SoulSync: A persuasive meditation app

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Abstract

Mental wellness is essential for productivity and overall well-being. The usage of software applications in the wellness domain has increased. This work involves the design of a persuasive meditation app SoulSync to improve the mood of working adults by reducing stress using meditation. A prototype of the user interface was built using Figma using the DECIDE framework. The app incorporated many persuasive strategies such as reduction, scarcity, dialogue support, etc. A peer evaluation of the application was conducted using 10 participants. 90% of the participants reported that the app can help with the consistent practice of meditation and all the users found the application to be easy to use. Therefore, persuasive strategies are effective in changing user behavior and promoting mental wellness.

Keywords: meditation, persuasive design, behavior change

1 Introduction

Nowadays, with technology developing at a breakneck pace and competition fierce, people place an unparalleled premium on efficiency, leading to a society where work takes precedence over a healthy lifestyle. People have come to glorify productivity as a metric of success because of the unrelenting pace of invention and the demands of a competitive economy [1]. There is a major disparity between personal and professional lives as a result of this hyper-focus on continuous performance, causing general well-being and mental health to suffer due to chronic stress [2]. According to the World Health Organization [3], stress is defined as a state of worry or mental tension caused by a difficult situation and workplace stress arises from challenges and difficulties in

a work setting. Research [4] suggests that mental well-being and reduction of stress improve productivity and overall job satisfaction among employees. Over time many software applications have emerged to persuade individuals to improve and maintain their physical health. These applications are effective in helping users form healthy habits [5]. Consequently, a rise in the use and popularity of meditation apps was observed, and millions of adults used meditation apps [6]. These apps heavily rely on habit formation and require the use of persuasion and constant cues to increase their effectiveness [7].

The SoulSync app is aimed to be a persuasive mindfulness-based meditation mobile app that is dependent on the availability of a smartphone and access to the internet. The app also allows users to track their mood and their persistent meditation behavior. Mindfulness-based mediation apps have been proven to be effective in reducing work-related stress and improving the mental well-being of individuals [8]. The app employs many persuasive strategies and features such as mood journals, and meditation exercises to achieve the target outcome of reducing at least 20% of work-related stress of users over a month. One study by Hubert (2019) [9] used Calm the popular meditation app and investigated its efficacy on stress reduction. Based on the results of this study which reported a significant reduction in perceived stress compared with the control group over a period of 2 months, the 20% reduction value was estimated.

1.1 Objective

The objective of the SoulSync App is to improve the mood of working adults by reducing stress through the practice of mindfulness and meditation. The app primarily aims to promote a stress-free lifestyle.

1.2 App category

The app falls under the health and wellness category. According to the taxonomy proposed by Tavares et al. [10] apps that are aimed to improve the wellbeing of users can be classified in the health and wellness category. The SoulSync app primarily focuses on the mental well-being of users.

1.3 Target audience

According to Statistics Canada [11], it has been reported that working adults between the ages of 25 and 54 years experience work-related stress more commonly. Additionally, in Canada, 7.5% of employees had taken time off from their job or business because of stress or mental health reasons in the 12 months before April 2023. Based on this data, the SoulSyc app primarily targets working adults between the age of 25-54 in Canada as they are most susceptible to workplace stress.

1.4 Application Novelty

Currently, most mindfulness-based meditation apps such as Calm, Calmify, or Headspace only allow users to practice meditation. However, these apps do not use

any mechanism to track the mental state of the user. Separate applications are needed for users to journal their moods, however, the SoulSync app allows users to journal their moods and meditate in the same application reducing cognitive load [12] and helping them relax. While some apps ask questions such as how are you feeling, users are only prompted with one-word answers which does not provide enough information to track the progress of the user's mood. This is because the one-word answers do not allow the user to express themselves [13]. Moreover, these moods can be time and context-dependent [13]. As users are able to answer them at any time, the impact of the meditation exercise cannot be understood. In the SoulSync app users can journal at any time to help them relax but they are also prompted with a text box to insert their feelings after a relaxing exercise.

2 Related Work

Previous literature identified that software applications are effective in helping users practice meditation [14]. This has given rise to many applications in this domain such as Apple's Calm app and the Headspace app [15]. These applications use persuasive strategies to help users build consistent habits [16]. Based on Cialdini's principles of persuasion [17] strategies such as personalization and reduction were found to be effective. In previous literature, the efficacy of mindfulness-based meditation mobile apps is thoroughly studied. Mindfulness is referred to as a flexible state of mind in which individuals are actively engaged in the present, noticing new things, and sensitive to context [18]. Bostock et al. [8] studied the Headspace app which is the number one mindfulness app out of 23 apps based on criteria including engagement, functionality, visual aesthetics, and information quality [19]. The app features guided mindfulness-based meditation exercises. The study [8] reported that if practiced many times a week, brief guided mindfulness meditations via smartphone can potentially have long-lasting benefits in reducing work-related stress and promoting well-being. Another study investigated the effects of mindfulness-based meditation on two mobile applications namely Headspace and Smiling Mind and found similar effects of mindfulness-based meditation as Bostock et al. [8].

Another application Calm reports more than 26 million users, 50,000 new members per day, and an anticipated $92 million in income in 2019 [20]. The calm app was studied by Dauden et al. [21]. The app reported effective positive outcomes for reducing stress and provided guided meditation exercises with sound of nature. Another study [22] investigated the efficacy of these applications in reducing the stress of parents. The age group of the participants of that study was 25-54 similar to the age range of the target audience of the SoulSync app suggesting promising results. While there are many reported similarities between the proposed SoulSync app to current popular applications in the market, one of the key differences is the option of mood journaling in the application. One study [23] investigated the impact of mood journaling and participants reported overall reduced stress. Moroever, mood tracking apps are popular such as MoodFit among users [24]. Therefore, the SoulSync app

aims to provide both the feature of guided meditation and mood tracking making it a novel persuasive application designed for behavioral change.

