Creative Technology

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"We CreaTe Impact"

Thesis

Grow your World

A positive health based application for young adults

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Abstract

This project aims to motivate young adults towards behavior change to gain a healthier lifestyle through positive health and lifestyle coaching principles. Positive health is a view of health that argues being healthy is more than just not being sick, dividing health into six pillars. Lifestyle coaches base their methods on this view and focus on celebrating achievements and self-awareness. The available positive health tool is not suited for daily use, so this project designed a mobile application that allows users to set and achieve goals, using positive feedback in the form of a globe. This globe grows based on achieved user goals. The idea is based on multiple brainstorm sessions, and an online questionnaire (n=46), and was further specified using lo-fi prototypes. The application was tested for 5 days, resulting in the indication that the application helped people broaden their view of health and take more actions. Concluding, the research indicated that paying attention to health and consciously taking actions improves health or improves how people view their health. Longitudinal studies are needed to test how well the application helps young adults' lifestyle. The app, however, had promising results, and participants were thankful for the reminder that taking care of yourself is important, especially now during the corona epidemic.

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1. Introduction

Health is a largely discussed topic, especially during the covid-19 epidemic of 2020, with concerns surrounding physical and mental health. Recently, many concerns about the health of young adults have risen, as pointed out by the GGZ (geestelijke gezondheidszorg, Netherlands) [1]. Young adulthood is a critical period to take care of one's health, not just during the transitional years but also with regard to health in future years. The declining health in this age group was already problematic before the corona epidemic [2] and is now more relevant than ever. Prior to the virus, young adults had the worst health profile compared to adolescents and older adults despite being the youngest. This included, among others, less physical activity, bad nutrition and mental health disorders. On top of this, the current generation of young adults is more vulnerable to obesity related health consequences than previous generations were [2]. This health declinement has major consequences for future health, but also for educational attainment and economic well-being. Young adults tend to seek health care services less than other groups (due to economic or emotional reasons), so the worrisome trends can be expected to continue or worsen [2]. It seems that young adults are faced with a large amount of challenges and their health is to suffer from this. However, young adults do not seem to be motivated to change their bad health habits and achieve a healthy lifestyle.

Many novel technological interventions were made in the past to tackle lifestyle issues, but often with a small success rate as many users do not achieve sustainable behavior change [3]. These interventions aim to motivate users to change their behavior by using for example BCTs (behavior change tactics) to manipulate the user to a desired behavior by giving rewards, introducing competition, and other tactics. The term used for this *"arranging environments in ways that make health-promoting behaviors more likely"* is nudging, which may be effective in producing immediate behavioral changes; however, there is little evidence that nudging interventions result in lasting behavioral changes [3]. There are two flaws within these concepts that may be the causation of this little evidence. First, feedback given to the user is often negative and is portrayed as a necessity for healthy living. Portraying behavior as a necessity could result in opposed solutions that do not match the lifestyle of the user and are therefore unattainable and/or seen as a chore. When someone is told they need exercise three times a week, people can develop aversion to exercising and feel like they have to do it, not want to do it for themselves. This could even result in self-hatred or disappointment which could lead to more bad health behavior. Imposed solutions are not formed to the need of the individual and therefore only work for a few. The responsibility of behaving in a certain way gets taken away from the individual when imposed by someone/-thing else as well. And the second issue is that long-term behavior change is less appealing than so-called 'quick-fixes'. In the busy society of today, people often desire fast solutions, which are not sustainable and therefore will not gain a healthy lifestyle in the long term. These fixes often result in behavior change and short term joy, however often are not sustained and therefore do not result in long term happiness or health. People often, for example, throw themselves into diets that they can only last for 2 months and gain all weight again after. This, again, could lead to disappointment and spiral into bad health behavior.

A fairly new concept to empower people towards a healthy lifestyle is positive health, which is now practiced by lifestyle coaches and adapted in more and more health related centres (hospitals, therapy, community related operations, etc.) [4]. The novel principle of positive health is defined as *"a state beyond the mere absence of disease and is definable and measurable."* [5] and focuses on self-management, positivity and resilience [4]. It argues that health is more than the absence of illness and aims to describe and measure health using six pillars: Bodily functions, mental wellbeing, purpose, quality of life, participation and daily life. Lifestyle coaches working from this view focus on empowering people towards making their own decisions towards better wellbeing and therefore a healthier lifestyle instead of giving them a guide. They believe health and lifestyle are individually different and therefore should be adjusted to everyone individually [6]. Lifestyle coaching has been implemented within health care in the past 2 years, even gaining inclusion in dutch basic health insurances [11]. Clients, however, mostly include people of a later age. The current project will focus on helping younger adults by using positive health and lifestyle coaching principles. Many young adults especially are unable to afford lifestyle coaches or feel a social threshold applying for a coach, but this group is also faced with a lot of stressful situations that could lead them to bad behavior [2], as described above.

The core challenge of this is designing a technological intervention that can achieve behavior change without telling the user what to do to avoid the possible negative results of imposed solutions. These behavior changes have to come from the user themself (intrinsic motivation) and will therefore be individually different. Lifestyle coaching strategies to achieve this could be implemented into something technological, which poses the challenge of translating something humane into a technological device. Ultimately, this method should result in behavior change that is successful and long-lasting, as opposed to quick-fixes, easily falling back to bad behavioral habits, or achieving awareness without behavior change. Furthermore, the positive aspect of positive health should be implemented as well. This resulted in the following research question:

How can an intervention be designed to coach young adults towards behavior change, without telling them what to do, using positive health and lifestyle coaching methods?

To answer this research question, the following sub-questions will need to be researched first:

What are the principles of lifestyle coaching?
What are the principles of positive health?
How does behavior change as a technique work for young adults?
How can an intervention be designed in such a way that the user is in full control?

This report is structured in chronological order, wherefrom chapters are defined as different phases of the graduation project, as proposed by the creative technology design process (ideation, specification, realization, and user evaluation) [7]. Starting with literature research in Chapter 2, which is used for the ideation phase described in Chapter 3. Based on this, Chapter

4 describes the specification and Chapter 5 the realisation. The user test is evaluated in Chapter 6, whereafter Chapter 7 states the discussion, conclusion and recommendations for future work. Ending the report with the appendices and references used in the report.

2. State of the art

This chapter will discuss the current state of the art and attempt to answer the sub-research questions mentioned in the introduction. Furthermore, requirements will be discussed in the conclusion that are needed in the ideation phase. The structure of this chapter will be as follows: 2.1 has information on behavior change and motivation among young adults, attempting to answer the sub-question: *"How does behavior change as a technique work for young adults?"*. After this, 2.2 describes lifestyle coaching methods and positive health principles, to come up with the requirements. This will attempt to answer sub-research questions: *"What are the principles of lifestyle coaching?"* and *"What are the principles of positive health?"*. 2.3 focuses shortly on motivation, to help develop the requirements for the ideation phase. 2.4 discusses related work and 2.5 summarizes and concludes all findings, including a list of requirements for the ideation phase.

2.1 How young adults are motivated to behavior change

Previous research set a base of knowledge to accomplish novel interventions to improve health, however first research needs to be done into the view young adults have on health. This research could indicate which methods might work better as opposed to others for the particular age group.

A study into young adults' health [8] found that young adults recognise future health benefits that they could gain from following healthier lifestyle behaviours. Participants indicated that they were trying to adopt healthier nutrition and/or more physical activity or were planning to. Besides recognizing the benefits, young adults also indicated that attaining good health was seen as a future benefit and not as a motivational aspect for now. When participants indicated they would not alter their lifestyle behavior, most mentioned reasoning was time and effort costs, despite recognizing the benefits. As the papers explains: *"Where the competitive forces and associated costs weighed greater than the benefits associated with the behaviour proposition, they said that they were not ready to change their lifestyle behaviours at the present time."*. They mentioned low self-discipline and unstructured lifestyle as a reason to want to engage in healthier lifestyle behavior in the future as opposed to now. The paper calls this the classic optimistic bias: Young adults feel like they can get away with an unhealthy lifestyle because they are young. Despite their perception, many key transitions occur in the *"emerging adulthood period"*, from 18-25 years. The paper indicates that this provides a *"perfect" opportunity to promote healthy lifestyles [...] when young adults become more self-reliant and focus on asserting a new identity"*.

