HEALTH APPLICATION FOR UNPAID CAREGIVERS

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Abstract

This project designed and developed a prototype of Carezone, a mobile application that helps caregivers to identify their care burden by using the structured questionnaire format mood diary, and using the virtual self-representative, virtual plant, to visualize the mood test results. The virtual plant will provide the suggested mood improvement activities according to their mood diary results that need caregivers to complete. By establishing a gamification technique to motivate caregivers to proactively participate in the mood diary and mental health improvement activities, potentially leading to the better mental wellbeing and physical health of caregivers.

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Project Background & Description

1.1 Project Background

The number of people who are suffering from chronic disease or disabilities is soaring worldwide. (Sherifali, et al., 2018) According to the research carried out by Carers Weeks and YouGov, it was estimated that in 2020 there were 13.6 million unpaid carers in England, Scotland and Wales., which the number of unpaid carers was more than twice times than that 2011 Census found. (Carers Week, 2020) Therefore, the caregivers, which play important roles in supporting the people who need day-to-day assistance, are highly demanding at present and in the years to come.

Unpaid carers provide non-medical care to people who suffer long-term diseases, age-associated issues, or disabilities (Kong, et al., 2021). Any family member, close friend, relatives or neighborhood can take on the responsibility of providing informal and unpaid care to the patient. The type of help and workload given by unpaid caregivers vary noticeably, which sometimes could be complex and exhausting and associated with the need of care recipient. It can be ranged from housekeeping, assisting walking, bathing, taking care of the diet, medication management, taking charge of transportation to even financial supporting (Kong, et al., 2021). Unpaid carers bring a bundle of benefits to society, according to the research result, unpaid care brings £132 billion a year value, which is equal to a second NHS (Carers Week, 2020). However, due to the complexity of caregiving tasks, unpaid carers present high levels of emotional stress, consequent financial strain, depressive symptoms, and poor physical health. Also, the Shriver Report states that caregivers have a higher chance of suffering depression, increasing stress levels, chronic anxiety, insomnia, exhaustion, immune system deficiencies, and many other diseases than those non-caregivers. (Home Care Assistance, n.d.). Evidence has accumulated that the death rate of caregivers who are suffering from anxiety is 63% greater than non-caregivers of the same age (Schulz & Beach, 1999). What's more, the unstable and detrimental emotions of caregivers can affect the quality of delivering the care service to the patient. Hence, the mental health and the life quality of the caregiver has raised the global concern (Bruno Kajiyama, et al., 2013). It is very essential to recognize and measure the carers' burden at the early stage as plenty of caregivers are unaware of their unhealthy mental state and suffering from huge stress. There already exist many interventions to support the unpaid carers' well-being, which had been evaluated and have the potential to improve the caregivers' health and quality of life. According to the studies, mostly, the support interventions offered in the form of face to face. However, Digital technologies bring the opportunity to support unpaid carers' wellbeing. Evidence has shown that there are 80% of internet users seek health and medical information on the internet. The Internet seems to become a popular tool that can provide health information and share it with each other. Furthermore, studies indicated that approximately 26% of caregivers also seek support and help information using the internet. Unpaid caregivers that provide care service within a year are the most likely group who seek health information online (Fox & Duggan, 2013). Internet is highly used by people and also as a valuable tool for people to gain health-related information makes it possible for web-based or mobile-based technology to play an essential role in alleviating the caregiver burden, emotional distress and improving their health condition. eHealth offers hope in delivering more efficient and more accessible help to unpaid carers. Especially, during the Covid-19 pandemic, the unpaid caregivers can easily get access to these resources from home or a long-distant workspace. Currently, most of the ICT-based technology (information and communication technology-based technology) is more focused on assisting the caregivers to take better care of the person with chronic disease to reduce their care burden but less in just focus on the caregivers themselves directly (Ploeg, et al., 2017) . We can aware that measuring

carer burden and easing their stress also appears to be understudied and overlook. Many caregivers do not realize that their negativity is related to caregiving or that they don't know if they're under stress. There still needs a lot of effort to spend on designing a better and well-rounded caregiver-centered ICT-technology based system in health and wellbeing systems (Chen, Ngo, & Park, 2013).

1.2 Project Description

In this project, I will design and develop a prototype of an interactive mobile-based application for informal caregivers to help themselves identify their stress and burden levels, meanwhile mitigate their psychological stress.

The study found that the participants' emotional states may influence the extent of information they would like to provide for self-reflection (Fuentes, Hernandez, Escobedo, Herskovic, & Tentori, 2014). Creating a comfortable situation and using a more effective way for them to self-assess and recording their mental status is a better way for them to proactively participate in self-reporting a mood diary. Studies conducted by Ahtinen et al. found that a majority of their participants preferred a more structured and guided way to record their mood diary using pre-defined optional answers. To identify the caregivers' burnout level, the tool of measuring the caregivers' burden is critically important. However, most of these kinds of tools are paper-based or questionnaire format. This project aspires to present the self-reported mood monitoring diary in a more interactive and effective way, which is to establish the structured care burden questionnaire through a virtual plant as a self-representative image. The carer will take care of themselves by taking good care of the virtual plant, through completing the meditations and recommended improve mood activities, which is designed based on the gamification techniques.

Therefore, the questions of the Zarit burden interview, which was the first tool that used self-reports (Kudra, Lees, & Morrell-Scott, 2017), will be presented as a conversation between a virtual plant and caregivers. The rating of the answers originally uses the 5-point Likert scale to measure different burden levels (Association, 2011). The caregivers can rate each question with the pre-set option. There will be no need for self-calculation and one can easily observe personal burden level. As they complete the questionnaire, the virtual self-representative plant will show the status of the plant which is exactly the mental health status of caregivers. All the data will be stored in the database in order to show and share the index with their psychologist, therapist or relatives. What's more, the virtual plant can interact with caregivers and keep them a companion. After finishing the questions, the virtual plant will give relative tips and mood improvement activities on how to reduce the stress according to domains to which they got the highest score. By attending these activities, such as meditation, reading mindful articles and so on, the caregivers will be awarded with the water and fertilizer to take care of their plant. By establishing a gamification technique to motivate caregivers to proactively participate in the mood diary and mental health improvement activities, potentially leading to the better mental wellbeing and physical health of caregivers.

The process of design application will follow the user-centered design principle, which will especially emphasize emotional interaction to create an expressive interface. During all the process, I will focus on an understanding of the users(caregivers) and their context in all stages of design and development. Before the development, I will research into the caregivers' current situation, technologies that can support the caregiver mental health and the way to design and improve mental health application that can actually help them. Then I will study the relevant literatures of interface design, do the color schema selection and the content presented. The medium-fidelity prototype will be developed and the interface design will be evaluated using heuristics

evaluation against the Jakob Nielsen's 10 general principles.

Due to the time limitation, the prototype proposed will be evaluated with informal caregivers in the future, which will be established at a platform called Miro, which can support the remote and synchronous sharing of resources. The evaluation with the caregivers in the future should decide whether it will be a better way to present the care burn and stress level assessment; whether it is a way for them more willing to participate in the self-reported emotion assess and whether it can mildly ease their loneness and mental burden; whether adopting the appropriated gamification technique can potentially make caregivers more engage with the mood improvement activities.

Project Aims & Objectives

2.1 Project Aims

This project aims to design and create an initial medium-fidelity prototype of a mobile-based application to help informal unpaid caregivers to identify their burden level at the early stage and mildly alleviate their distress at the same time.

2.2 Project Objective

- Research for the background and literature review
  - I. Carry out the research on the background of informal caregivers' context and current existing technology that have beneficial to caregivers.
  - II. Research into different kinds of tools for measuring the caregivers' burden levels to find the appropriate measurement tool to use.
  - III. Learning and understanding the principle and guidelines that needed to follow during the design of the interface.
  - IV. Research into the tools and techniques for making the user personas, interface wireframe and prototype.
- Design and develop the prototype
  - I. Based on the research result and choose the right tools for modelling and create the persona.
  - II. Developing a use case diagram and having the clear structure of application.
  - III. Develop the interaction dialogues for state and action within the system.
  - IV. Develop the wireframe to simulate the possible situation that occurs in the setting situation.
  - V. Design and develop the expressive interface guideline for the application.
  - VI. Develop a chosen type of initial prototype for the application: medium-fidelity prototype.
- Evaluation and reflection
  - I. Carry out the heuristic evaluation decide whether it will be a better way to present the stress level test; whether it is a way for them more willing to participate in the self-reported emotion assess and whether it can mildly ease their loneness and mental burden.
  - II. Reflect on the results of the interview and find out the limitations in order to make some future improvements.

Literature review

During this section, the I research the project target user group and roughly understand their current situation. Then the I took the study under the main types of mental health intervention currently available to the caregivers. During reviewing the existing literature on the study of the mHealth tool that can help caregivers to reduce emotional stress and improve mental health, some limitations are evidently aware of. This section presents the logical thinking of my research process. Through the literature review, the I hopes to gain some design insights to achieve the project aims.

1. Who are the Caregivers and What Crisis are Caregivers Currently Facing?

The caregivers can be just around us. Any family member, close friend, relatives or neighborhood can take on the responsibility of providing informal and unpaid care to the care recipients. Informal caregivers bridge the gap between the services that the health care system can provide and the types of assistance that care recipients need.

The survey conducted by National Statistics' Opinions and Lifestyle Survey has indicated that the number of women caregivers is larger than man caregivers, whereas, there is no significant difference in the type of caregiving and the time spent. Also, the study has shown the largest proportion of people who were unpaid carers in Great Britain falls in the age group 55 to 64 years (Office for National Statistics, 2021). Several pieces of literature have pointed out the compared with other age groups, older adults tend to be less familiar with technological knowledge and have lower technology literacy (Guan, Bouzida, Oncy-Avila, Moharana, & Riek, 2021).

Hence, usability, accessibility and learnability which are the essential principles in the human-computer interaction accessibility field should be attached importance to the designing of a well-rounded mobile-based application.

Caregivers carry out complex and exhausting caregiving work every day. Hence, Unpaid carers are suffering from high levels of emotional stress, consequent financial strain, depressive symptoms, and poor physical health, leading to higher mortality than those who are non-caregivers.

2. Available Main Types of Support or Intervention for Unpaid Caregivers

According to the study carried out by Lopez-Hartmann, et al., the interventions that are used to support the unpaid carers' wellbeing are classified into three main categories (Lopez-Hartmann, Wens, Verhoeven, & Remmen, 2012).

I. **Respite service**
   The respite service offers an opportunity for carers to take a temporary break during the caregiving service. This kind of intervention has a positive influence on the caregivers' mental and physical health in the meanwhile, also reduces their care burden.

II. **Psychosocial interventions**

   Psychosocial interventions focus on improving the carers' skills of caregiving situation management. This kind of face-to-face intervention is often given in person or as a group. It educates caregivers with coping skills and caregiving information and offers mental support.

III. **Information and Communication Technology Intervention (ICT Intervention)**

   ICT intervention offering caregivers mobile-based or web-based or other ICT-based technology that can support caregivers improve wellbeing and skills to deal

with distress and anxiety. For example, using the internet platform to educate carers at home or remote workplace with stress management or any other techniques to delivering the better care service.

Several pieces of literature have pointed out that there is a significant decrease in burden and stress after caregivers using digital mental health tools, an increase in medical copying skills with care recipients and the ability to maintain healthier emotional self-regulation (Petrovic & Gaggiol, 2020). Also, the ICT-based interventions provide a more accessible, lower budgeted and easier mean to care for the caregivers, which is proved to be as effective as the treatment that can be provided by face-to-face therapies. Hence, in this research, the ICT based technology is chosen as the emphasis of this paper and review the relevant pieces of literature on this topic.

3. Look into the ICT-based Technology

The ICT-based technology aims at improving mental health or using the encouraging measurements to lead to improve mental well-being can be referred to as eHealth and mHealth technology. There are three types of mental health tools that can support caregivers, which is been categorized as mobile-based applications, web-based tools, and other digital mental health tools (Petrovic & Gaggiol, 2020).

I. **Mobile-based Applications**
   The mobile-based applications are targeted at cultivating the coping skills and improving the emotional regulation abilities of the carers to cope with their negative emotion, burnout and intensive stress.
II. **Web-based Tools**
   The overall aims of the web-based mHealth tools are training the copying skills of certain disease and disorder of care recipients and helping them to better perform their caregiving role in this mean to reduce their mental burden and stress. The common forms of delivering assistance are using short educational video episodes to provide the stress reduce mindful training.
III. **Other Digital Mental Health Tools**
   Virtual reality and telephone-delivered intervention are used to benefit both caregivers and care recipients. For instance, using virtual reality technology to train the caregiver with care skills or play some mindful-relax mini-game to relax and reduce the stress of caregivers (Huelat & Pochron, 2020). Also, the combination of monitoring system and voice interaction system intervention to help and assist the distance conversation between carers and care recipient.

According to the finding of the literature reviews on existing interventions that can support the caregivers' mental health, the I decided to adopt the mobile-based intervention. The telephone-based intervention is too costly and unable to operate on a large scale while using the mobile phone as the intermediary to get access to mental health content is not constrained by space or time. Also, using telephone-based intervention may increase the burden of the community support crew. The mobile phone has extremely high ownership and is used by individuals privately. Not only it can be used as a low cost and engaging tool to help carers to improve their mental well-being, but also be an easily accessible tool that can be used in any place at any time (Bakkera & Rickarda, 2018).

Furthermore, there is increasing demand for mental health applications and available through mobile phone platforms over the past few years. Survey results have shown that 76% of respondents are interested in using the free self-monitoring and management mHealth application (Bakker, Kazantzis, Rickwood, & Rickard, 2016).

Besides, according to the funding of Plantrovic and Gaggiol (Petrovic & Gaggiol, 2020), most of the mobile applications mainly focus on helping caregivers to build skills,

whereas web-based mHealth tools contribute to providing training and exercise of the skill, as well as education. Plantrovic and Gaggiol suggested that there is a chance to combine both digital tools to create a mixed menta health tool to deal with caregiver's burden, stress and mental wellbeing. But there may exist a drawback that this kind of mixed technology may be leading to the overwhelm and increased burden of caregivers.

4. The current situation of eHealth or mHealth digital tools in supporting and providing help to the unpaid caregiver.

I. Lack of research on caregiver-centered eHealth and mHealth application

Though the awareness of the digital health tools that can potentially improve the carer's wellbeing has arisen the attention to public and academic research. The study performed by Yunan Chen et.al has pointed out that plenty of the research and design of technology are primarily patient-centric, enabling the caregivers to deliver better care to the care recipients. However, those existed technologies are less focused on helping caregivers to cope with their burden, identify and understand their distress (Chen, Ngo, & Park, 2013).

According to the qualitative and quantitative systematic review conducted by Milica and Andrea (Petrovic & Gaggiol, 2020), they searched with three electronic databases according to certain preset criteria. There were only 16 articles are meet the eligibility criteria after the full-text screening. These studies include the digital mental tools that are applicable to the caregivers' unhealthy mental status, such as carer burden, distress, stress, and coping skills. A vast amount of available mHealth or eHealth tools are aimed at improving caregiving which is be of great benefit to care recipients. As well as exploring the possibility of the measurements that can be taken by caregivers to additional improve the life and care quality of the care recipients but not on the caregivers their own.

This implicates the evident fact that in the current market, there exists a vast lack of digital mHealth technology offering and support the help on caregiver themselves and the caregivers seem to be an overlooked majority.

II. Low engagement in mHealth application

Research data indicated that there are 74% of the user give up using a health application after only ten times of using (Torous, Nicholas, Larsen, Firth, & Christensen, 2018). So the mental health applications are also faced with the same low engagement situation.

According to the potential theories of low engagement proposed by Torous at. el, those applications tend to be not user-friendly, not using the user-centered design manner, having serious privacy issues and using the unknown source of mental health information (Torous, Nicholas, Larsen, Firth, & Christensen, 2018).

Poor usability is a common issue that appears in mental health applications. Poor usability application tends to have bad and messy interface design and layout; people cannot easily efficiently perform the basic function; hard for new users to use and accomplish their goals. Evidence of several long-time studies has shown that more than 50% of participants with major depression had difficulties in entering and accessing their mood data when using four popular mood tracking applications (Sarkar, et al., 2016). Also, according to a national survey conducted by the US, the result has shown the reason most people who have had downloaded the mHealth application stopped using them is enter the data into the application is too time-consuming.

Protect the user personal data is also an essential principle when designing a mHealth application. The investigation of the availability of mHealth or eHealth application privacy policy conducted by Sunyaev et al. illustrated that only 30.5% of the eHealth applications have regulated their privacy policy to the users (Sunyaev, Dehling, Taylor, & Mandl, 2015). A large majority of the users are afraid of sharing their personal health data with digital companies because of privacy leaks for commercial purposes. The data collected by the US company has shown that only 8% of the user are keen to share their personal data with digital technology companies (Torous, Nicholas, Larsen, Firth, & Christensen, 2018).

To sum up, we should arise attention to the need of developing an application that focuses on improving and support the caregiver's health. In the meanwhile, how to develop a high engagement, good usability and highly-trust application is a good question for all of us to think of. Several pieces of literature have pointed out that the mHealth or eHealth application with good usability, aesthetics, high learnability, intuitive interface design and have trustful resources of mental health content can be regarded as a high-quality mHealth application (Torous, Nicholas, Larsen, Firth, & Christensen, 2018). It is important to understand the protocols and guidelines of designing a mHealth mobile application for detecting and reducing caregivers' stress when creating one (Stoyanov S. R., Hides, Tjondronegoro, & Mani, 2015).

Hence, the I decided to research into protocols and design guidelines that can be suitable and appropriately used in the mHealth application.

5. What makes a Good mHealth Application for Caregivers?

According to the review done by Bakker et. al., the author researched into several existing mHealth applications and carried out 16 recommendations (Bakker, Kazantzis, Rickwood, & Rickard, 2016). The recommendations for the future development of the mHealth application are shown as follow:

(1) cognitive behavioral therapy based; (2) address both anxiety and low mood; (3) designed for use by non-clinical populations;(4) automated tailoring; (5) reporting of thoughts, feelings, or behaviors; (6) recommend activities; (7) mental health information; (8) real-time engagement; (9) activities explicitly linked to specific reported mood problems; (10) encourage nontechnology-based activities; (11) gamification and intrinsic motivation to engage; (12) log of past app use; (13) reminders to engage; (14) simple and intuitive interface and interactions; (15) links to crisis support services; (16) experimental trials to establish efficacy.

