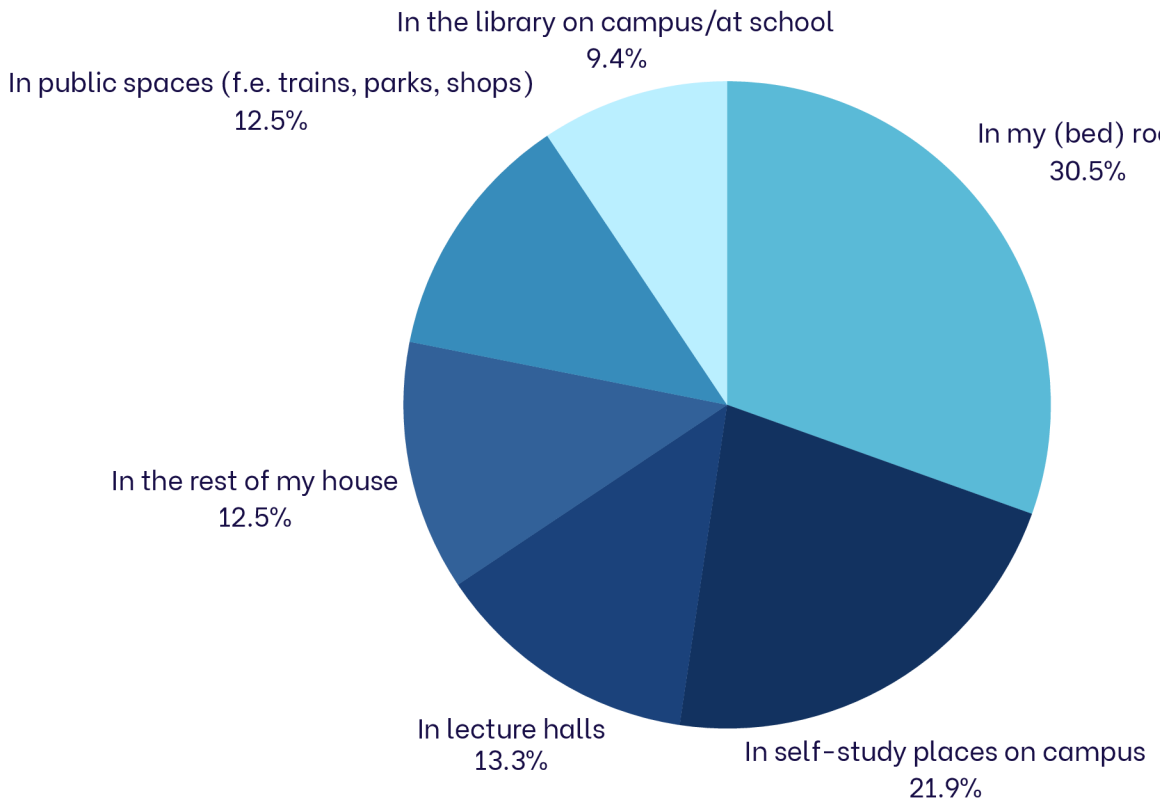
Results of question: "Do you want to reduce your smartphone use?"



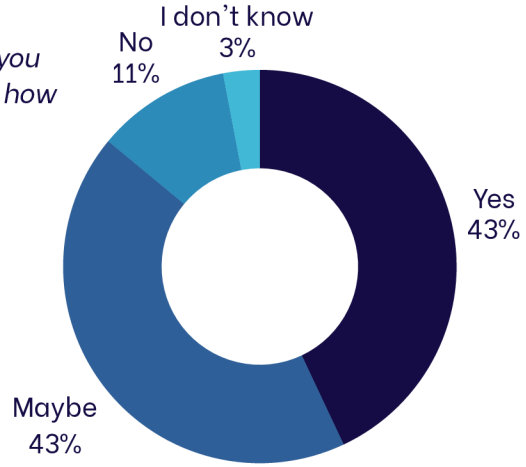
Results of question: "How distracting do you consider your current average smartphone use to be while studying (or doing other academic related activities)?"



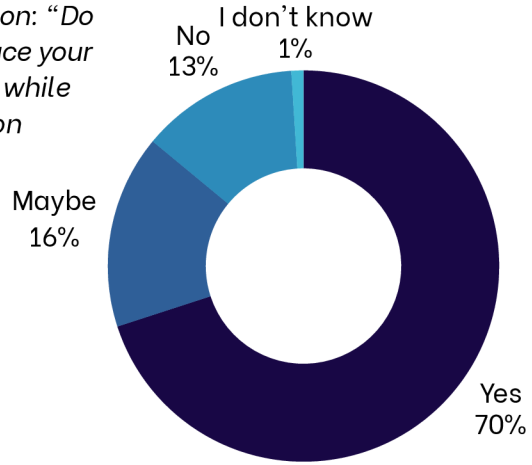
Results of question: "Where do you consider your smartphone use to be the most unhealthy?"



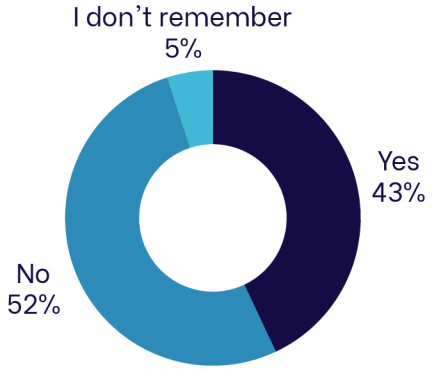
Results of question: "Would it motivate you knowing and seeing how other students are actively trying to improve their smartphone use?"



Results of question: "Do you want to reduce your smartphone use while studying/being on campus?"

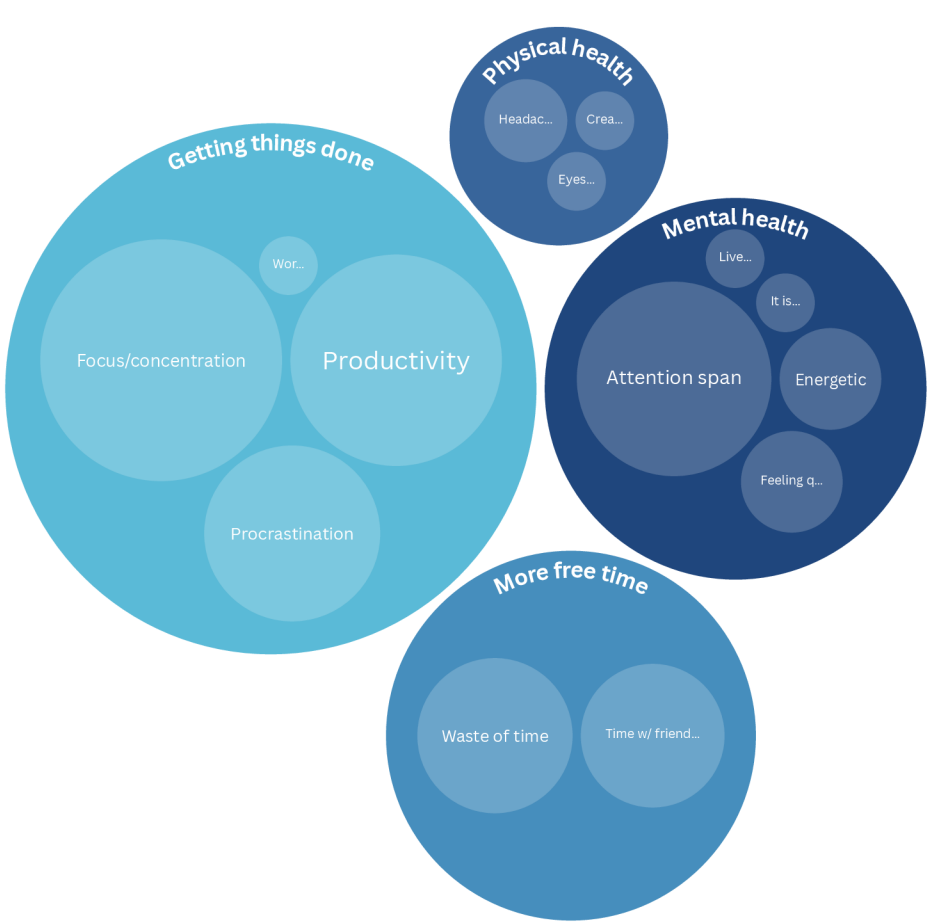


Results of question: "Have you ever used an app or apps that helps control your smartphone usage?"

