Designing a mindfulness intervention app

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1 INTRODUCTION

Inspired by the United Nation's sustainable development goal three: Promoting Good Health and Wellbeing [5], we decided to create an intervention app designed to interrupt users whenever they are mindlessly using an app they are addicted to. This app is supported by an intelligent, Large-Language-Model [7] powered recommendation system that facilitates the creation of case-specific interventions for the user to manage their time on these applications better.

This app was conceived after studying existing solutions that also promoted good health and well-being for their users. For example, Bulb is a social-companion robot that provides subtle cues to promote healthy behaviour change in its users, like movement or light coming from a light-bulb-shaped head [4]. Through a 2-day, 5-user, on-the-wild diary study, Bulb was found to help users maintain their schedules in a healthy manner and users found it to be: "Like a buddy, like a companion". We appreciated how Bulb embodied a humanified, chubby companion for its users and lauded the authors for employing an iterative design process which yielded an effecting lighting system, embedded within Bulb, which encouraged positive behaviour change among its users.

In our project, we also looked at applications designed to reduce social media addiction, focusing on innovative solutions that encourage users to engage more mindfully with their devices. One such application we explored is the "one sec app," which incorporates several features aimed at curbing excessive screen time and fostering healthier digital habits [2]. The app introduces automated triggers as a core feature. These triggers act as a mindful check, pausing the user for a moment before they continue to use a particular app or website. This deliberate pause allows users to reflect on whether they truly need to be on their device or if they could be doing something more productive or fulfilling with their time. To further assist users in maintaining their focus on their original intentions, the app provides timely reminders. These can be set to occur one to five minutes after opening an app, serving as a nudge to reconsider their current activity. This feature aims to combat the autopilot mode of endlessly scrolling through feeds without a conscious purpose. A pivotal function of the "one sec app" is its ability to host focus sessions. During these sessions, users can completely block access to selected apps and websites for a specified period. This self-imposed barrier ensures that users can dedicate their attention to work, hobbies, or rest without the constant temptation of digital distractions.

Finally, a significant aspect of the app is its ability to visualize the user's progress. By providing a statistical analysis of app usage, users can see tangible evidence of their behavior change over time. The app displays this data in an accessible format, such as graphs that track the frequency of app openings. For example, the statistics may show a user's Instagram usage has decreased from 128 attempts per week to just 8, demonstrating a substantial decline and thus, the effectiveness of the app in reducing social media addiction.

Another avenue of exploration in the field of mental health is the use of virtual reality (VR). The integration of VR in mental health research and practice, which includes various transformative aspects, is elaborated in Bell 2020's work [3]. These include:

(1) **Enhancing Ecological Validity**: By simulating real-world scenarios in a controlled virtual space, VR technology enhances the realism and applicability of mental health research. This approach allows for the replication of everyday environments and situations that patients might encounter, providing a more authentic context for diagnosis and treatment.

(2) **Control and Manipulation of the Virtual Environment:** VR technology offers unparalleled control over the environment, allowing researchers and therapists to tailor scenarios to the specific needs and conditions of individual patients. This degree of control also facilitates the exploration of specific psychological triggers and the assessment of responses in a safe, controlled setting.

(3) **Personalization and Tailoring:** The ability of VR to be customized for each individual is a significant advantage. It enables the creation of therapeutic environments and scenarios that are specifically designed to address the unique challenges and requirements of each patient, thereby enhancing the effectiveness of the treatment.

(4) **Real-time, Automated Data Capture:** VR technology allows for the collection of detailed, real-time data on patient responses and behaviors. This automated data capture is crucial for ongoing research, providing a wealth of information that can be used to refine therapeutic approaches and understand mental health conditions better.

(5) **Increasing Engagement:** The immersive nature of VR can lead to increased patient engagement with the therapeutic process. The interactive and often gamified elements of VR can make therapy more engaging and less intimidating, potentially improving patient outcomes.

While these points underscore the potential benefits of VR in mental health, it's also important to consider the ethical implications, especially concerning privacy and data security. The personal information recorded by VR applications must be handled with utmost care to protect patient confidentiality. Furthermore, keeping pace with rapidly evolving VR technology presents a financial challenge, necessitating ongoing investment to ensure that therapeutic tools remain current and effective.

Finally, we also looked at the role of conversational agents in supporting group therapy [6]. This paper explores the use of conversational agents (CAs) in individual therapy for couple problems, utilizing cognitive-behavioral couple therapy (CBCT) principles. The study employed a Wizard-of-Oz experiment with a chatbot to simulate therapy sessions via instant messaging. Twelve participants engaged in single-session therapy, and their feedback was analyzed qualitatively. Findings suggest that while some participants valued the non-judgmental, empathetic nature of the CA and its quick response, others found the interactions too generic, impersonal, and lacking in emotional depth. This pilot study contributes to understanding the potential and limitations of this approach, highlighting the need for more personalized, empathetic, and human-like interactions.

2 DESIGN

2.1 Persona Design

Our design process began with the conception of three personas we believed would benefit the most from an app that can support and subsequently improve their mental health. We note that these persona descriptions are adapted from our work in Assignments 2 and 3 and we are summarizing it here for presentation and completion.

(1) **Persona 1 - Isolated remote-work knowledge workers:** As a byproduct of the COVID-19 pandemic, these individuals still have a working setup where they work from home most days of the week. This experience blurs the lines between work and home, with one usually creeping into the other. These individuals tend to use social media more often due to the lack of social interactions that once came from colleagues in the work environment. In Assignment 2, we described the problems faced by our fictitious user, Stephany Mendieta. She is an extremely dedicated and busy millennial, working hard in her corporate job and running a thrifting business. Her packed schedule leaves little time for hobbies and relaxation, which is essential for her to unwind. She wants a product that helps her relax effectively while also respecting her schedule due to how much her mental health has deteriorated due to how busy she is.

(2) **Persona 2 - Younger kids addicted to digital media:** This persona represents children and pre-teens who are increasingly becoming more dependent on social media for social connections and entertainment. They are at risk of excessive screen time, which might impact their development. In Assignment 1, we describe Arun Shah, an ambitious teenager who struggles with focusing on the details of his goals despite understanding the bigger picture, due to his digital media addictions, particularly to TV shows and movies.