It pointed out there is a small chance that incorporates all the sixteen recommendations previously mentioned within one single application. These recommendations offer a rough idea or design guideline decision for the developer to develop a mHealth application. It would be more considered to be successful on target at a certain type of foundation.

6. Design Insight

I. Interface design insight

An application with good usability can improve the engagement of the users to a great extent. What is usability? It is defined as the "Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (ISO, 1998) In other words, an application with good usability means the user can perform the desired goal through the application in an easy and effective way. How to make mHealth applications with good usability and what to avoid will be simply put in this section.

In this section, the I will research into human-computer interaction field to gain system and interface design enlightenment.

- Simple and intuitive interface design

  Equipped the mental health applications with an enjoyable and intuitive interface design, as well as a concise and neat interface layout is essential for a good design of the mobile-based intervention. A simple interface reduces user's difficulties to interact with the application and increases engagement to a large extent (Bakker, Kazantzis, Rickwood, & Rickard, 2016).

  Using the simple icon or image pairs with a certain short phase tag can be effective and easily understandable in the interface. For example, using a 'book' next to the word 'menu', using a left arrow icon to represent the word 'go back, which is in accordance with Nielsen's ten heuristic principle (Nielsen, 1994), the "Match Between System and the Real World". Linking the familiar graph with the words can make users more comprehensive. And it also complied with Nielsen's ten heuristic principle (Nielsen, 1994), the "Recognition rather than recall", which directly shows the user which section they are at and does not need to remember what the icon stands for.

  The words used in the application should be concise and direct. It should not only be restricted by the screen size but also need to be within the memory load of the users. According to the research, it is important to reduce the memory load for those who suffer from anxiety and depression because negative mental states can restrict memory function.

- Well-structured navigation

  First, having concise and well-structured navigation is the key to make people know the basic block of your application and using the highlighted color or underline to make people aware of which section they are at. Providing the visual cures is in line with Nielsen's ten heuristic principle (Nielsen, 1994), the "Visibility of System Status", which indicates a good design should keep users informed of the current system status and presents with noticeable feedback. It should be noticed that some of the applications limited the user's freedom to choose the order of the navigation or never present the back or menu button on all pages. It should be considered as a bad design, leading to a higher abandon rate of use. Onboarding section

  The learnability of an application system is the extent to which a user can perform the basic functions or tasks the first time they use the system. Also designing an interface with high learnability can lower the chance of people abandon using it.

- Onboarding Design

  The design of the onboarding section is essential to improve learnability, which can be used to improve user retention and activation (Chapin, n.d.). The onboarding experience is used as an introduction of the application and features to the users who use the application for the first time. It is like a quick walkthrough of basic functions and features of the application, usually presented using short and simple words associated with intuitive images. And walkthrough should be presented using the steps. Sometimes, the onboarding can be presented in the form of a video. One research on developing an application called Oiva, using the video to introduce the purpose of the application to activate them to use it. (Ahtinen, et al., 2013) However, from the point of the I's view, I think video onboarding can be troublesome and low-efficacy, after the users finished the video, they may forget about what has been introduced in the video. But if using the short sentence and

image to guide the users to carry out the task step by step is a more direct and efficient way to enhance their memory and

Besides, using the visualized indicator to inform the users how many steps remain, for instance, using the circle point navigation or progress bar to give the user an intuitive presentation of the remaining steps. What's more, it also keeps users inform of the current status of where they are at. (As mentioned in the previous "Well-structured navigation" part)

- Consistency and Predictable

  Maintain a good interface consistent can contribute to the enhance of usability and learnability of an application. The visual consistency includes the color schema, fonts, navigation layout and icon consistency should be established within the whole application. Using different types of styles for the UI element can confuse users. Also, within an application, if the horizontal navigation bar is used, on the next page the navigation bar should be positioned at the same place. It can establish the familiarity and make it predictable, which is compiled to Nielsen's ten heuristic principle (Nielsen, 1994), the "Consistency and Standards". This kind of consistency and predictable status can make users feel a sense of control.

- Color psychology

  Color can play an important role in interface design, which can affect the user experience and their mental states. When design the button color, red usually have a negative meaning, however, green has a positive meaning. For example, if we using the red color for the "yes" button while using green for "no" button, it can cause the misunderstanding, because the first time come across people's mind is click the green button for the "yes" option. This does not in accordance with Nielsen's ten heuristic principle (Nielsen, 1994), "Error Prevention". On the other hand, color can affect the user's mood and behavior, shown in figure 1. Using the right colors can help your users get into a mindset that makes them take action. Color can increase focus by capturing the customer's attention and stimulating the right mood for the content the application is trying to deliver.

  The color plate choice is associated with application content and purposes. This project is endeavor to develop an application that helps caregivers to detect their negative emotion, help and guide them to reduce the stress. So, the I decides to choose green for the basic tone.

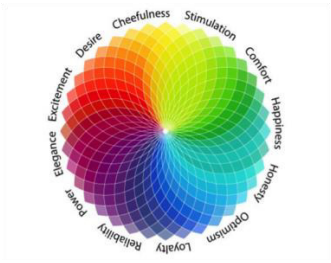


Figure 1. Color Meanings

II. Content design insight

- Cognitive behavioral therapy-based design (CBT-based design)

Cognitive behavioral therapy refers to using a collaborative, personalized psychotherapy approach, considered to be the most supported method for generating common psychological problems with a wide range of behavioral, cognitive, and emotional adaptations (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). Evidence has suggested that using the CBT-based self-administered intervention have proved to be a success in reducing the depress and anxiety (McCrone, et al., 2004).

There are three core principles of CBT, categorized by Mennin et. al (Mennin DS, 2013): 1) Context engagement. Making the users in an invisible persuasive way to engage. For example, using the game-based component to motivate users to engage with the application. 2) Attention change. Making users focus on non-distressing stimuli, such as mindfulness training, meditations. 3) Cognitive change. Changing the users' perspective on things.

- Self-reporting and emotional tracking
  Most of the CBT-based intervention applications are using mood or symptoms tracking to gain self-awareness and coping abilities. Self-monitoring can be a key to boost emotional awareness, which can in a way helping caregivers to improve self-regulation. Poor emotional awareness is the main reason that causes people to feel anxiety and depression. (Bakker, Kazantzis, Rickwood, & Rickard, 2016)

  Self-report can be an ideal and effective way for the caregivers to have a better awareness of their mental status. At the same time, the data collected from the self-report can be a good measurement of what kind of interventions or therapies are suitable for the individual user. The study results of a research of an application with mood charting use to track the mood and symptom showed that mobile tracking mood tools can Increase treatment compliance and self-awareness. What's more, the mood chart can be shared with the therapist or as a recording tool to consult the difficulties with the psychologist (Matthews & Doherty, 2011).

  Though the self-monitoring and self-report mood function implemented in a mobile application can be a good way to improve self-regulation, how to design this function making it more effortless to achieve the self-report can be an important question to pay attention to. The format and interface design of the self-report should contribute to reducing the data entry barriers. According to the survey result on using the dairy function of Oliva's application (Ahtinen, et al., 2013), the participants would like to have a more structured and pre-defined response answers to the questionnaires, because sometimes it is also a burden for them to thinking about what to put. Participants pointed out that making dairy more well-structured making it easier to monitor their emotions ups and downs. Some people with perfectionism or obsession will spend too much unnecessary time on inefficient self-reporting and overwhelming with the open-ended self-report. Especially for caregivers, they are under the big pressure of care burden, it would be an extra burden to them. By giving users a structured questionnaire instead of giving an open-ended log for them to self-report their emotional status, simplifying the process can reduce the barriers to performing better self-monitoring, leading to increased engagement of users. Also, using a simple data visualization of their emotional status would be intuitively aware of emotional changes.

- Appropriated and Potential Used of Gamification Techniques

  When using digital tools to help with mental health, it needs high self-control to keep engage with applications. If the users are low motivated and have low self-control, the self-help mHealth application will not be used at the most of it. Currently, a majority of applications provide the guided mediation but lake of giving the appropriate meditation guidance when the user is under the stress and suffering

from distress. According to the recommendation of Bakker et. al (Bakker, Kazantzis, Rickwood, & Rickard, 2016), gamification can be a novel way to enhance motivation.

Gamification is using the game-based mechanism and components into the non-game context, leading to higher engagement, enhancing the engagement. Using the game components can improve the motivation of users to achieve a goal, such as forming a new habit. For example, in the Smiling Mind application, the application will reward users with badges for achieving mediation exercises (Bakker, Kazantzis, Rickwood, & Rickard, 2016). Also, in the Oiva, when the user completed the exercise, a virtual rose will be rewarded as a result of completing meditations and the graph will be shown up at the interface of the completed exercise. The survey towards the Oiva suggested that there are 60% of the participants were skeptical of the implementation of the gamification. They indicated that collecting badges, rewarding the point will not in accordance with the initial purpose of the mental well-being application or even unappropriated to be in line with the philosophy of mindfulness. The participants suggested that the real achievement should lie in the real achievement in the emotional improvement. Hence, they thought it would be better if the progress of their achievement can be showed or visualized when they accomplished achievements or had the positive change. In the designing of the mHealth application of caregivers, the write will take this point of view serious and come up with an appropriate way to implement the gamification mechanism into the application, which will be detailed explain in the next chapter.

- Caregiver Burden Measurement Tools (Measurement Criteria)

  In the previous section, the I found that most of the mHealth applications are not caregiver-centered and also lack an effective way to using the digital tool to evaluate and self-test their care burden. Hence, instead of a free open-ended diary, the I decided to present the mood diary using a structured questionnaire, which improve the accurate and effective way to help them self-monitoring and self-report their mental state.

  The selection of measurement tools suitable for evaluating the unpaid caregivers' care burden is critical. Hence, I decided to research the currently available carer burden measurement tool. Currently, there are plenty of the carer burden measurements, which have been concluded into three main categories by Aleksandra et. al (Kudra, Lees, & Morrell-Scott, 2017): direct measurement tools, indirect measurement tools and disease-specific measurement tools. Direct measures including the Zarit Burden Interview (ZBI), Caregiver Reaction Assessment (CRA) and Caregiver Distress Scale (CDS) and so on. The indirect measures are usually be used as the supplement of direct measures, which will not be introduced detailly in this section. As for the disease-specific measurement tool, it refers to the measurement tools that specifically design or modified for the caregiver that took care of certain types of patients. Hence, the I decided to focus on the direct measurement tools and compared among them to choose one to implement into the application design. In this paper, the I will compare the ZBI with CRA.

  I. Zarit Burden Interview

  A Zarit burden interview is a measurement tool designed to assess of the carer burden level. It was first developed for the measure caregiver who takes care of the old people with dementia and the disabled, which is a 29-item version (Zarit, 2018). But now have been modified to be a 22-item version with 5-point

Likert scale answers and also, it can be applied to a variety type of caregivers that have been validated. It is the first self-report tool instead of an interview. (Kudra, Lees, & Morrell-Scott, 2017) The overall score can be referred to as the burden index, the higher the overall score is, the higher level of care burden is.

II. Caregiver Reaction Assessment

Caregiver Reaction Assessment is used to assess the caregivers from four negative dimensions and one positive dimension of caregiving (Kudra, Lees, & Morrell-Scott, 2017). Four negative dimensions are health problems, disrupted schedule, financial problems and lack of family support. One positive dimension is the self-esteem of caregivers (Bachner, O'Rourke, & Carmel, 2007). The CRA has a totally of 24 items questions. It is first designed to target caregivers of the elder with dementia and cancer, but now can be applied to larger populations of caregivers. The questionnaire is attached in the appendix.1.

In this paper, the I chooses the Zarit Burden Interview questionnaire and modify it into a structured diary questionnaire of the mHealth application. The reasons will be discussed below:

Several pieces of research suggested that the ZBI can be studied at multiple dimensional subscales. For instance, it can be scaled from a two-domain model, "personal strain" and "role strain", which is proposed by Whitlatch et. al. And Ankir et.al (Ankri, Andrieu, Beaufils, Grand, & Henrard, 2005) proposed a three-domain model, "social consequences", "psychological burden" and "feelings of guilt". There are five domains in the ZBI which are proposed by Mapi Research Trust (Zarit, 2018): (1) "Burden in the relationship" (2) "emotional well-being" (3) "social and family life" (4) "Finances" (5) "Loss of control over one's life."

The two-domain model and three-domain model are not considered to be used in this research. Although they have been well concluded, they were too general to know the current factors that cause the caregiver's burden. Hence, the I decides mainly focus on using the five-domain model proposed by Mapi Research Trust as the evaluation criteria. And each domain including a series of questions, the details can be seen in Figure.2

[Proposed by Mapi Research Trust – Concept mapping]

Domains	Number of Items	Cluster of Items	Item reversion*	Direction of Domains
Burden in the relationship	6	1, 8, 11, 14, 18, 20	No	Higher score = Greater caregiver distress/burden
Emotional well-being	7	2, 4, 5, 9, 10, 21, 22		
Social and family life	4	3, 6, 12, 13		
Finances	1	15		
Loss of control over one's life	4	7, 16, 17, 19		

Item reversion: item follows the opposite direction of the domains

Figure 2 the scaling proposed by Mapi Research Trust (Zarit, 2018)

Both ZBI and CRA can be used to access the care burden of a variety type of caregivers. They also got questions that can be categorized according to the different dimensions. But the quantities of questions in the finance domain of ZBI, which is just one question, are less than those in CRA, which are five questions. Though financial burden also is a stressful situation for the unpaid carer, ZBI's questions can be effective for carers to evaluate the financial domain instead of rating for five more questions on the same meaning but expressed in a different way. Also, the overall questions of ZBI are less than CRA, which can save a lot of time for them to self-report their situation. Besides, there are some reverse-keyed answers in the CRA, which may confuse the carer to evaluate.

Though the Zarit did not give the cut-off score for the ZBI, there are several pieces of literature studied on the cut-off score of identifying the caregivers who potentially need further assessment and intervention (SCHREINER, MORIMOTO, ARAI, & ZARIT, 2006) (Yu, et al., 2019) (Gort, et al., 2007). The Scheriner et al. found out that 24-26 would be the cut-off score. As a result of Yu et al., the cut-off score of identifying depression is 48 which is close to 46 of the study carried out by Gort et al. However, the cut-off scores access by different backgrounds and contexts can vary. And in this project, this application is not design for psychiatric diagnosis or treatment. So, the cut-off score will not be used to diagnosis whether the caregivers have a mental disease.

The ZBI has five different domains of the questions. And each domain has a different number of items, which can be seen in figure.2. The system can analyze the score of each domain and make the comparison between those scores, finally find out a "stressor". To sum up, the overall score of all the domains of Zarit burden interview suggests the stress level index of caregivers and the highest score among these five domains can be used as the indicator of "the factor that makes caregiver feel stress". And then, the application system can give tailored activities and meditations that can enhance and improve the mood. But in this project, this project will design the questionnaires related to emotional wellbeing first. The questionnaire design is shown below.

Emotional and wellness	Question statement
1	You feel that you don't have time because of taking care of your loved one.
2	You feel embarrassed over your love one's behavior
3	You feel angry when you are around your love one
4	you feel strained when you are around your loved one
5	you don't have time you feel your health has suffered because of your involvement with your loved one
6	you feel you could do a better job in caring for your loved one

Table 1. Stress level test question design

Design, Specification, and Implementation

This chapter clarifies the design of the Carezone mobile application, the I decided to use the user-centered design methodology to develop and design the system. In the usability engineering cycle (Mayhew, 1999), the whole application design must base on an understanding of the user's needs and the tasks they would like to achieve within the system. Hence, the I decided to splits the application prototype design into two main steps: 1. System design 2. Interface design.

In the system design, this section presents the following deliverables:

- Three personas of caregivers as the archetype of users.
- Point Of View (POV) statement and "How might we" (MHW) questions to gain the interface design insight
- Application functions description
- Application structure map
- Use case diagram for the CareZone applications
- The design wireframe of the application
- Interface design manifestation

After the system design, the author will manifest the interface design idea and the application prototype will be implemented. The author decided to use the Adobe XD to develop the interactive medium-fidelity prototype. In the implementation section, the author will be delivered a quick walkthrough of the applications and some design descriptions.

I. System design

Before starting to design the system functionality, it is important to understand the user's goals and needs. Having the user analysis and task analysis is critical when doing the system design.

a. User Analysis: User Persona

In this project, the I aimed at designing a caregiver-centred application. In order to have a deep understanding of the caregiver's behavior and needs allows us to define who the product is created for, and what they need and don't need from a caregiver-centric perspective. Hence, the I developed the persona as the archetype of users which are based on the existing literature (The Ontario), secondary research data I collected from the caregiver's forum and the real case persona provided by my supervisor.

The ppersonas of three different types of informal caregivers will be created: 1. An informal caregiver of old people 2. An informal caregiver of children with cancer. 3. A male caregiver of disable old people The personas are based on previous research of caregivers mentioned in the literature review chapter. And the I expands the persona that was created and used in the previous study (Fuentes, Rodríguez, & Herskovic) that involves helping caregivers to improve mental health content.