What also sets young adults apart from other age groups is how they recognize a wide range of benefits and costs, meaning that they recognize the effects of actions, good and bad. The paper also mentions that future public health messages may need to recognise this wide view young adults have and promote all the benefits: *"This research suggests that this age range (19-24 years) is a key stage in young adults' lives, and this period of emerging adulthood is an*

opportunity to encourage young adults to adopt healthier lifestyle behaviours. In particular, and to encourage present-day behaviour change rather than future behaviour change, health promotional material may need to be alternatively framed to better accommodate the exchanges – the benefits and costs – that young adults associate with healthier lifestyles." [8].

Another study [2] adds to this information that: *"young adults take long to consider difficult problems before deciding on a course of action, are less influenced by the lure of rewards associated with behavior, are more sensitive to the potential costs associated with behavior.".* They emphasize the importance of development in the age group, as they have to take on new roles, responsibilities, different social contexts, and brain development. The study indicates that these might limit optimal decision making in young adulthood, but also that the enhanced motivational processing that occurs plays an important adaptive role in supporting optimal learning, exploring, and adapting to new environments.

This research on the target group of the project indicates that it is important to give control to the young adults, to promote forming their new identity in the development phase. It also indicates how young adults have a broad view of health, which is important for understanding Positive Health. If young adults already have a broad view of health, it could be easier for them to embrace the positive health view.

2.2 Positive health and lifestyle coaching

Research into young adults' view on health indicated that young adults view health in a broad sense, which is also the main idea behind positive health. This could indicate that positive health fits young adults well and therefore might give the best results regarding sustainable behavior change.

2.2.1 Positive health

Machteld Huber has been working on a different view towards health since 2009 [9]: Positive health. In 2008, another paper predicted the importance of this field, based on positive psychology. This paper described positive health as *"a state beyond the mere absence of disease that is definable and measurable"*. Positive psychology has proven positive consequences from exploring positive mental health instead of only the absence of mental health. Positive health had not had a lot of scientific attention up till that point yet. This paper predicted the positive effects positive health would likely have on physical and mental health. The most important theme of this paper is the link between positive psychology and positive health: *"Subjective well-being, as measured by optimism and other positive emotions, protects one from physical illness"* [5]. The risk of choosing negative feedback methods instead of positive ones might result in demotivation and frustration within the user [10], which could result in fall-back to undesirable behavior. This shows the importance of positivity that should be adapted in the intervention.

Another key element of positive health as it has developed is that it is focused on self-empowerment. Positive health challenges the view on health that only focuses on not being

ill and emphasizes the importance of the whole picture. The method focuses on a broad view of health that goes beyond the symptoms and focuses on what is important for the patient in particular. This would help to achieve behavior change that is actually sustainable and long-term because it fits the individual perfectly. An important aspect of positive health to achieve this is the ability to be resilient and self-managing. Positive Health is ordered in six different pillars, which will be listed and translated below [4]:

- Lichaamsfuncties (bodily functions) – Ik voel me gezond en fit (I feel healthy and fit)
- Mentaal welbevinden (Mental well-being) – Ik voel me vrolijk (I feel happy)
- Zingeving (Purpose) – Ik heb vertrouwen in mijn eigen toekomst (I have faith in my own future)
- Kwaliteit van leven (Quality of life) – Ik geniet van mijn leven (I enjoy my life)
- Meedoen (Participation) –   Ik heb goed contact met andere mensen (I have good contact with other people)
- Dagelijks leven (Daily life) – Ik kan goed voor mezelf zorgen (I can take care of myself)

From these six pillars a spider web is made, designed by the founder of the institute for positive health, Machteld Huber [9]. A questionnaire is set up and every pillar has a score based on the given answers. The idea is that the spider web can help with self-awareness. There will be no advice, only the visualization as shown in figure 1. Based on this spiderweb image clients can start thinking about what they value most in life and set goals and take control themselves. Important to note here as well is the connection between all pillars: When one is improved by a client, the other pillars usually also improve and visa versa. Important also to emphasize when talking about positive health is that it is always just about a certain moment in time and concerns what the coachee wants to work on at that specific moment in time. The spiderweb could assist in this process, lifestyle coaches use it as an instrument to start the conversation with a client. If the client fills in the test again at a later point in time, the web will show the changes that have been made on the person since the previous captured moment [6, 11].

Figure 1: Positive Health spider web example

2.2.2 Lifestyle coaching

The positive health principles form the basis of lifestyle coaching methods. Hoenderdos, Hulshof, and Kootstra describe different important aspects of lifestyle coaching. A few key and novel aspects are translated from their book below:

A lifestyle coach can help make choices and actions that lead to sustainable behavior change in the area of lifestyle.

Lifestyle coaching is extremely different from advising because it assumes the power and knowledge that are already present in the coachee his-/herself.

A lifestyle coach has broad knowledge about all lifestyle factors (exercise, nutrition, sleep, stress, addiction, relaxation) and the influence of them on health.

The lifestyle coach is a true coach; someone who knows how lifestyle factors relate to patterns and emotions, relations and environmental factors. The lifestyle coach lets the coachee become aware of those patterns and makes the coachee responsible for his/her behavior. The cliënt holds regie, the lifestyle coach supports the changing process the client will go through/is going through [11].

An interview with lifestyle coach E. M. van den Bos has been conducted to check whether the insights from the literature review were correct. Some additions to the research that came from this conversation are the emphasis on the client. The consent form for this interview can be found in Appendix B. A lifestyle coach focuses on enabling the client to make choices and work towards a healthier lifestyle/lifestyle improvements. The goal here is not to have the client live a perfect happy healthy lifestyle, but to allow the client to construct improvements that fit within their lifestyle. This results in sustainable change instead of short-term changes. Letting the client set individual goals also ensures that the responsibility lies with the client, not the coach. The client should not become dependent on the coach but should be able to set individual goals. This is also to ensure the client does not feel like they 'need' to perform a certain action, but rather 'can'. E. M. van den Bos indicated that many clients feel like they 'must' perform a lot of actions in a day, and are only 'allowed' a few, which works against sustainable behavior change. For example when they 'must' lift weights three times a week and feel 'allowed' to go jumping, it would be way more beneficial to go jumping more often. Important also is the focus on the situation as it is now and how the client thinks it should be improved in the future. Important here is to work on resilience to obtain sustainable change: when a stressful situation occurs, resilience will help the client to avoid falling back into old negative/bad behavioral habits. Individualism is extremely important in this type of coaching.

Self-management and development is the highest value within this coaching method. On top of this, the importance of small steps is also of high importance within the lifestyle coaching methods, as this contributes to the process. E. M. van den Bos emphasizes how clients often want to take steps that are too big or they want to perform too many at the same time. She also emphasized the importance of celebrating success, which is often overlooked or forgotten by clients. The negative factors seem to outweigh positive factors and clients often steer the

consult towards the negatives instead of the positives, which works against the process of progress. And lastly, the focus points are mostly: nutrition, movement/exercise, stress management and sleep [6]. When a lifestyle coach notices that a certain aspect of a client is standing in the way of lifestyle changes too much, they can refer them to a designated professional. For example if there are underlying psychological disorders, physical diseases or even economical or relationship issues.

When discussing the short-comings of existing behavior changing interventions with the expert, she argued that the reason behind lacking proof for long-term/sustainable behavior change is because it only works for some. Not allowing the person to set their own goals results in solutions that only fit a few peoples already existing lifestyles. This results in a low number of successful cases to sustainable behavior change and emphasizes the importance of self-management when changing behavior in a sustainable way.