(3) **Persona 3 - People isolated due to severe mental illnesses or trauma:** These personas represent people affected by severe mental illnesses like PTSD and depression, which are often exacerbated by isolation. These people turn to social media in order to lessen the symptoms of their pre-existing conditions, which might inversely amplify them due to the amount of harmful content plaguing social media platforms. In Assignment 1, we illustrate this persona through David, a young individual who suffers from isolation and depression and would like to leverage an HCI solution to provide an autonomous aid for his mental health problems.

Following feedback from Assignment 2, we came to the realization that although these three personas were pivotal for us to understand the surgical details of our potential users, we had to expand the number of personas we covered to achieve our goals more expansively. As such, we added the following two personas:

(1) **Persona 4: Busy Parents Seeking Balance**: This persona represents parents who are juggling work, parenting, and personal life. They often find themselves checking social media during brief moments of downtime, which can add up to significant usage throughout the day. They want to cut down on social media to be more present with their children and manage their time better.

(2) **Persona 5: University Students Preparing for Exams**: This persona represents students who are preparing for their exams. This endeavour often involves days to weeks of concentrated, distraction-less effort from the students, and any distractions might be costly for their study routine.

2.2 Paper-Prototype

Following our initial literature review in Section 1 and our persona design process in Section 2.1, we created a paper prototype that supported the following major tasks. The description of our supported tasks is directly obtained from our work in Assignment 3.

(1) Create an intervention **(All Personas P1-P5)**: This occurs on the app's main screen and is where a user can design an intervention. Users' initial recommendations are powered by LLMs.

(2) Modify an Intervention **(All Personas)**: After an intervention is created and deployed, a user can modify it.

(3) Exit App **(Persona 1)**: Minor interventions designed to be included after the first prototyping session. With the lock app intervention, the user is prevented from using the app entirely for a determined amount of time.

(4) Switch app **(Persona 2)**: While using the target social media app, a user is taken to another alternative app that is proven to be more beneficial for their mental health as measured by their usage data (i.e. an informative YouTube video).

(5) Journaling Exercise **(Persona P3)**: While using the target social media app, the app intervenes with a screen with a journal prompt and a journaling exercise. After the journaling exercise, the user can return to the main app.

(6) Breathing Exercise **(Persona P4)**: While using the target social media app, the app intervenes with an interactive screen that prompts the user to engage in a guided, 20-second breathing exercise. This intervention targets P4 because busy parents may be overwhelmed with their responsibilities and need a simple breathing and/or meditation exercise to get them back to a more levelled headspace.

(7) Math Puzzle **Persona P5)**: While using the target social media app, a user is taken to a screen where they are asked to do a math puzzle to return to the social media application. If they don't solve the puzzle after a specific amount of time, a timer runs out, and they are taken back to the app. This intervention targets P5 since users might want a productive break from their studies, which keeps them on their feet to eventually return to studying.

2.3 Medium-Fidelity Prototype

Leveraging the Balsamiq prototyping tool, [1], we created a medium-fidelity prototype to further iterate on our design. Due to the good reception of our initial paper prototype, most of the work in this part of our process can be attributed to the exercise of translating our paper-prototyping work to a platform that can provide more interactivity to test our ideas further. Due to the precision by which we defined our tasks in Section 2.2, we had little trouble in translating our design into this platform. Furthermore, we ran our medium-fidelity prototype on a mobile phone during testing, and thanks to a laborious process of adding a bunch of links between the different pages of our prototype, we actually created the illusion of presenting an implemented solution even though our work involved zero coding.

3 REVISIONS

The following is a list of revisions we performed to our paper-prototype (Section 2.2) following a round of testing sessions:

(1) Intervention app buttons were relabeled for more clarity.

(2) Timer setting was improved with color-coded slots and a separate pop-up for easier time setting.

(3) To reduce setup effort, default recommended interventions were added. We also included a scrollable list to better navigate all the intervention options.

(4) We addressed data collection concerns with a data collection user agreement when the app first boots up.

(5) We improved journaling intervention by providing specific prompts to aid the journaling process.

We also performed the following revisions to the prototype following a testing session with the medium fidelity prototype we developed in Section 2.3:

(1) We added more details to the data consent policy that appears when the app first boots up to better inform users on how their data will be used, encouraging them to say yes.

(2) Redundant Instagram apps on the home screen were reduced to avoid confusion.

(3) Intervention notification contrast and opacity were enhanced for better visibility.

(4) 'Info' icons were replaced with 'edit' icons to clarify functionality.

(5) 'Intervention status' title was changed to 'status' for clarity and UI enhancement.

(6) 'Back' button visibility was improved by enlarging and bordering it.

(7) The journaling intervention's closing mechanism was fixed after users experienced issues with it when testing.

(8) Wording for 'switch app' intervention was revised for better user reception.

Both sets of revisions helped us in creating our final 90-second demo.

4 LESSONS LEARNT

(1) **Iteration Matters:** The effectiveness of our prototype can be largely attributed to the fact that we iterated on this idea many times. As computer scientists, it is difficult to stop the inkling of coding up a solution before even thinking through the entirety of the problem and solution spaces. We found the paper prototyping sessions particularly insightful in determining the intricacies of our prototype and desired interaction paradigms.

(2) **Valuing User Privacy and Trust:** In developing our app, a key lesson learned was the importance of data security and ethical considerations. Surprisingly, we found that users were highly aware and concerned about their digital privacy and what their data was used for, prompting us to prioritize transparent and responsible data practices through an informative consent form.

Overall, We found it surprising how exciting users found our prototypes to be, even if they were quite simple to understand. We did not find it surprising how difficult understanding the users would be and appreciate the process these classes made us go through to be able ti understand our desired users better.

5 INDIVIDUAL CONTRIBUTIONS

(1) Junior Francisco Garcia: Came up with the idea of the app, was in charge of most of the writing/editorial components of the writing assignments, acted as the moderator in the prototyping sessions, and implemented the interventions in the paper prototype and medium-fidelity prototype.