3 Methodology

3.1 Application Design

The app was designed for behavior change using the DECIDE framework [25]. The DECIDE framework is a decision-making model often used in product design to guide the process of making informed decisions [25]. The first step of the DECIDE framework involved defining the problem where the target action, target outcome, and target audience were brainstormed. Afterward, user characteristics, behavioral personas, and behavioral maps were created to explore the context and understand the users better. Wendel [25] introduced an action funnel called the CREATE action funnel where the cue, reaction, evaluation, ability, timing, and experience of the users were brainstormed to craft a better intervention. Afterward, design guidelines about implemention within the product as stated by Wendel [25] were followed to guide the design process in Figma. The design process was modified iteratively to showcase each feature and persuasive elements were added to the application. Additionally, metrics that could potentially be used to determine the impact and evaluate the next steps for the application were also theoretically brainstormed. It is to be noted that these two steps were not implemented as it was outside the scope of the project. Finally, a non-commercial prototype was designed using Figma.

3.2 Peer evaluation

To assess the design, an informal peer evaluation was conducted using opportunity sampling, where individuals or groups were selected based on their availability and accessibility [26]. A Google form (Refer to Appendix F) circulated through the researcher's social media, facilitated data collection from 10 participants who interacted with the Figma prototype before completing the questionnaire. The survey gathered demographic data on age and gender, while established scales with a 5-point Likert scale modified for this app such as the attitude towards using scale [27], perceived ease of use scale [28], and perceived usefulness scale [29] were used. Researchers have applied the technology acceptance model to evaluate application acceptance in e-learning and wellness contexts [30]. Perceived ease of use and usefulness which are derived from the technology acceptance model significantly influence behavioral intentions toward system usage [28]. Additionally, attitudes toward the target action, as measured by the attitude towards using scale, impact system persuasiveness [31]. To understand system persuasiveness, multiple 7-point Likert perceived persuasiveness scales [32–34] were used in the survey.

4 Application Design

4.1 Features

The features present in the app are discussed and illustrated below.

4.1.1 Relaxing sounds

The app features a selection of calming music such as the sound of waves, the sound of the sea, and other calming music as shown in Figure 1a. Previous applications such as Calmify which is one of the most popular applications for meditation use relaxing sound features to assist users in unwinding [35]. Moreover, research suggests that relaxing music particularly nature sounds is an effective mindfulness technique that reduces stress among users [36].

4.1.2 Guided meditation exercises

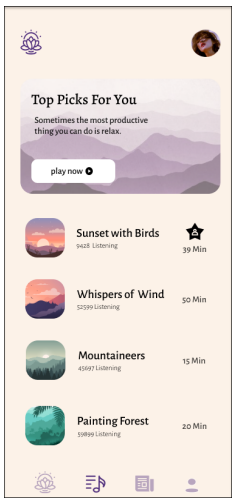
The app includes guided meditation exercises where the user is instructed to perform certain activities through an audio track as shown in Figure 1b. A study [37] conducted a randomized clinical trial to identify the mental state of the users and found that meditation exercises are effective in allowing users to form a habit of practicing meditation and assist with the overall improvement of their mood. Moreover, current well-reviewed applications in this category utilize guided meditation exercises. Examples of these applications include Calm and Headspace [38].

4.1.3 Mood journals

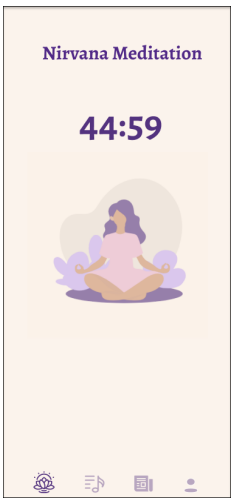
The app allows users to journal their feelings using text entries and record their entries using the date and time. This is illustrated in Figure 1c. Psychological research shows that journaling is effective in reducing the stress of users by providing an outlet for emotional expression [39]. It provides an enriched information source regarding the state of the user's mood [40]. The mood journal is a feature in the app and is used before and after the meditation exercises or relaxing sounds to track changes in mood post-meditation or relaxation. This information can be used to conduct sentiment analysis and track user's progress. This will also assist in tracking the effectiveness of the exercises. Although many meditation applications, do not use a mood journal, some feedback is taken from the user surrounding their emotional state. These are usually in the form of words like "Happy", "Relaxed" etc. However other apps such as MoodFit which focuses on tracking moods use the strategy of collecting detailed accounts of users' moods as one word might not accurately represent their mood [41].

4.1.4 Meditation time tracking and reminders

In order to assist users in identifying their progress which will in turn help them be persuaded to practice meditation, a mediation time-tracking feature was incorporated into the app as shown in Figure 1d. This is motivated by Apple Fitness which tracks uses time spent meditating. Users are allowed to set reminders for their preferred meditation time in the application. To avoid crowding the user with notifications at any given time, the user's time preferences were given priority as the target audience of the app is working adults. Research [42] suggests that cues such as timely reminders and progress monitors such as trackers can motivate individuals to regularly practice a certain task on mobile applications.

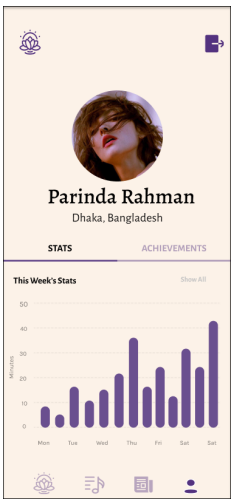


(a) Interface showcasing the relaxing sound feature



(b) Interface showcasing the guided meditation feature

(c) Interface showcasing the mood journal feature



(d) Interface showcasing the meditation time tracking feature

Fig. 1: Various features of the SoulSync App

4.2 Persuasive strategies and Implementation

The persuasive strategies implemented in the app with their examples are showcased below.