A study investigated the possibilities of lifestyle coaching and its effect on motivational aspects of behavior. This study concluded the following: *"multiple internal, social and environmental barriers exist to lifestyle behavior change and all of these were observed to increase over the course of long term intervention. Behavioral problem solving approaches have long term dissemination potential for many kinds of participant barriers. Given minimal resources, training lifestyle coaches to facilitate these approaches in a highly skillful manner appears warranted."* [12]. This indicates how lifestyle coaching could be important to lifestyle change, however the paper does emphasize that more lifestyle coach training is necessary. This project could contribute to normalizing talk and effort into health and lifestyle and therefore help lifestyle coaches as well.

2.3 Motivation

When talking about behavior change, a lot of papers mention motivation. Springer [16] discusses the contribution of lifestyle coaching to motivation change, and the importance of understanding motivation to conduct a study like this graduation project. Motivation has always been a largely discussed topic of which many different factors play a role. The Self-Determination Theory [17] describes different types of motivation, wherefrom the most basic form distinguishes between intrinsic and extrinsic motivation. Intrinsic motivation refers to doing something because it is interesting or enjoyable and extrinsic refers to doing something because it leads to a desired outcome [3]. A study into fitness and gym attendance concluded that the gym attendance, regular and continuous, was more likely for individuals who enjoyed the exercise programs and realized the value within these programs [18]. According to the definitions of intrinsic and extrinsic behaviour, this indicates that intrinsic behaviour is more likely to cause sustainable change in behaviour. This is also in accordance with previous research into lifestyle coaching views.

Previous research into young adults' motivation to a healthier lifestyle, however, indicated that most of their motivation to change lifestyle behavior focuses on changing appearance and not on becoming healthier. This is based on extrinsic motivation as opposed to intrinsic motivation.

Extrinsic motivation could, however, turn into sustainable motivation when a behaviour is consistently done long enough to become a habit, which is a method many technological interventions rely on. This could result in intrinsic motivation in the form of self-determination with respect to the factor that started as extrinsic motivation. Richard M. Ryan and Edward L. Deci found that *"social contextual conditions that support one's feelings of competence, autonomy, and relatedness are the basis for one maintaining intrinsic motivation and becoming more self-determined with respect to extrinsic motivation"* [17]. This indicates that behavior change tactics based on extrinsic motivation could still result in intrinsic motivation when used correctly and in the case of this project, in accordance with lifestyle coaching principles.

Assuming that extrinsic motivation could indeed turn into intrinsic motivation and that young adults currently generally mostly feel extrinsic motivation, this project would benefit from research into behavior change tactics. According to the psychology book [10], young adults are still more egocentric than older ages, which makes them more vulnerable for *nudging*, a term often used to describe a method used by interventions to change human behavior. In his review paper, [3] describes this term as *"arranging environments in ways that make health-promoting behaviors more likely"*. There are 93 evidence-based Behavior Change Techniques (BCTs), also called 'nudges', used by psychologists in clinical practice. A list of these nudges/BCTs can be found in appendix A [19]. Based on these 93 BCTs, [20] identified the five most used in healthy/positive behavior change, which is identified as *'improved health outcomes and an increased quality of life through behavior change around nutrition, exercise, medication management and other factors'*. These strategies emphasize the importance of setting specific, actionable, achievable and short-term goals and allowing self-understanding. In their paper, [3] warn of the shortcomings of nudging methods by stating: *"nudging may be effective in producing immediate behavioral changes; however, there is little evidence that nudging interventions result in lasting behavioral changes"*. This suggests that the method might not be effective in the long-run, which is in agreement with previous research into extrinsic motivation. Therefore, this project will focus on self-management and awareness of decisions, as opposed to nudging and manipulative techniques. The behavior change tactics will be kept in mind when designing the intervention and used for ideas on how to make the intervention interesting and appealing for young adults.

2.4 Related work

The idea of embodying positive health and lifestyle coaching methods in a technological intervention to achieve sustainable behavior change is specific and entails many different aspects, so an example of a study with the same purpose and method is hard to find. Multiple related works are listed below, that all contain different elements important to this graduation project.

2.4.1 Broad health applications

Related work includes for example different apps like [21]:
- **HealthTap**

"Questions about your health? Browse more than 2.6 million answers from doctors and 700,000 topics and articles about 850 conditions. Ask a question for free and get a confidential answer from a doctor within about 24 hours, or pay to see a doctor immediately."

- **Fabulous: Self Care**

"Build healthy habits with Fabulous so you can enjoy a healthier, happier life. The app takes a holistic approach that motivates you to be more productive. You'll maximize energy levels, find more focus, lose weight, and sleep better — just follow the app's prompts."

- **Health Pal**

"Health Pal has all the features you'd ever think to need to keep your lifestyle healthy. From a step counter and diet reminders throughout the day to food and exercise trackers, the Health Pal app is a daily companion tool to empower your journey toward a holistically healthy lifestyle. It houses info on your diet, your fitness, and many other health resources in one place."

- **Remente – Self Improvement**

"Being healthy is more than just eating right, drinking enough water, and sleeping well — it's also about getting your mind right. The Remente app gives you many resources to help search your life for happiness and fulfillment, with goal setting, a daily planning tool for day-to-day tasks and longer-term goals, and written and visual features to help you track your feelings in detailed ways that can help you better understand what brings your life purpose"

Figure 2: Healthy Lifestyle Applications

These apps particularly relate to this project because they recognize the importance (and convenience) of taking all health aspects into account instead of focusing on only one aspect This project is based on the assumption that only focusing on one particular aspect of health does not result in resilience and will therefore cause fall-back and will only result in short-term behavior change, not sustainable change. These apps, however, can be overwhelming and perceived in a negative way. These apps propose only one way of living a healthy lifestyle, and this is by needing to improve all these different aspects of life. This is not an achievable goal and does not focus on individualism or personal opinion on what supports good quality life. It

does succeed in setting short-term goals that could eventually result in long-term effects. However, proposing the steps as a "must-do" to get healthy can have negative effects on users, as mentioned before. This project is about achieving sustainable lifestyle change in young adults, so it should focus on things that make the user happy instead of focusing on punishment or focusing on "you must". So this project should aim at an application that focuses on numerous aspects of health, and an intervention style that is positive, gives the user choice and control over what he or she wants to change, hopefully resulting in intrinsic motivation and long-term sustainable results.

There are many more apps that try to improve lifestyle. To help people navigate in all these apps, the Gemeentelijke Gezondheidsdiensten (or GGD) app store was developed [22]. This appstore assigned different positive health pillars to all the applications they provide, see figure 3. This way, users can search for apps in their desired pillar or find out which pillar belongs to their apps. The apps also all need to be approved before they get a place on the app store and provide more insight into what the pillars are all about. There is no application yet that entails all pillars and visualizes this to the users, so this project should entail all pillars and progress to the user.