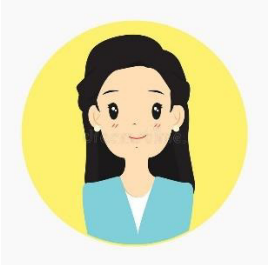
<table>
<tr><th colspan="2">User Persona 1</th></tr>
<tr><td> </td><td>Name: Sherry
Age: 62
Gender: Female
Occupation: retired; now as the informal caregiver for her husband
Hobbies: reading, gardening, cooking, travelling

Quote: ‘taking care of yourself while taking care your loved one. Be aware of my own mental health is also a way to protect my loved one.’</td></tr>
<tr><td>Overall wellbeing:
• Quality of life: medium level
• Physical Health condition: have the pain in both neck and back; blood pressure high.
• Mental health condition: insomnia and feel depress sometimes.
• Stress level: medium level

Technology knowledge

• Digital literacy: low
• Social network: low
• Use of technology:
- Use smartphone for making a call and sending the basic message.
- Unfamiliar with mobile applications and seldom use them.
- Never use the computer.
• Perception of technology:
Sherry thinks mobile technology is wonderful, which can make people do whatever them wants in just a tiny device. She is willing to learn and familiarize herself with mobile applications.</td><td>General description
Sherry is a 62-year-old retired woman who is currently taking care of her husband with chronic disease, John. They lived in a twin near the city centre. John has been diagnosed with dementia and stroke. Sherry took the role of taking care and support of John due to lack of financial support on hiring a paid carer. Sherry assists John with his daily tasks, such as feeding, bathing, toileting, cooking meals for him. It became a burden to sherry as time goes by, she didn’t have time to stick to her own interests and socialize. Sometimes, sherry felt upset but she was unsure about the feeling that she is going through and she felt alone. Also, sherry was always worried about John’s health condition, she keeps waking up at midnight to take care of John. On the other hand, sherry and John live on john’s pension, so the financial burden makes sherry stressful and sometimes had a hard time falling asleep. She put all her effort and attention on John so that she overlooks her own mental and physical health. Though she has regular checks by her GP, she just has the regular test of her physical health but not mentally. She listened to her children’s advice to phone some community psychic hotline. But she found it hard to keep track of her mentally status regularly and didn’t have any records once the telephone conversation is ended. She finds it even harder to keep track of her mental status during the pandemics. She would like to use some smart technology to keep track of her health every day since it is the faster and cheaper way. Also, she needs to balance her life and find a way to alleviate her uncertain feeling of stress. But she had tried the stress management application once, but sometimes the interface outlet and some functions make she feel confused.</td></tr>
<tr><td>Goals:
• She would like to have a smart device to keep track of her mental health.
• Having and finding the balance between caregiving and her life.
• Having some mild meditation and mood improvement activities to reduce her anxiety and stress.
• To use some application with clear clarification of the functions or features and user-friendly interface.</td><td>Needs:
• A reliable and economic way to identify and keep track of her mental health and care burden.
• A simple and user-friendly interface for her to use the functions of the application.
• An easy way to view her mental health states.
• A comfort zone for her to do some remote meditations and some advice to reduce the anxiety.
• Using the application without any barriers or be confused by the interface. Better to have clear guidance on how to use the application.
• To know there is a large group of people who are caregivers as she is.</td></tr>
</table>

Table 2. Persona 1: Sherry

<table>
<tr><th colspan="2">User Persona 2</th></tr>
<tr><td>  </td><td>Name: Alice
Age: 37
Gender: Female
Occupation: part-time tailor; now as the informal caregiver for her child
Hobbies: reading, hiking, travelling, baking

Quote: ‘it is sometimes annoyed me when I don’t know how to deal with my negative emotion. And I don’t want to have extra burden when using the mental health application.’</td></tr>
<tr><td>Overall wellbeing:
• Quality of life: Low
• Physical Health condition: Have chronic neck pain.
• Mental health condition: huge stress and anxiety. Be diagnosed with minor depression.
• Stress level: high level

Technology knowledge

• Digital literacy: medium
• Social network: low
• Use of technology:
- Use smartphone for basic functions and use mobile applications frequently.
- Use the computer just for basic functions.
• Perception of technology:
Alice thinks mobile technology is very convenient. She can order all the tailoring stuff online, and ordering the food and so on. Also, she is open to have mobile applications that can help her with her stress and anxiety.</td><td>General description
Alice is a 37-years-old single mother who is currently taking care of her son with cancer. She worked as a part-time tailor so that she can have more time to take care of her son, Jason. But as Jason ongoing treatment processes, she needs more money to support the treatment, so she even works at the weekend and stays up all night but, in the meantime, Alice has to take care of Jason’s daily life. Hence, Alice has been undergoing huge stress physically and mentally for a long period of time, leading to insomnia and slight depression. She turned to phycologists for help, but she has no time and her financial condition is not allowed to have frequent appointments with phycologists. She needs a tool to record her mental health states and also can identify her stress level from time to time. She tried a few mental health applications before, but she quit after she realizes it cause more problems than that she did not use it. For example, she often spends time thinking of what to write down in the mood diary when she used the mood diary application. And she also found that a lot of applications need to input a lot of data which is troublesome and making her lost interest in using it. She would like to have a tool to can easily record her mood and identify stress levels, and all the data can be stored and share with the therapist when she turns to one. Also, some of the applications recommends or offers some mood improvement activities, but sometimes she found it less motivated to do it from time to time. She would like to have some mood improvement activities that can ease her anxiety and stress when needed.</td></tr>
<tr><td>Goals:
• Keep track of the mental health data and can be shared with the therapists or doctors when needed.
• To have an effective way to input the health-related data and have an intuitive view of her health data.
• To know the current mental health status and stress level.
• To find the resource that can reduce her anxiety and stress when she needed</td><td>Needs:
• An effective and time-saving means to keep track of mental health, which don’t need much effort for her to participate in.
• A tool to record and easy to share the mood diary data to the therapist or any health provider.
• An effective and simple way for her to input any data with minimal time spending.
• Provide an intuitive presentation for her to observe her own mental health condition.</td></tr>
</table>

Table 3. Persona 2: Alice

<table>
<tr><th colspan="2">User Persona 2</th></tr>
<tr><td> </td><td>Name: Lvan
Age: 40
Gender: Male
Occupation: accountant; now as the informal caregiver for his father
Hobbies: walking, joggling

Quote: ‘I have nobody to turn to when I feel down. But I also got a difficult time to tell my feelings to other people. What should I do?’</td></tr>
<tr><td>Overall wellbeing:
Quality of life: medium level
Physical Health condition: fine
Mental health condition: sometimes he is stressful and feels lonely
Stress level: low leve</td><td rowspan="2">General description
Mr Lvan is a 40-years-old accountant who is going to retire. He and his father lived together in a rural area. His father is quite old and disabled, so he needs to take care of his father’s daily life. His wife is passed away and he got only one child who is currently studying abroad. He has no time to let himself have a break. He works day and takes care of his father after work. When he feels down and this emotion comes from nowhere, he had nobody to turn to, because he doesn’t want his father and his son to worry about him. Taking care of his father took up most of his leisure time, he sometimes feels lonely and stressed. He tried to turn to a therapist for a little help, but he is an introverted person, sometimes he found it hard to speak it all out. But he is willing to share his mood using the technology, it can make him feel comfortable since he doesn’t need to talk to a real person. And all his data can be shared with therapists since he is too shy to open his heart. And also using the application that passes the positive energy every day can give him strength. And he is worried about his unknown frustration can somewhat affect how people feel around him, especially his father. Hence, he needs some self-help and mood improvement applications to help with him.</td></tr>
<tr><td>Technology knowledge
Digital literacy: high
Social network: low
Use of technology:
Have a good command of how to operate mobile phone and use all kinds of applications without barrier.
Use computer frequently due to his job.
Perception of technology:
Lvan thinks he would rather “communicate” with a mobile phone than a real person. And he is willing to have a mental health mobile application to help him identify and keep a record of his states.</td></tr>
<tr><td>Goals:
He would like to use the mobile application to know his emotion better and keep track of her mental health.
Having some positive and mood improvement activities to support him with energy in the daily life.</td><td>Needs:
A comfortable way to identify and keep track of his mental health and unclear emotion.
A place where he can receive some positive energy and some mood improvement activities.</td></tr>
</table>

Table 4. User persona 3: Lvan (Fuentes, Rodríguez, & Herskovic, 2016)

b. Task Analysis

- **User Goals and Define Design Problem**

  Getting inspired by the caregiver's persona that I made in the last section, it is important to reframe the design challenges based on the user's needs into a problem statement. I decided to use a Point of View (POV) statement and "How might we" (MHW) questions (Dam & Siang, 2020) to help me decide the system functions design and gain the interface design insight as well.

User goals	Point Of View statement	How might we?
Users need to identify and keep track of mental health and care burdens.	Informal carers need an effective way to identify their stress level because they are suffering from stress without being aware of it, which may do damage to their mental and physical health also can affect the person they are taken care of. And they also want to share their daily or weekly data with the therapist when needed.	How might we help informal carers to keep track of their stress level more effectively?
Users need to find a suitable way for them to reduce and deal with their stress and anxiety.	Informal carers need to find an approach to reduce their stress which is suitable for them and more tailored depending on their situations, because everyone's stress level is different and their treatment or mood improvement activities should be recommended based on their situations, and they can make the choices.	How might we help informal carers to find more suitable and tailoring activities for self-helping and mood improvement activities?
Users need to have an effective and simple way to input any data with minimal time and energy spending.	Informal carers need a simple and user-friendly interface to use the functions of the application without any barriers or be confused by the interface because the caregivers come from different backgrounds and have a different level of digital literacy.	How might we help informal caregivers to use the application without any barriers and being confused by the interface?
Users need some motivation to keep up with the mood improvement activities.	Informal caregivers need to find a way to keep them motivated at taking part in self-helping and mood improvement activities because they sometimes found it hard to keep the habits of taking the mood improvement activities such as meditation regularly.	How might we help to keep caregivers motivated in participating in the self-helping and mood improvement activities, such as meditation?
User need to have a space to make them feel less lonely and being left out.	Informal caregivers need to find a space to keep each other accompany and knowing they are not alone because sometimes caregivers can suffer from loneliness and feel being left out and spending much time on caregiving leading to less social life.	How might we help caregivers to feel less lonely and being supportive?

Table 5. POV statement and HMW statements based on personas

c. System design

- **Functions**

  Based on the personas, POV statements and HMW questions, the basic functions of the application will be introduced in the following section. The specific design of the functions will be presented later in the interface design section.

  There are four main features in the CareZone and design mechanisms are stated in following:

  - **My plant**

    In the My Plant section, using a virtual self-representative plant as a metaphor for the caregiver. The virtual self-representative plant will present the health status of the plant which is exactly the mental health status of caregivers. The color of leaves, the number of flowers and the anthropomorphic image of the plant illustrate the mental health status of caregivers. When the leaves color turned yellow, the flower falling and the face of the plant turns to a sad face, it means the caregivers are under a high level of care burden and stress, vice versa.

    This feature is designed for caregivers to intuitively observe and keep aware of their mental status. Choosing the plant as the metaphor is inspired by research was done by Fuentes et al. (Fuentes, Hernandez, Escobedo, Herskovic, & Tentori, 2014), using the tree metaphor to represent the caregiver's social network status and using the persuasive mobile technologies to change the behavior. This feature is intended to use the plant to directly show the status of caregivers' mental health status and using persuasive technology to make caregivers carry out the recommended mood improvement activities so that can help them to mitigate the stress.

Status Number	1	2	3	4	5
Stress level	low	good	Medium	high	Extremely high
My plant image					
Virtual plant status	-leaves color is green -the flowers are blooming and grows more -the face of the plant is happy face	-leaves color is green -the flowers are blooming -the face of the plant is happy face	-leaves color turn light green -the flowers are withered -the face of the plant is confused face	-leaves color turn brown -the leaves and flowers are withered -the face of the plant is sorrow face	-leaves color turned yellow -the flower falling -the face of the plant turns to a sad face

  - **CareYou**

    In CareYou section offers a structured questionnaire as the way of the actual mood diary. The questionnaires will be established by the conversation between the caregiver's virtual plant and the caregiver. The questionnaire will base on the Zarit burden interview measurement tools, which were previously introduced in chapter 2 and we can see the questionnaire design in appendix

2. But the frequency of this feature will be established by the user setting, which means that the user can choose the frequency of taking this questionnaire. The minimal setting is once a week and the maximum setting is three times a week, which will be set in the onboarding section. Because this questionnaire is used for recording for a period of time, not just a simple greeting, it doesn't need to take every day. And allowing users to be able to choose the frequency of taking this diary will be in line with the user-centred design principle. After finishing the questionnaire, the result will be shown using the virtual plant status. As illustrated in the 'My plant' section.

The mechanism behind this setting is the questions bring up by the virtual plant are categorized by 5 domains and the overall score of all the domains of Zarit burden interview suggests the stress level index of caregivers and the highest score among these five domains can be used as the indicator of "the factor that makes caregiver feel stress". And then, the application system can give tailored activities and meditations that can enhance and improve the mood according to each caregiver actual stress level. And the suggested activities will be listed in the same page of 'My plant' part. And all the other activities that are available will be presented at the 'CareYou' tab for caregivers to explore and browse. And the design will be illustrated specifically in the interface design part.

- **Care4plant**
  In the Care4plant features, the system will recommend the mood improvement activities according to the result of CareYou questionnaires. And the recommendations will be established by the caregiver's virtual plant through the little conversation box. There will be a pre-set path for them to do the mood improvement activities, but as the questionnaire results varied between different caregivers, the path and the activities will change with the change of the stress level score. The mood improvement activities contents are set based on the previous studies (Ahtinen, et al., 2013) that proved to be effective and can improve the caregiver's mental wellbeing. Mood improvement activities in this application will consist of guided meditations, some copying skills related to learning the acceptance of the negative feelings, thoughts and some mindful feedings and music healing. Caregivers can modify the order of doing mood improvement activities. After caregivers finish the suggested mood improvement activities, they will be rewarded with the chance to care for their virtual plant by watering, giving sunshine, shovel soil and having the bee over. After a few times of care, the plant will present a better status, such as the leaves will turn greener and put on a smiling face or even bloom. If the caregivers are currently under less stress, the more activities they complete, the more flowers will their plants bloom.
  This functional design is using the gamification technique. Using the reward mechanism to motivate the caregivers to perform the mood improvement activities. They will be afraid of their plant withering and tend to take the measurement to prevent it from withering by complete the suggested activities that are good for their mental wellbeing.
- **Greenhouse**
  The greenhouse is a community of caregivers and a space for them to support each other. Each caregiver can display their virtual plant in this virtual greenhouse, it is up to caregivers to decide whether to display their plants in the greenhouse. Each user can click on the other's virtual plant, and it will pop up the 'support' button and a sentence to encourage each other if added by the users. Insides, this virtual greenhouse, caregivers can simply just write down a sentence to encourage other caregivers. The design propose of this Greenhouse is to let caregivers know they are not alone, there are a lot of

caregivers out there and they are not being left out. Also, they can support each other by give other the encourage words and give them a like.

- **Application map**

The following diagram are the application map, which illustrates the basic structure of the CareZone.

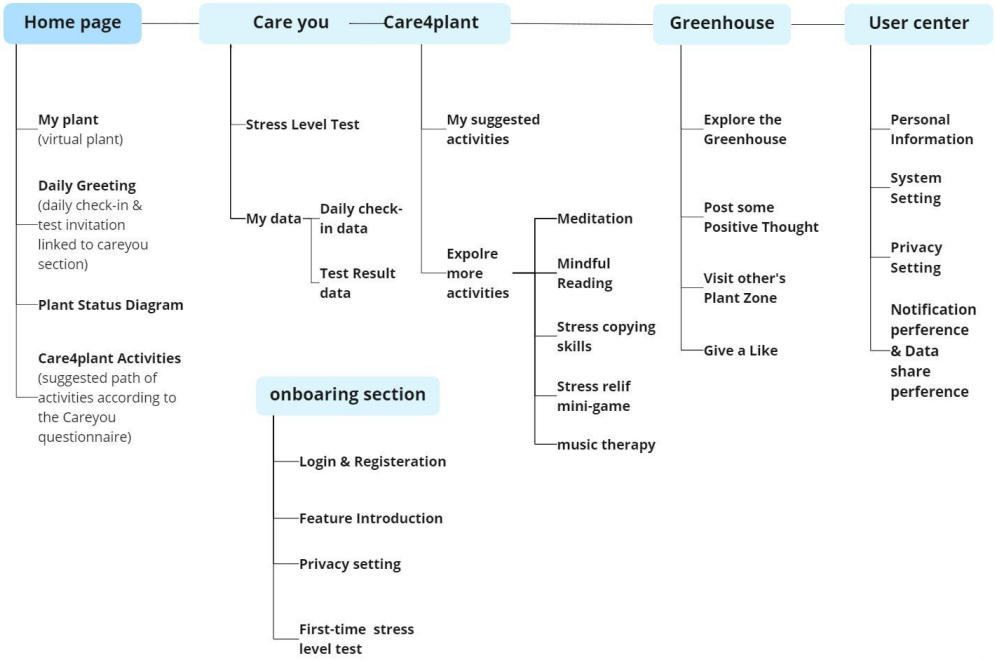


Figure 3. Application map for Carezone

- **Use Case Diagram**
  The following figure is the use case diagram for the CareZone mobile application.

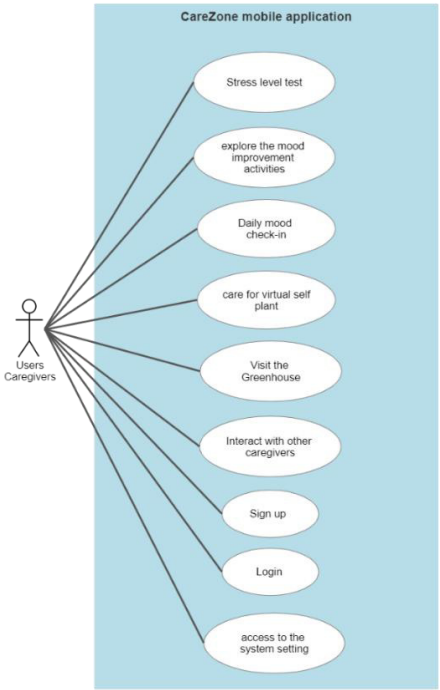


Figure 4. Use Case Diagram for CareZone Application

II. Interface design

- Application wireframe draft

Figure 5. application initial hand-draw wireframe

- Color
  The color palette choosing is based on the color psychology as well as the application content. Green is considered as one of the most comfortable and brings people a feeling of harmony, which can help people emotional steady and stay calm. Using the low-saturated light green and dark green to bring the different background of the content, navigation bar and also the button color. Using the dark green, white and gray for the text and title. To maintain a consistency in visual content, the low-saturated green and soft green are adopted as the main tone of the illustrations.