4.2.1 Social Proof

This is a persuasive strategy that is based on Cialdini's six strategies for persuasion [43]. This strategy utilizes individuals' desire to follow people who are similar. In another study [44] social proof was found to be effective in driving online behavior in online contexts. Current applications such as Amazon use social proof to show the number of people who liked a product, viewed it, or purchased it [45]. The SoulSync app shows the most popular relaxing sounds and quantifies the number of users listening to a certain relaxing sound to simplify the choice decision for users. Given that the app aims to destress users, minimizing the decision load from the users aims to increase user participation. An example of this persuasive element can be observed in Figure 2.

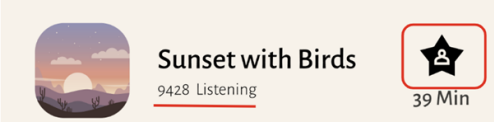


Fig. 2: Social proof persuasive strategy incorporated

4.2.2 Primary Task Support: Self-Monitoring and Personalization

This is a persuasive strategy outlined by the persuasive system design framework [46]. The self-monitoring principle in this framework states that an effective system should provide ways in which users can track performance, status, and progress. In the SoulSync app, the meditation time feature allows users to track their progress in the total number of hours spent meditating. Apps such as Apple Fitness utilize this form of tracking and this is illustrated in Figure 1d. Another strategy is personalization, this is where the system provides specific content to specific users. In the SoulSync app after the user signs in they will provided with recommended exercises based on their past interaction patterns. The user interfaces for new user and an existing user are shown in Figure 3. Based on past interactions and inclination towards Buddhist mindfulness meditation exercises the user "Parinda" shows such recommendations whereas the user "John" is a new user who does not receive personalized content yet.

4.2.3 Dialogue Support: Praise, Reward, and Reminders

Another important component of the persuasive design system framework is Praise, Reward, and Reminders. The app provides users with badges as a form of reward for certain task completion. One example is the completion of 10 meditation exercises.

Additionally upon documenting their mood persuasive affirmation language is used to praise the user for their activity. Previous apps such as Duolingo and Calm [47] use similar strategies. The SoulSync app also allows users to set reminders for mediation at their preferred time. This is consistent with previous literature [48] which states that effectively timing reminders is important for habit formation. While this strategy

(a) Interface showcasing personalization for an existing user

(b) Interface showcasing no personalization for a new user

Fig. 3: Persuasive strategy of personalization

is adopted there is no leaderboard as ramifying and competing on mental well-being would result in added stress and would be unethical. The examples of these strategies are presented in Appendix A.

4.2.4 System Credibility Support: Surface Credibility

Another strategy of the persuasive design framework is system credibility support. This strategy deals with the perception that users have about the credibility of the application. The SoulSync app is a relaxation app therefore a minimal aesthetic with limited ads was followed as a design principle to establish the credibility of the system. Recent literature [49] also suggests that a calming aesthetic is essential to the success of a mental health app. The majority of mental health apps like Headspace follow the same principle. The color theory states that colors can invoke emotional reactions [50]. A split complementary color scheme was used in the SoulSync app with soothing colors. Violet or lavender was used as the guiding color because research reported that violet evoked happiness and peace [51]. Figure 1 showcases many elements of the user interface design where a consistent minimal aesthetic can be observed. Additionally, the entire app shows the presence of one ad in Fig 1c which is labeled as sponsored increasing the credibility of the system.

4.2.5 Scarcity

This is another persuasive strategy that was employed in the SoulSync app by introducing limited-time exercise. This strategy is used by many mental health applications such as Calm which uses a premium model. In SoulSync it was incorporated to drive user engagement in the long run and prevent the users from being bored of the same available set of exercises. Applications such as Amazon adopted this strategy to drive user engagement and ongoing app usage. Refer to Appendix B for an illustration of this strategy [52].

4.2.6 Reduction

This is another persuasive strategy used in the SoulSync app. It involves simplifying the tasks for the user as per the definition of B.J Fogg's principles [53]. Similar to Amazon's one-click-to-checkout strategy, sign-in using Google was incorporated in the application. Previous literature identifies that sign-in with Google is an effective reduction strategy and helps more users to sign up [54]. Illustrations for the sign-in interface are shown in Appendix C.

4.2.7 Authority

Authority is a persuasion technique wherein people are more likely to comply with or trust something when the message is from someone perceived as an authority figure [55]. The SoulSync app utilizes this principle by adding a description to the meditation exercise highlighting the psychologist and their qualifications who designed the exercise. Previous literature highlights the effectiveness of authority as a persuasive technique particularly when making lifestyle changes [56]. The descriptions in Figure 3a show this principle.

4.3 Use of the DECIDE framework

4.3.1 User Characteristics

Using the framework, the different types of user characteristics were brainstormed and identified. The user's experiences with prior actions, experiences with similar products, and existing motivations to act were explored. Some of the insights and assumptions are discussed below. The user's relationship with the application and their potential barriers to action were explored. Users may have varying levels of prior experience with meditation practices, ranging from regular practitioners to those with minimal exposure. Some users may be motivated by a desire to alleviate workplace stress, improve productivity, or follow social media trends emphasizing self-care [57, 58]. Additionally, support from friends and family may influence motivation levels. Users are assumed to have access to smartphones and may have familiarity with meditation apps like Calm or Headspace, as well as other wellness apps such as fitness trackers [57, 58]. Moreover, establishing trust with the application is crucial for user engagement. Therefore, providing credible sources, maintaining a minimal aesthetic, and limiting ads can contribute to building trust [57, 58]. Challenges such as time constraints, financial limitations affecting internet access, and social stigma surrounding mental

health may act as barriers to user engagement [57, 58]. These barriers need to be overcome to foster user adoption and retention.