Figure 3: GGD Appstore

2.4.2 Growing application

A particular app that focuses on positive feedback is "Forest" [23], see figure 4. This app intends to help users concentrate better. When the app is downloaded, the user can start a timer when they start studying and select a tree they would like to grow digitally. This tree will keep growing as long as the study timer runs and the user is not on the phone. This way, users concentrate on their work instead of the phone. The positive feedback here is a growing tree for

concentrated time spent. The app does, however, give negative feedback, as the situation does change when spending time on the phone, the grown trees could die. Based on positive health and lifestyle coaching principles, this type of negative feedback should be avoided and victories should be celebrated.
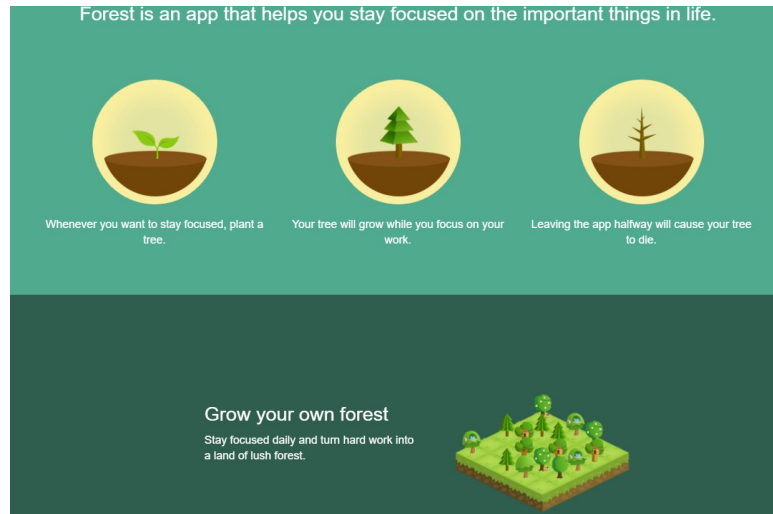
Figure 4: Forest concentration application

2.4.3 AI coaching

There are also multiple examples of online coaching intervention using AI mechanisms, like "Replika: My AI friend" [24], where people can chat with an AI to improve their mental health. Here, individualism is extremely important where the AI friend is made by the user and all conversations are different depending on the user, which seems to work well. The current project wants to move away from advising and will therefore not use an AI-type technique, but the fact that individualism works so well for mental health is an important finding. The project should take this into account in the ideation phase.
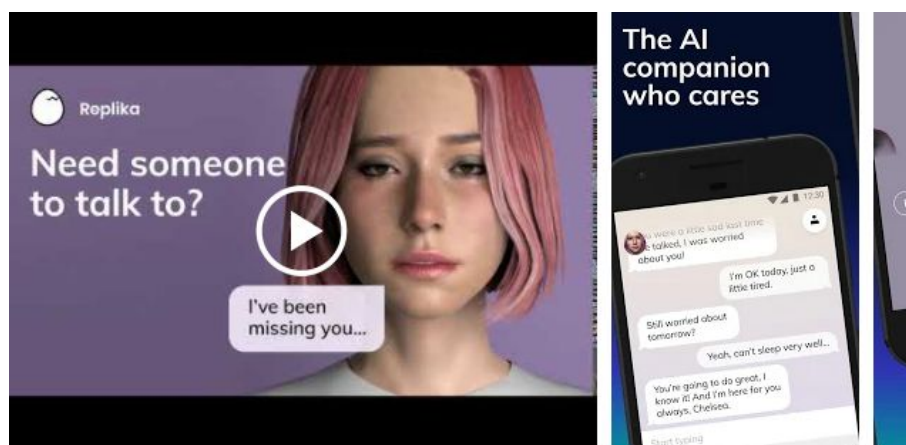
Figure 5: Replika the AI therapy example

2.4.4 Positive Health spider web

Another example previously mentioned is this report is the spiderweb application that is used in positive health and lifestyle coaching [9], which can be found in figure 1. This intervention is a data visualisation application that shows all aspects of health and allows the user to decide what they value in life and what aspect they want to improve. The intervention does not base an advice on the spiderweb, but leaves it open to avoid judgement and the 'must-do' feeling. The visualization, however, could still transfer negative emotions because users could interpret low scores for certain health aspects as disappointing. This project should visualize health in such a way it could not be perceived negatively. Furthermore, the spider web relies on the user filling in a 43-question long questionnaire everytime they want to use the spider web. Previous research showed that young adults feel like they are too busy to change their lifestyle, so needing to fill out a long questionnaire would probably demotivate them to use positive health. Because of this, the spider web is nog qualified for frequent use, let alone daily use. The current project should therefore aim at making an application that is suitable for daily use and still show progress in a clear and positive way.

2.4.5 Mental selfie

In his Tedtalk [25], Jazz Rasool explains how he wanted to capture his inner self in a picture, so as a mathematician he started to do so using numbers. He made a table grading himself and the relation between his actions and his personality. He then changed the numbers into colors and got a portrait of his mind which he called a 'mental selfie'. When he implemented this mental selfie in hospitals on people with mental health issues he started to compare people's selfies and came to the following conclusion: everyone needs other people who are similar for support, people who are opposite to them for challenge, and people who are somewhat similar and somewhat opposite for reflection. He started to match people, see figure 6. Then, he started to change the colors in such a way that he could make a terrain. Low values were valleys, high values were mountains, etc. This way, he created a virtual reality world of his mind. This method shows how important social contact is, but also how people can relate to a virtual world that is related to their mind. The idea of presenting mental state through nature and matching nature with values of life seems appealing and people seem to relate nature positively instead of negatively.
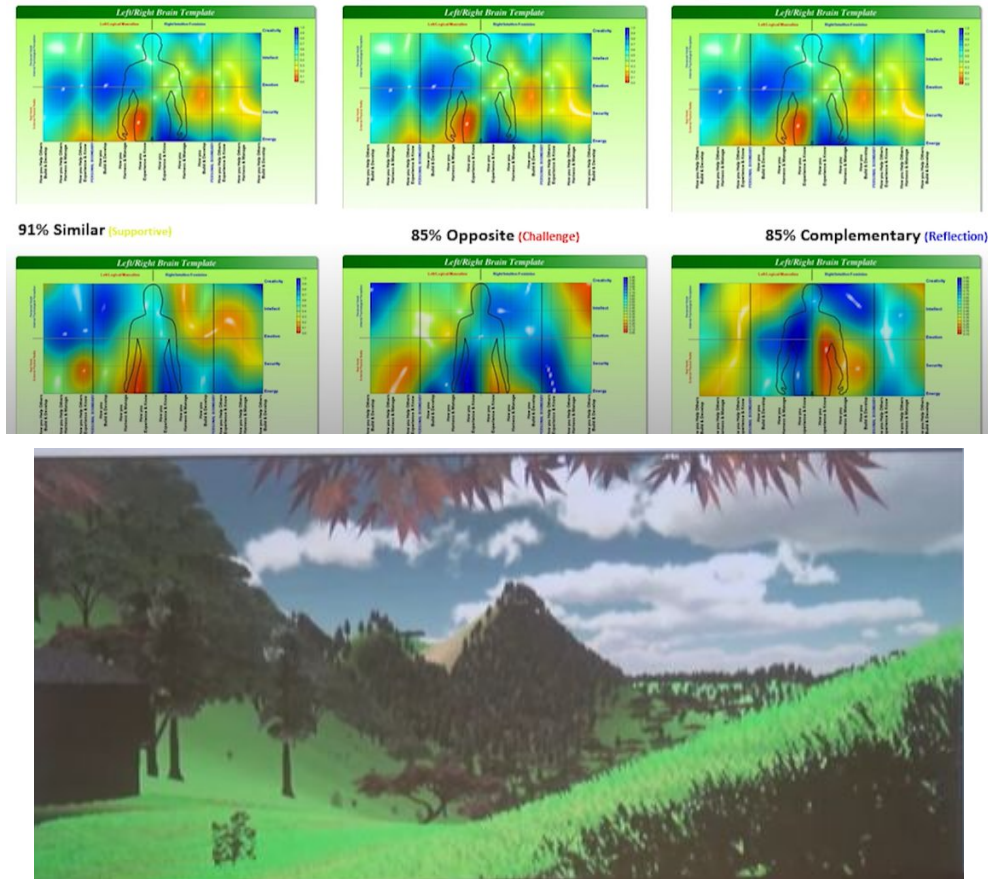
Figure 6: Mental Selfie example

2.4.6 Conclusions

From this related work, multiple conclusions can be drawn. To begin, the novelty of this project is emphasized as apps do not incorporate all positive health aspects and often have some form of negative feedback. The ideas considering nature were immediately appealing because of aesthetics and also the natural way nature grows, which seems free from negativity. The Forest app example, however, also lets trees die when the app is neglected. A mechanism like this shall not be used in the intervention of this project, but using nature as a positive feedback method is a good consideration for the ideation process. On top of that, all related work emphasizes the importance of rewards. Users stay engaged when they are rewarded for their actions immediately, which motivates them to keep going. Important also is to focus on individuality, as apps that are focused on the individual seem to perform well. Another important aspect that became more clear from the related work, is that an intervention that proposes solutions should be avoided, instead the user should be able to find the solutions that fit them and get feedback on that.