Figure 6. Color palette for application

- Navigation and process bar
  The parallel navigation is adopted to enable users easily get access to all the functions within the application. The visual style of navigation is simple and maintain the consistency within the whole application. Using the little circle sign to indicated the user where they are currently at.
  The progress bars are used to keep inform of and give feedbacks to the users while they are using the applications. Using the number and color as the visual indicator to suggest which steps the users are currently at, which can be illustrated in the figure 6. Color scheme is consistent with the whole application.

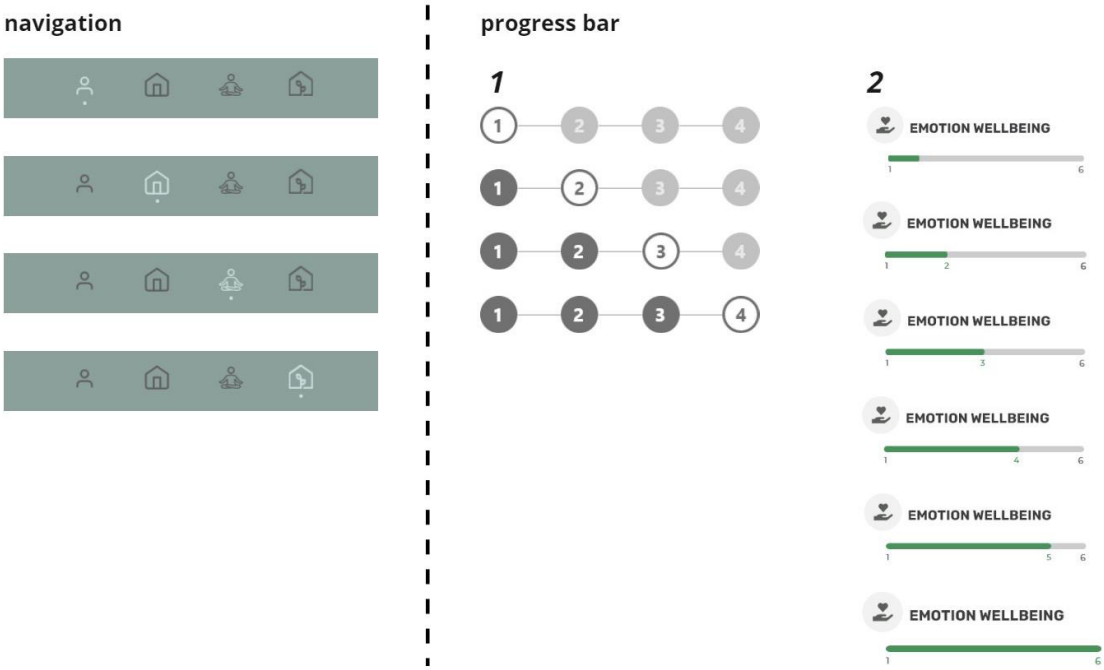


Figure 7. Navigation and Progress bar design

- Button
  Button visual design are using the green color as main tone, which keep the consistency within system. The primary button will always using the dark green color to highlight while secondary key uses the lighter green color, in case of mis-click. The hungover effect of the buttons uses the same color to keep the consistent and standard. The below figure.7 demonstrate the visual design of the button and hungover effect within the application.

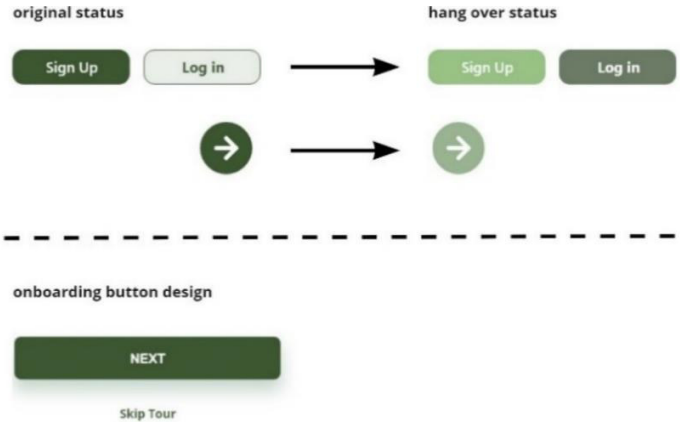


Figure 8. Button Design

III. Quick application interface design walkthrough

- Application login and register page

  The CareZone application boot up with an icon page with the application title and application icon. The users can choose to sign up (fig.8(1)) or login (fig.8(2)) the application by clicking the button and they will be redirect to the page according to their choose. They can easily switch between the login and signup page when they entering the wrong page by mistakes.

  Using the inline hints to give users perceptual intuition to know what they need to do before every they enter the details. Also, offering the fast and easily sign in and login methods by using the Facebook, google account or twitter.

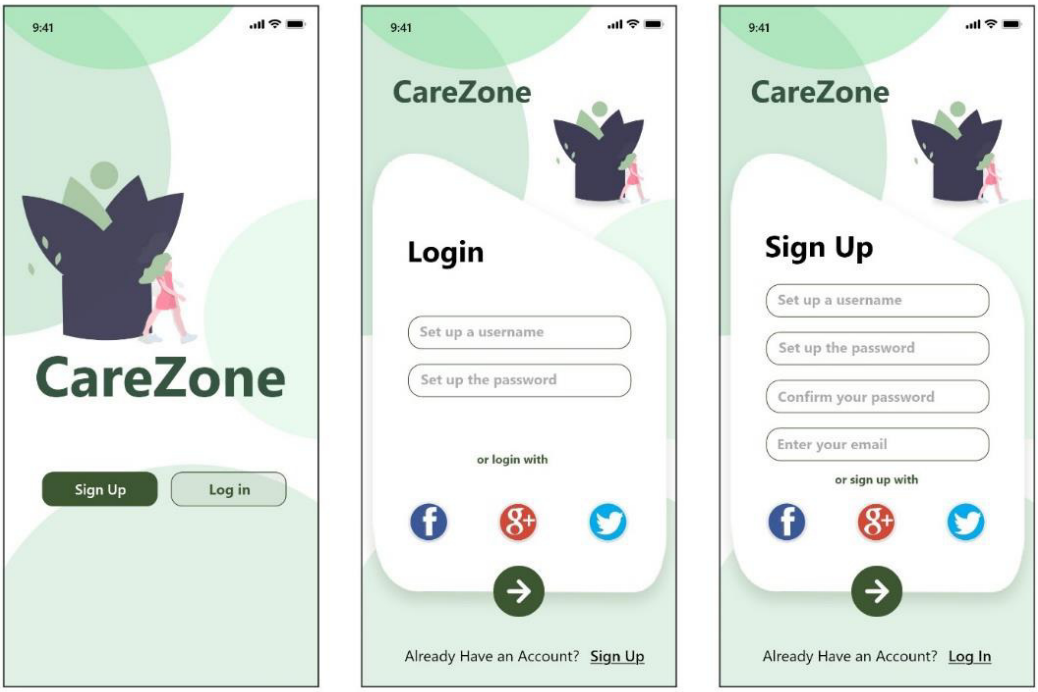


Figure 9. Application icon page (1), Login page and sign-up page (2)

- Onboarding section

The onboarding sections are designed for first-time users, using the four-step splash screen to illustrate the main features and functions of the application. Combination of image and words instructions to give the users a rough introduction to help and guide them before they explore the application(fig.9). By using the little circle as the progress indicator to let users aware that the section structure and how many steps they should complete, which can effectively prevent users abandon the completing process before using the application. During the whole process, users have the right to skip the onboarding feature introduction at any time by clicking the 'Skip Tour' button.

Besides, for the first-time users, they will need to do some basic settings before they start using the application, which the step-by-step guidance of basic setting is adopted to make the process more effective(fig.9). Starting from creating an account to setting up some basic preferences in the preset flow. Using the process tracking design to keep users inform of where they are at. Those steps completed by the users will be shown in the dark gray to indicate the accomplishment. And the lighter gray color indicator means that the steps have not been done yet. Once complete the basic setting, the virtual plant will guide user into the first-time stress level test. Before that, the illustration conversation will be established by the virtual plant.

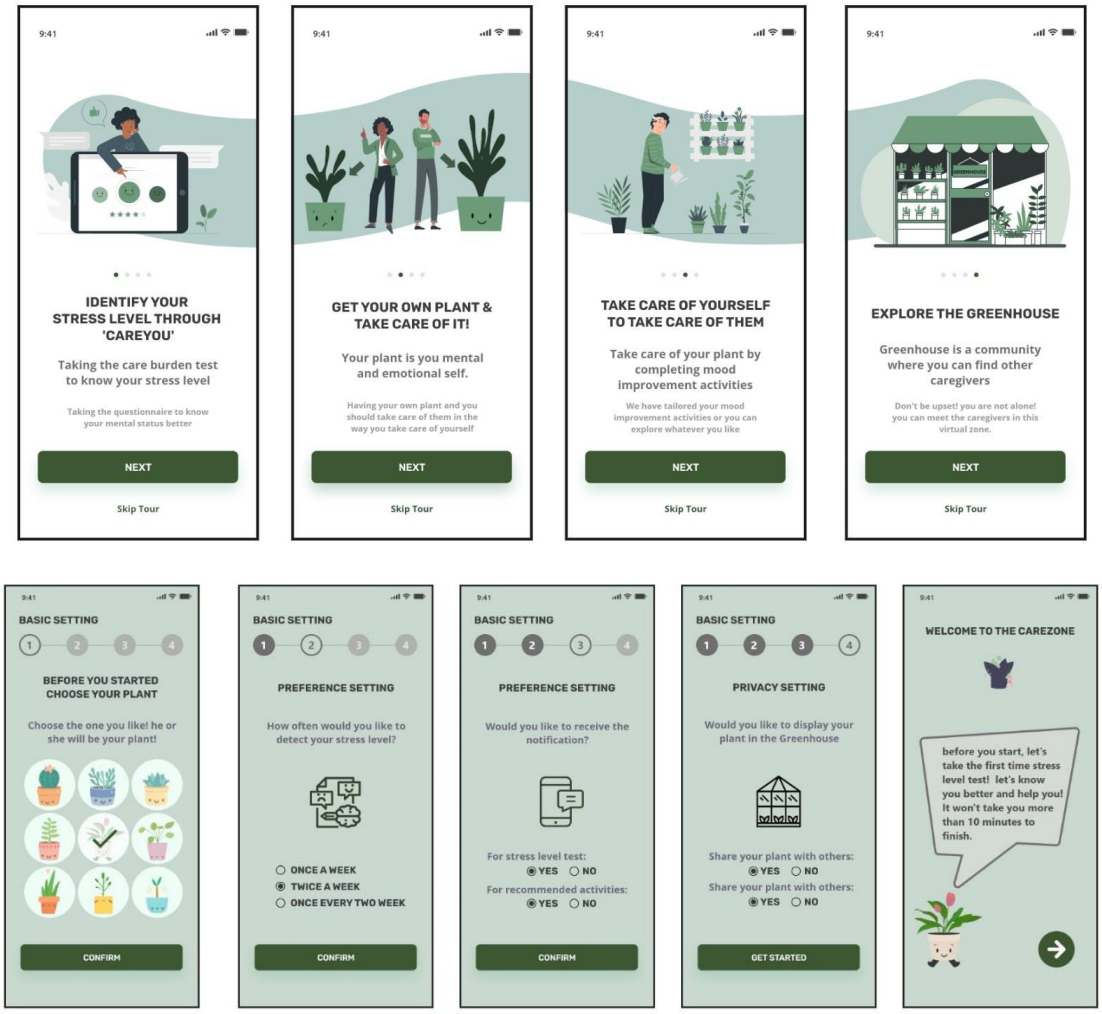


Figure 10. Onboarding section design

- Stress level test
  When users finish the basic preference settings, they will enter the first-time stress level test. There will be the process tracking bar to inform the users how many questions they need to answers, how many questions they have already finished and how many questions they haven't finished. There will be the audio icon which the elder with poor eyesight can press it and hear the pre-recorded audio. After users complete the test, the virtual plant will establish a conversation to inform the users of the welcome message, by clicking the button, the users can enter to the 'my plant' page.

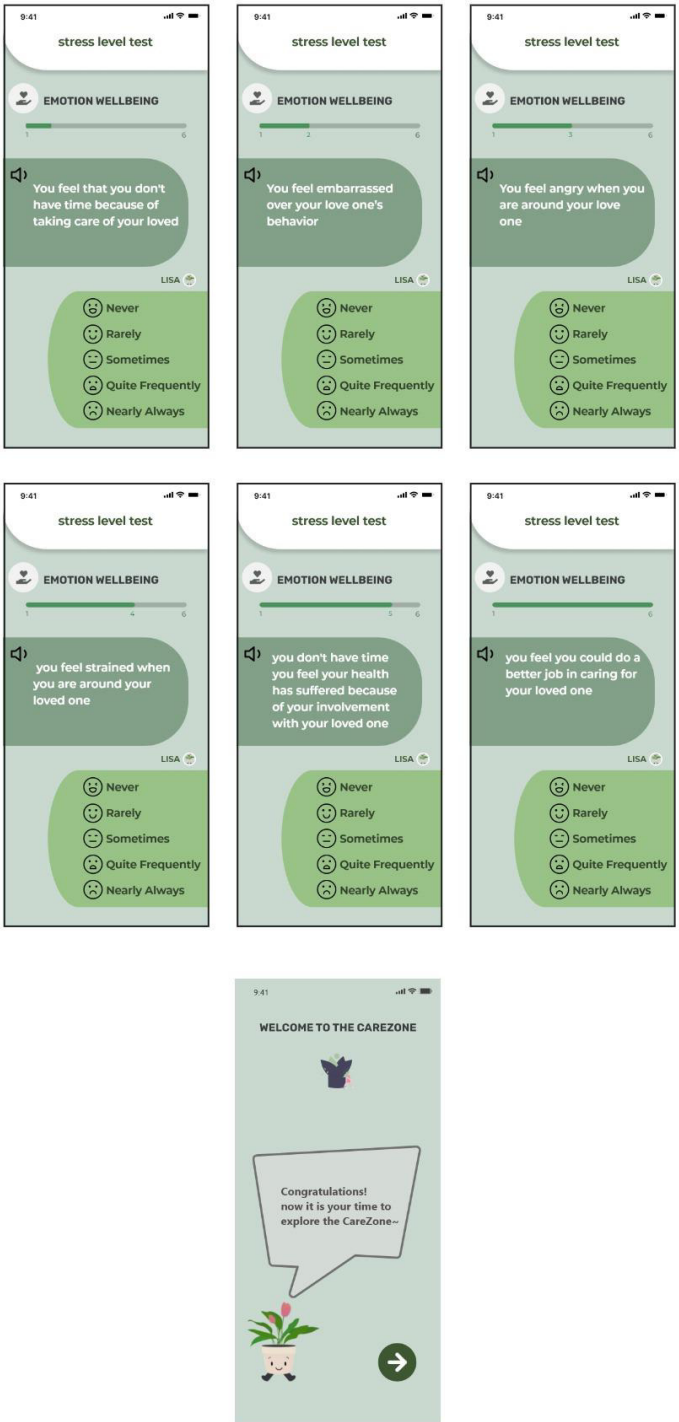


Figure 11. Stress level test interface

- My plant
  The main page of the CareZone application will have several components: the daily greeting with user name, my plant interaction zone, daily check-in section, stress level test quick entry, and suggested path of activities. Once the users enter the application main page, there will be a daily personal greeting. The plant Carezone will have your own plant which metaphors your current mental status. The virtual plant will establish the conversation and give some instruction to the users. Users can click on the conversation box and the application will directly redirect to the recommended activities that are tailored for each user depending on their own situation after the stress level test (fig.11).
  In the plant care zone, there will be four types of props, which will be activated after accomplishing the recommended activities.
  In the 'recommended path for you' section, the activities will be presented as a diagram flowchart with the title, time and the status (To do or Well done!). All the design maintains the same visual style.