4.3.2 Behavioral Personas

Using the insights, various types of potential behavioral personas were also brainstormed during the design process. Table 1 shows the different types of user behavioral personas that may be relevant. The SoulSync application is primarily designed to target the variable wellness adherents for consistent practice and for supporting the practice of Mindful/self-aware users.

Table 1: Different Behavioral Personas

	Mindful/self-aware	**Variable Wellness Adherents**	**Non-self-aware/Self-care Avoidant**
Experience with similar actions	Already practices mindfulness meditation or yoga regularly	Practices mindfulness meditation whenever it's convenient. Struggles with consistent practice	Does not recognize the need for healthy ways to de-stress. Never took part in any wellness activity.
Experience with similar products	Does not depend on an app to practice consistently but uses one to improve the experience. Takes care of mental wellness through self-motivation	Depends on some apps and reminders to meditate.	Has some familiarity with existing online meditation tools but is uninterested in them.
Existing motivations around practicing meditation	Recognizing the importance of reducing stress through meditation and experiencing the benefits	Reading and watching content that promotes the benefits of self-care. Some co-workers engage in this activity	Taking care of mental wellness and de-stressing healthily seems like something older people do. They would like to de-stress but believe meditation is required only in the future and is not necessary right now as they can enjoy and de-stress through other activities.
Hard barriers to action	N/A	Lack of time to practice meditation	Perception and attitude towards mental wellness

4.3.3 Ethical Considerations

The design of the application considered the ethical implications as stated in the DECIDE Framework. Informed consent and autonomy are some of the major ethical concerns within persuasive technology applications particularly for health and wellness applications [59]. The SoulSync app has an interface that shows terms and conditions as well as states the intention of the app and the intended outcome of persuasion (Refer to Appendix D). This is suggested by Timmer et al. [60] to ensure users are

aware of their decisions. The app refrains from overloading the user with too much information as that might take advantage of their cognitive biases [61].

5 Results

5.1 Peer Evaluation

The results of the survey contained 10 responses. The study had a balanced gender ratio with 50% men and 50% women (Refer to Appendix E.1). Half of the participants belonged to the age range 18-24 while the other half was in the age range of 25-34, indicating that the survey might not be reflective of the perception of older adults (Refer to Appendix E.1). From the results of the attitude towards using meditation apps scale, 60% of the participants reported a generally favorable attitude towards using meditation apps. 100% of the participants believed that mental wellness was important for stress reduction. However, 30% of participants disliked the idea of using meditation apps. Figure 4 illustrates results for the attitude toward using meditation apps. Using the ease of use scale, 100% of the participants found the app easy to use. 90% of the participants believed that learning to use the SoulSync app was easy, the interaction of the SoulSync app was clear and understandable and that information was clearly communicated. Figure 5 shows the results of the ease of use scale for the SoulSync app. Using the perceived usefulness scale, 90% of participants reported that the app can help with the consistent practice of meditation (Refer to Appendix E.2). The perceived persuasiveness of the application was explored using multiple scales (Refer to Appendix E.3). 70 % of participants believed that the SoulSync app would make them meditate more and influence them (refer to Appendix E3.1). 100 % of participants believed that personalized meditation, relaxing sounds, and mood tracking were useful and persuasive while 90 % that the ability to set their own reminders was useful (Refer to Appendix E3.2). This indicates that all the features of the application were perceived to be useful by participants. 70% of users reported that the communication in the application was persuasive (refer to Appendix E3.3). All other visualizations for the survey can be found in Appendix E.

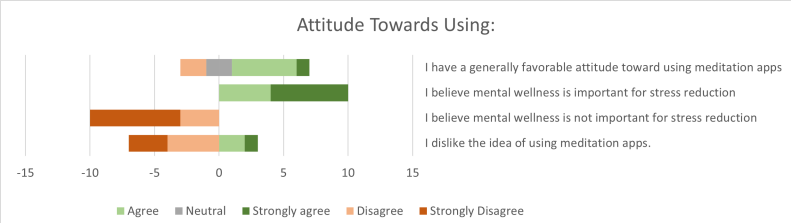


Fig. 4: Results from the survey showcasing the attitude toward using meditation apps