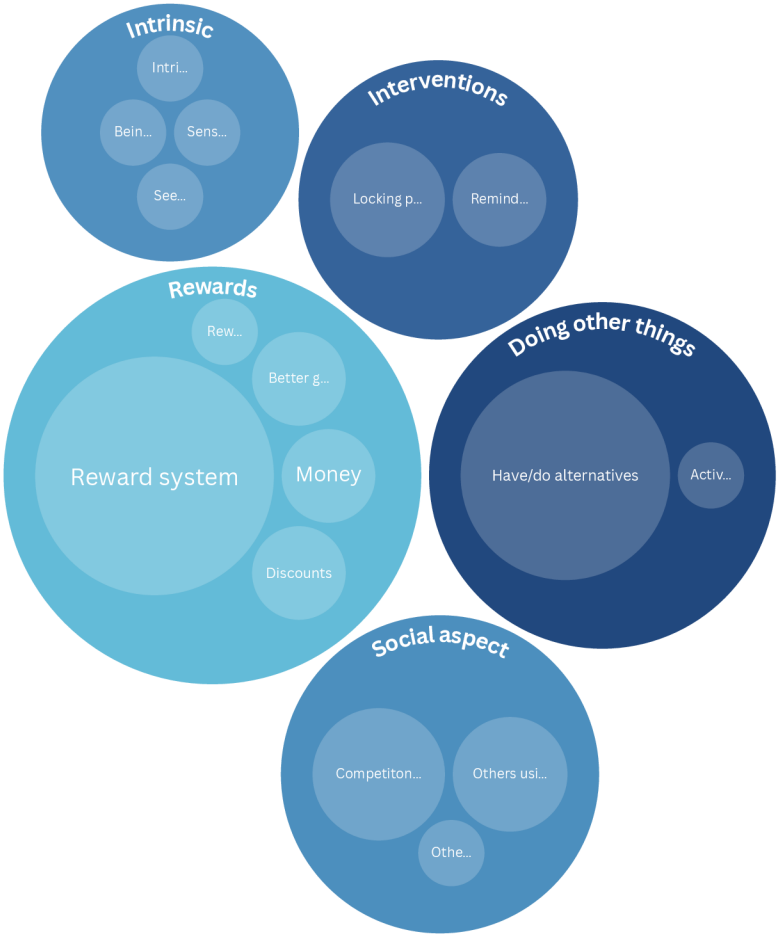


Appendix 6- Qualitative survey results

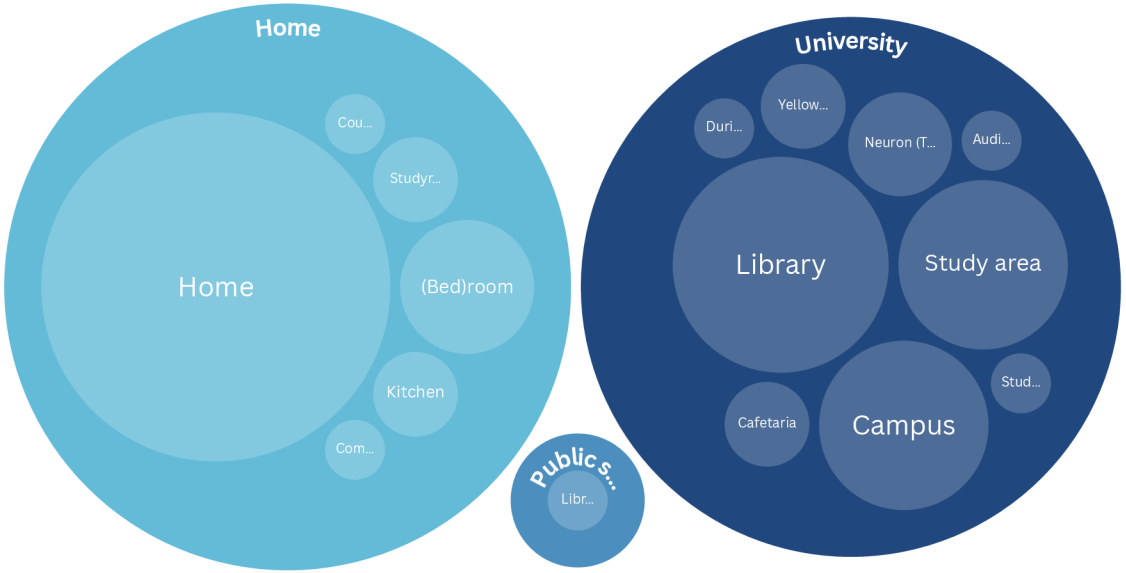
Results of question: "What would be reasons for you to use your smartphone less and why?"



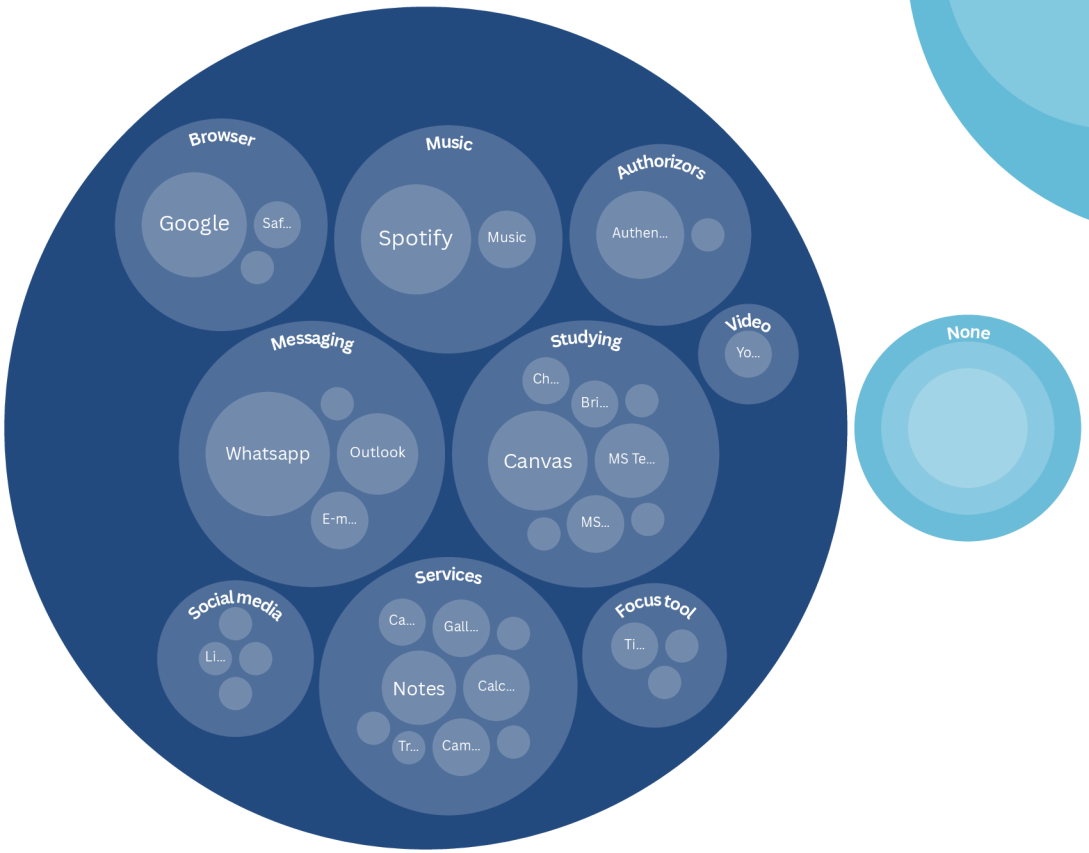
Results of question: "What would be a motivator for you to use your smartphone less and why? "



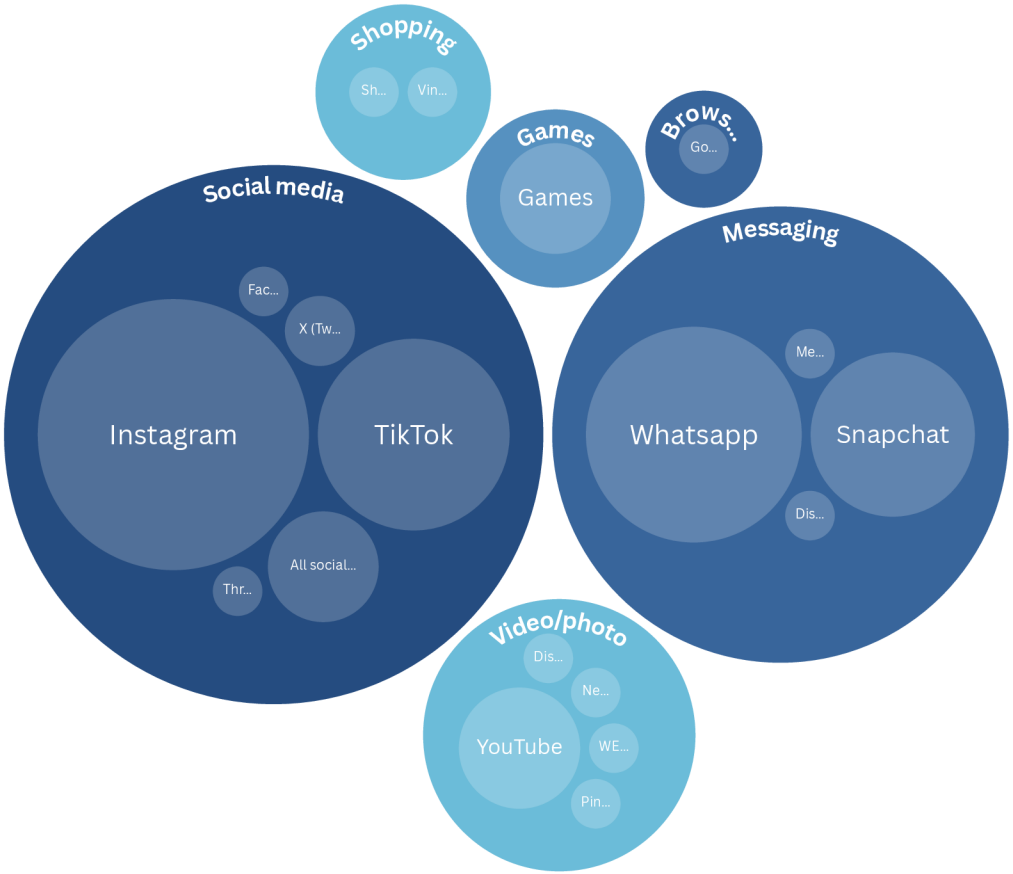
Results of question: "Where do you usually study?"