2.5 Conclusion

Concluding this chapter, there are multiple requirements for the project that should be taken into account for the ideation phase.

First, the project should take characteristics specific to young adults into account. These include the following:
- Young adults realise health benefits but are not motivated for behavior change, which means that they are already at the awareness phase, but need motivation.
- Social connection and feeling of control is highly important for young adults, so the project should contain a social aspect and be focused on self-control and awareness.
- Young adults have a broad view of health that goes beyond not being sick, so it is important that this project matches that view.

Second, the project should be in accordance with positive health and lifestyle coaching principles. This results in the following requirements:
- Health should be presented including all different aspects, which include bodily functions, mental well-being, purpose, quality in life, participation and daily life.
- Regarding the method, users of the project should be able to set their own goals within the above named aspects and the intervention should not impose solutions: The project cannot advise the user and the user should never feel like they have to perform an action, but rather like they can.
- All feedback the project provides to the user should be positive and positivity should be central.
- Important is to allow short-term goals to reach the long-term behavior change goal, so the intervention should allow short-term goal setting.

And third, from looking at previous related work, the following should be included as well:
- To keep users engaged it is important to have short-term rewards or rewards right after desired actions.
- Nature seems to convey positivity as opposed to negativity.
- Personalisation is very important.

The spider web that is currently the only tool that entails all positive health factors is not suited for young adults, as it requires answering 43 questions to get a data visualisation. Users can set goals based on the insights they get from this data visualisation, but tracking their progress with this tool is not suitable. The intervention should find a way that requires less effort and is therefore easier to use on a daily basis to track progress. The tracking of this progress should be positive feedback only and the feedback should be interesting and novel to keep young adults engaged. The goals should not be imposed on the user, but rather the user should come up with the goals. This way, self-management and control, as well as high personalisation, can be included. The research indicates that that is the key to resilience and sustainable behavior change. Based on the requirements and research, the final research question changed to the following: *"How can a positive health intervention visualize progress to motivate young adults to change behavior on all positive health components without telling them what to do?"*

3. Ideation

Before the ideation process begins, the requirements from the previous chapter need to be taken into account. Furthermore, the project still consists of multiple factors, which needs narrowing down in 3.1. After that, brainstorming sessions will be held, mood boards made, and ideas sketched. The first brainstorm in 3.2 leads to feedback categories that will be scored based on the requirements in chapter 2. The top 2 categories will have their own mood board and brainstorm to come up with concrete ideas, which will also be scored against the requirements again. In 3.3 the top 3 ideas will be sketched out, presented to the target group and a decision on a final design will be made.

3.1 Before design process

Before starting the design process the following questions need answers:
- How can we measure all different aspects of positive health
- How can feedback be given only positively (this has two sides: 1. How to positively show starting position and 2. how to positively show progression)
- How should users input their data (goals they want to achieve and that they have achieved)
- When should feedback be given (only after an action is done, or after the user indicated they want to do an action)

The first and third question consider input, while the second and fourth consider output/feedback. Due to the scope of this project, the input methods will be based on currently used positive health methods. This focusses a lot on the self-management and control of the user, so the input will be given by the users themselves. They will start off with the spider web questionnaire, whereafter the intervention should help them make and realize goals. Therefore, the intervention does not need a starting point, as the spiderweb will function as the starting point and the intervention should be able to give feedback and be used on a daily basis. This project will focus on that feedback mechanism that should fulfill all requirements from the previous chapter.

3.1.1 Input method

The current input method used by positive health is a questionnaire with a grading system. The researcher took this test and a few insights were gathered: seeing the results of the test can feel negative because of low scores, but is very clear in one glance. The results can be found in Appendix C, together with the questions that were asked in the questionnaire. The spiderweb is not likely to be shared with others due to grading, also not when improved, see Appendix C as well. This means that the social aspect is lost. The only visible grades are 0, 5 and 10. This decision can be based on the fact that people allow more of a general feel for the answer they give instead of a set number, but the test will still get a set number and calculate an average per pilar.
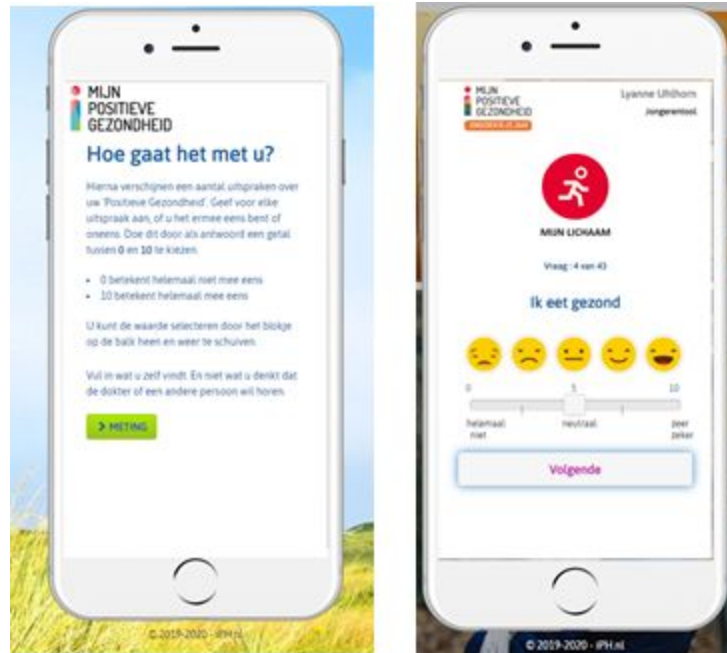
Figure 7: Positive health questionnaire

Since all health factors require different measures (sleep, exercise, nutrition, but also happiness, purpose, mental health, social interaction etc.), the user themselves will be asked for the input for the intervention, which is the same method used to make the spider web. Important here, however, is that it is easy and quick, because long questionnaires can be very demotivating and not used daily. Therefore, the researcher decided on the following: the users are asked to set up their own goals for all pillars, leaving room to connect multiple pillars to a goal. How this will be done depends on the feedback method. To check whether the intervention shows accurate feedback with the chosen input methods, the participants that test the intervention will also fill in the positive health spider web on the first and last day of the test.

3.2 Brainstorm: How to give feedback

Now that the input method is established, it is time to focus on the feedback/output. First, a general brainstorm about ways to give feedback was done using post-it notes with the question *"How to give users feedback"*. Due to corona, the brainstorm session was done by the researcher alone.

After the brainstorming session, a compact list of requirements of the feedback method was compiled, based on the requirements in chapter 2. The reason this is done after the brainstorm, is to promote creativity and inclusion in the brainstorm first, and look at the requirements after.
1. Has to be experienced as positive feedback (no negativity)
2. Must be able to show progression
3. Must stay interesting
4. Must be shareable (to add social connection to intervention)

5. Must be able to combine multiple factors or feedback methods
6. Must show overall view of health factors in one glance
7. Must be sustainable

To make the process of choosing the best feedback methods easier, all methods are categorized in table 1, however some different feedback methods could be placed in multiple categories and this should be taken into account. For this process they are comparable enough to put together in the choosing process.