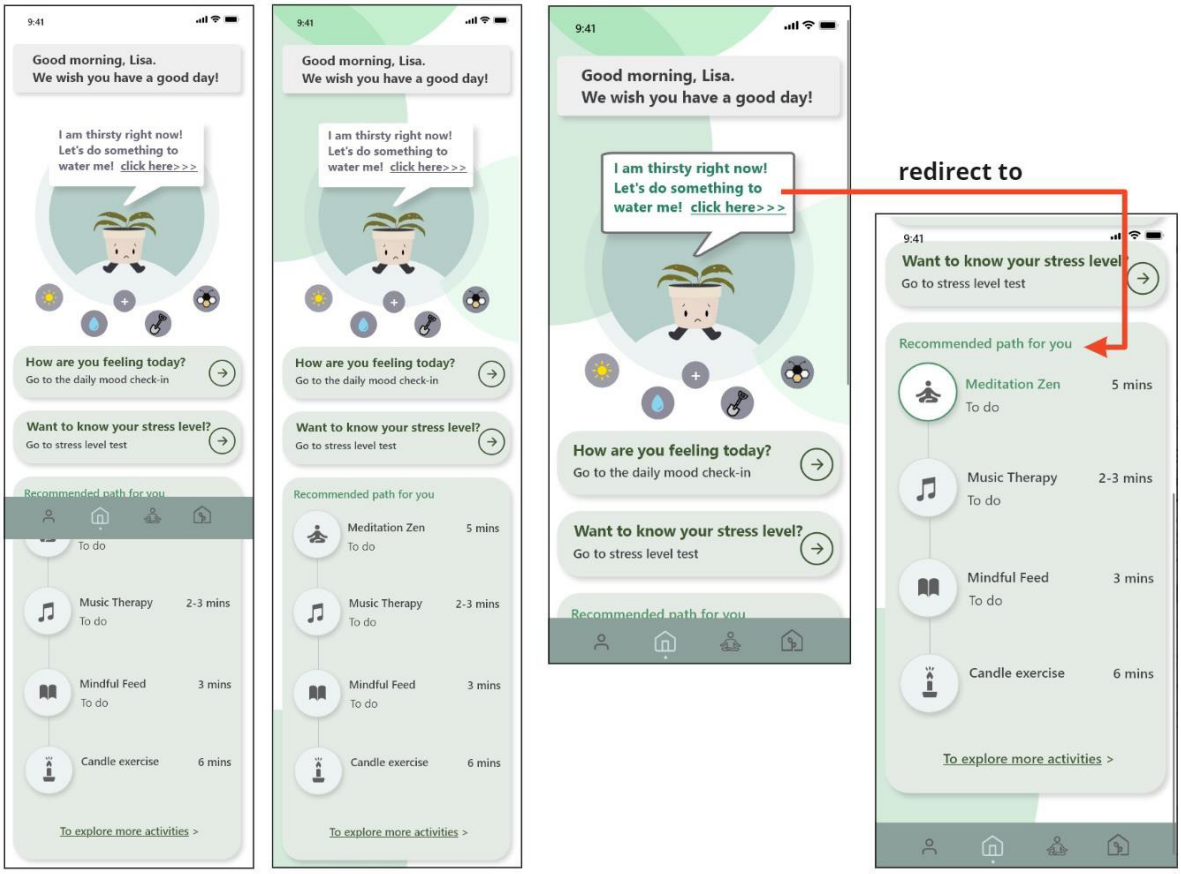


Figure 12. Main page of CareZone

- Perform and accomplish the recommended activities

  When the user clicks on the activity's icon or title (fig.12(1)), the user will be redirected to the specific activities item page(fig.12(2)). After the user finishes the activities, there will be a pop-up window to inform the user of what kind of reward they gained and they have the right to choose whether to use the reward right now or later(fig.12(3)). Then users can be aware of the props bar shows up with a little green point which means that the button is now clickable(fig.12(4)), in other words, the prop is activated now. Also, in the activities progress bar, the status change from 'To do' to 'Welldone!', as well as the icon color became dark(fig.12(5)). This design gives the user visual feedback after each action.

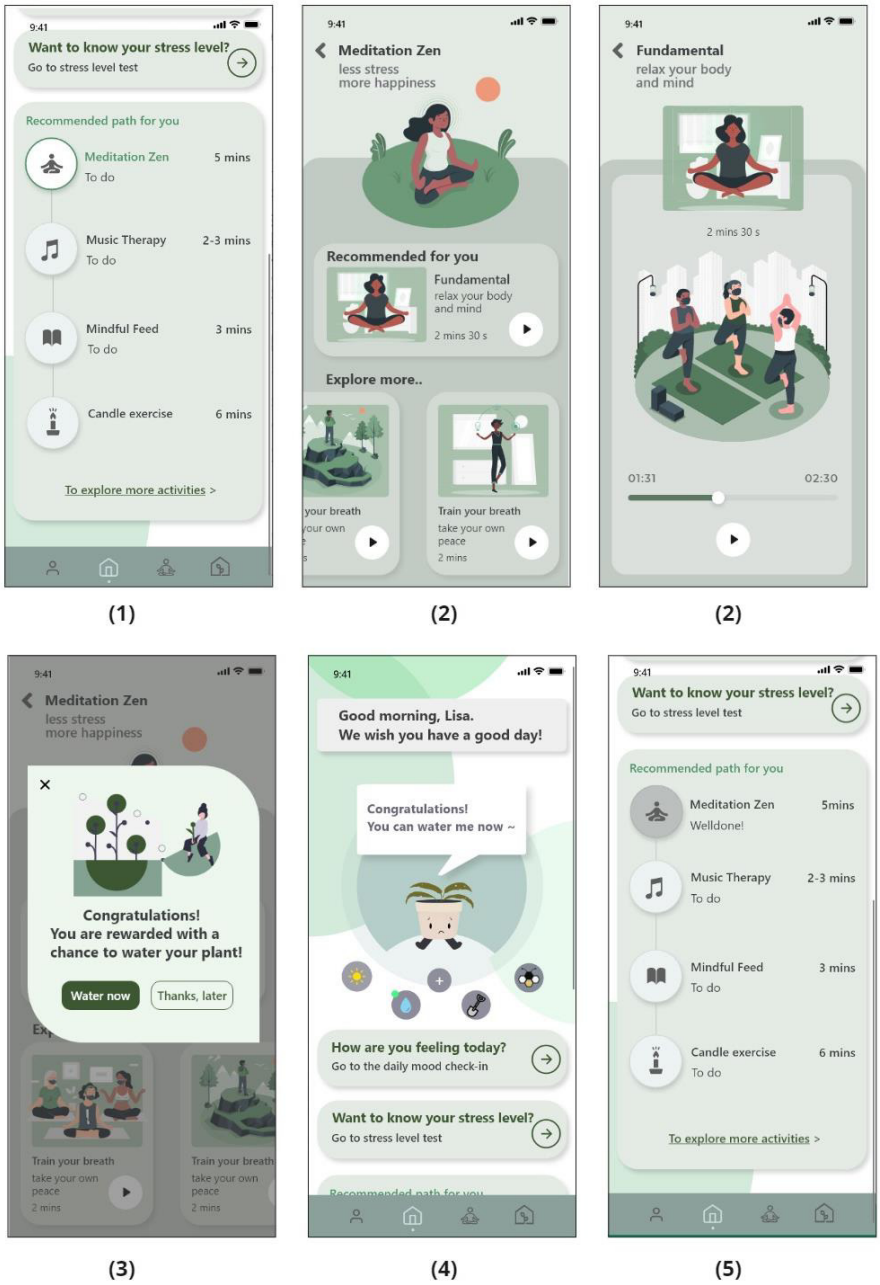


Figure 13. Perform and accomplish activities page

- Care plant in the meanwhile care yourself
  As the activities been accomplished one by one, the plant will become better. All the suggestions are established by the conversation box of the virtual plant. All the characters are using the dark color, bold and big size to ensure the elder to see clearly. And the props bar buttons are designed in the round shape and the size is suitable for finger to click on.

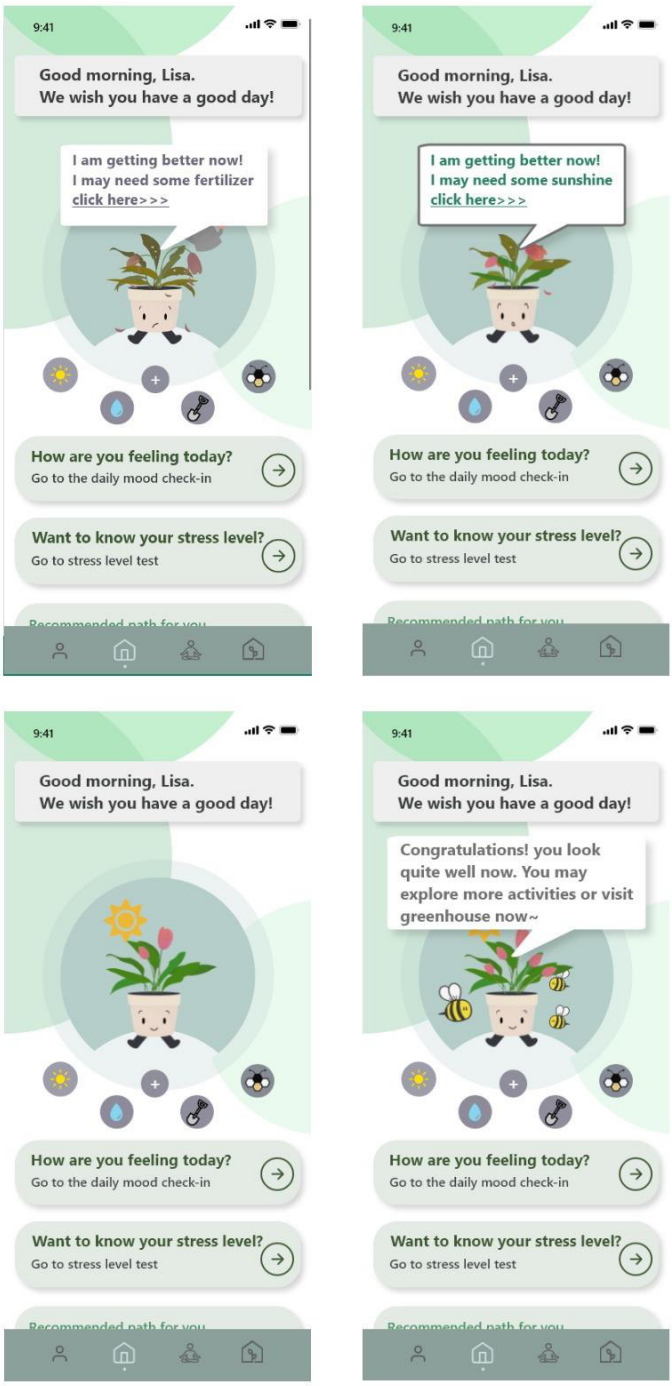


Figure 14. Plant change diagram

- Care center and activities detail page

  In the care center, all the activities types will be listed out and users can choose whatever they like. There is a daily check-in section where users can self-report, they own objective feelings. Each page has the return button which makes the user more easily quit when they accidentally enter the page. Green is the basic tone in this section because the green color can give the user a sense of comfort and peace which can be of great benefit when they are doing emotion-related activities.

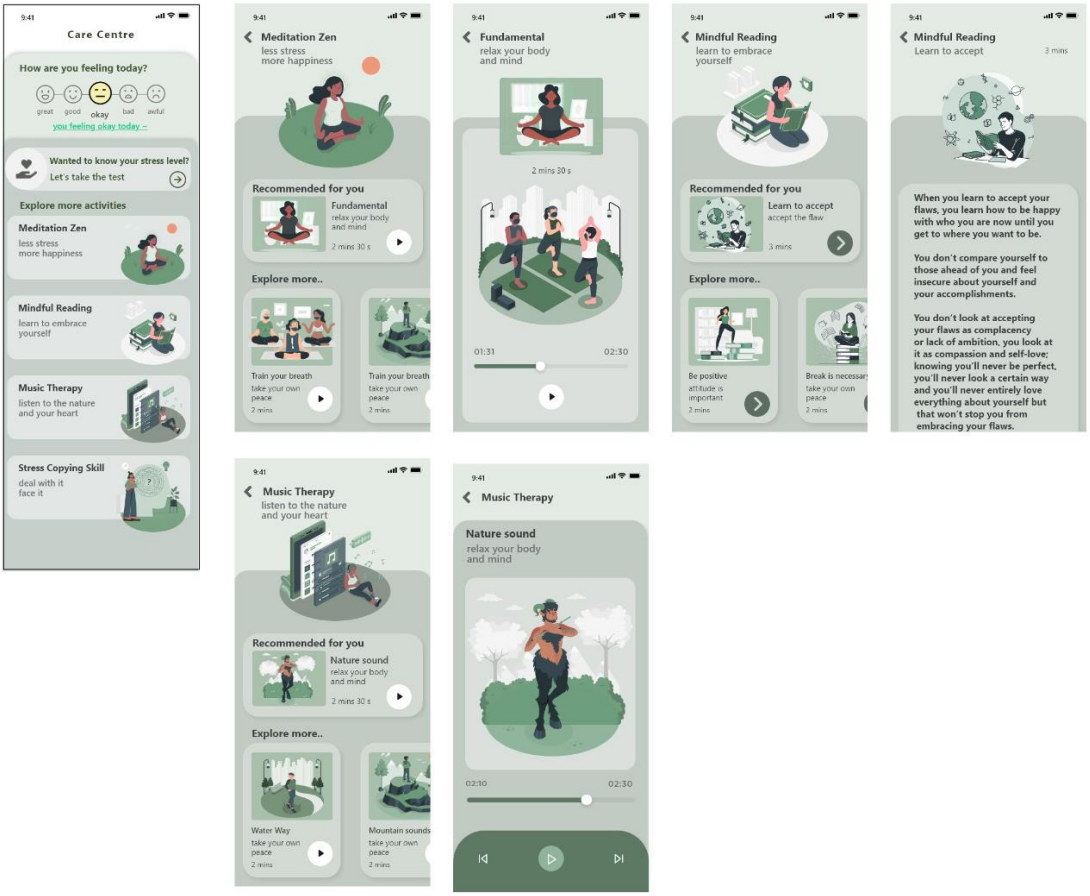


Figure 15. Care center and activities detail page

- Greenhouse

When users entering the greenhouse, they can swap the screen left to right or right to left to browse more caregivers out there. When they slide through each plant, there will be a black outline to highlight the chosen one. At the bottom of the greenhouse is the text input box where caregivers can establish some positive words to others and the content will be also put in the personal zone page. Using the inline hints to give users perceptual intuition before every they enter the details, which save the space for extra explanations and make the screen looks more concise. By clicking on the virtual plant icon, user can enter other's zone to have a visit. The positive sentence posted by users will be listed out in time order and others can give a like on each post.

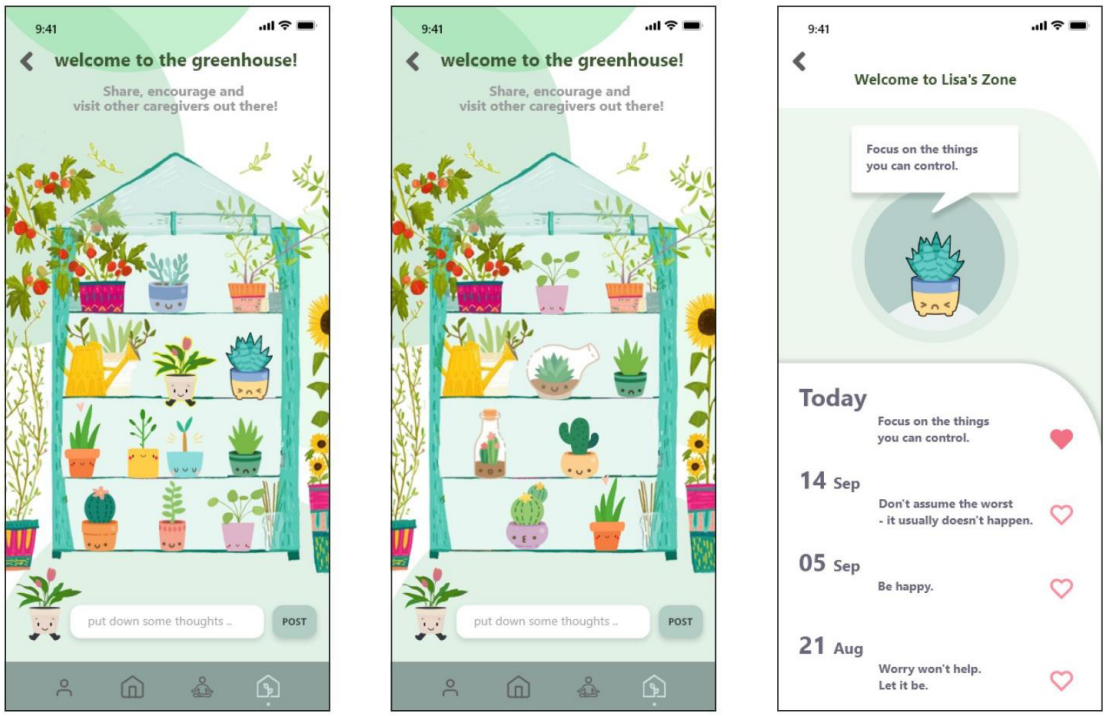


Figure 16. Greenhouse community and personal zone page

- User Center

When the user accesses the user center by clicking the navigation bar with an avatar icon, user will be direct to user center page with the personal information and some system preference. The shortcut to the important privacy setting on sharing your plant in the greenhouse community are directly show on the main user center page which make it easier for user to locate. The brief function names are displayed in a button block, the size of the button is user-friendly.

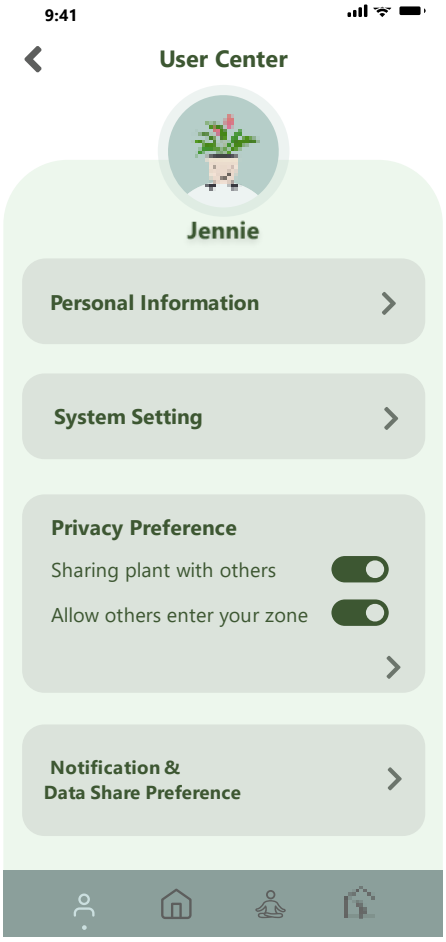


Figure 17. User center interface

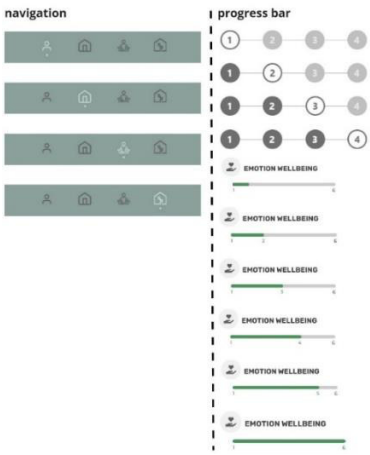
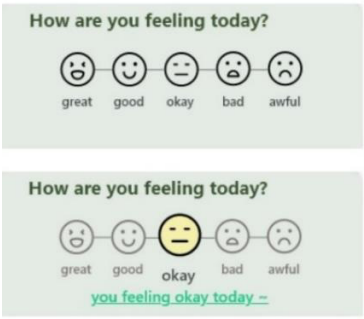
Evaluation

The Carezone application is presented as a medium-fidelity prototype. In the application early design process, prototyping can be essential in user-centered iterative design. Because the prototyping brings the possibility for the designer to collect contributive feedbacks with users before implementing a complete application. It provides an effective and low-cost way to optimize the interface. In this project, the medium-fidelity prototype method is adopted, which can partially simulate the functionality of the system and the interaction between the application and users.