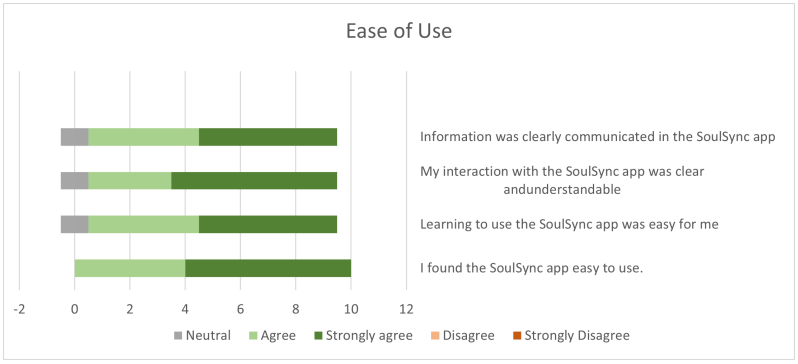


Fig. 5: Results from the survey showcasing the ease of use of the SoulSync app

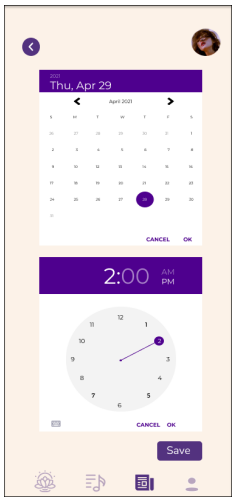
6 Discussion

The design of the SoulSync app indicates that persuasive strategies can be effectively incorporated for creating applications focused on behavioral change using the DECIDE framework. The peer evaluation also indicated that the majority of the features of the application nudged users towards the target action. However, there are some limitations to the work. The peer evaluation sample size was small and did not have older participants. Using a random sampling technique a larger and more representative sample can be collected. Additionally, the process of tracking mood depends on user feedback and a rich text entry. This can be improved by using shorter prompts such as providing keywords to describe their mood and then asking for detailed descriptions. Additionally, the design process of the SoulSync app lacks comprehensive user studies, therefore many assumptions were not validated. Moreover, the user engagement strategy can be improved using other techniques such as the introduction of exciting features involving yoga periodically except for only using limited-time meditation exercises. The SoulSync app could be improved by addressing these limitations and improving the user experience through interactive design elements. The application incorporates ethical considerations as well as brainstorming user personas and behavior extensively to account for potential pitfalls of the design.

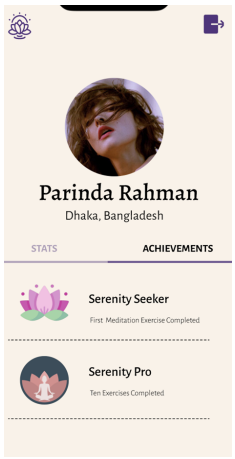
7 Conclusion

In conclusion, using a meditation app with persuasive strategies and a journaling feature is an effective behavioral change application that can reduce the stress of individuals through consistent meditation and relaxation.SoulSync app provides a prototype for such applications. A user-centric approach with effective tracking tools can be incorporated into other wellness applications to change user behavior and promote mental well-being.

Appendix A Dialogue Support: Praise, Reward, and Reminders

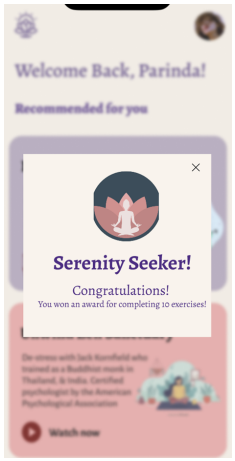


(a) Interface showing the option to customize reminders and notifications



(b) Interface showcasing the badges earned by a user

(c) Use of affirmative language as a form of praise



(d) Interface showcasing the badges earned by a user

Fig. A1: The persuasive strategy: Dialogue Support: Praise, Reward, and Reminders