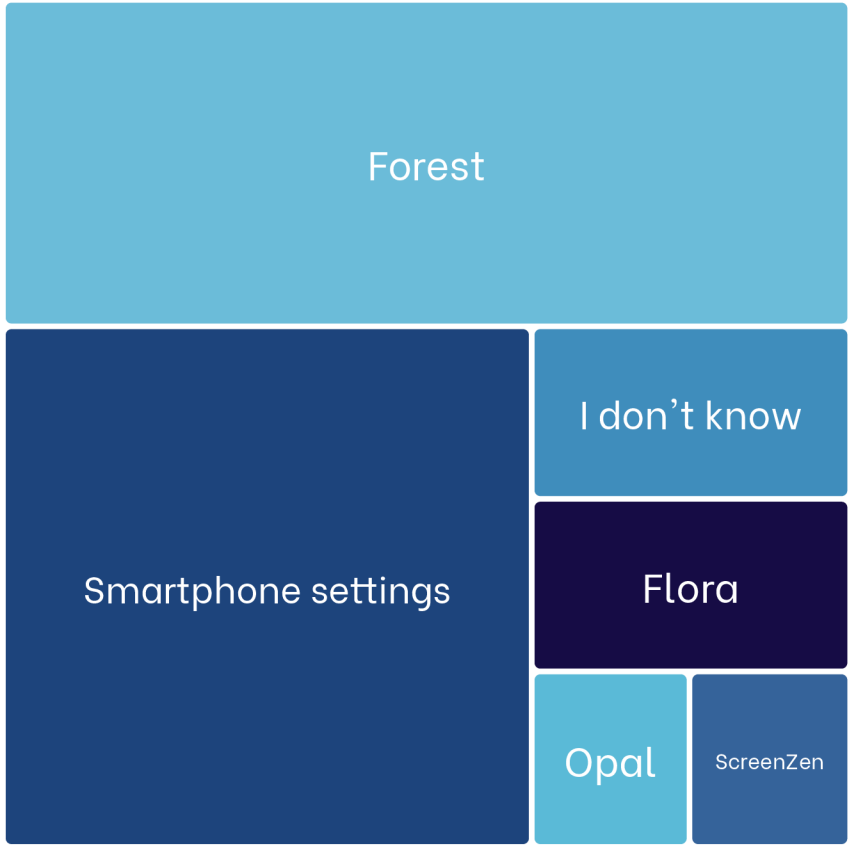
Results of question: "Which apps on your phone do you find necessary when studying?"



Results of question: "When studying, which app(s) distract(s) you the most?"

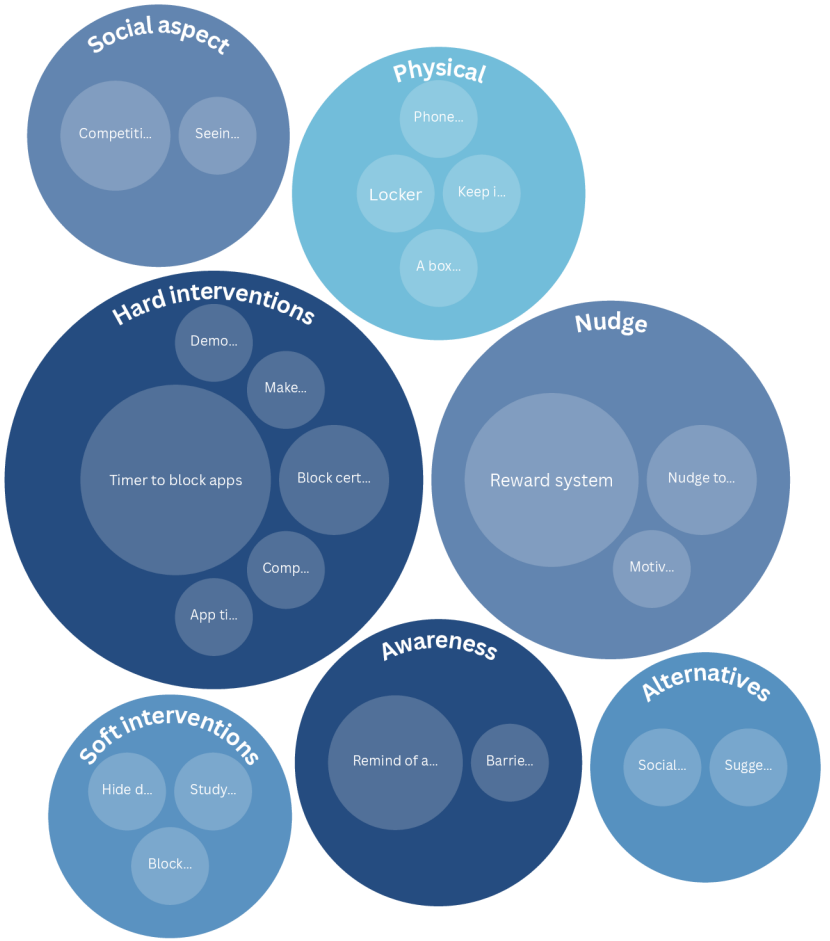


Results of question: "If you have ever used an app/apps that help(s) control your smartphone usage before, can you share the name of the app(s)?



Results of question: "What do/would you like about apps that control your phone use?"

Results of question: "Imagine, you are now a designer. You want to design a solution to increase productivity and time off your phone on campus. What features would your design have?"



Appendix 7- Ethical Review Form

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Ethical Review Form

(Version 2.2)

This Ethical Review Form should be completed for every research study that involves human participants or personally identifiable personal data and should be submitted to ethics@tue.nl. For more information about how this process works please click here. Please check if you are using the correct form: Ethical Review Form (version 2.2). Please click here to obtain this latest version.

Part 1: General Study Information

1	Project title / Study name	Designing for healthy smartphone use
2	Name of the researcher / student	Mats van Deijck, Jeanneke Smeets, Camila Vicent, Tanya Yesurajan
3	Email of the researcher / student	m.j.j.v.deijck@student.tue.nl, j.e.smeets@student.tue.nl, c.vincent.perez@student.tue.nl, t.yesurajan@student.tue.nl
4	Supervisor(s) name(s) *Additional explanation: Please write down the name of your direct supervisor. You can mention several supervisors if appropriate, but at least one supervisor should be mentioned.*	Maarten Houben
5	Supervisor(s) email address(es) *Additional explanation: Please give the email address of the supervisor(s) mentioned in question 4.*	m.houben1@tue.nl
6	Department / Group *Additional explanation: Please specify group if relevant e.g. JADS or HTI*	Industrial Design, Health and Inclusive Design
7	What is the purpose of this application?	☐ Scientific study ☒ Bachelor education. Course: Project 3 ☐ Master education. Course:…… ☐ Other (e.g. external, following external regulations):……
8	Research location *Additional explanation: Where will the data collection take place? On campus, in a company, in public space, online, etc.*	☒ Eindhoven University of Technology campus ☐ Other, name organization(s):…… ☐ Public space ☐ Online
9	Start date data collection *Additional explanation: Please state when your data collection will start. Please note that you do not have to provide information about your complete (PhD) project, but only on this particular sub-study that you are submitting for approval in this form.*	4 December
10	End date data collection	7 December
11	Does your project receive external funding (e.g., NWO, relevant for special regulations from funders)?	☐ Yes. Name Funder: ☒ No

Ethical Review Form

12	Which internal and external parties are involved in the study? Think about sharing data or information between TU/e and other universities, commercial companies, hospitals, etc. *Additional explanation: Describe all internal and external parties that are involved in the study or project, including:* • *researchers or research groups at the TU/e who participate in the study;* • *(Researchers at) other universities/institutions that provide data/services, help analyzing the data, etc.;*	Internal parties • Researcher(s): **B2 group Healthy Smartphone Use** - **Camila Vicent** - **Mats van Deijck** - **Jeanneke Smeets** - **Tanya Yesurajan** • Supervisor: Maarten Houben

Appendix 7.1- Ethical Review Form

	• *(commercial) partners, companies, government bodies, municipalities, consultancy firms, hospitals or care institutions that provide data (e.g., contact details of participants, data for further analysis).* *Indicate which role each party plays: who defines the means and purposes in the study, who will supply the data (external parties?), who will process/handle the data, who will be able to access the data during and after research (only researchers at TU/e or also others)?*	External parties • Other universities/institutions: Herm Kisjes (Fitphone (Fontys Eindhoven)) • Others: ……
13	Have any special agreements already been made with an external party, such as a Non-Disclosure Agreement (NDA) or a data sharing agreement?	☐ Yes, namely: ☒ No
14	Has your proposal already been approved by an external Ethical Review Board or Medical Ethical Review Board? *Additional explanation: For example, when you are collaborating with another university and the project has been approved by their Ethical Review Board, or when you received a WMO-waiver from a Medical Ethical Review Board.*	☐ Yes ☒ No
15	If yes: Please provide the name, date of approval and contact details of the ERB. Please also include the registered number for your project approval. Additionally, please send in the Ethical Review Form upon which ethical approval was granted together with this form.	
16	If you process personal data that are likely to result in high privacy risks for participants, you need to perform a Data Protection Impact Assessment (DPIA). Have you done this for this or a very similar project? ***Please read the information below: a DPIA is not the same as a regular privacy impact assessment. More detailed questions on privacy will follow in the section below.*** *Additional explanation: A Data Protection Impact Assessment (DPIA) is a formal document that must be drafted under the guidelines of the General Data Protection Regulation (GDPR). Think of research with vulnerable people, high-risk medical research, The Dutch DPA (Autoriteit Persoonsgegevens) and our website provides more information about a DPIA.*	☒ Not applicable (no high privacy risks) ☐ Yes (the form is attached to the application) ☐ No
Part 2: Medical study		
1	Does the study have a medical scientific research question or claim? *Additional explanation: Medical/scientific research is research which is carried out with the aim of finding answers to a question in the field of illness and health (etiology, pathogenesis, signs/symptoms, diagnosis, prevention, outcome or treatment of illness), by systematically collecting and analyzing data. The research is carried out with the intention of contributing to medical knowledge which can also be applied to populations outside of the direct research population. If your research contains questions about health and health related parameters (such as well-being, vitality, feelings of anxiety or stress) but your research question is not primarily medical, then you can answer 'no' to this question.*	☐ Yes* ☒ No *If yes or in doubt, please contact Susan Hommerson via s.m.hommerson@tue.nl