The qualitative analysis, heuristics evaluation, will be performed on the medium-fidelity prototype of CareZone application. The reason for performing the heuristics evaluation is to improve the usability of the existing prototype and deliver a better user experience when fully accomplishing the application. Hence, the I decided to use Jakob Nielsen's 10 general principles to do the heuristics evaluation of CareZone application interface design.

- **Visibility of system status**

This principle means that the good system should handle well when convey the system status clearly and effective to users (Nielsen, 1994). The users should be kept informed of and have the feedbacks on what is going on. The visibility of system status can give users the predictability and control to make a better decision making when they are using the application.

Principle	Evidence	Comment
Visibility of system status		(+) A navigation bar on the bottom of the application shows icon of the selected page is highlighted with lighter green color with a point highlighter under the icon to indicate that which current section the users are currently at. (+) Using the process indicator when setting up some basic settings, using the color and number as visual clues to inform the users which step, they are at, decreasing the uncertainty when performing the basic system setup.
		(+) The color of the emotion face icon changed and the size of the icon became bigger once the user has clicked on it, which gives the users clear feedback on what they have achieved and the system has reacted to its action. Also, there is a notification written in sentence to show the user have already selected the 'okay' mood. This design elicited the uncertainty of unknowing whether the system receives the user's input, increasing the effectiveness.

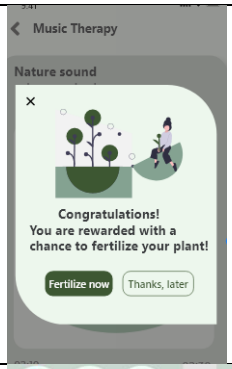
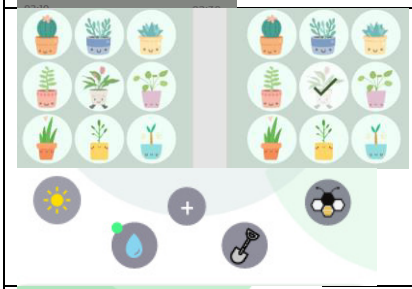
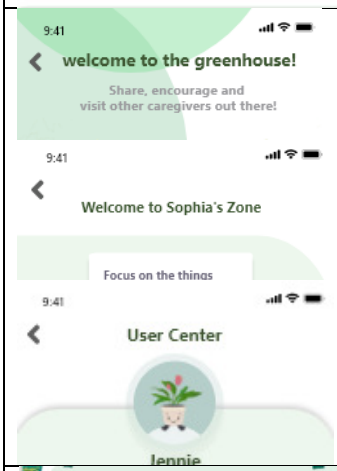
		(+) Using the pop-up window to inform users that the activities have been successfully completed.
		(+) Using the '✔' icon to shows that the system has receive the user's input and the icon has been selected. Using the green light to inform user that button is clickable.
		(+) A title of each page is shown on the top of the window to give the user instant feedback about the system status of the application (e.g., notifies the user that they are on the 'User Center' page)
		(-) There is no notification after successfully post a thought. Users may be confused and do not know whether they successfully post it or not. The future improvement of the post status notification should be implemented to reduce the uncertainty.
Rating (0-10)		8

Table 6. Heuristic evaluation on 'Visibility of system status'

- **Match Between System and the Real World**

This principle means that system should describe things in user's language with their familiar phases and concepts, not just presented the information in machine language (Nielsen, 1994). The system should use the real-world logic and natural order to present the information.

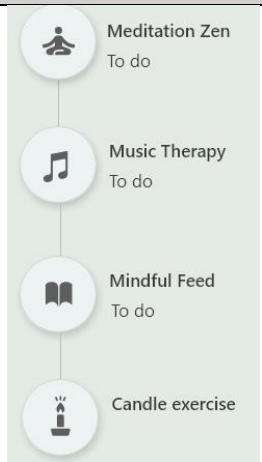
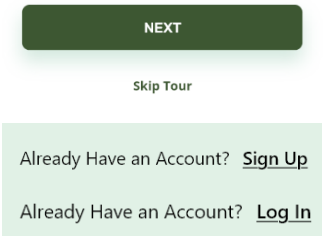
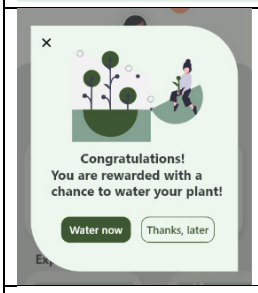
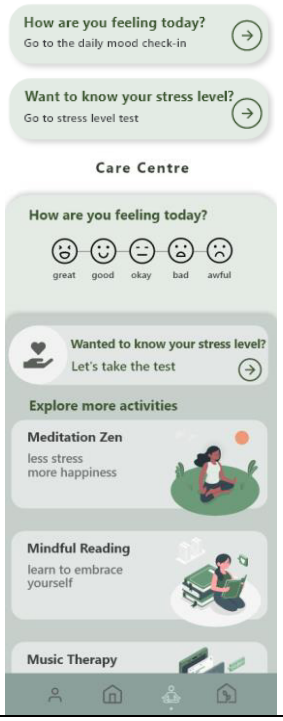
Principle	Evidence	Comment
Match Between System and the Real World		(+) Using the activities image that is match to the real-world activities or objects, which match the user's cognition with the system function. For example, there is a meditation yoga icon with short concise words, Meditation Zen, to indicate this function is the same as what they familiar with in the real world. Also, the activities are stated in the short phase in English, users can easily understand the meaning without searching. (+) Also, the recommended activities are presented in the horizontal process flowchart, which makes users automatically click on these buttons in the suggested order.
		(+) The candle exercise presents a digital candle which is exactly the same look as the real-world candle that they familiar with. The digital experience that brings the user the familiarity just feels like they light up a candle in the real life.
		(+) Using the image of greenhouse which is look like the real-world greenhouse to translate the 'greenhouse community' concept in what users familiar with. When they sharing their plant, they feel like they are placing their plants in a greenhouse.
Rating (0-10)		9

Table 7. Heuristic evaluation on 'Match Between System and the Real World'

- **User Control and Freedom**

This principle suggested that users can have the freedom to choose and sequence the task when needed. They can have the effective way to redo and undo the actions that are carried out by mistakes without spending the extra time on entering another dialogue.

Principle	Evidence	Comment
User Control and Freedom		(+) Though the recommended activities are presented in the horizontal process flowchart, users have the freedom to choose whichever to start with. There is no compulsory sequence of carrying out these activities.
		(+) User have the freedom to choose to skip the onboarding section by clicking on the 'skip tour' button. The 'Skip Tour' button is located on the bottom of every page of onboarding section. (+) Users can easily access between sign up page and login page, in case of entering the wrong page accidentally.
		(+) There is 'x' button for users to choose whether to close the pop-up window. Also, the users can close the window by clicking the 'Thanks, later' button, which support the multiple paths to achieve the task.
		(+) There is the entry for entering the daily check-in section and stress level test on the main page. Also, user can also access the daily check-in in the care center. And the stress level test can be accessed in the care center too, which support the multiple paths to achieve the task.

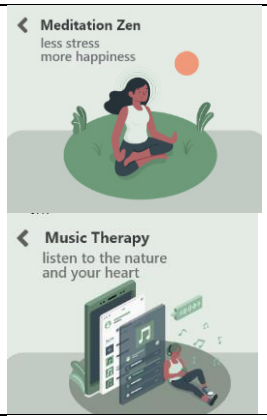
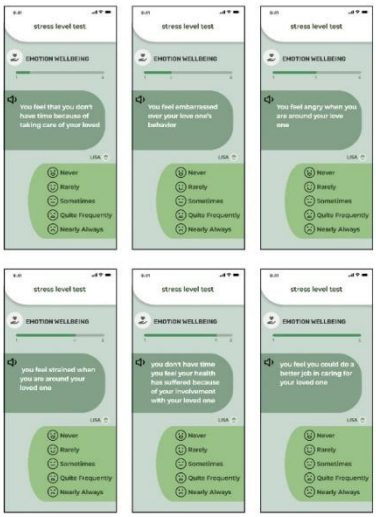
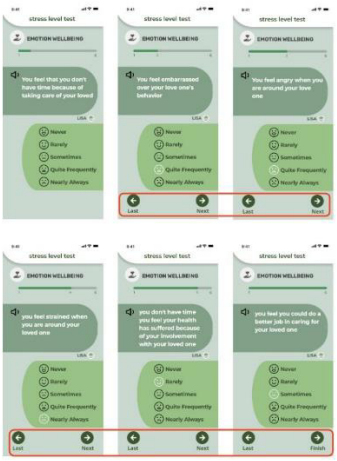
		(+) when the users enter the activity detail page, they can quit whenever they like by clicking the left button on the top of the page.
		(-) In the stress level test, the users do not have the button to return back to the last questions, which can cause the difficulty when the users want to do some changes on the answers. There should be a forward and backward button. 
Rating (0-10)		7

Table 8. Heuristic evaluation on ‘User Control and Freedom’

- **Consistency and Standards**

This principle states that all the visual design, content design and page layout should be consistent within the whole system. “Users should not have to wonder whether different words, situations, or actions mean the same thing.” (Nielsen, 1994) (“Consistency and Standards — Examples of Nielsen’s Design ...”)

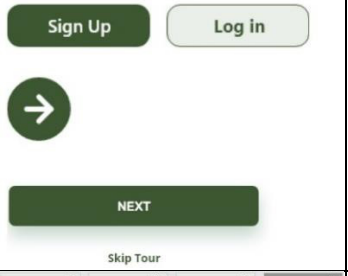
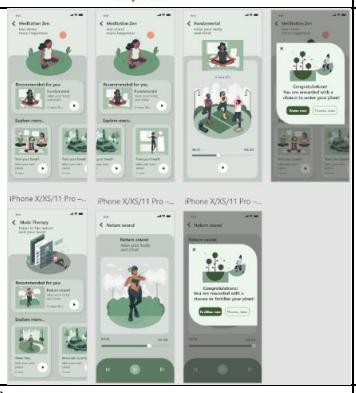
Principle	Evidence	Comment
Consistency and standards		(+) Button visual design uses the green color as main tone, which keep the consistency within system. The primary button will always using the dark green color to highlight while secondary key uses the lighter green color, in case of mis-click. The hungover effect of the buttons uses the same color to keep the consistent and standard.
		(+) all the page title and the backward button are placed at the same place on a page. And the visual style of illustration, button and front are consistent within the whole application. There are several different types of pages in the application, but all components will be consistent from page to page.
Rating (0-10)		9

Table 9. Heuristic evaluation on ‘Consistency and Standards’

- **Help Users Recognize, Diagnose, and Recover from Errors**

This principle refers to using the understandable language to present the error message (Nielsen, 1994).

Principle	Evidence	Comment
Help users recognize, diagnose, and recover from errors	None	(-) because this is a medium-fidelity model so some of the processes are not presented in this prototype. But in the future, the error message will be added in the login and register processes. The error message will be presented using the short and concise sentence in human language.
Rating (0-10)		0

Table 10. Heuristic evaluation on ‘Help Users Recognize, Diagnose, and Recover from Errors’

- **Error Prevention**

This principle means that a system should have the ability to prevent the error occur in the first place (Nielsen, 1994).

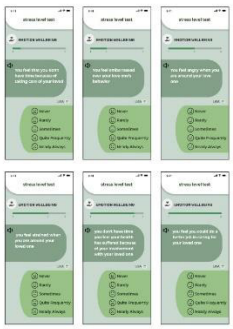
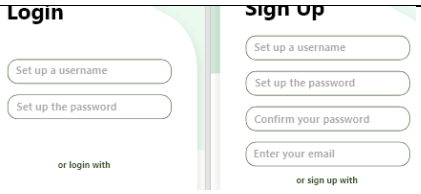
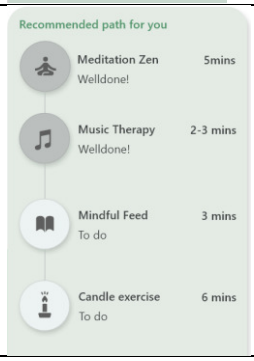
Principle	Evidence	Comment
Error Prevention		(+) Using the structure answer by implementing the button with answers to prevent user's input an inconsistent format of answer and input error. (-) there is no forward and backward button provided, which may cause the difficulty in changing the answer of last question.
		(-) There should be the validator evaluate whether the user input data are validated. And there should be the reminder to prevent user input the wrong data type.
Rating (0-10)		5

Table 11.Heuristic evaluation on 'Error Prevention'

- **Recognition rather than recall**

This principle refers to making all the actions and objective to be visible to users. Making the interface more in richer contexts which can help users to retrieve memory easier. Also, the Nielsen pointed out that "The user should not have to remember information from one part of the dialogue to another." (Nielsen, 1994)

Principle	Evidence	Comment
Recognition rather than recall		(+) The page header is always shown at the top of the page, meaning that the user does not have to remember which section they selected to get to this state. (+) The emotional icon has the words listed below, so that users do not need to consider which icon represent which kind of emotion.
		(+) All the activities icon are paired with the corresponding title. So, the users do not need to recall what meaning is the icon represented, which can reduce the user's memory load to improve the usability.

		(-) Though the navigation is always at the bottom of the application and reminds users where they are at. But the icon on the navigation does not promote recognition, because there are no text labels next to the icons which may be difficult for first-time users to know what the icon is used for.
Rating (0-10)		5

Table 12.Heuristic evaluation on 'Recognition rather than recall'

- **Flexibility and efficiency of use**

This principle illustrated that the system should be equipped with the accelerator that can boots the interaction between system and expert users, also the inexperienced users (Nielsen, 1994).

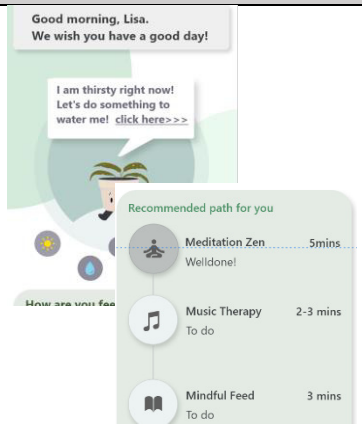
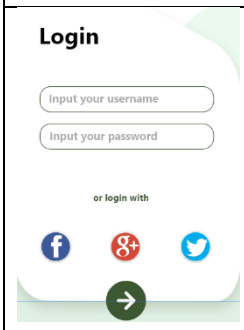
Principle	Evidence	Comment
Flexibility and efficiency of use		(+) When the user clicks on the conversation box, the system will immediately direct users to the 'recommended path for you' section without performing a scrolling down gesture. This can be seen as a shortcut or an accelerator to make the user go through fewer steps, which can improve the efficiency of use a great deal. But also, they can scrolling down by themselves to have the access to the 'recommended path for you' section, which the same task can be achieved in multiple path.
		(+) login are support with using the third-company account which can save the time for the expert users who sign up the account with their third-company personal account. They do not need to input the users name and the password which can improve the efficiency. Also, they can choose to use their username and password to login.
Rating (0-10)		9

Table 13.Heuristic evaluation on 'Flexibility and efficiency of use'

- **Aesthetic and Minimalist Design**

This principle illustrated that irrelevant or rarely needed information should not be include in the dialogues. Try to keep the interface simple and intuitive. Balance the minimalist with the functionality and in the meanwhile stay aesthetic is important for a human-centered design.

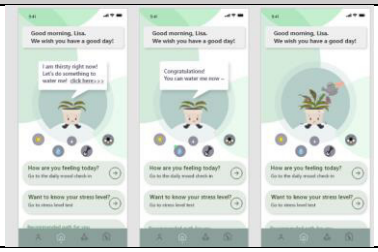
Principle	Evidence	Comment
Aesthetic and Minimalist Design		(+) all the visual style are stay the same within the application. All the components are well placed. The content is presented in direct and concise words, phrases and sentences. The layout of the character and the dialogue box are left with suitable space.
Rating (0-10)		9

Table 14. Heuristic evaluation on 'Aesthetic and Minimalist Design'

- **Help and Documentation**

This principle indicated that it is necessary to have the helping documentation to support users which helping them to learn to use the system more quickly and focus on their tasks.

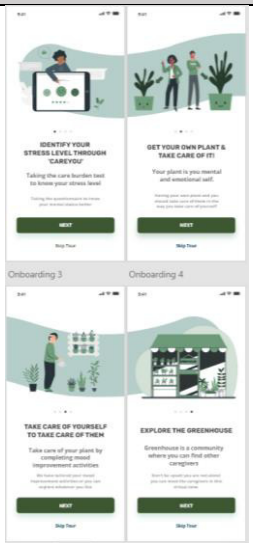
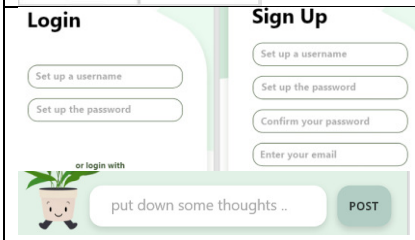
Principle	Evidence	Comment
Help and documentation		(+) Having the onboarding section to provide users with a quick guide of the system feature. Using the concise words and short sentences, even attached with the image to help users understand the content.
		(+) The application provides the inline help in the text input box to illustrate the function of the input box. (-) However, there still need some help button or reminder icon besides each input text box to suggest the data input type and limitation.
Rating (0-10)		6

Table 15. Heuristic evaluation on 'Help and documentation'

Since the now the application is presented in the medium-fidelity prototype, the result and comment of the heuristic evaluation can be used for further development of the CareZone application. Most importantly, the further heuristic evaluation should be made by experts. The following radar diagram illustrate the heuristic evaluation rating of each principle implemented in Carezone application. We can aware that the application has shortcoming in the three aspects, which is “Help Users Recognize, Diagnose, and Recover from Error”, “Help and Documentation” and “Error Prevention”. To develop a high retention and usability mental health application for caregivers, the progress and improvement should be made on these aspects, which is mentioned in the comment of heuristic evaluation.