(2) William Xu: In charge of most of the implementation of both our medium-fidelity and paper prototypes, including the interactivity of our prototype and the create/edit intervention screens. Fixed prototype bugs and acted as the computer in prototyping sessions. Assisted with writing portions of the assignments as needed.

(3) Suyash Yogesh Soniminde: In our class project, I primarily recorded user feedback during the evaluation phase, presented use cases, and encouraged user interaction with our guided flow. Outside class, I created two intervention flows for paper prototyping and led discussions on revisions. I implemented user-suggested

changes in our medium fidelity Balsamiq prototype and contributed extensively to the group assignment reports, including literature reviews, revisions and photo uploads.

REFERENCES

[1] Balsamiq Studios, LLC. 2008. *Balsamiq Wireframes*. https://balsamiq.com/

[2] David J. Grüning, Frederik Riedel, and Philipp Lorenz-Spreen. 2023. Directing smartphone use through the self-nudge app one sec. *PNAS* (2023). https://one-sec.app/research Published Peer-Reviewed, February 2023.

[3] Mario Alvarez-Jimenez Andrew Thompson Imogen H. Bell, Jennifer Nicholas and Lucia Valmaggia. 2020. Virtual reality as a clinical tool in mental health research and practice. *Dialogues in Clinical Neuroscience* 22, 2 (2020), 169–177. https://doi.org/10.31887/DCNS.2020.22.2/lvalmaggia arXiv:https://doi.org/10.31887/DCNS.2020.22.2/lvalmaggia PMID: 32699517.

[4] Simone Ooms, Jay Kolvenbag, and Charlotte Bording. 2023. Lighting up Well-Being with Bulb. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (, Hamburg, Germany,) *(CHI EA '23)*. Association for Computing Machinery, New York, NY, USA, Article 586, 6 pages. https://doi.org/10.1145/3544549.3583838

[5] United Nations. 2015. Transforming our world: the 2030 Agenda for Sustainable Development. United Nations General Assembly. https://sdgs.un.org/publications/transforming-our-world-2030-agenda-sustainable-development-17981 A/RES/70/1.

[6] Berkan Yuksel and A. Baki Kocaballi. 2023. Conversational Agents to Support Couple Therapy. In *Proceedings of the 34th Australian Conference on Human-Computer Interaction* (, Canberra, ACT, Australia,) *(OzCHI '22)*. Association for Computing Machinery, New York, NY, USA, 291–297. https://doi.org/10.1145/3572921.3572922

[7] Wayne Xin Zhao, Kun Zhou, Junyi Li, Tianyi Tang, Xiaolei Wang, Yupeng Hou, Yingqian Min, Beichen Zhang, Junjie Zhang, Zican Dong, Yifan Du, Chen Yang, Yushuo Chen, Zhipeng Chen, Jinhao Jiang, Ruiyang Ren, Yifan Li, Xinyu Tang, Zikang Liu, Peiyu Liu, Jian-Yun Nie, and Ji-Rong Wen. 2023. A Survey of Large Language Models. *ar5iv* (2023). https://ar5iv.org/abs/2303.18223
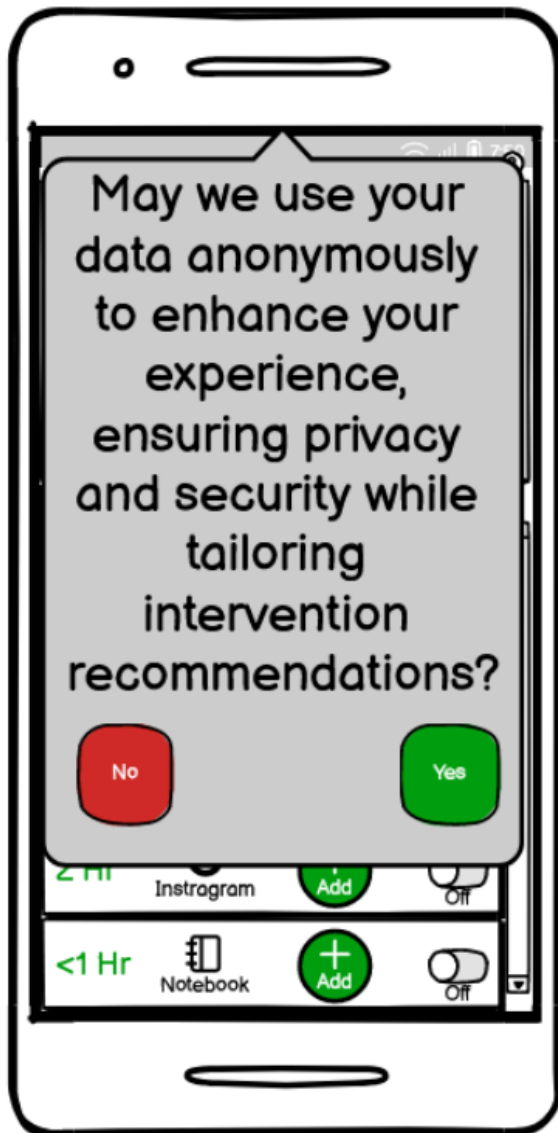
A ADDENDUM