Ethical Review Form

Part 3: Use of (medical) devices in the study		
1	Does your research include a device? *Additional explanation: A device is a complete piece of physical hardware that is used to compute or support computer functions within a larger system. Devices can be divided into input-, output-, storage-, internet of things-, or mobile device.*	☐ Yes, not self-made ☒ Yes, self-made ☐ No
2	Please describe your device or link to an online description of the device	We made a lamp that will be influenced by their phone usage., this lamp consists of multiple light bulbs that can turn on and off. We also printed some of the app features.
3a	Will you use a device that is 'CE' certified for **unintended use** (meaning you will use existing CE certified devices for other things than they were originally intended for) or use a device that is not 'CE' certified? *Additional explanation: You can find more information about CE certification here*	☒ Yes ☐ No ☐ ☐
3b	If no: Please explain to what extent the device was assembled according to relevant standards and provide a risk assessment *Additional explanation: You can find more information about a risk assessment here*	
3c	If yes: Do you use a device or software that has a medical purpose such as diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease or injury?	☐ Yes, my device or software currently has a medical purpose ☐ Yes, my device or software could have a medical purpose in the near future ☒ No ☐ I'm not sure
Part 4: Information about the study		
1	What are your main research questions? *Additional explanation: You need to provide at least one clear research question.*	Does the lamp motivate people to use the app? Do people studying find it disturbing if the lamp goes off? Are they maybe even motivating non-users to use the app? How do they find the blocking of the apps? Are they more focussed or are they experiencing withdrawal symptoms? Do the houses on the app and the lamp motivate people to continue using the app? Or do people just ignore the timer and use the blocked apps BONUS: if some people do not use it, do people with the app use their phone less and are they more productive?
2a	Please check the box that indicates the relevant study population *Additional explanation: Please select which persons are eligible for your study.*	☒ Students ☐ General healthy population ☐ General population with specific feature, e.g., pregnancy, specifically ..... ☐ Patients, specifically …….. ☐ Other, specifically ……
2b	Age category of participants	☐ Younger than 12 years of age ☐ Older than 11 and younger than 16 years of age ☒ 16 years or older

Appendix 7.2- Ethical Review Form

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Ethical Review Form

3	Description of the research method (select all that applies) *Additional explanation: Please specify your research method. Note that you need to provide information about the research method in an additional file that you attach to the ERB form. E.g., for interviews you provide the interview questions, for surveys you provide the survey questions, etc.*	☒ (Semi-structured) interviews ☐ Surveys ☐ Group workshops/roundtable discussios ☐ Diary studies ☒ Behavioral observations ☐ Building sensor data ☐ Wearable device (e.g. Fitbit watch, on-skin sensors) ☒ User testing ☐ Pilot study ☐ GPS tracking/location data ☐ Living Lab ☐ Other, namely .....
4	Description of the measurements and/or stimuli/treatments *Additional explanation: Think about your outcome measures and the variables you will be collecting and describe them in a way such that another person understands what the participant will experience. For example: Participants will perform task A and see pictures from database B, and we measure validated Scale 1.*	There are people working in a space One person walks in and one light goes out There is a QR code and they scan it: It says: Did you notice the light go out? If you want to turn it on, please set a timer on your phone. You should at least study for this amount of time, otherwise will lose your progress and the lamps will go off again. During this time, you cannot use the apps on your phone, apart from the timer app. If you want to be able to use more apps during the study session, you can chat the names of these apps to us now. We will be putting cardboard plates on your phone. Please act like these are app features. They are studying, and we are noting everything down as an observation. We are also putting full screen interventions in the form of a carboard plate on top of their phone when they open blocked apps. We will also show them the progress of their houses when they open their timer. After the session, the person can leave and we will ask them some questions in an interview.
5	Describe and justify the number of participants you need for this study. Also justify the number of observations you need, taking into account the risks and benefits. *Additional explanation: Think about if you need 3 or 30 participants for example, and why? Do they need to provide their input once, or several times, and why? If relevant, specify the duration of the study per participant and the compensation that is needed for the study.*	We aim for 4-6 participants to participate in our study, this is because this amount is easy to monitor but it is big enough for them to have some interaction.
6	Explain why your research is societally important. What benefits and harm to society may result from the study? *Additional explanation: What benefit will the results of your study have to society in general?*	Research has shown that smartphone use has become unhealthy amongst more and more people, including students. This research will provide us with the insights to contribute to a solution to this societal problem. We found out that a lot of students want to decrease their smartphone use to be more productive.
7	Describe the way participants will be recruited *Additional explanation: How will you recruit participants for your study? For example, by using flyers, personal network, panels, etc.*	☐ Survey link posted online, e.g., social media platforms ☐ On campus flyers ☒ Personal network ☐ Via a company, namely …….. ☐ Via a hospital, namely …….. ☐ Via an organization …… ☐ By a Consortium Partner, namely …… ☒ Other, namely …….some people gave us their e-mail in previous survey because they were interesting in helping with user testing…..

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Ethical Review Form

Appendix 7.3- Ethical Review Form

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Ethical Review Form

8	Provide a brief statement of the risks you expect for the participants or others involved in the study and explain. Also take into consideration any personal data you may gather and associated privacy issues. *Additional explanation: Risks for the participants can be anything from risk of data breach to risk of safety or well-being (think about stress, extreme emotions, visual or auditory discomfort). Describe these possible risks and describe the way these risks are mitigated.*	All de conducted data will be stored on the TU/e OneDrive so there will be no risks.

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Ethical Review Form

Part 5: Self-assessment checklist

	Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	Yes	No
1a	Does the study involve human material? (e.g., surgery waste material derived from non-commercial organizations such as hospitals)		x
1b	Will blood or other (bio)samples be obtained from participants? (e.g., hair, sweat, urine or other bodily fluids or secretions, also external imaging of the body)		X
2	Will the participants give their consent – on a voluntary basis – either digitally or on paper? Or have they given consent in the past for the purpose of education or for re-use in line with the current research question?	X	
3	Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator? Additional explanation: Think about doing research on your own students or on your own employees. When there is a dependency or power imbalance between you and the research participants, you need to answer 'yes' to this question.		X
4	Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children (<16 years of age), people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups)		X
5	Will participating in the research be burdensome? (e.g., requiring participants to wear a device 24/7 for several weeks, to fill in questionnaires for hours, to travel long distances to a research location, to be interviewed multiple times)?		X
6	May the research procedure cause harm or discomfort to the participant in any way? (e.g., causing pain or more than mild discomfort, stress, anxiety or by administering drinks, foods, drugs, or showing explicit visual material)		X
7	Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants? Additional explanation: For an explanation of what is considered a reasonable compensation, see the topic participant fees from the HTI group		X
8a	Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people)		X
8b	If yes: Will you be observing people without their knowledge in public space? (e.g. on the street, at a bus-stop)		
9	Will the study involve actively deceiving the participants? (e.g., will participants be deliberately falsely informed, will information be withheld from them, or will they be misled in such a way that they are likely to object or show unease when debriefed about the study)	X	
10	Will participants be asked to discuss or report sexual experiences, religion, alcohol or drug use, suicidal thoughts, or other topics that are highly personal or intimate? Additional explanation: Think about your research population. For some participants, particular topics can be considered sensitive or intimate, whereas the same topics will not be perceived as such by other participants.		X

11	Elaborate on all boxes answered outside of the blue boxes in part 5. Describe how you safeguard any potential risk for the research participant.	

Appendix 7.4- Ethical Review Form

Part 6: Self-assessment on privacy

The following questions (1-11) concern privacy issues, as laid down in the General Data Protection Regulation (GDPR). The Data Stewards and – if necessary – privacy team of TU/e will assess these questions. In some cases, more information is required to assess the privacy risks. If this is the case, you will be notified that the Data Stewards team will contact you.

The GDPR defines 'personal data' as any information relating to an identified or identifiable natural person ('data subject'). Personal data also includes data that indirectly reveals something about a natural person. Personal data can lead to the physical, physiological, genetic, mental, economic, cultural or social identity of a natural person. There are two main categories of personal data: regular personal data and special category personal data.

If you are not sure whether some of these questions below should be answered with a Yes or No, please contact a Data Steward first through rdmsupport@tue.nl.

	Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	Yes	No
1	Will the study involve discussion/collection/processing of **regular** personal data, or will you collect and (temporarily) store video or voice recordings for the purpose of conducting interviews? *Additional explanation: For example, name, address, phone number, email address, IP address, gender, age, video or interview recordings? If you are not sure whether your data contains personal data, please contact the Data Stewards Team (rdmsupport@tue.nl).*		X
1A	If yes: Please describe which regular personal data you will collect in this study?		
2	Will the study involve discussion/collection/processing of **special category** personal data or other **sensitive data**? *Additional explanation: Examples of special category personal data are race, religion, health information, political views, genetic or biometric data for the unique identification of a person, sexual preference, etc. Health information concerns personal data of the physical or mental health of persons, including the provision of health care. Examples of other sensitive data is information such as communication data, financial records or credit scores, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, criminal records, data of vulnerable persons (children, people with disabilities, refugees), BSN number etc. Please be aware that the use of special category personal data in research requires extra security measurements in order to safeguard the privacy of data subjects and to comply with the GDPR. Processing of this special category data is prohibited, except for specific purposes and under certain circumstances. If you need to process special category data, please consult the data stewards at rdmsupport@tue.nl.*		X
2A	If yes: Please describe which special-category personal data and/or sensitive data you will collect in this study?		