Appendix B Scarcity

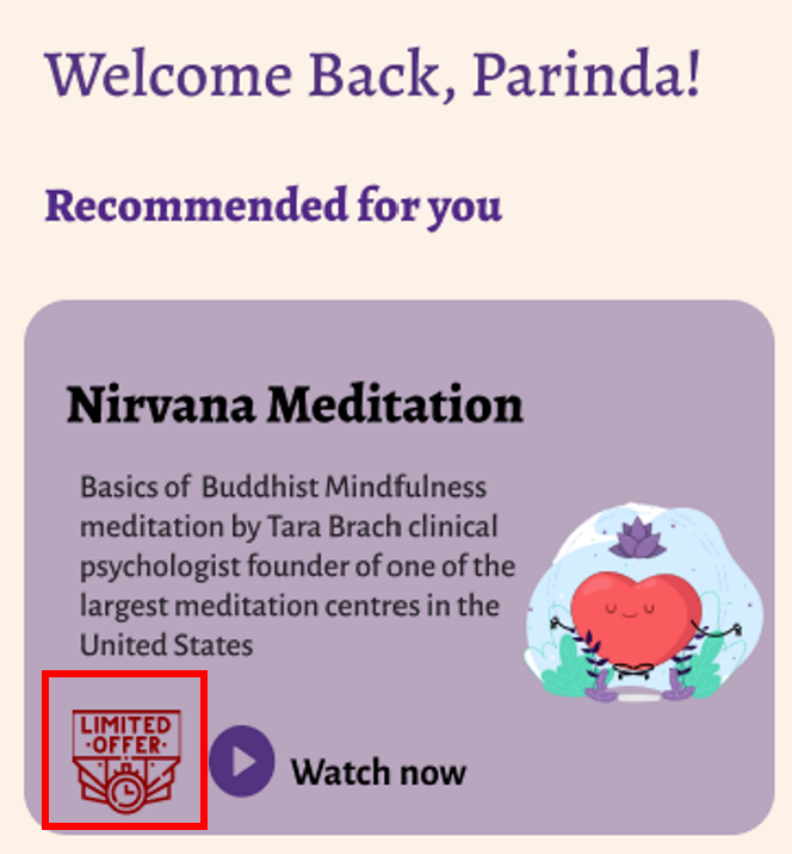


Fig. B2: Persuasive strategy of scarcity being used

Appendix C Reduction

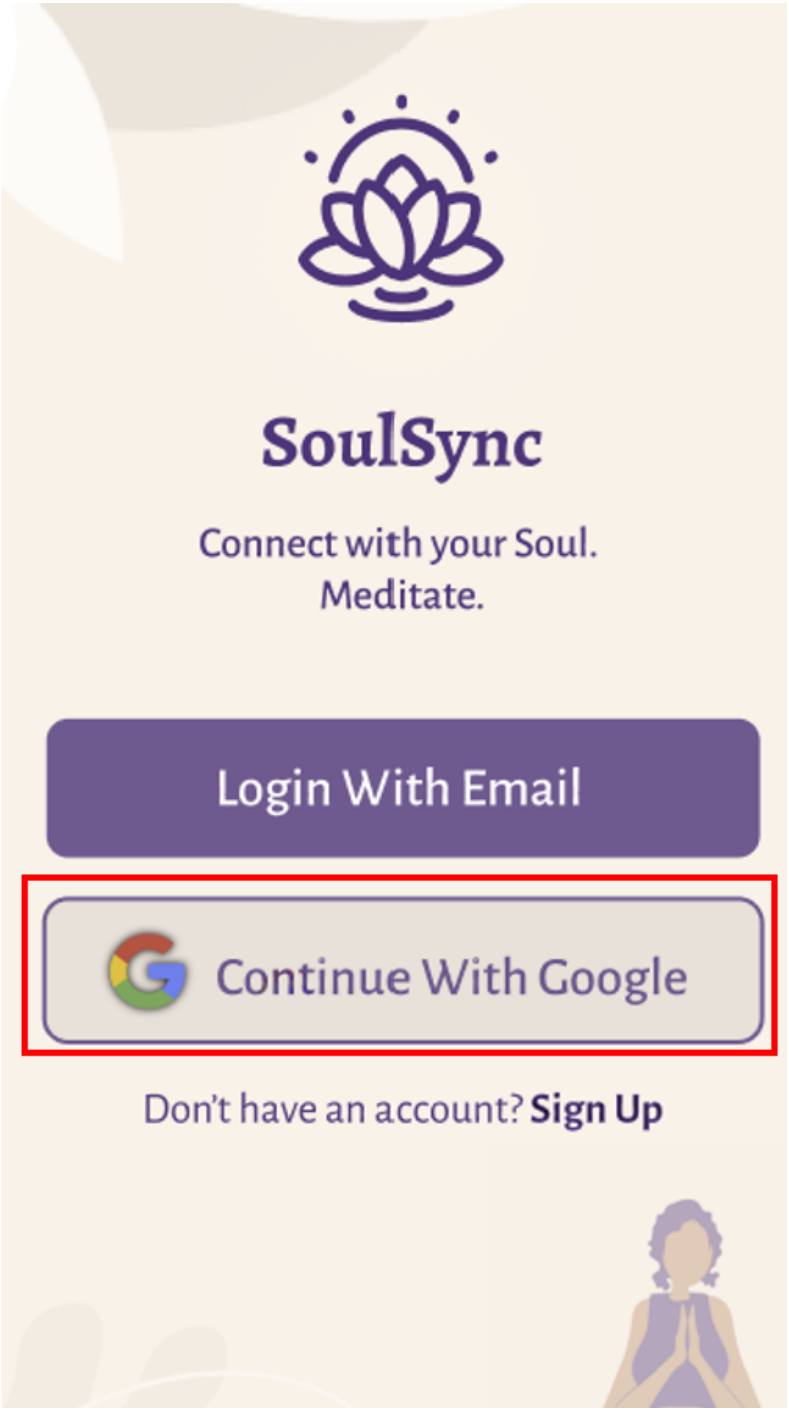


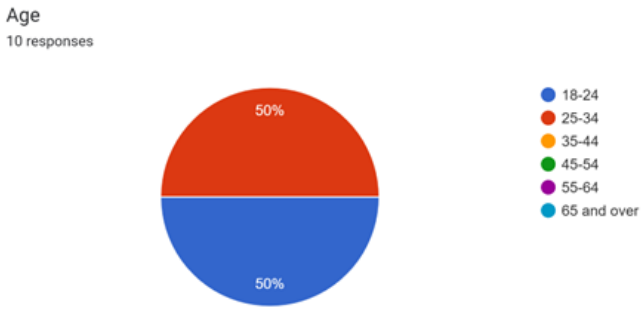
Fig. C3: Persuasive strategy of reduction through the Google sign-in process

Appendix D Ethical Considerations

Fig. D4: Informed consent and communication of the intention of

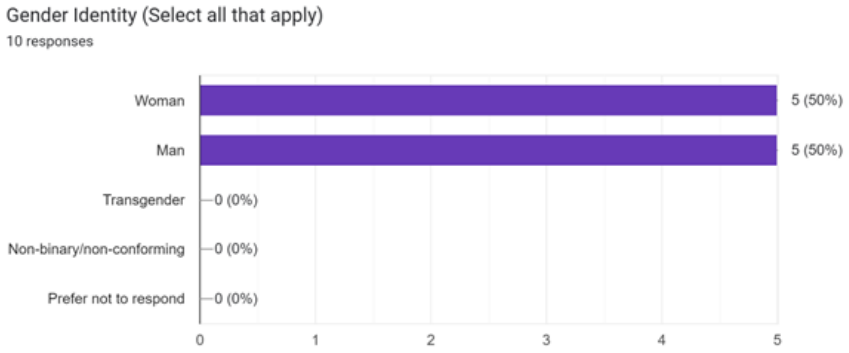
Appendix E Peer evaluation survey results

E.1 Demographic Information



(a) The age of participants of the survey

Fig. E5: Demographic information collected



(a) Gender identity of participants

Fig. E6: Demographic information collected (continued)

E.2 Perceived usefulness

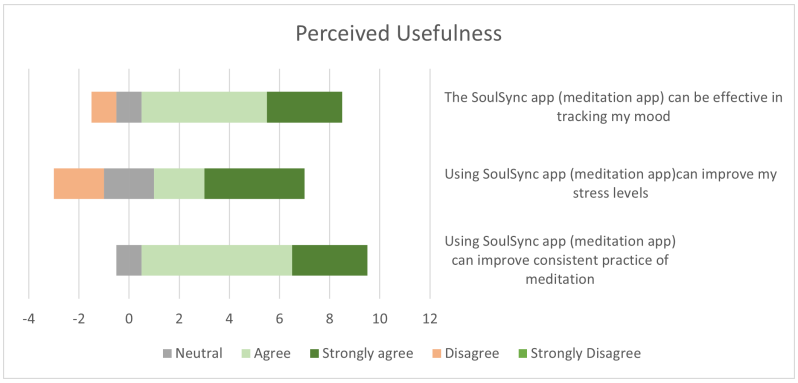


Fig. E7: Results from the survey showcasing the perceived usefulness of the SoulSync app