Comparison	Levels	Direct	Distributions	Humor	Future view	Movement
Natural growth	Fluid levels	Verbal feedback	Shapes	Drawn cartoons	Bodily age	Shaking/Vibrating
Evolution	Height of balloons	Advise	Colors	Movie cartoons		Water flow
Developing painting	Graphs (bar, line, etc.)	Film	Mood picture			Fluid flow
Plants growing	Grades	Compliments	Jigsaw pieces			Weather
Biodiversity	Emoji	Quotes	Sculpture art			
Nature aesthetics	Signal colours	Written stories	Music			
Evolution of men	Flags in the wind	Progress pictures	Legos (build it yourself)			

Table 1: Result brainstorm categories

The researcher chose the nine best feedback category ideas from the brainstorm and put them in a grading table to find the best five feedback methods that fit the requirements. The researcher made sure that every category was represented in the grading table. The grading was done on a scale of -2 to +2 (-2, -1, 0, +1, +2) and is based on the 0-factor of the spider web that lifestyle coaches and positive health use now. This was chosen as the 0 to compare the feedback methods to, because it is the only method that is currently used to display all positive health factors and lifestyle progression. The spider web falls into the category grades, in levels.

requirements	Evolution / nature growing	Movement	Progress pictures	Written stories	Build it yourself	Fluid level	Future view	Humor	Mood picture	Standard (spider web)
1	+2	+2	-1	+1	+1	0	-2	0	0	0
2	0	0	+2	-1	-1	0	+1	0	-2	0
3	+2	+2	0	+1	+2	0	+1	+1	+2	0
4	+2	-2	0	0	+2	0	+2	+2	+2	0
5	0	+1	-2	+2	+2	0	-2	0	+1	0
6	-1	0	-2	-2	-2	0	-2	-1	-2	0
7	0	+2	+1	+2	0	0	0	+1	+1	0
Total	5	5	-2	3	3	0	-2	3	2	0

Table 2: Grading table categories

As can be seen in table 1, the top 2 ideas include natural growth and movement. To design final ideas in these categories, both categories were further refined in a mood board and brainstorm session. To find the final top ideas, another grading table was made per category (natural growth and movement). The requirements for the final ideas are the following:

1. Feedback is perceived as positive
   To ensure that through the design process this requirement is not lost it is graded here again.
2. Idea is feasible to build
   The idea should be feasible to build with the available materials and time.
3. Idea is feasible to test
   The idea should be feasible to test in a COVID-19 situation. Also when the result is a physical intervention, this should be feasible to test with at least 5 participants. Due to time restrictions this means that multiple prototypes should be made, as the design is so personal it cannot be tested with multiple people at the same time.
4. Social interaction is possible through sharing
   To ensure the social aspect that is especially important to the age group it is graded again.
5. All health factors are visible at the same time
   The creativity or aesthetics of an idea should not take away the practicality of seeing all health factors at the same time. Without this requirement, new insights are harder to see. For example: when a user works on a certain pillar they should be able to see that a different pillar also grows from this, so they can see the connection.
6. Progression feedback is clear and sustainable
   The progression the user makes should be instant and clearly visible in the design, because short-term rewards are important to keep going for long-term goals.

These requirements are slightly different from the previous requirements, because feasibility is also important in this phase of the project.

3.2.1 Natural growth

3.2.1.1 Mood board

Based on the initial brainstorm natural growth includes: Evolution, Developing painting, Plants growing, Biodiversity, Nature aesthetics, Evolution of men. The created moodboard can be found in figure 8.

Figure 8: Natural growth moodboard

3.2.1.2 Brainstorm session

Based on this moodboard, another brainstorm session was organized. The question was: *"How to give feedback in an intervention using natural growth?"*. Due to corona, the maximum number of people to participate in this brainstorm was four, so it consisted of the researcher and three participants. The participants were asked to fill in the form in Appendix D and all brainstorm ideas were put on sticky notes.

Results:
- Caring for a baby animal that grows up dependent on your progress
- Painting that evolves into a picture depending on progress: picture can be chosen by user to keep it personal
- Building a hologram of your ideal self: using young adults' interest in appearance
- Biodome: a self-fulfilling ecosystem that can change dependent on lifestyle changes user
- Building a rocket by gaining pieces from progress users that will take off and then continuing growth with space missions.

- RPG (role playing game) in a world that becomes bigger based on progress, playing on interest young adults in these game types.
- Social media followers up: using rewards that connect to young adults
- Digital or physical tree that opens new leafs based on user progress
- Composing the symphony of your life: Based on progression of the user, they will receive more parts of their song of choice (all different pillars could be linked to instruments for example, so you will need to work on all)
- Musical notes: Same as before, but building with notes so that you can hear the beginning of the song in an earlier state already.
- DNA: Building your own DNA based on real life progression to form an ideal.
- Landscape maquette that will progress (in height, etc.) based on progression of user
- Planting tree app: App that plants trees when users perform desirable actions. Could also be applied to different good causes that could be chosen by the user depending on whether the app has that cause organization as a business partner etc.
- Expanding universe: Different health pillars can be different types like planets, stars, moon, etc. that can be built from desirable real life actions from the user.
- Flower bouquet: Different colored flowers for different pillars that can open and/or appear based on progress from the user.
- Earth Globe: Users will be able to build their own world based on progression in real life lifestyle. The different pillars could be represented by different aspects of the world including for example water (rivers, seas), forest (trees), meadows, etc. That could grow based on progression.
- Learning survival skills that are needed in an expedition game that you play for example with friends: This is social and different pillars could teach different skills and improve them etc.
- LED's to make an image: the LED's could turn on dependent on actions in real life and different pillars could be different colors. Users will need all colors to form the picture and therefore progress in all different aspects
- SIM games: building and living based on progress in real life
    - Sim Farm: build your own farm based on actions in real life (progress)
    - Build your own city based on real life progressive actions

3.2.1.3 Grading table top 8 ideas

From these results, the researcher picked a top 8 that was most appealing to grade in table 3.

requirements	Bio dome	Growing tree	Symphony of life	Expanding universe	Earth Globe	LED image	Flower bouquet	Good causes app	spiderweb
1	+2	+2	+2	+2	+2	+1	+2	+1	0
2	-1	-1	-1	-2	0	-1	0	-2	0
3	-2	-1	0	0	0	-1	0	0	0
4	+1	+2	+2	+2	+2	+2	+1	+2	0
5	0	0	0	0	0	-1	-1	-2	0
6	-1	0	0	0	0	0	-1	-2	0
Total	-1	2	3	2	4	0	1	-3	0

Table 3: Grading table natural growth ideas

This initially results in the *earth globe* and *symphony of life* ideas. Furthermore, the growing tree scored low only for feasibility so an easier concept like an application of a growing tree instead of a physical growing tree would result in high grades as well. This results in the following ideas: *Building your own globe* or *growing a tree* and *symphony of life*.

3.2.2 Movement

3.2.2.1 Mood board

Based on the initial brainstorm movement can be expressed as: shaking, vibrating, weather, water flow and fluid flow. The moodboard created on this category can be found in figure 9.

Figure 9: Movement moodboard

Based on this moodboard, another brainstorm session was organized. The question was: *"How to give feedback in an intervention using movement?"* Due to corona, the amount of social contact had to be minimized, so the brainstorm was done in the same session and with the same participants as the previous session on natural growth. The same consent form and method using sticky notes was used.