If you answered yes to either question 1 or 2, please answer the questions below. If you answered no to both questions, you can skip this part and continue onto part 7. Also, if an answer to any of the following questions is 'yes', please contact a Data Steward at rdmsupport@tue.nl

		Yes	No
3	Will your project involve the processing of personal data on a **large scale**? *Additional explanation: In general, any processing that involves more than 10.000 data subjects should be considered "large scale". However, if the data of approximately 1000 persons (or more) are involved, the data processing may still be considered large scale. In that case, besides the number of persons involved in the study, one should also assess (i) the amount of data collected from these persons taking into account the type/risk level of the personal data, (ii) the duration of the data processing, (iii) the geographic scope or extent of the processing. For example, if you would collect and process data across several European countries with 10+ socio-economic data items of 1200 individual persons for several years in a row, that is likely "large-scale processing". Other examples of a large-scale processing activity are:* • *Monitoring driving behavior of road users on Dutch highways* • *Collecting data of Covid patients* • *A hospital that processes patient data as part of its usual operations*		x

Ethical Review Form

	• *A transport company that processes travel information of people who travel by public transport in a certain city. For example, by tracking them through travel maps.*		
4	Does this processing activity involve the use of new or innovative technologies? *Examples of a new technology: combining fingerprints and facial recognition for physical access control, the use of bodycams in public spaces, the use of new technical methods in conducting research such as AI. This question also refers to new technologies that have not been deployed by TU/e so far.*		x
5	Does your study involve systematic (c.q. automated) monitoring of persons? *Additional explanation: Consider data processing activities that have the purpose of observing, monitoring or controlling individuals, for example in circumstances where the individuals are not aware by whom their personal data is collected and how it is used. Examples of such activities are using camera systems to monitor driving behavior on highways, monitoring email inactivity or employee phone use, certain applications of machine learning and artificial intelligence.*		x
6	Does the study involve collaborations (with third parties) in which data are shared or exchanged in order to link or combine data? *Additional explanation: This may often apply in a collaboration between the university and a commercial party, contract research, etc. It is important to assess this for all data in the entire project, not just your own data. An important consideration in this situation is whether the person whose data is involved could have expected that data from these different databases or sources of information were to be combined. For example, it is less likely for data subjects to expect that databases from different parties will be combined and the results are used for different purposes than one could reasonably expect; this may apply for example in a collaboration between the university and a commercial party.*		x
7	Will the study include data processing activities that prevent data subjects from exercising their rights or using a service or contract? *Additional explanation: Examples include processing operations carried out in public places that people cannot avoid (train station, airport, shopping mall, public university premises, etc.) or processing operations whose purpose is to allow or not allow data subjects to use a service or enter into a contract (examples: by refusing to pay a benefit, not being able to apply for a loan, etc.).*		x
8	Will the study process personal data to score, rank or profile persons? *Additional explanation: Examples: monitoring (highway) roads to give road users a "score" based on their detected driving behavior, a bank assessing its customers based on their creditworthiness, or an organization building behavioral and marketing profiles based on use of their website or navigating their website.*		x
9	Does your data processing include activities that involves composing "**blacklists**" – and, in particular, in relation to sensitive or special category data, such as communication data, financial records or credit scores, genetic data, biometric data, health data, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, etc. *Additional explanation: This situation will not be a common occurrence in research, but you may indirectly be involved in this. In general, this typically concerns processing operations involving personal data relating to criminal convictions and offences, data relating to unlawful acts, data concerning unlawful or annoying behaviour or data concerning bad payment behaviour by companies or individuals are processed and shared with third parties (blacklists or warning lists, as used, for example, by insurers, hospitality companies shopping companies, telecom providers as well as blacklists relating to unlawful behavior of employees, for example in the healthcare sector or by employment agencies, etc.).*		x
10	Will personal data be transferred or shared outside the EU/EEA? EU data protection rules apply to the European Economic Area (EEA), which includes all EU countries and non-EU countries Iceland, Liechtenstein and Norway. *Additional explanation: The GDPR has drafted additional requirements for transfers data outside of the EU/EEA. Typically, additional safeguards must be implemented to protect the personal data of residents in the European Union. For example, if you collaborate with an American, Indian or Chinese university or other third party outside the EU/EEA, you must first check whether this is allowed and under which conditions this is allowed. Another typical example is storage of data on American providers of cloud (storage) services. Please contact the data stewards first to discuss this.*		x
11	Will any raw or anonymized personal data or any other sensitive data or research results from the project possibly be transferred to a high-risk country*? ***High risk countries**: China, Russia, Iran, Turkey, and North Korea.* ***If personal data or other potentially sensitive data is exchanged with one of these countries, or if part of the data processing takes place in one of these countries: an advice from the Data Protection Officer, the kennisveiligheidsteam (Knowledge Security team), and the CISO (Chief Information Security Officer) is ALWAYS required.***		x

Appendix 7.5- Ethical Review Form

Part 7a: Processing of research data

1	Is consent your legal basis for processing the personal data in your study? *Additional explanation: What is a legal basis? One of main principles in the GDPR is to ensure that personal data is processed lawfully, fairly, and transparently. To comply with this principle, the processing of personal data also requires that you have a valid legal basis for the personal data processing activity.* *In research projects, the legal basis is often but not always consent. However, it is possible that it is not clear or not possible to establish whether to use consent as a legal basis.* *Some examples where consent may not be applicable as legal basis are covert research, data collection in public spaces, secondary data analysis of existing data, data that are transferred to you by a third party, consent is not possible or would require disproportionate effort, etc. In that case, please indicate which legal basis you think that applies or (preferably) contact a data steward first.*	☒ Yes and it will be obtained via …… An informed consent template* is attached to this application. ☐ No, I will use another legal basis to process the data. Namely, …….. * You can download a suitable template **here**.
2	Where will the data come from?	☐ Data obtained from another party (secondary data use) ☒ New data collected only by my research team ☐ New data collected together with collaborators
3	Which of the following tools will you use to process personal data?	**Surveys** ☐ Qualtrics ☐ Limesurvey ☐ MS Forms ☐ Other, namely …….. **Interview/workshop recordings** ☐ Voice/video recorder ☐ Phone in a flight mode ☐ MS Teams ☐ Other, namely …….. **Transcription** ☐ Manual transcription ☒ Microsoft Office software (e.g. Word, Teams) ☐ Other, namely …… **Statistical analysis** ☐ SPSS ☐ R ☐ Other, namely …… **Other tools**, specifically……..
4	Where will the data and in particular the personal data be stored during and after completion of the study? If you have already uploaded your Data Management Plan, you can refer to your Data Management Plan.	☒ Onedrive ☐ Research Drive ☐ Network Drive

	Additional explanation: University supported-storage facilities are SURF Research Drive, Ceph, departmental drives (this includes BE Project Drive), and the TU/e instance of Microsoft OneDrive. For most personal data, the use of SURF Research Drive or departmental drives (including BE Project Drive) is required.	☐ Research Manager ☐ Other, namely ……

Part 7b: Safety and security measures

1	Will you pseudonymize/anonymize the data? *Additional explanation:* *Anonymization: remove all direct identifiers (name, address, telephone number etc.) but also indirect identifiers (age, place of birth, occupation, salary) that, linked with other information, can lead to a person's identification. Anonymization to the point that a data subject is no longer identifiable means that the anonymized data is not considered to be personal data anymore.* *Pseudonymization: replacing the unique identifier of a data subject with an artificial pseudonym. This means that identification is still possible with the identification key. The identification key needs to be stored securely and separately from the pseudonymized data. If the data subject can be identified by combining data with additional information, the data is also called pseudonymous.*	☒ Yes ☐ No If yes, describe how: no names or info will be written down, the will be called participant 1, participant 2, etc.
2	Is access to (personal) data restricted? (Select all that apply)	☐ No ☒ Yes, via access control ☐ Yes, via password protection ☐ Yes, access only given to TU/e research team ☐ Yes, access only given to research team, including non-TU/e collaborators ☐ Other, specify……
3	Who will have access to the data during and after completion of the project? (Select all that apply)	☐ Main researcher ☒ TU/e supervisor(s) ☐ External supervisors ☒ TU/e research team ☐ Other, specify……
4	Will you store data for future research?	☒ No ☐ Yes, in a public data repository ☐ Yes, in a public data repository under restricted access ☐ Yes, in a TU/e-recommended storage (SURF Research Drive, Network Drive)
5	Will you share data outside the TU/e?	☒ No ☐ Yes, in a fully anonymized form ☐ Yes, raw or pseudonymized data* *If you selected this box, make sure that a suitable data agreement is put in place. You can contact the Data Stewards for support in preparing such an agreement
6	How long will data be stored after the end of the project?	1 month

Appendix 7.6- Ethical Review Form

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Ethical Review Form

Part 8: Closures and Signatures		
1	Enclosures (tick if applicable and attach to this form):	☒ Informed consent form ☐ Informed consent form for other agencies when the research is conducted at a location (such as a school) ☐ Text used for ads (to find participants) ☐ Text used for debriefings ☒ Approval other research ethics committee ☐ The survey the participants need to complete, or a description of other measurements ☐ Data Protection Impact Assessment checked by the privacy officer ☐ Data Management Plan checked by a data steward
2	Signature(s)	Signature(s) of applicant(s) - Camila Vicent - Mats van Deijck - Jeanneke Smeets - Tanya Yesurajan Date: 11/11/24 Signature research supervisor Date:  Maarten Houben 2-12-24

Appendix 8 - Consent Form

Information sheet for design research project "Healthy Smartphone Usage"

1. Introduction

You have been invited to take part in the design research project "Healthy Smarthphone Usage".