A.1 Video Presentation

Link to our 90-second video grab: https://drive.google.com/file/d/1Jbw_YSyi8ZYppaLyiAFAAdmfeoU_SZCG/view.
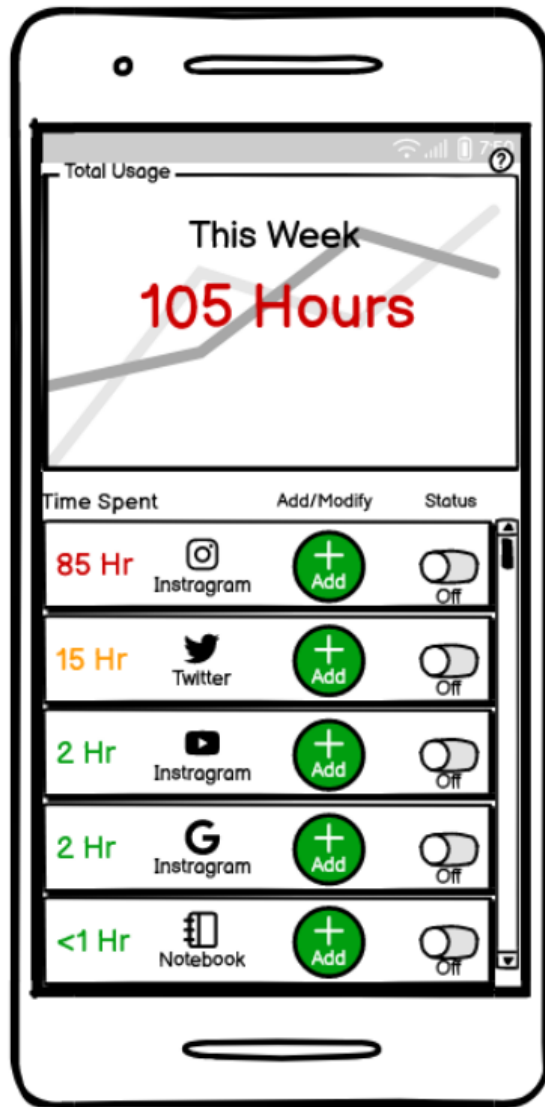
A.2 Pictures

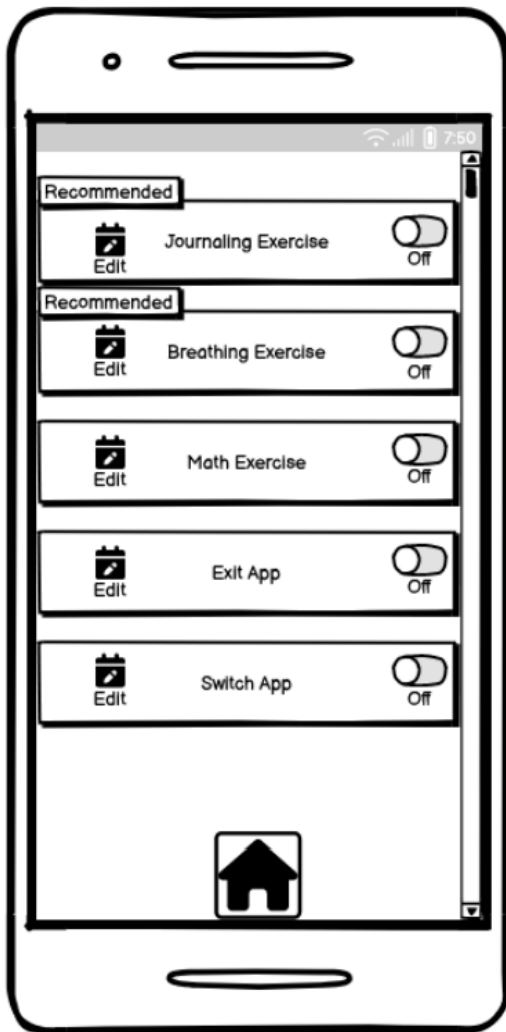Below are the pictures of our final prototype:
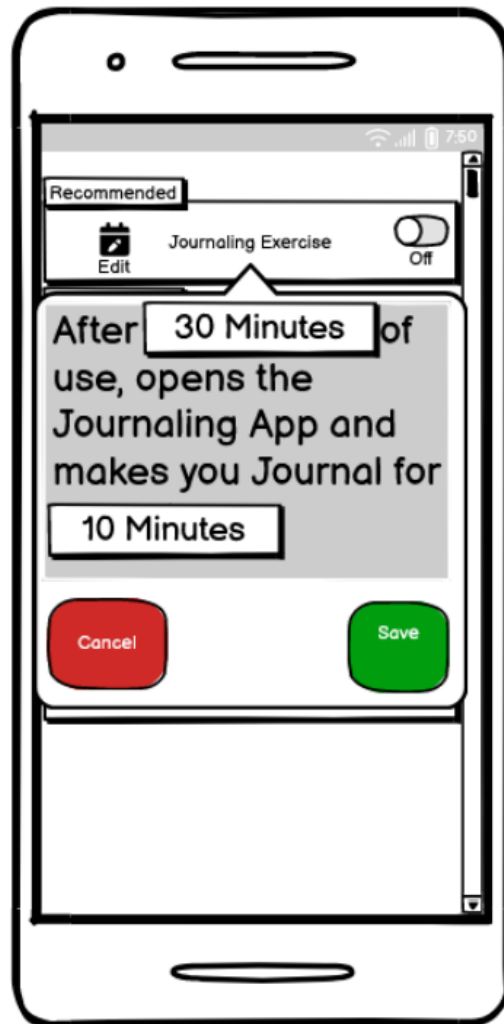
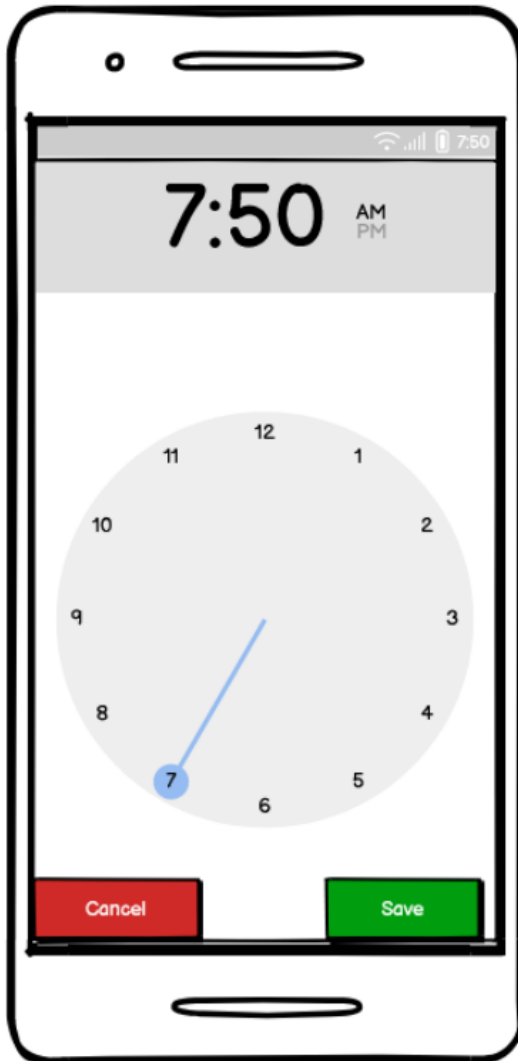1] user data access agreement screen:

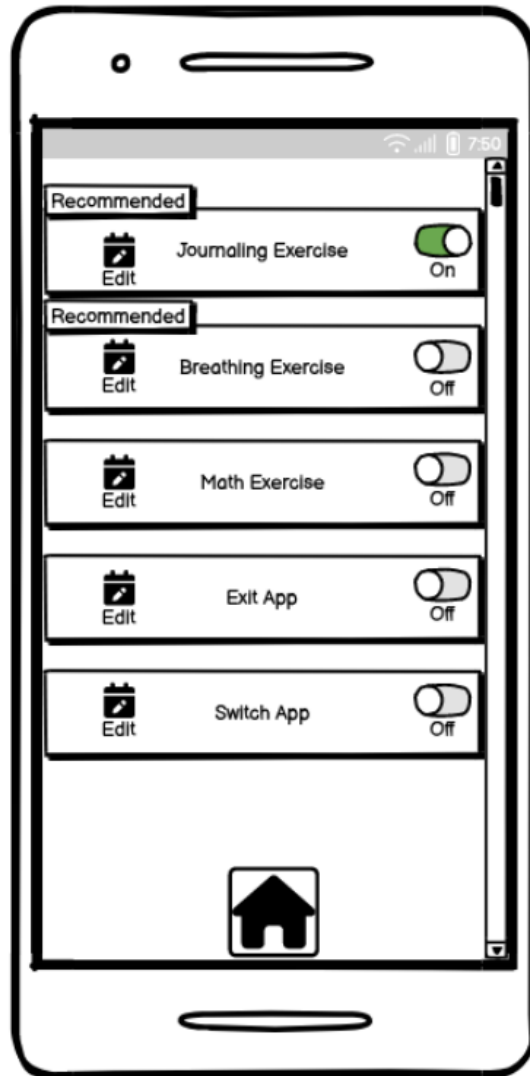2] app default screen

3] add interrupt screen

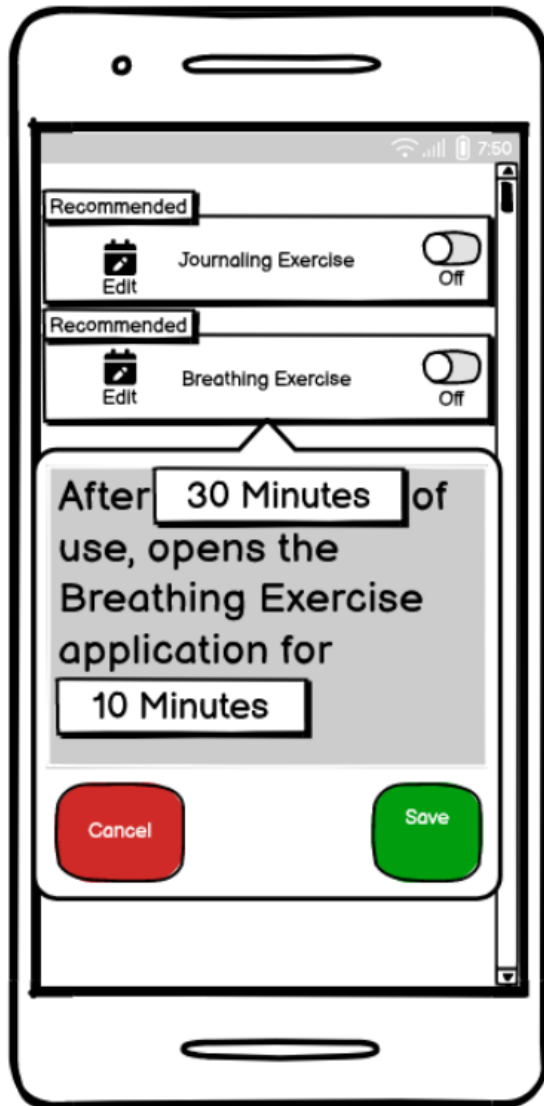4] journaling exercise intervention create/edit screen:

5] journaling exercise/ –breathing exercise/ –math exercise/ –exit app/ –switch app/
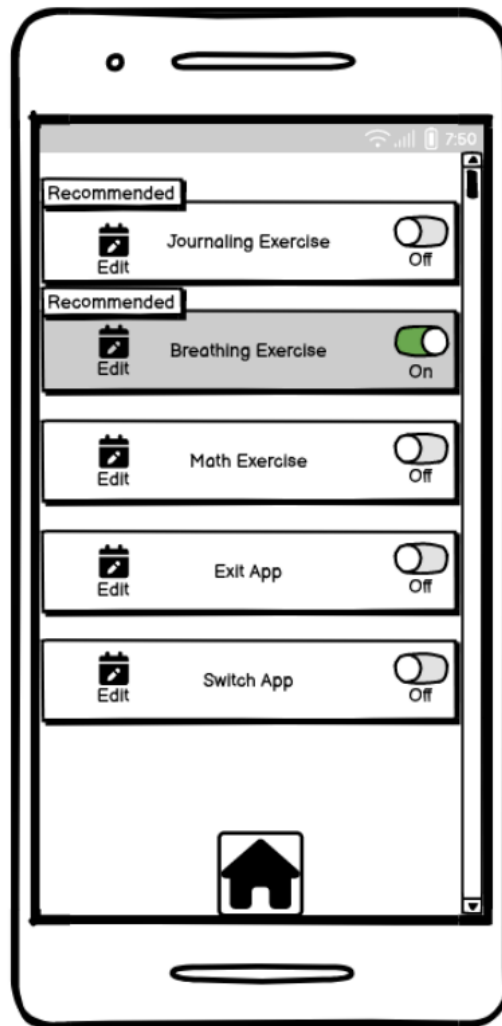interventions clock screen
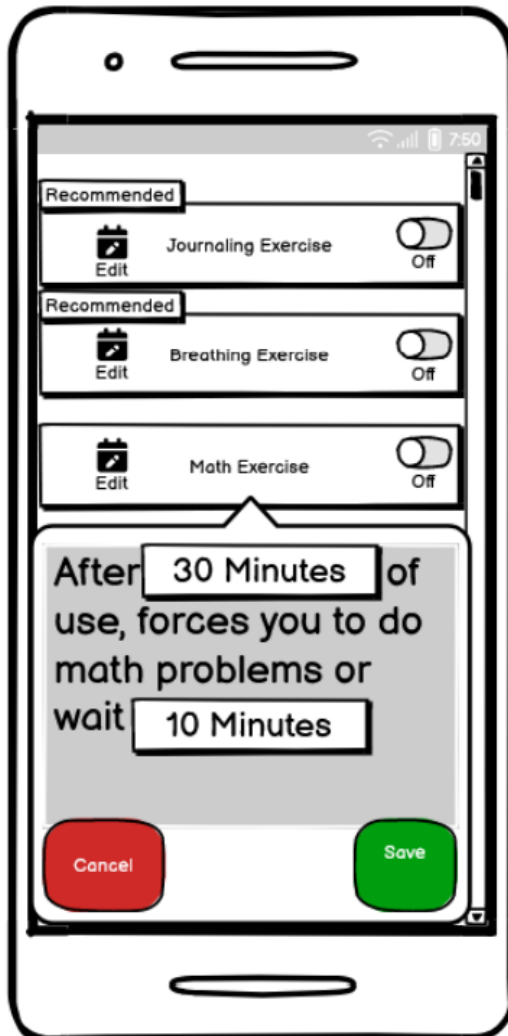
6] journaling exercise on screen

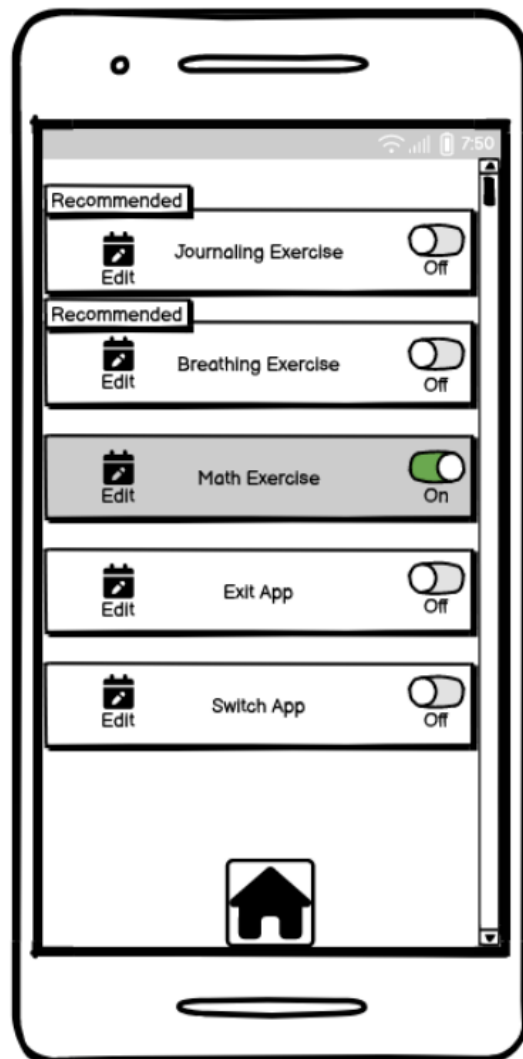7] breathing exercise intervention create/edit screen

Recommended

Journaling Exercise
Edit
Off

Recommended

Breathing Exercise
Edit
Off

After **30 Minutes** of use, opens the Breathing Exercise application for **10 Minutes**

Cancel

Save

8] breathing exercise on screen

9] math exercise intervention create/edit screen

10] math exercise on screen:

11] exit app intervention create/modify screen:
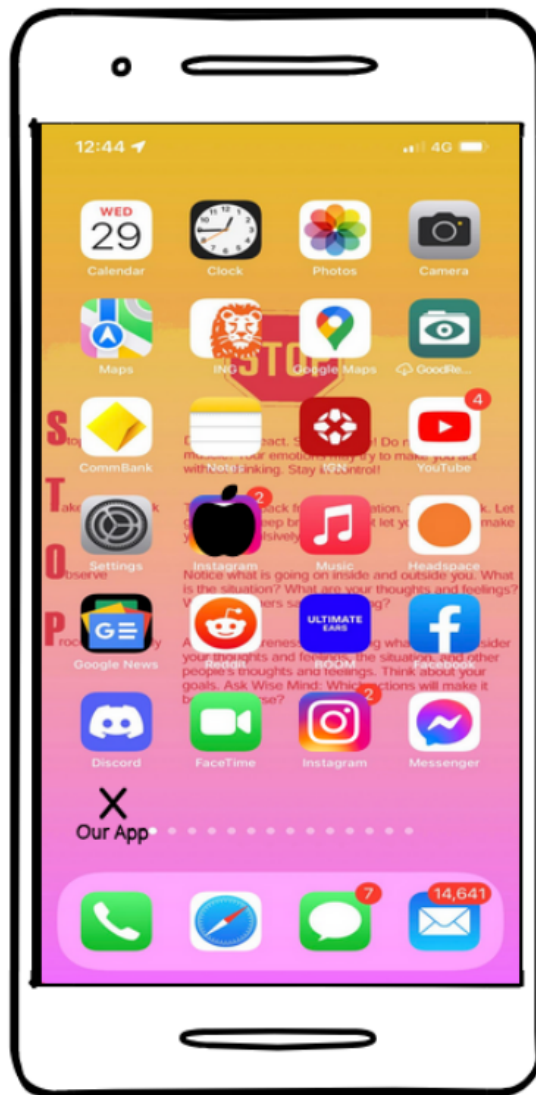
12] exit app on screen:
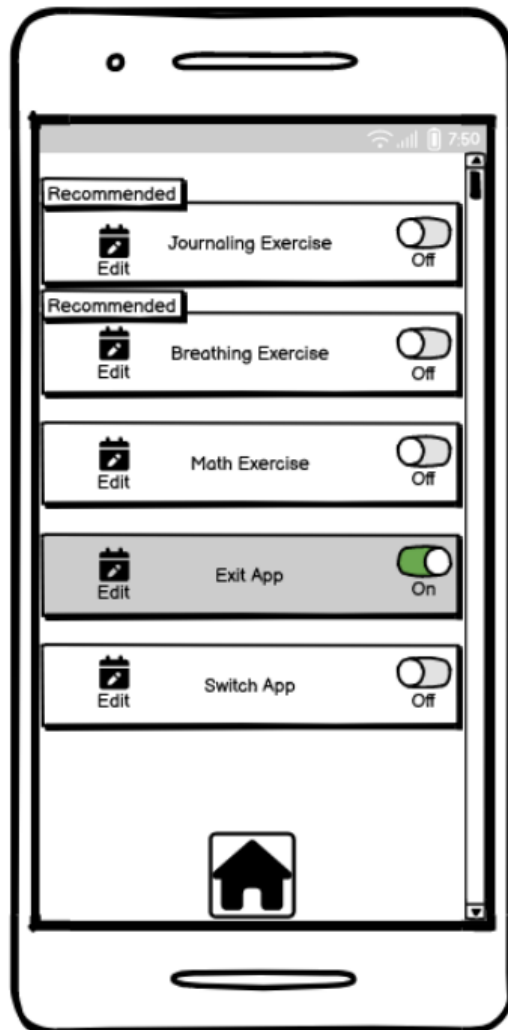
13] switch app intervention create/modify screen
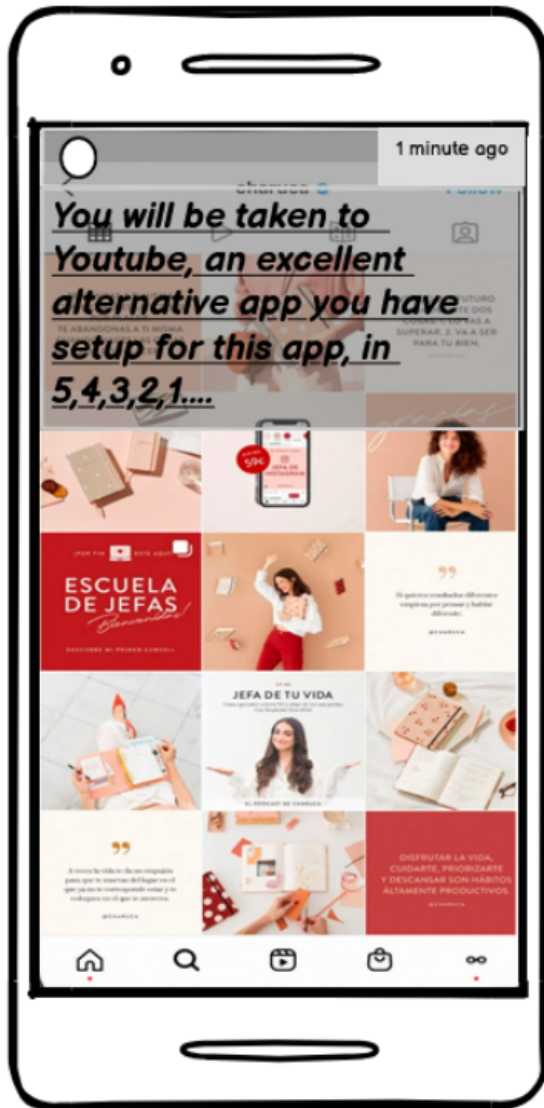
14] switch app on screen
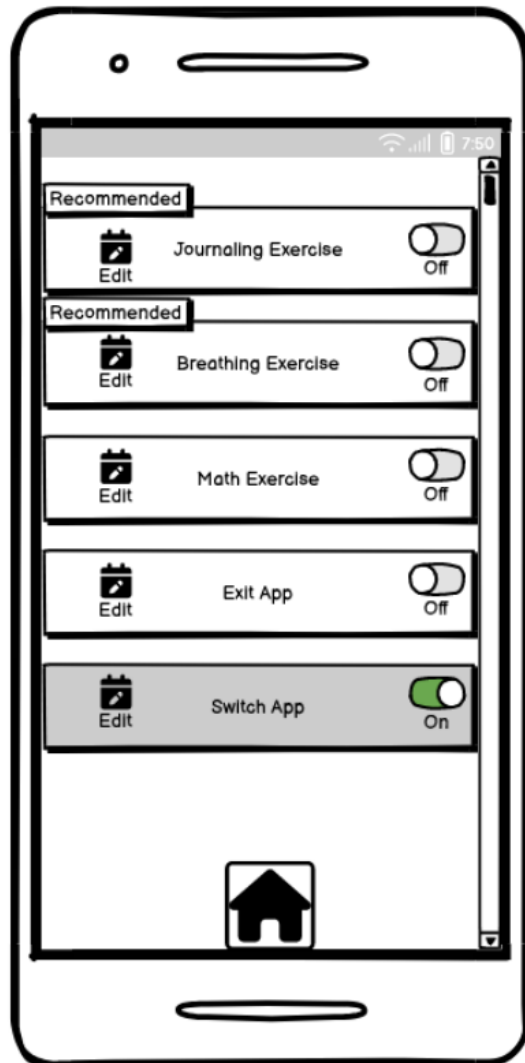
15] Home screen for —switch app/ —journaling exercise / —breathing exercise/ —math exercise/ —exit app intervention setup 'on' for instagram app
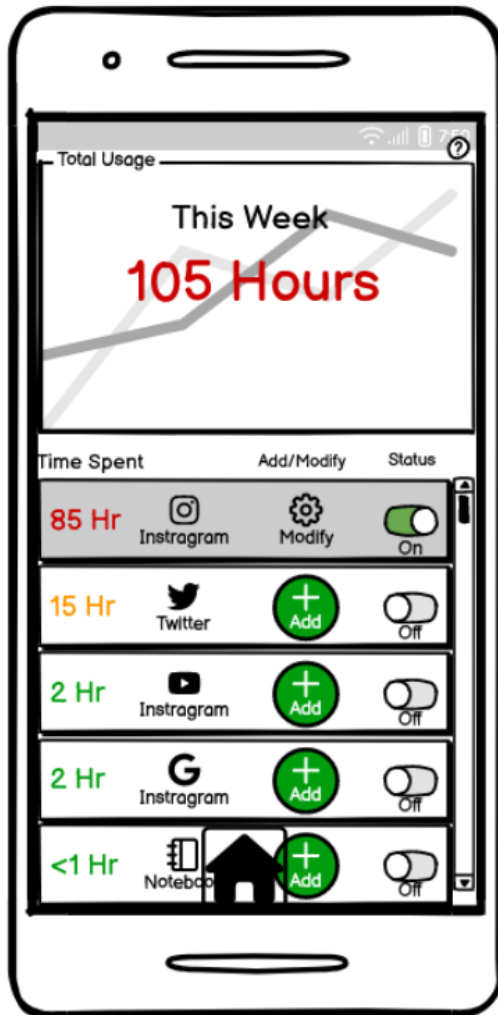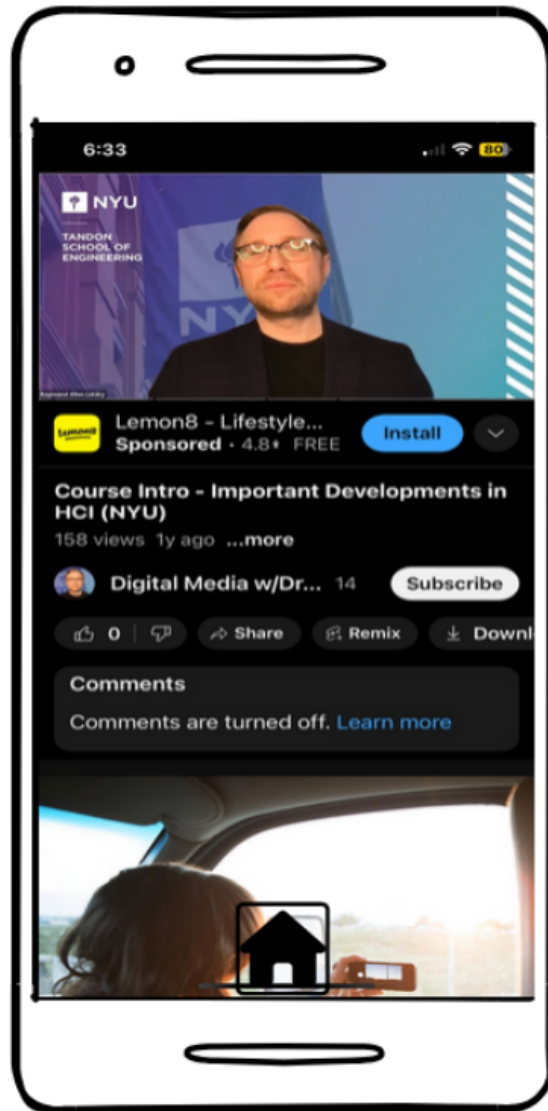
16] default home screen:

17] switch app intervention notification screen:

18] youtube screen:

19] exit app intervention notification screen

20] journaling intervention screen

21] journaling intervention open screen

Please answer the following randomly selected prompt:

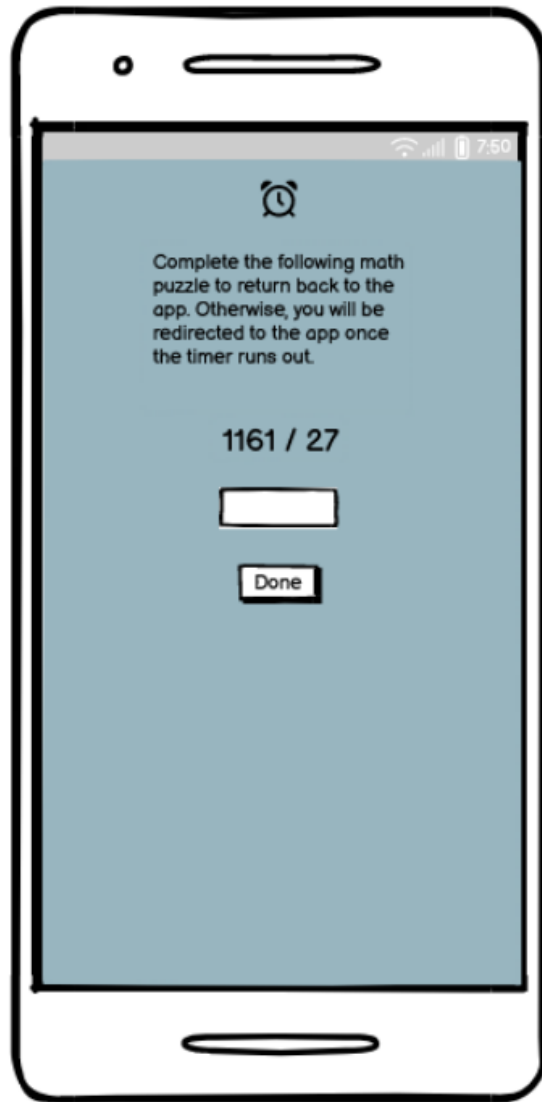"When do I feel most in tune with myself?"

100 words minimum

Done

22] breathing exercise notification screen

23] math puzzle intervention notification screen

24] math exercise intervention on screen

25] intervention closed screen