Results:
- Water that turns to a multicolor pattern: different colors could be injected in water with every color standing for a different health pillar. The amount of color will be based on the user's lifestyle and the colors will be able to move when the object is moved as well.
- Moving ants: Rebuilding an anthill with moving ants, where different paths lead to different pillars.
- Minecraft-like game: The game could entail building blocks to play the game with, and the more progression the more different blocks the user will have. The different health pillars could be connected to different types of blocks.
- Boardgame: based on real-life actions from the user, their game character will be able to move forward.
- Opening flowers: Different colored flowers per pillar that will open based on progression.
- Fireworks: gaining different fireworks based on progression in all pillars and at the end of the year the user can see all different fireworks made into a show. If a year is too far away for a goal, it could be at the end of every month for example.
- Flipbook: A flipbook with a story can be built based on progression with new pages to the story as reward. All pillars will add different elements (text boxes, drawing, etc.)
- Colored mirror/glass: Different pillars have different colors that can be chosen by the user. The colors spread behind a glass, forming an art piece intervention that can be put on the desk or hung on the wall. The colors can move around when the user works on that pillar.
- Water Wave that crashes on land: building up the wave with desired actions in real life, to find the results of that when the wave crashes on land and shows the results: the water transported treasure of different forms that are connected to the different pillars.
- Waterfall / waterfontein: distributing water and speed of water dependent on progress.
- Domino's: Building a figure in domino's with different parts of that object for different pillars, when falling back only a part will collapse within that pillar, not all parts, to show how little is lost (resilience).
- Lavalamp: Moving lava lamp with different colors lava per pillar. Multiple parts dependent on the user's progress.
- Wind Chimes: when doing a desired action, the wind chimes will klink. Different sounds/chimes per pillar composing sound together.
- Mini drones: mini drones that can group and make shapes dependent on real life actions the user performs.
- Waving flags: flags that are designed to be able to move from itself, when a desired action is done they can become higher, roll out or start to move 'in the wind'.

- Music water organ: the more desirable actions the user performs, the more the different cans get filled with water to make music.

From these results, the researcher picked a top 8 that was most appealing to grade in table 4.

requirements	Wind Chimes	Colored mirror/glass	Lavalamp	Opening flowers	Music water organ	Fire works	Domino's	Waterfall/fontein	spiderweb
1	+1	+2	+2	+2	+2	+2	+1	+1	0
2	0	0	-1	0	-2	0	-1	-2	0
3	0	-2	-2	0	-2	0	0	-2	0
4	-1	+2	+1	+1	0	+2	+1	0	0
5	0	0	0	-1	-1	-1	0	0	0
6	0	0	0	-1	-1	-1	0	-1	0
Total	0	2	0	1	-4	2	1	-4	0

Table 4: Grading table movement ideas

From this could be concluded that the fireworks app should be implemented. However, when looking at the different types of requirements it becomes clear that the colored mirror/glass and lava lamp would score just as high when the feasibility is reconsidered. This results into the following conclusion: An app with fireworks and a version of colored glass or lava lamp design that is feasible to make are the preferred options. The firework, however, did not score high enough in comparison to scores from the previous category, natural growth, and will therefore not be included. The same goes for the colored glass, however, that would have a high enough score if the feasibility score was higher. The reason for this low grade is because of the time limit and resources of this project. Making a physical product instead of an application requires multiple prototypes for the testing period. If the test consists of 4 people that need to use the product for a longer period of time, 4 prototypes need to be made or people need to test the prototype after each other. Both options take a long time, either in the building or testing phase. It is however important to carry this idea to the next phase, because it would have the highest score of all without the feasibility. If this idea turns out to be the preferred design, solutions can be made like a longer testing period, less participants or an efficient way to build multiple prototypes fast.

3.3 Top ideas

Based on the previous grading tables, the top 3 ideas are the following:
1. A globe or tree growing app (same idea, different visual)
2. An app that makes music from pillars
3. Colored glass physical desk idea (lava lamp is same idea, different aesthetic)

These ideas were run past the target group (young adults) to see which design is preferred and because a lot of the researchers own perception and assumptions influenced the ideation process so far. Asking feedback from the target group before proceeding to a final idea ensures the design fits with their needs and preferences. Based on this choice, the specification process will start. The questionnaire questions can be found in Appendix E. To gain perspective in the interests and characteristics of the participants, a few questions are asked before starting the ideation related questions. And before these questions, the participants are asked for consent.

3.3.1 Descriptions.

Idea 1 consists of the globe and tree idea. Both ideas present feedback by growing nature.

Idea 1.1 Globe
A globe subscribes different natural components to the health pillars. For example tying bodily functions to forests, mental health to water, purpose to mountains etc. The more the user progresses the pillar, the more growth there will be on their planet with this type of habitat.

Figure 10: Globe application idea

Idea 1.2 Tree
This is an application where each different branch represents a health pillar. When you perform an action in that pillar, the tree will grow and branch out. For example: eating healthy will grow a new branch on your bodily functions branch. If you also drink more water, a branch will grow from your grown nutrition branch etc.
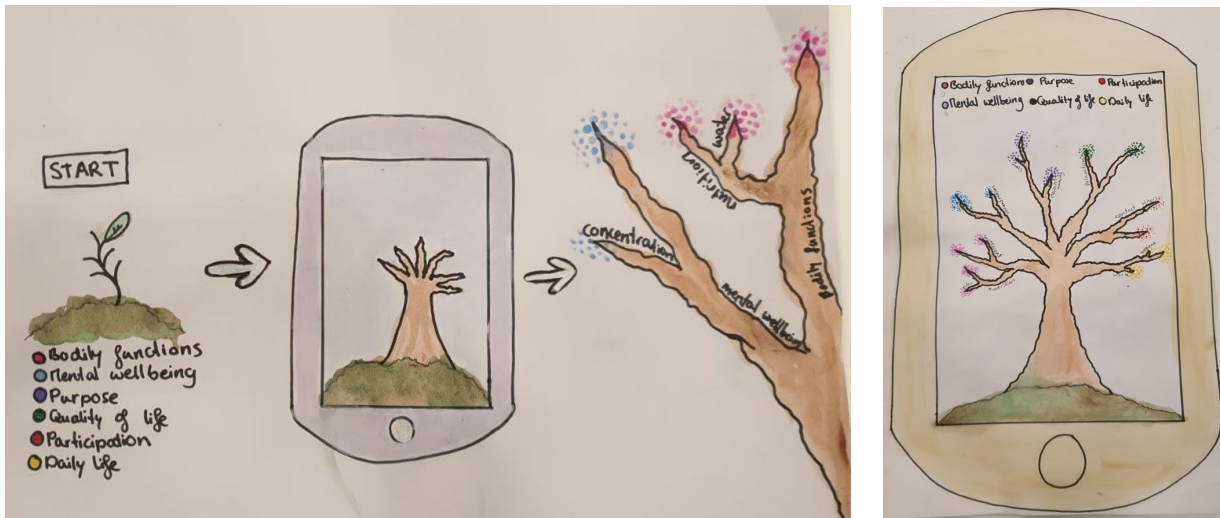
Figure 11: Tree growing idea

Idea 2: Music app
In this case, an application will be developed where different instruments will be tied to different pillars. Bodily functions could be the drums, mental health the voice, purpose the base, etc. The more the user improves these pillars, the further they will get in the song. To personalize this idea, different genres or even specific songs could be chosen by the user.
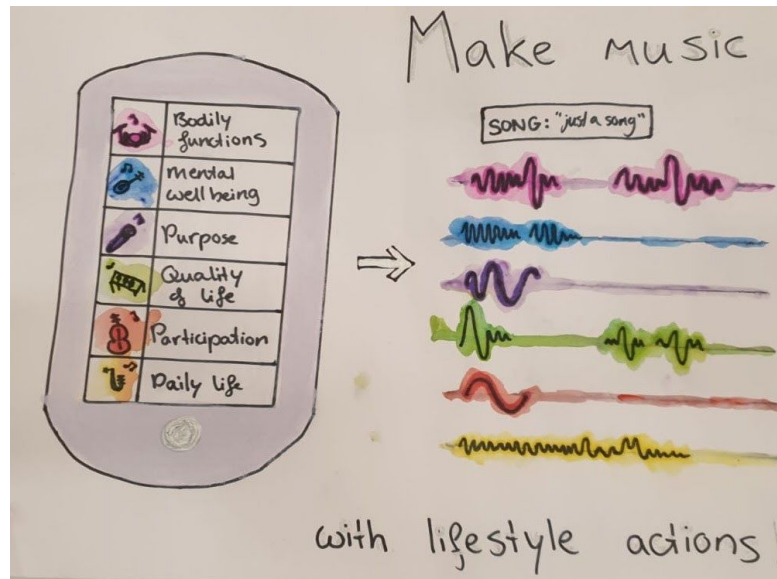