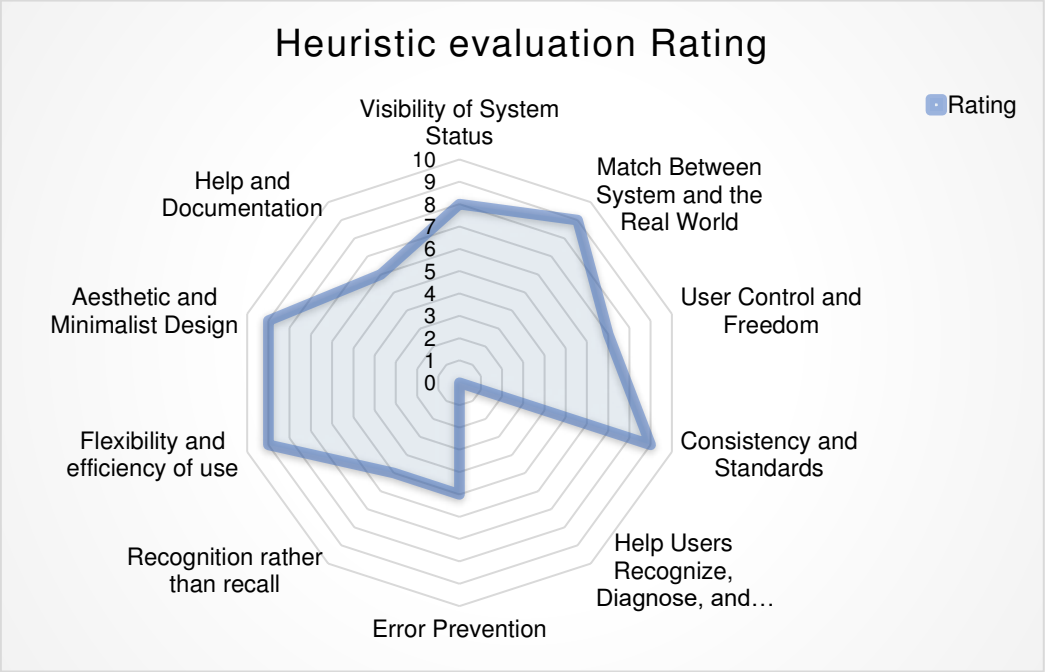


Figure 18. Heuristic evaluation rating of CareZone

Conclusion

Currently, there is a lack of research on caregiver-centered eHealth and mHealth application. This project designed and developed a medium-fidelity prototype for unpaid caregivers to identify their care burden by using the structured questionnaire format mood diary, and using a virtual self-representative, virtual plant, to visualize the mood test results. The virtual plant will provide the suggested mood improvement activities according to their mood diary results that need caregivers to complete. This project is aimed at building a mobile-based application that can potentially lead to better mental wellbeing and physical health of caregivers in the future by establishing a gamification technique and cognitive-behavioral therapy-based system to motivate caregivers to proactively participate in the mood diary and mental health improvement activities.

During the project, the I adopt the human-centered design principle by researching the current situation of the unpaid caregivers and also developing the persona based on the real person. And the developed processes follow the usability engineering cycle, the application design is based on an understanding of the caregivers' needs. The Heuristic evaluation is conducted to evaluate the interface design of the application and gain well-rounded feedbacks and comments that can be used in the future. Though the evaluation of the prototype is not carried out with the caregivers, the research provides a speculative design for future research. The heuristic evaluation shows currently the medium-fidelity prototype has a good interface design that is basically well complied with Jakob Nielsen's 10 general principles. Despites, the project did not realize the final model of the application, but the heuristic evaluation and the design insight can be used for the further research.

Reflection and Future work

During the application design process, I provided with three personas as the user analysis. According to the Forrester research done by Manning (Manning, 2005), it pointed out that a project needs to have 21 interviews and then create 4 personas to deliver and design a better system. But during the Covid-19 pandemic and time limitation, it is much harder for the I to conduct the interview based on the real person (informal carers). Caregivers are also a hard group to reach because they got a really tight schedule especially during the pandemics. Also, I have researched on the caregiver's forum to get to know their current situation as the inspiration of the personas. Besides, I also used the personas of past studies (Fuentes, Rodríguez, & Herskovic, 2016). In the future, as the pandemic end, I would further research and interview the informal caregivers to gain a better understanding of their situation and their needs to improve my prototype.

Also, this research presents a speculative design and prototype of a mobile application that can help to identify informal caregivers stress and burden levels. Due to the time limitation, the outcome of the project is a medium-fidelity interactive prototype developed by Adobe XD. The self-helping and mood improvement activities contents currently provided are just the roughly ideas of the result of existing researches and studies, which is not the major research scope, because the focus of the study is about the interface design, system framework, basic functionality idea and engagement techniques. As well as this is the project of computer science area, so I decided not to

involve too much with the phycological area because I am not an expert or familiar with this area. As for the suggestions for the future evaluation of the proposed prototype, the prototype should be presented with the informal caregivers of different types of patients and have different demographic backgrounds. The prototype can be established at the Miro platform, it can receive real-time feedback from the different users and the prototype can be presented well to them. After evaluation of the caregivers, the improvement of the prototype should be made according to the feedback. As the professional phycological content of mood improvement activities is implemented in the future, the initial version of the application prototype can be developed. The Mobile App Rating Scale (MARS) can be used to scale and evaluate the quality of the application, which is an objective and reliable measurement tool of mobile health applications (Stoyanov S. R., Hides, Tjondronegoro, & Mani, 2015). The MARS can be an effective way to be a benchmark in the process of designing and developing a new high-quality health mobile application.

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Appendices

The following items relate to the care you have provided for your loved one. Using the response key below, please select the number which best describes your feelings. Note that some of the items refer to the care you provided during the terminal stage of the disease, while others refer to your feelings today.

1	2	3	4	5
Absolutely not true	xxx	xxx	xxx	Absolutely true

Subscale 1: Disrupted schedule (α=0.84)

1. Most of my time was dedicated to personal caring of the patient
2. Giving care to the patient caused me to concede many important things in my life
3. Giving care to the patient caused a substantial change in my daily schedule
4. Giving care to the patient caused me to lose my privacy
5. Due to the patient's care, I had to quit my work
6. Due to the patient's care, I had to reduce hours of my work
7. My work was hurt as a result of the care I gave the patient
8. To the present day, I feel the damage to my work caused by the care I gave the patient

Subscale 2: Lack of social support (α=0.82)

9. Caring for the patient caused me to meet less with my family
10. Caring for the patient caused me to meet less with my friends
11. Caring for the patient caused a reduction of the intimacy level with my friends
12. My social life was hurt because of the care I gave the patient
13. To the present day, my social life is hurt because of the care I gave the patient
14. To the present day, the relations with my family members are hurt because of the care I gave the patient

Subscale 3: Health problems (α=0.85)

15. I needed all my physical strength to care for the patient
16. My physical health has become worse because of the care I gave the patient
17. I was healthy enough to care for the patient*
18. My health was hurt because of the care I gave the patient
19. Because of the care of the patient I felt tired all the time
20. To the present day, my health is hurt due to the care of the patient

Subscale 4: Self-esteem (α=0.73)

21. Caring for the patient was important to me
22. Caring for the patient made me feel good
23. I really wanted to care for the patient
24. I felt lucky that I could take care for the patient
25. Without any choice I took care of the patient, I did not really want to*
26. To the present day, I feel satisfaction for taking care of the patient

Subscale 5: Financial problems (α=0.86)

27. Caring for the patient put a financial strain on me
28. My financial resources were adequate for taking care of the patient*
29. It was difficult for me to pay for all of the treatments
30. My financial status has got worse because of the care I gave the patient
31. To the present day, my financial status is hurt because of the care I gave the patient

Note: Asterisked items are reverse-keyed.

Appendix 1. The modified Hebrew Language Version of The CRA (Bachner, O'Rourke, & Carmel, 2007)

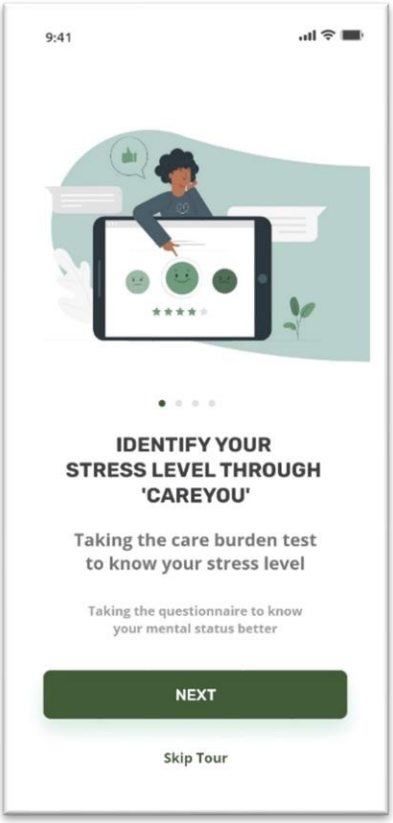
Questionnaire design

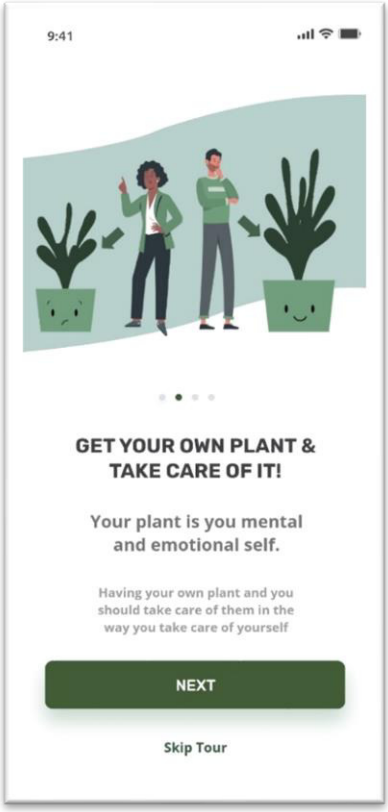
There is total 22 questions in the ZBI, but there is one question “Overall, how burdened do you feel in caring for your relative?” will be taken out in the mood diary section. Instead, the virtual pet will establish a conversation with caregivers by asking them “How are you feeling today?”.

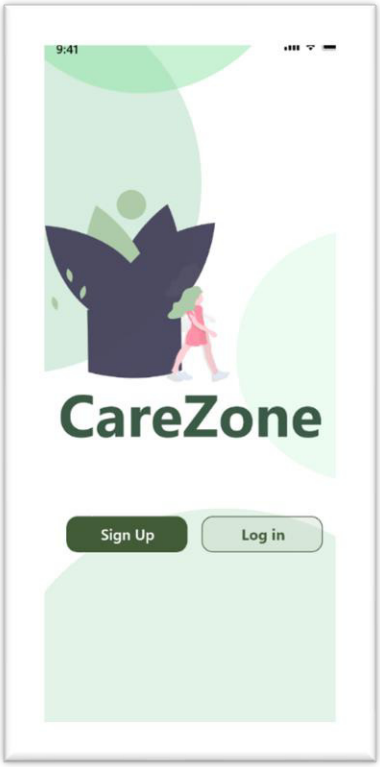
Domain	Zurit Burden Interview questions
Burden in the relationship	1. Do you feel that your relative asks for more help than he/she needs? 2. Do you feel your relative is dependent upon you? 3. Do you feel that you don’t have as much privacy as you would like, because of your relative? 4. Do you feel that your relative seems to expect you to take care of him/her, as if you were the only one he/she could depend on? 5. Do you wish you could just leave the care of your relative to someone else? 6. Do you feel you should be doing more for your relative?
Emotional wellbeing	1. Do you feel that because of the time you spend with your relative that you don’t have enough time for yourself? 2. Do you feel embarrassed over your relative’s behavior? 3. Do you feel angry when you are around your relative? 4. Do you feel strained when you are around your relative? 5. Do you feel your health has suffered because of your involvement with your relative? 6. Do you feel you could do a better job in caring for your relative?
Social and family life	1. Do you feel stressed between caring for your relative and trying to meet other responsibilities for your family or work? 2. Do you feel that your relative currently affects your relationship with other family members or friends in a negative way? 3. Do you feel that your social life has suffered because you are caring for your relative? 4. Do you feel uncomfortable about having friends over, because of your relative?
Finances	1. Do you feel that you don’t have enough money to care for your relative, in addition to the rest of your expenses?
Loss of control over one's life	1. Are you afraid what the future holds for your relative? 2. Do you feel that you will be unable to take care of your relative much longer? 3. Do you feel you have lost control of your life since your relative’s illness? 4. Do you feel uncertain about what to do about your relative?

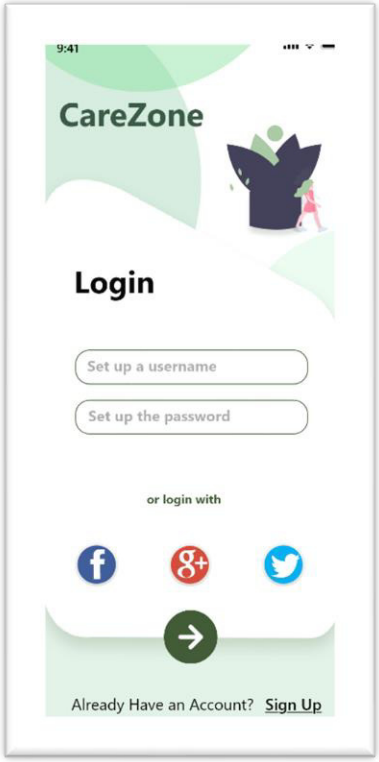
Appendix 2. Zarit Burden Interview questions corresponding to each domain proposed by Mapi Research Trust

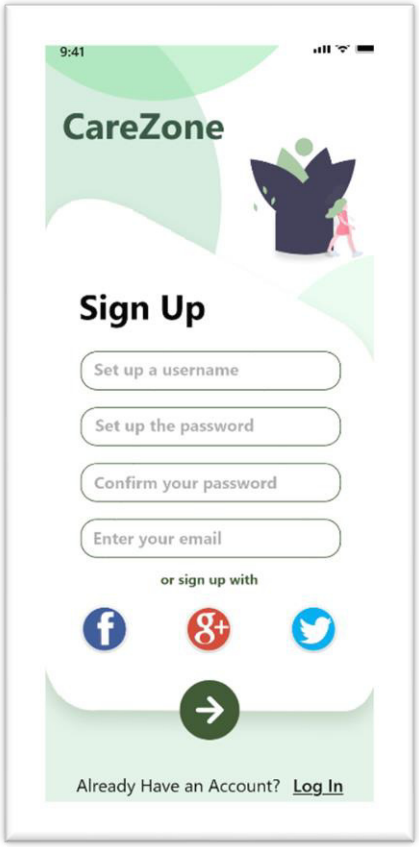
Appendix.3 application overview

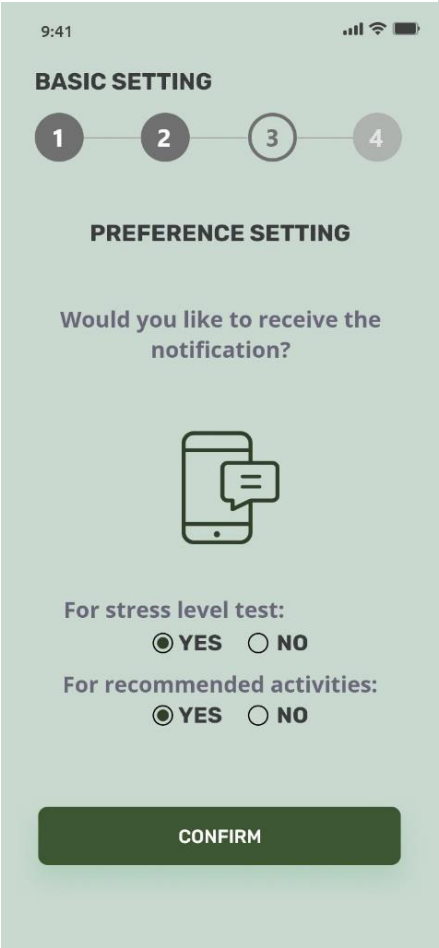




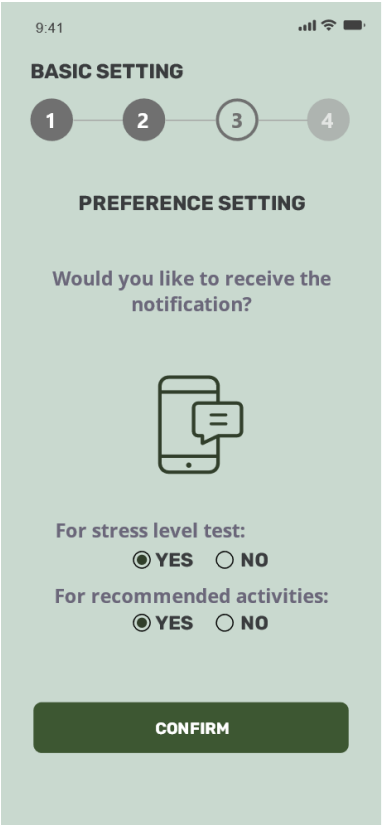

9:41
CareZone
Sign Up
Log in


9:41
CareZone
Login
Set up a username
Set up the password
or login with
Already Have an Account? Sign Up