Participation in this project is voluntary: the decision to take part is up to you. Before you decide to participate we would like to ask you to read the following information, so that you know what the research project is about, what we expect from you and how we deal with processing your personal data. Based on this information you can indicate via the consent declaration whether you consent to take part in this research project and the processing of your personal data.

You may of course always contact us, if you have any questions, or you can discuss this information with people you know.

2. Purpose of the design research project

The pupose of this project is to design for a healthier smartphone usage among young adults.

3. What will taking part in the project involve?

You will be taking part in a design research project in which we will gather information through -

- Participating in user testing
- Interviewing you about your experience and record your answers via audio. Also, we will make a transcript of the interview.

This study will be completely anonymous, and the data obtained from the study will not be traceable to you.

4. Potential risks and inconveniences

Your participation in this research project does not involve any physical, legal or economic risks. You do not have to answer questions which you do not wish to answer. Your participation is voluntary. This means that you may end your participation at any moment you choose by letting the researcher know this. You do not have to explain why you decided to end your participation in the research project. Ending your participation will have no disadvantageous consequences for you

If you decide to end your participation during the research, the data which you already provided up to the moment of withdrawal of your consent will be used in the research. Do you wish to end the research, or do you have any questions and/or complaints? Then please contact us

5. Confidentiality of data

The raw and processed data will be retained for a period of 1 year. Ultimately after expiration of this time period the data will be either deleted or anonymized so that it can no longer be connected to an individual person. The research data will, if necessary (e.g. for a check on scientific integrity) and only in anonymous form be made available to persons outside the research group.

This project was assessed and approved on 2-12-2024 by the ethical review committee of Eindhoven University of Technology.

Consent form for participation by an adult

By signing this consent form I acknowledge the following:

1. I am sufficiently informed about the project through a separate information sheet. I have read the information sheet and have had the opportunity to ask questions. These questions have been answered satisfactorily.
2. I take part in this project voluntarily. There is no explicit or implicit pressure for me to take part in this research project. It is clear to me that I can end participation in this research project at any moment, without giving any reason. I do not have to answer a question if I do not wish to do so.

Name of Participant:

Signature:

Date:

Name of researcher:

Signature:

Date:

Appendix 9 - The reflective transformative design process visual [7]

Appendix 10- Arduino C++ Code

```
#include <Adafruit_NeoPixel.h>

//Led pins
#define LED_PIN1 12
#define LED_PIN2 13
#define LED_PIN3 11
#define NUM_LEDS 8

//button pins
#define BUTTON1 9
#define BUTTON2 8
#define BUTTON3 10

//NeoPixel objects for each strip
Adafruit_NeoPixel strip1 =
Adafruit_NeoPixel(NUM_LEDS,
LED_PIN1, NEO_BRG + NEO_KHZ800);
Adafruit_NeoPixel strip2 =
Adafruit_NeoPixel(NUM_LEDS,
LED_PIN2, NEO_BRG + NEO_KHZ800);
Adafruit_NeoPixel strip3 =
Adafruit_NeoPixel(NUM_LEDS,
LED_PIN3, NEO_BRG + NEO_KHZ800);

// Button states
bool strip1On = true;
bool strip2On = true;
bool strip3On = true;

// Flickering control
bool isFlickering = false;
unsigned long flickerStartTime = 0;
const unsigned long flickerDuration =
3000; // Flicker duration in ms

void setup() {
 // Initialize LED strips
 strip1.begin();
 strip2.begin();
 strip3.begin();


setStripColor(strip1, 255, 255, 255,
strip1On);
 setStripColor(strip2, 255, 255, 255,
strip2On);
 setStripColor(strip3, 255, 255, 255,
strip3On);

 pinMode(BUTTON1, INPUT_PULLUP);
 pinMode(BUTTON2, INPUT_PULLUP);
 pinMode(BUTTON3, INPUT_PULLUP);
}

void loop() {
 if (digitalRead(BUTTON1) == LOW &&
!isFlickering) {
 isFlickering = true;
 flickerStartTime = millis();
 flicker(strip1, 255, 255, 255, strip1On);
 strip1On = !strip1On;
 }
 if (digitalRead(BUTTON2) == LOW &&
!isFlickering) {
 isFlickering = true;
 flickerStartTime = millis();
 flicker(strip2, 255, 255, 255, strip2On);
 strip2On = !strip2On;
 }
 if (digitalRead(BUTTON3) == LOW &&
!isFlickering) {
 isFlickering = true;
 flickerStartTime = millis();
 flicker(strip3, 255, 255, 255, strip3On);
 strip3On = !strip3On;
 }
```

Appendix 10.1- Arduino C++ Code

```
// End flickering after 3 seconds
 if (isFlickering && millis() -
flickerStartTime >= flickerDuration) {
 isFlickering = false;
 updateStrips();
 }
}

// flicker effect function
void flicker(Adafruit_NeoPixel &strip, int
r, int g, int b, bool isOn) {
 unsigned long currentTime = millis();
 while (millis() - currentTime <
flickerDuration) { // Flicker for 3 seconds
 for (int i = 0; i < NUM_LEDS; i++) {
 if (random(2) == 0) { // Randomly turn
LEDs on or off
 strip.setPixelColor(i, isOn ? strip.Color(r,
g, b) : strip.Color(0, 0, 0));
 } else {
 strip.setPixelColor(i, strip.Color(0, 0, 0));
 }
 }
 strip.show();
 delay(50);
 }
}

void updateStrips() {
 setStripColor(strip1, 255, 255, 255,
strip1On);
 setStripColor(strip2, 255, 255, 255,
strip2On);
 setStripColor(strip3, 255, 255, 255,
strip3On);
}

void setStripColor(Adafruit_NeoPixel
&strip, int r, int g, int b, bool isOn) {
 for (int i = 0; i < NUM_LEDS; i++) {
 if (isOn) {
 strip.setPixelColor(i, strip.Color(r, g, b));
 } else {
 strip.setPixelColor(i, strip.Color(0, 0, 0));
// Turn off
 }
 }
 strip.show();
}
```

Appendix 11- Storyboard of 'Pressure Cooker' iteration

User uses the phone comfortably

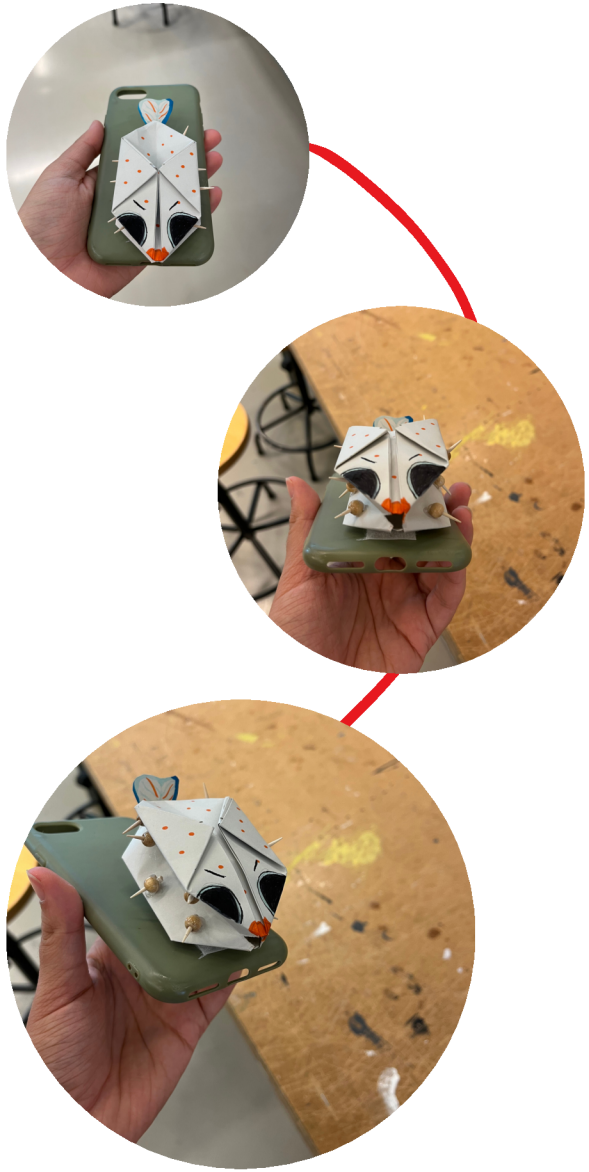
User uses the phone too long and the puffer fish puffs out