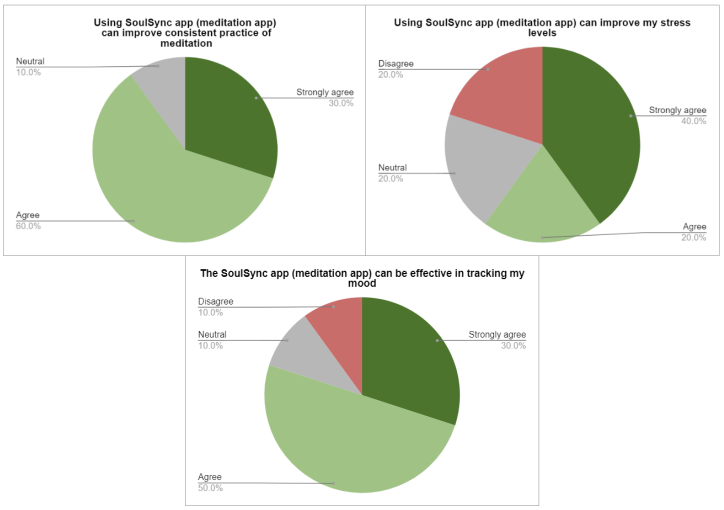


Fig. E8: Pie chart from the survey showcasing the perceived usefulness of the SoulSync app

E.3 Perceived Persuasiveness scale

E.3.1 Scale by Orji et al. [34]

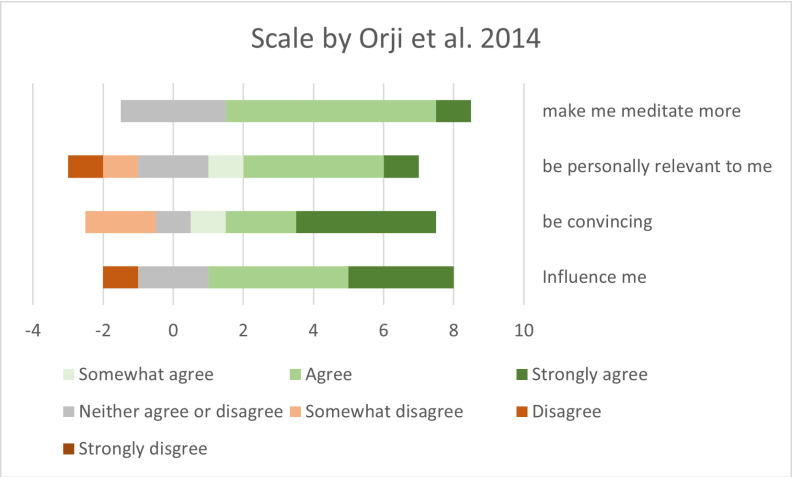


Fig. E9: Results from the survey showcasing the perceived persuasiveness of the SoulSync app according to the Orji et al. scale

E.3.2 Scale by Busch et al. [32]

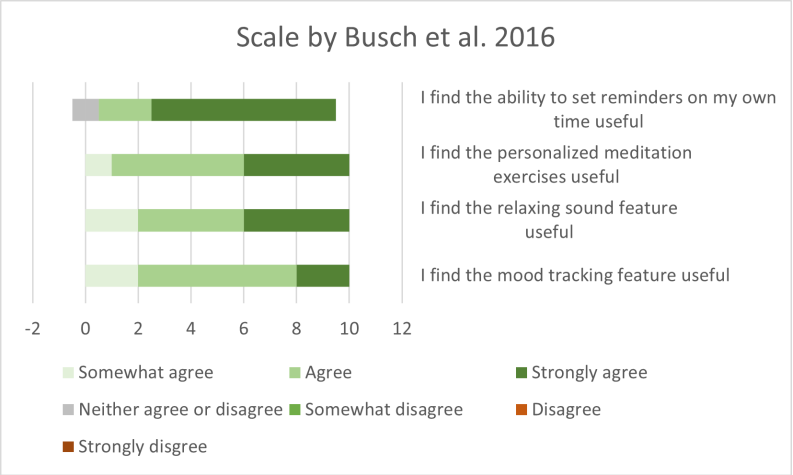


Fig. E10: Results from the survey showcasing the perceived persuasiveness of the SoulSync app according to the Busch et al. scale

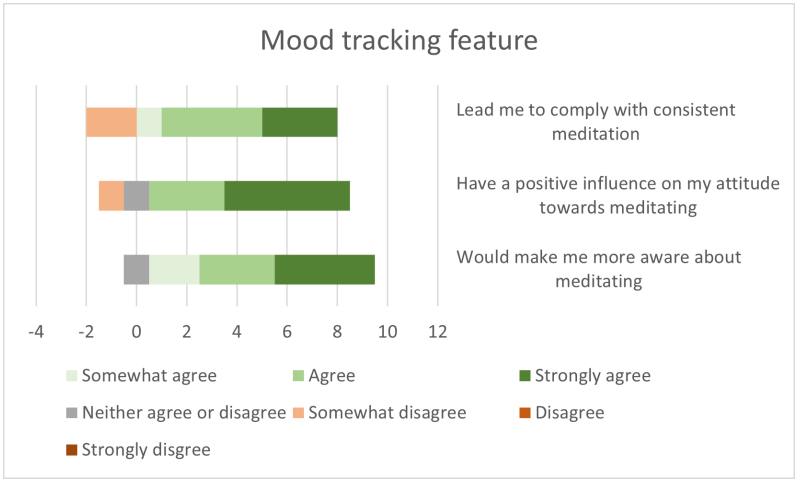


Fig. E11: Results from the sub-scale showcasing the perceived persuasiveness of the mood tracking feature according to the Busch et al. scale