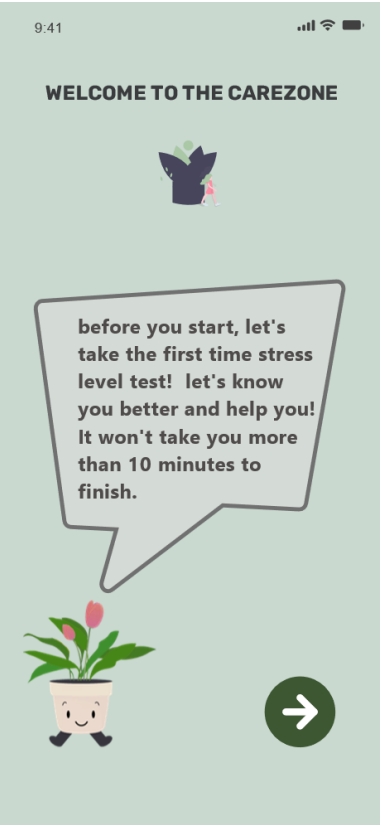

9:41
CareZone
Sign Up
Set up a username
Set up the password
Confirm your password
Enter your email
or sign up with
Already Have an Account? Log In


9:41
BASIC SETTING
1
2
3
4
PREFERENCE SETTING
Would you like to receive the notification?
For stress level test:
YES
NO
For recommended activities:
YES
NO
CONFIRM

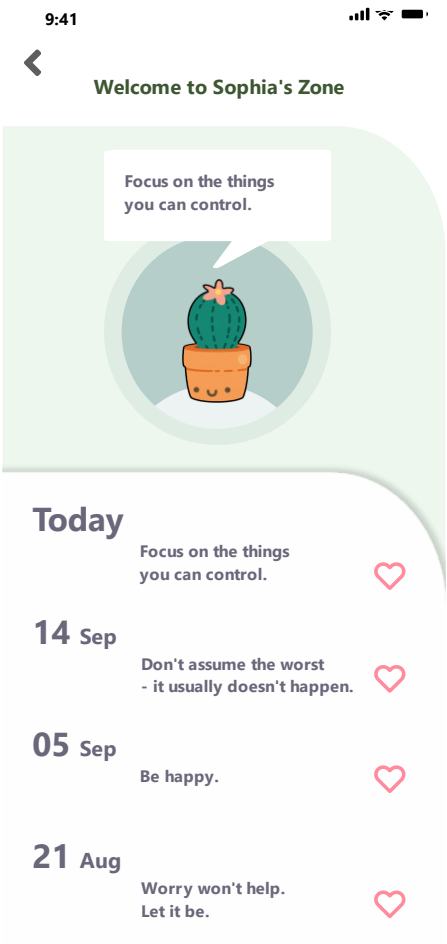
9:41
BASIC SETTING
1
2
3
4
PREFERENCE SETTING
How often would you like to detect your stress level?
ONCE A WEEK
TWICE A WEEK
ONCE EVERY TWO WEEK
CONFIRM

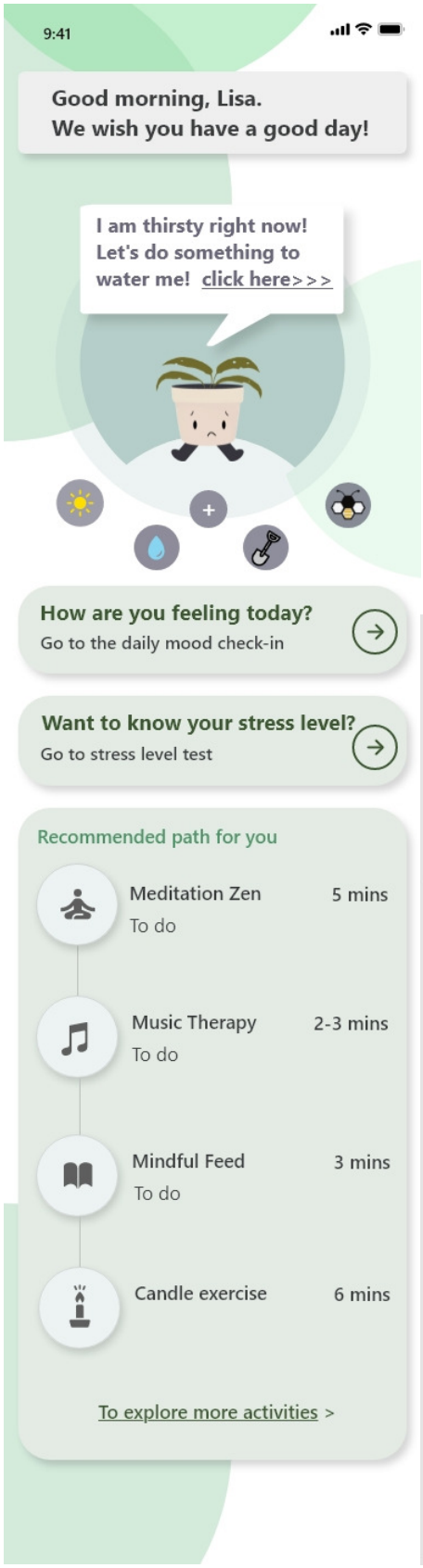

9:41
BASIC SETTING
1
2
3
4
PREFERENCE SETTING
Would you like to receive the notification?
For stress level test:
YES
NO
For recommended activities:
YES
NO
CONFIRM

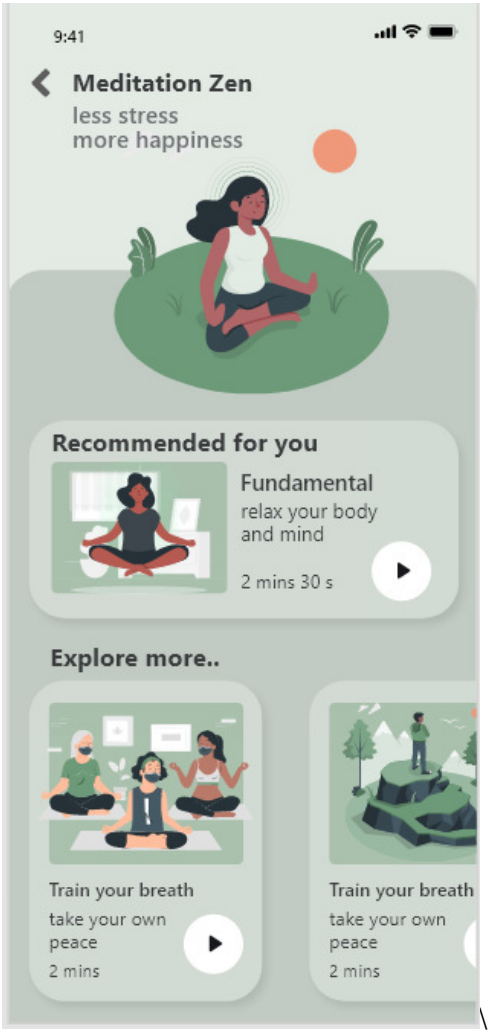
9:41
BASIC SETTING
1
2
3
4
PRIVACY SETTING
Would you like to display your plant in the Greenhouse
Share your plant with others:
YES
NO
Share your plant with others:
YES
NO
GET STARTED

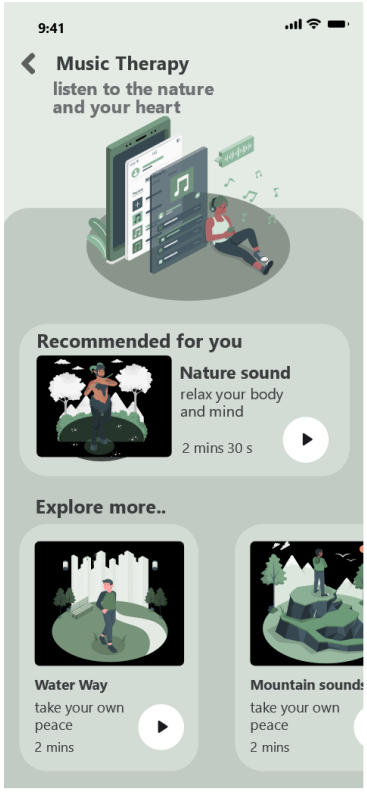

9:41
WELCOME TO THE CAREZONE
before you start, let's take the first time stress level test! let's know you better and help you! It won't take you more than 10 minutes to finish.

welcome to the greenhouse!
Share, encourage and
visit other caregivers out there!
put down some thoughts ..
POST

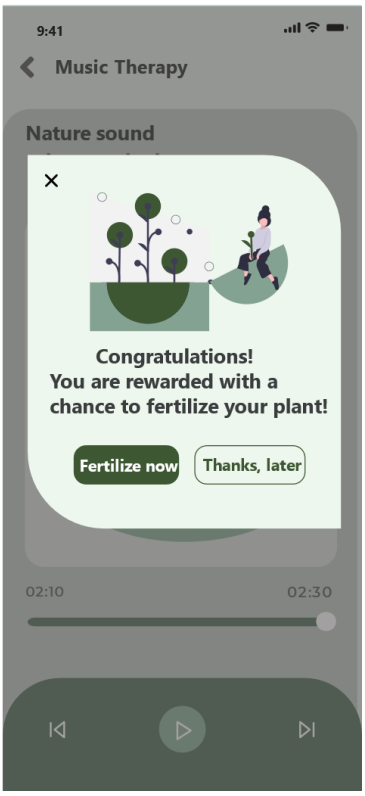

9:41
Welcome to Sophia's Zone
Focus on the things
you can control.
Today
Focus on the things
you can control.
14 Sep
Don't assume the worst
- it usually doesn't happen.
05 Sep
Be happy.
21 Aug
Worry won't help.
Let it be.

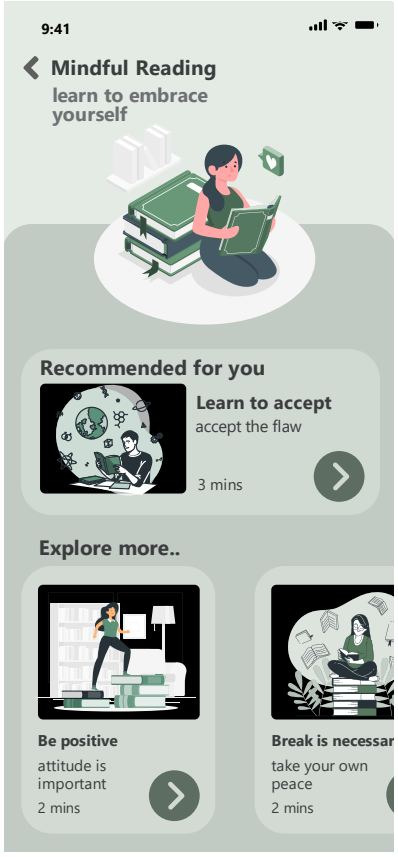

9:41
Good morning, Lisa.
We wish you have a good day!
I am thirsty right now!
Let's do something to
water me! click here>>>
How are you feeling today?
Go to the daily mood check-in
Want to know your stress level?
Go to stress level test
Recommended path for you
Meditation Zen
To do
5 mins
Music Therapy
To do
2-3 mins
Mindful Feed
To do
3 mins
Candle exercise
6 mins
To explore more activities >

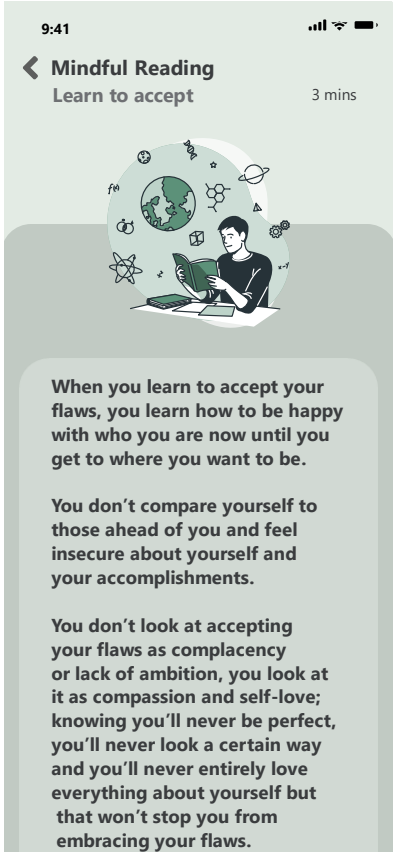

9:41
Meditation Zen
less stress
more happiness
Recommended for you
Fundamental
relax your body
and mind
2 mins 30 s
Explore more..
Train your breath
take your own
peace
2 mins
Train your breath
take your own
peace
2 mins

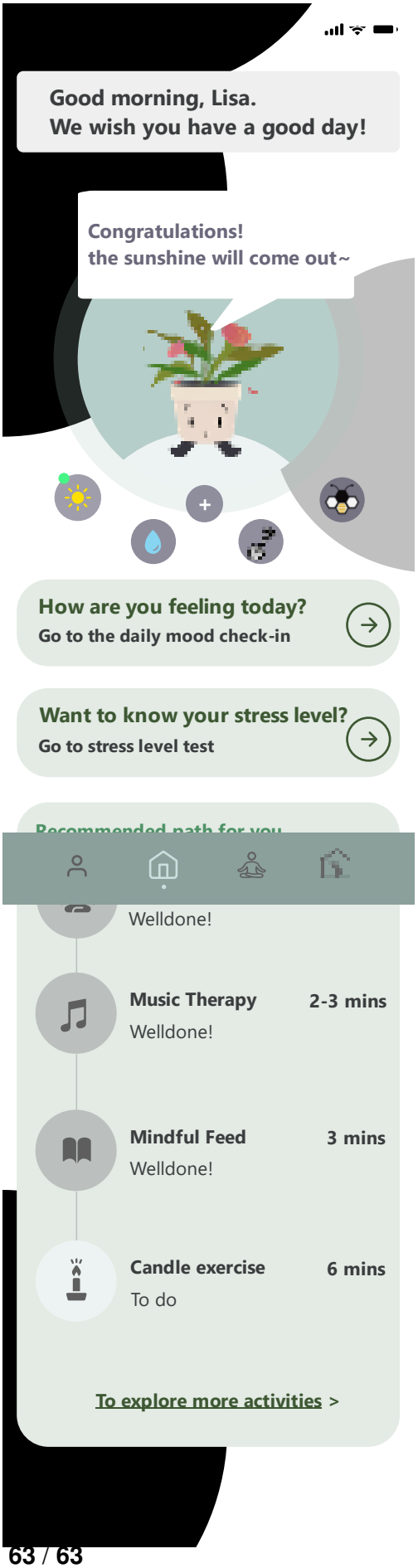

9:41
Music Therapy
listen to the nature and your heart
Recommended for you
Nature sound
relax your body and mind
2 mins 30 s
Explore more..
Water Way
take your own peace
2 mins
Mountain sounds
take your own peace
2 mins

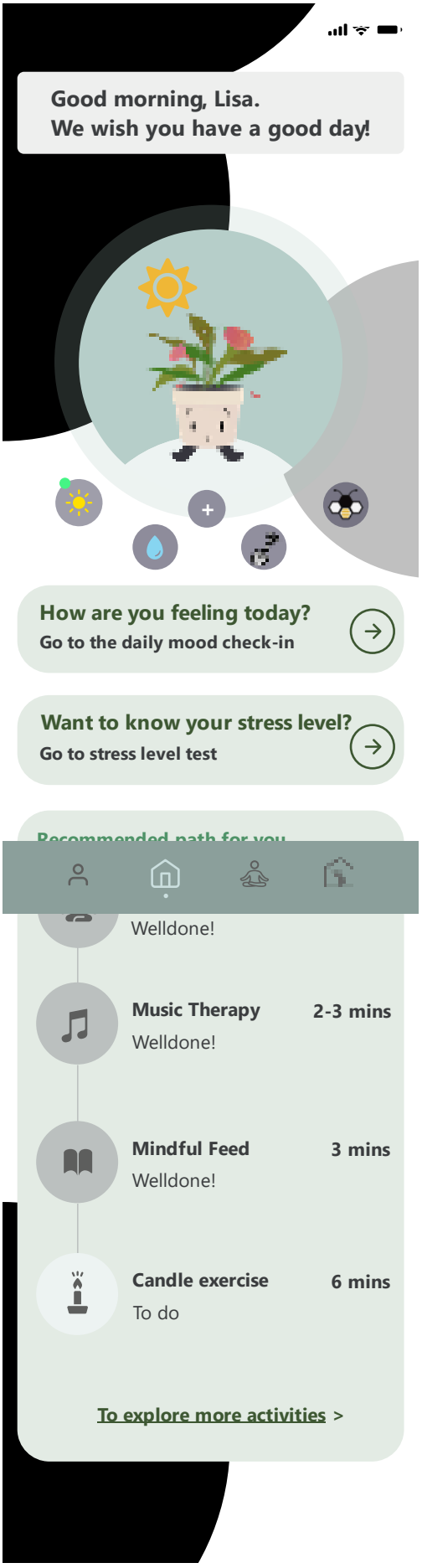
9:41
Music Therapy
Nature sound
relax your body and mind
02:10
02:30


9:41
Music Therapy
Nature sound
Congratulations!
You are rewarded with a chance to fertilize your plant!
Fertilize now
Thanks, later
02:10
02:30


9:41
Mindful Reading
learn to embrace yourself
Recommended for you
Learn to accept
accept the flaw
3 mins
Explore more..
Be positive
attitude is important
2 mins
Break is necessar
take your own peace
2 mins


9:41
Mindful Reading
Learn to accept
3 mins
When you learn to accept your flaws, you learn how to be happy with who you are now until you get to where you want to be.
You don't compare yourself to those ahead of you and feel insecure about yourself and your accomplishments.
You don't look at accepting your flaws as complacency or lack of ambition, you look at it as compassion and self-love; knowing you'll never be perfect, you'll never look a certain way and you'll never entirely love everything about yourself but that won't stop you from embracing your flaws.


Good morning, Lisa.
We wish you have a good day!
Congratulations!
the sunshine will come out~
How are you feeling today?
Go to the daily mood check-in
Want to know your stress level?
Go to stress level test
Welldone!
Music Therapy
2-3 mins
Welldone!
Mindful Feed
3 mins
Welldone!
Candle exercise
6 mins
To do
To explore more activities >


Good morning, Lisa.
We wish you have a good day!
How are you feeling today?
Go to the daily mood check-in
Want to know your stress level?
Go to stress level test
Welldone!
Music Therapy
2-3 mins
Welldone!
Mindful Feed
3 mins
Welldone!
Candle exercise
6 mins
To do
To explore more activities >