Time to take the baby fish away from its mom

User decide to read in a place away from her phone

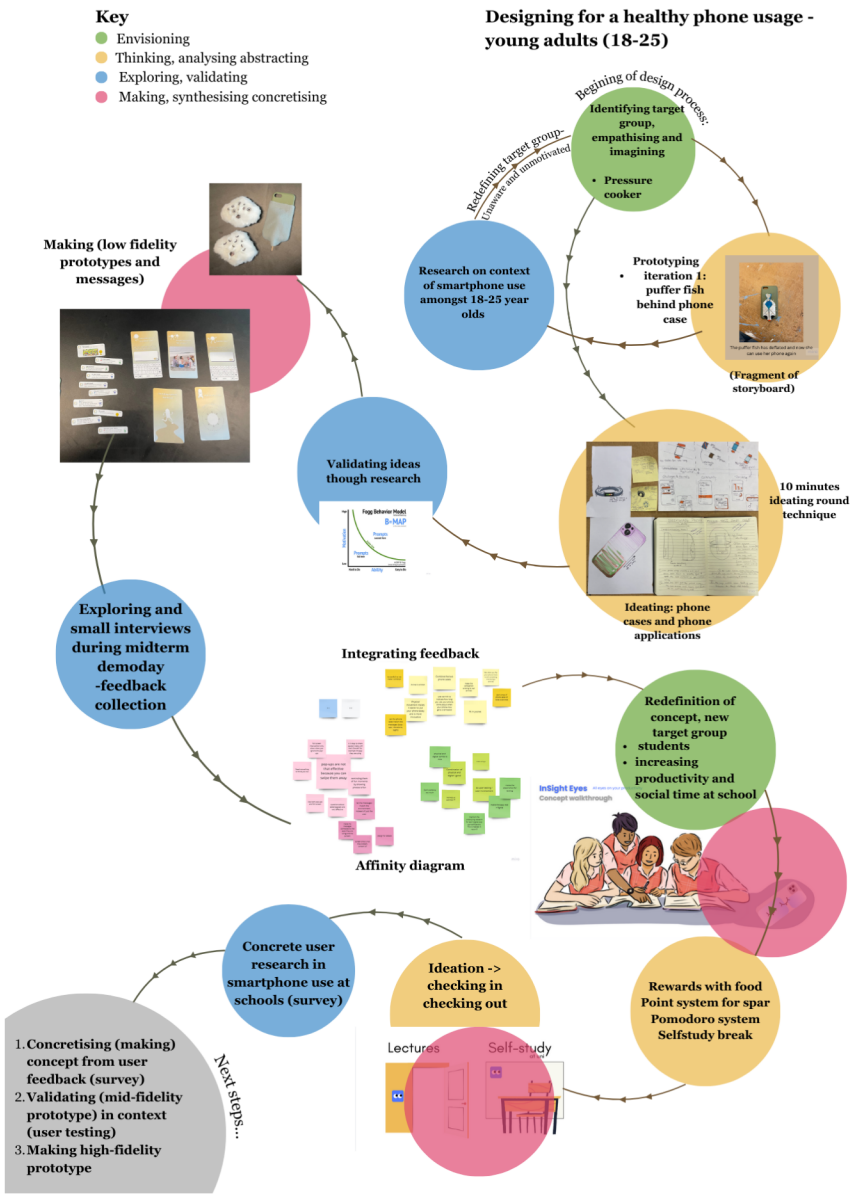
The baby fish also does a light sequence according to a breathing exercise

The puffer fish has deflated and now she can use her phone again



Appendix 12- Posters

Mid-term process visualization



Final demo day poster

Lightlock - Glow hard or go home

B2.1 (Research) Design Project

Young adults often struggle with maintaining focus due to constant smartphone distractions, which can negatively impact their productivity and academic performance. This issue is especially relevant for university students, as it directly affects their ability to study effectively and achieve their academic goals.

Lightlock addresses this challenge by promoting healthier phone habits and enhancing focus in shared study spaces. It combines smart lamps with an interactive mobile app to create a space where everyone is encouraged to stay on task. If you enter the space without the app, a lamp flickers, giving you a little social nudge to join in . The app blocks distracting apps, tracks study time, and visualizes progress, making it easier to stay motivated. By encouraging accountability and reducing distractions, Lightlock turns shared study areas into spaces where focus, productivity, and better digital habits thrive — together.

Students:
Mats van Deijck
Tanya Yesurajan
Jeanneke Smeets
Camila Vicent

Coach:
Maarten Houben
m.houben1@tue.nl

Client:
Fitphone

m.j.j.v.deijck@student.tue.nl
T.yesurajan@student.tue.nl
J.e.smeets@student.tue.nl
c.vincent.perez@student.tue.nl

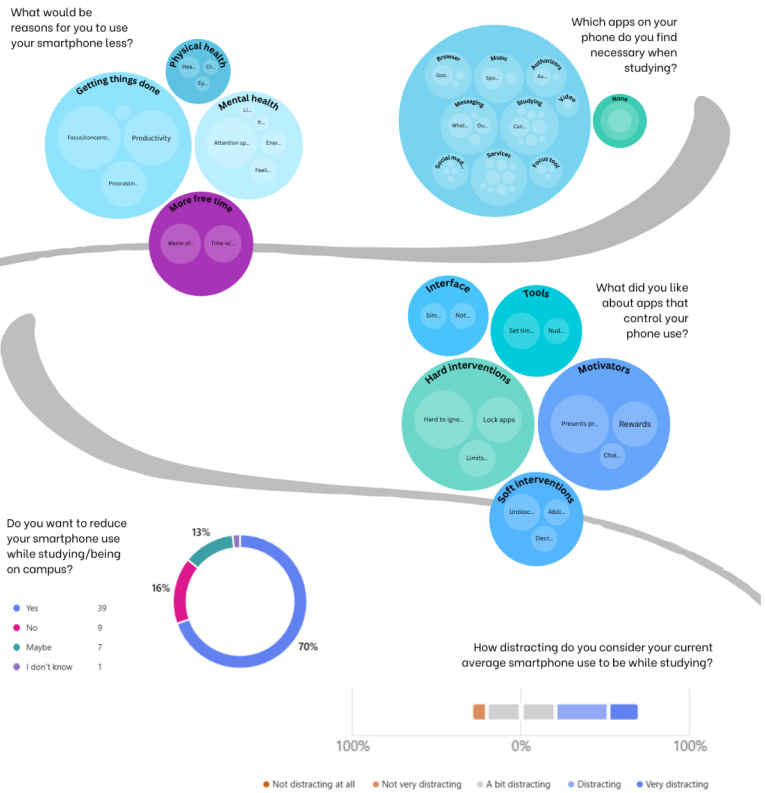
health inclusive design

Appendix 13- Information sheets

Critical Casper:

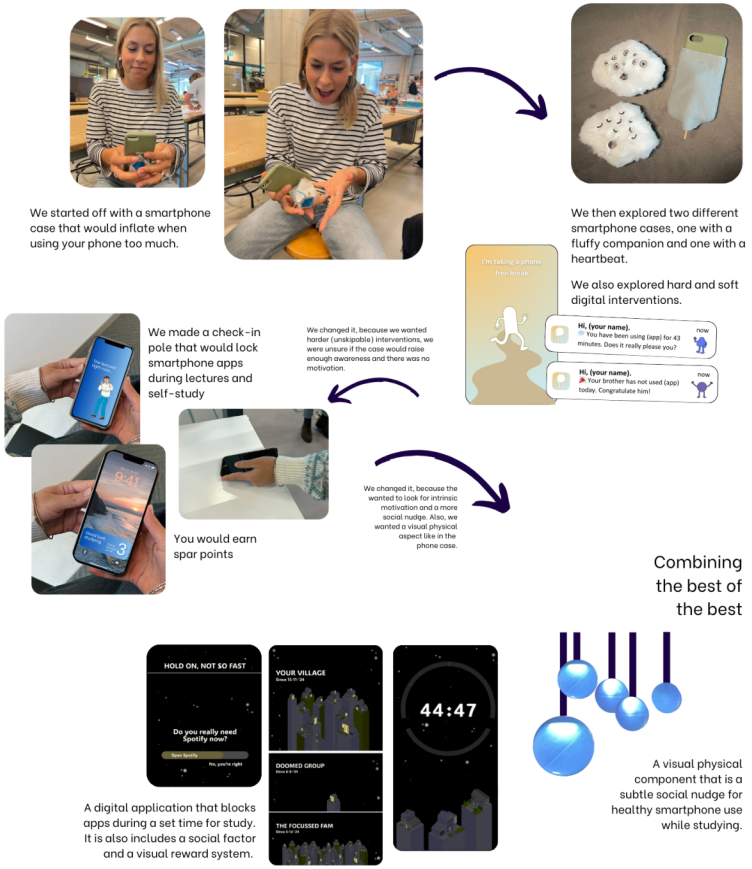
“But is this concept needed and wanted?”

By conducting an online survey, we found, amongst other things, the following:



Critical Claire:

“But did you iterate on your concept?

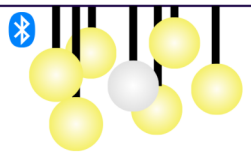


Appendix 13.1- Information sheets

Critical Chris:

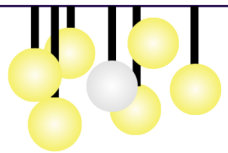
“But how could this work technologically?”

You can only set a timer when you are (almost) in the study space. Your phone will detect this through a bluetooth beacon in the lamp.

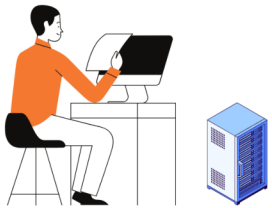


Motion sensors at the openings of the study space will keep track of the number of people in the space.

You set a timer in the app. Great! Now the app will send this information to the server (either cloud or local).



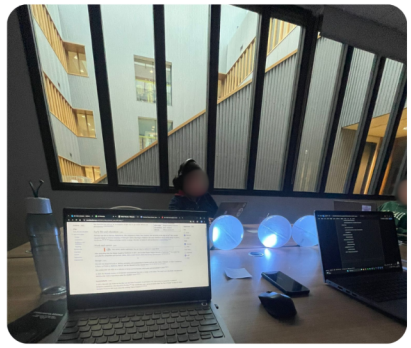
The lamp will adapt accordingly



The lamp server will calculate the difference between timers set and people in the room and turn of partially accordingly. Be warned!

Critical Charles:

“But did you test this concept on potential users?”



In our user test we used three lamps and cardboard sheets (to mimic app).