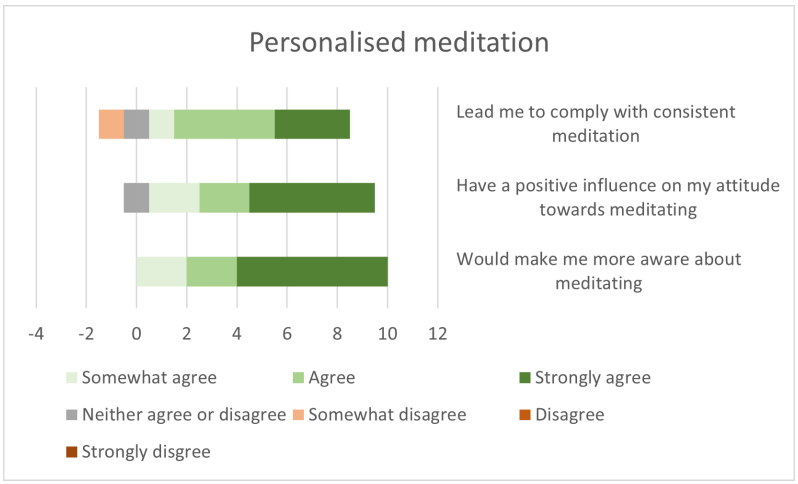


Fig. E12: Results from the sub-scale showcasing the perceived persuasiveness of the personalized meditation feature according to the Busch et al. scale

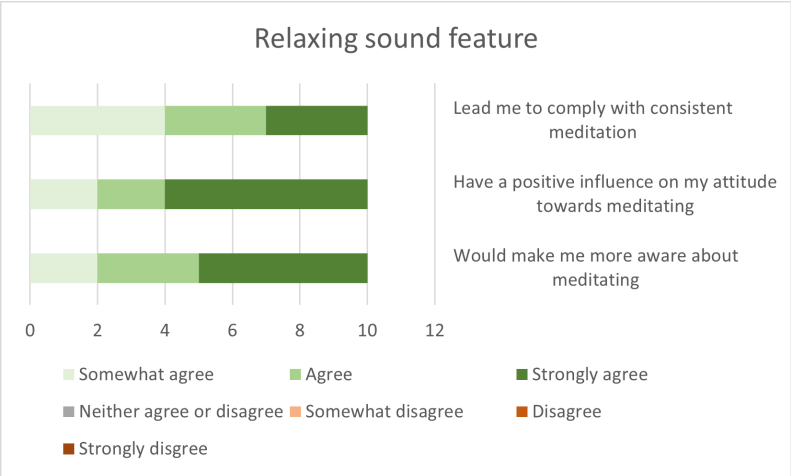


Fig. E13: Results from the sub-scale showcasing the perceived persuasiveness of the relaxing sounds feature according to the Busch et al. scale

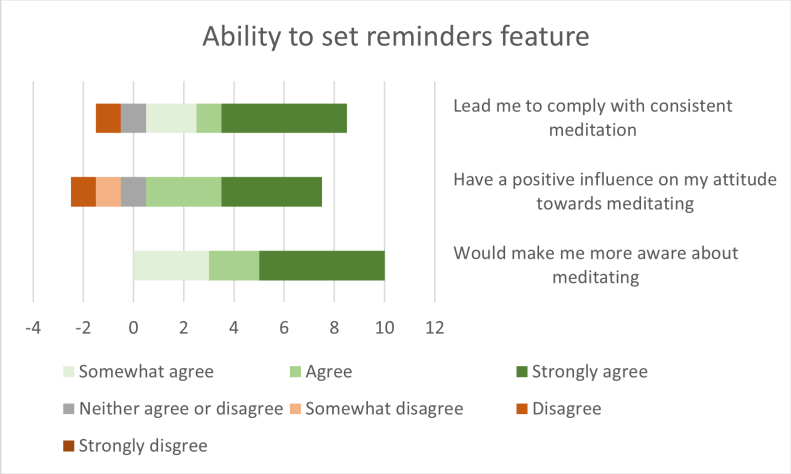


Fig. E14: Results from the sub-scale showcasing the perceived persuasiveness of the ability to set reminders feature according to the Busch et al. scale

E.3.3 Scale by Zhang et al. [33]

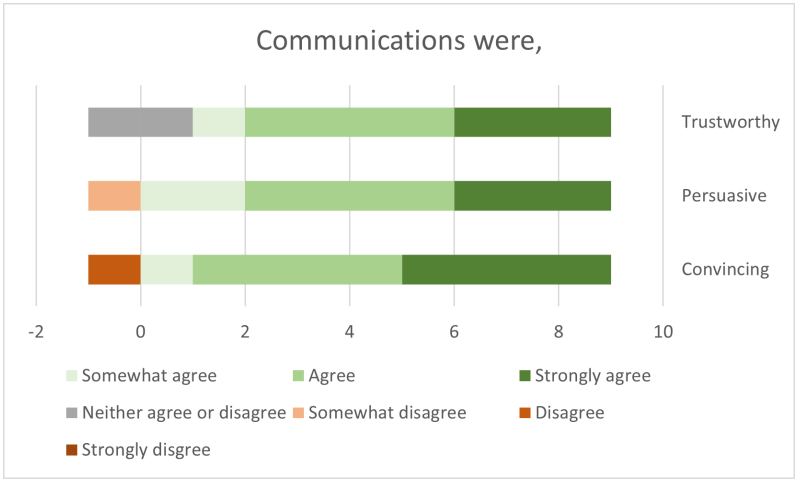


Fig. E15: Results from the perceived persuasiveness scale focusing on communications according to the Zhang et al. scale

Appendix F Link to Figma prototype and Google forms

Figma Prototype: Link

Survey Link: Link

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