Through our observations and semi-structured interviews, we found the following:

1. The structured environment and **social pressure** significantly enhanced focus.

2. Users did not always notice when the lamps switched off. To address this, the switch-off process has now been made more obvious.

3. Indicating **breaks** in study sessions can help prevent boredom; this is now included in the app’s timers.

4. The presentation of this concept needs to be clear, especially for first-time users.

5. The **dark environment** was perceived as a good study space. Consequently, our lamp is designed to replace existing lamp systems in study areas.

Appendix 14-Business cards

Appendix 15-Interviews after the user test

1. First of all, did you understand the design? Could you explain it in your own words?

I've seen three glowing devices and they were meant to turn on when i started, and they will dimm out if i use my phone.

2. How did you find your study session? Was it productive and focused?

It was quite productive, but i normally don't struggle with studying, it was nice.

3. In what ways was today different from your usual study sessions?

Not very different but i liked the atmosphere of like the dark room, this make me feel more focused.

4. What are your thoughts on the environment, such as studying alongside a group of strangers?

Yes it puts a bit of pressure on you when studying

5.Did you find the app interventions helpful? What did you think of it being rigid?

I don't know because i didn't use my phone, when the timer was done the bar moved a little. The app will definitely help me when studying, i did not use any similar apps jet but would maybe use something like this if i were struggling with studying.

6.What motivated you to download the app? Did you feel pressured or were you simply curious?

Curious

7. Is there anything else you would like to share about the design?

I liked the environment, and i think it's a nice idea to have this light with your study session

8. Did you find it distracting when one of the lights went out?

Yes, when it was flickering and going out it caught my attention

9. Did you find it difficult to stay off your phone?
No i don't normally struggle with this

1. Allereerst, begreep je het ontwerp? Kun je het in je eigen woorden uitleggen?

Nee ik begreep hem niet helemaal, ik zag in het begin wel dat er iets gebeurde maar t kwam voor mij niet duidelijk over of het licht kwam door mij of door die andere jongen die er zat. En voorderest heb ik hem helemaal niks zien doen, maar ik heb mijn telefoon ook helemaal niet gebruikt. Ik denk dat het dus dat als ik mn telefoon aan had gehad dat dan het licht was uitgegaan.

2. Hoe vond je je studeersessie? Was het productief en gefocust?

Minder productief omdat ik wist niet zo goed wat ik moest doen dus ik was mezelf de hele tijd aan t afvragen of ik iets moest doen, moet ik juist wel of niet op mijn telefoon zitten. En doordat ik steeds daaraan dacht was t wel minder productief.

3. Op welke manieren was vandaag anders dan je gebruikelijke studeersessies?

Het is donker hier en dat vond ik wel chill eigenlijk, maar ik kan me wel voorstellen dat als je iets doet dat niet op de laptop is dat dit minder chill is.

4. Wat zijn je gedachten over de omgeving, zoals studeren met een groep onbekenden?

Het was omdat we echt om een tafel zaten dat ik soms toch aan het nadenken was van oke ik moet nu niks raars doen.

5. Vond je de app-interventies nuttig? Wat vond je ervan dat het zo strak gereguleerd was?

Ja ik vind het wel goed dat de apps dan geblokkeerd worden. Ik denk wel dat je van tevoren echt heel goed moet nadenken wat je wel echt nodig hebt en dat je niet tijdens het studeren erachter komt dat je een app vergeten bent en hier achteraf achter komt.

Appendix 15.1-Interviews after the user test

6. Wat motiveerde je om de app te downloaden? Voelde je je onder druk gezet of was je gewoon nieuwsgierig?

Meer dat onder druk gezegd worden denk ik

7. Is er verder nog iets dat je wilt delen over het ontwerp?

Het is een heel rustgevend ontwerp en voor op de laptop zitten is dit dus wel echt top.

8. Vond je het storend toen een van de lampen uit ging?

Dat heb ik niet echt doorgehad

9. Vond je het moeilijk om van je telefoon af te blijven?

Voor een half uurtje niet maar voor langere tijd ga ik me misschien wel vervelen

1. First of all, did you understand the design? Could you explain it in your own words?

The design table was basically that you have a phone, and you set a timer and you should begin studying. We could set the timer for how long we want to be studying for. And we write the names of the apps that we were tempted to use.

- What happened when you tried to use another app? I didn't reach for my phone to use a app.
- Is that already a habit, or was this caused by the study set-up? I thought in this situation i shouldn't use my phone, but i was tempted to use it.
- What tempted you? Because I had to communicate with different people

2. How did you find your study session? Was it productive and focused?

Because I had half an hour that I dedicated to this, so I made sure i did something productive in that time. So productive.

3. In what ways was today different from your usual study sessions?

If i had a question or needed to communicate I normally would reach for my phone and ask people immediately.

4. What are your thoughts on the environment, such as studying alongside a group of strangers?

I liked the darkness in the room. I felt like i was responsible to study during this half an hour.

5.Did you find the app interventions helpful? What did you think of it being rigid?

Blocking certain apps will help because sometimes i'm on my phone just opening random apps and using them, if they are blocked i can't do this.

For whatsapp the reflecting question might not work but for youtube they do because i get tempted to just open it up

6.What motivated you to download the app? Did you feel pressured or were you simply curious?

Everyone else was really silent and i did not want to disturb them. They were all focused on their own work and also weren't reaching out for their phones.

7. Is there anything else you would like to share about the design?

Asking a question when they open the app will be very helpful to prevent them from using the app

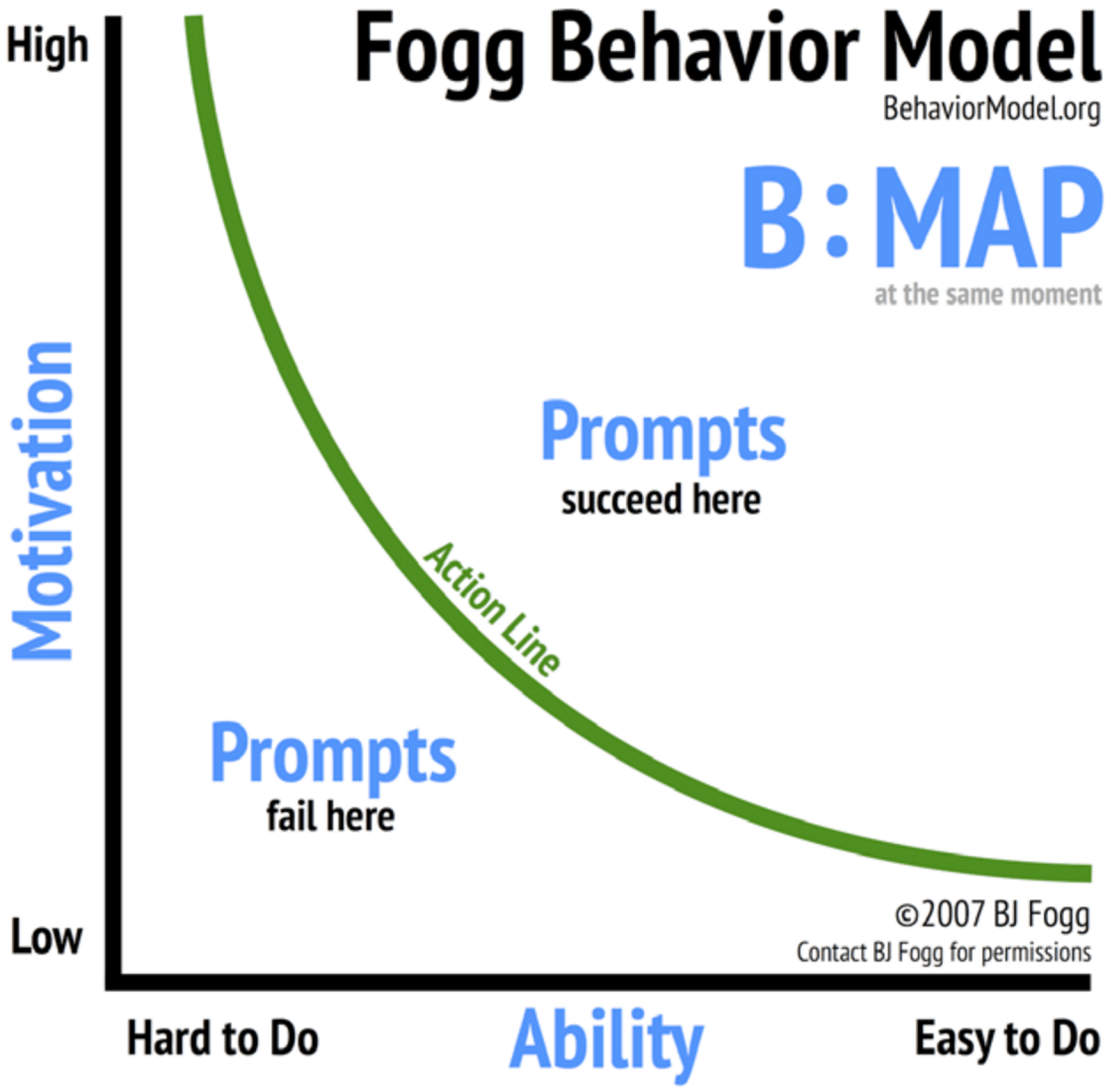
8. Did you find it distracting when one of the lights went out?

I noticed it but i didn't think it was distracting.

- How do you think it could be distracting? Adding a sound would definitely help

9. Did you find it difficult to stay off your phone?
Already anwered

Appendix 16 - The Fogg Behavior Model [6]



Appendix 17 - Explanatory LightLock video

Link to video on YouTube: https://youtube.com/shorts/71DkUBi0M6o?feature=share


Jeanneke
Mats
Tanya
How it works
CHECK OUT THE APP!