Figure 12: Symphony of life idea

Idea 3: Colored glass physical
In this idea, a physical intervention will be made as opposed to a web-based or mobile application. This physical intervention will still be connected to a mobile application that will send the input from the user to the physical part. The intervention will link different colors to different

pillars. To avoid color assumptions (like negativity with red for example) the user can pick the colors. These colors will move through glass to be aesthetically pleasing and when a user improves a pillar there will be more of that color in the glass. This means that there will have to be a base color like white or even see through so that the different colors do not take over each other.
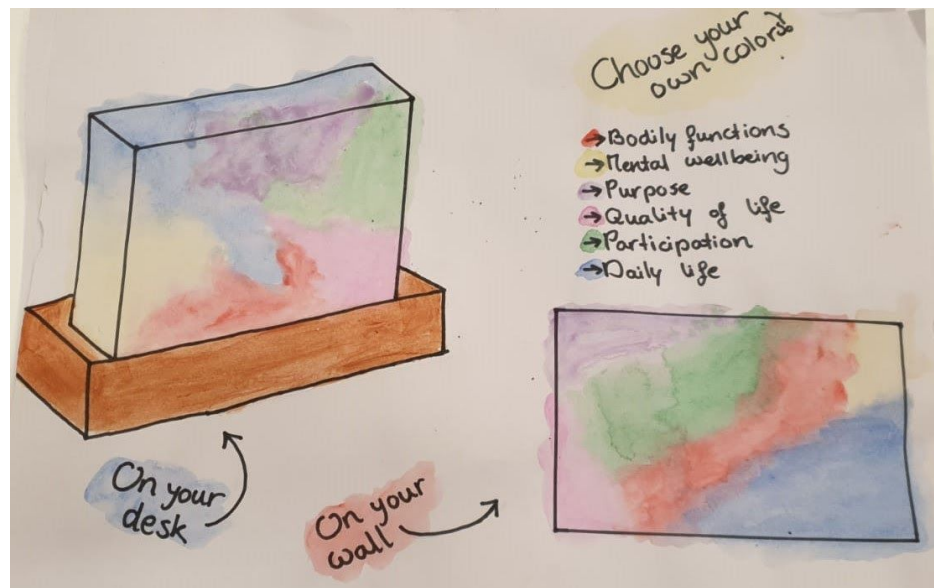

Figure 13: Colored glass idea

3.3.2 Results

The results from the questionnaire can be found in Appendix F. When comparing the positivity levels of all different designs, the most positive is the Globe and the most negative the music. Order: Globe, Tree, Colors, Music. Least likely to make lifestyle changes is also Music, so this idea can be discarded quite obviously. Most likely to make lifestyle changes is also the globe, after that the colors, then the tree and the music. From these results the globe seems to be the preferred design, however when asked which design is preferred theColor is voted on 17 times and the Globe 'only' 14 times. Despite the tree having a lot of positive feedback and the music a lot negative, the tree is only voted on 6 times and the music idea 7. Two people indicated that they do not believe applications would help in lifestyle but one of them indicated that they would prefer the globe if they had to choose.

From the notes it could be indicated that the tree was mostly too simple/boring to be chosen as a favorite. The opinions go two ways: Either the tree is more clear than the globe or the globe is more exciting. Furthermore there were almost 3 times as many males as females to pick the globe idea as favorite. It is also the only idea compared to a game, so the difference could have to do with gametype preferences but there is no question about gaming as this is an unexpected reference, so there is no way to check this.

When comparing the globe and colors, since these seem to be the most liked designs, a few things stand out. First, people seem to mostly like the colors design for two different reasons: 1. Because it is a physical object as opposed to an app and 2. Because even though other people could see it, it does not mean anything to them, only to the user. The downsides, however, that people name are: that colors have associated feelings that one might not want, that progression is less clear and obvious and that there is no possibility to keep growing. The globe has negative feedback that says that people seriously doubt an app would motivate them. When comparing the two, the globe might result in competitive behavior and demotivation for people who have an empty globe and see someone's full grown beautiful globe. The colors do not have this issue, as people indicated that it is nice that others cannot draw conclusions about how you are doing. However, the globe seems more clear in showing progression than the colors idea. On top of that, the issues that are mentioned with the globe could apply to any other idea, while the problems of the colors idea are more problematic.

Based on these results, the Globe idea is the idea that will be specified in the next chapter.

4. Specification

Now that the ideation is done, it is time for specification. Based on the results from the target group feedback, the final design to be further developed will be the Globe, which was design number 1.1 from the previous chapter. In order to do so, this chapter will execute multiple small lo-fi tests to explore different options and ideas. From these tests, results will be concluded to technical and design decisions.

4.1 Questions

First, a list of needed tests needs to be made and the different tests need to be worked out. The list, based on previous results from the survey and the literature research:

Practical questions

- When should feedback be given: after the user puts input in, or while the user puts input in?
- How can the application know which pillars to match to a goal, and if it applies to multiple pillars?
- How much information should be provided to the users to make them understand the pillars, without limiting their freedom and control? The information should not push them in directions they might not want to go.

Design questions

- What should the menu set-up be like and how should the user add goals etc?
- What is the clearest way to show progression feedback by growing the globe?

This requires multiple lo-fi tests. These tests will aim at answering the questions above.

4.1.1 Practical questions

When should feedback be given?

When thinking about the first question, multiple arguments can be made. Important to the researcher, however, is that the users focus on their activities and do not get distracted by the application on their phone while performing actions. To this means, feedback is better given after completion of an action as opposed to during: The user can only see progress when they look at their phone. And if they do not look at their phone while performing the action, they will see the end result and the purpose of showing feedback during actions is gone. So the researcher decided on giving feedback after an action is achieved. To achieve this, all goals will have checkboxes to tell the application the goal is achieved.

How can the application know which pillars to match to a goal, and if it applies to multiple pillars?

Research needs to be done into ways of measuring what pillars a goal matches to. Because of the scope of this project, the user will be asked to put in this information themselves. That is why the application should have the possibility for users to link a goal to multiple pillars. Implementing this can be done in different ways: the user could be asked a set of questions to determine the best suited pillar(s), but this contradicts with the requirement to make the application easy and short, not needing a long questionnaire. That is why the researcher decided to let the user pick the pillars themselves, allowing them to pick as many as they want per goal.

How much information should be provided to the users to make them understand the pillars, without limiting their freedom and control?

To answer this question a user test needs to be conducted. The design questions also need user testing, so the next phase is Lo-Fi testing.

4.1.2 General method Lo-Fi tests

The method of recruitment and selection of participants will be the same for all tests. The participants will be chosen from the target group, which consists of young adults between the ages of 18 and 30. The participants will be selected from the University of Twente region, to minimize traveling according to the corona measures. Due to this restriction, all participants will be alumni or current students of the University of Twente. This results in a high intelligence level among the participants which could influence the results of the test and should therefore be clearly stated.

Due to corona, the tests should be done with as minimal contact as possible A file of corona regulations during testing can be found in Appendix G and has been approved by the ethical committee of the EEMCS-faculty of the University of Twente. To avoid bias and the possibility to learn from previous scenarios, all lo-fi tests will be ordered in a specific way, which will be described separately for all tests. There will be 4 participants per test, minimizing social contact.

Ideally, all tests will be done in a public space like the Bastille on the University of Twente campus. When this is not possible, the researcher can visit the homes of the participants, with the limit of the amount of people that is set by the government at that point in time. If a lockdown takes place the tests will be moved to an online environment in which case the researcher has to make all participants aware of the privacy regulations of the platform. Consent forms will in this case be sent digitally. All tests will start with signing the consent form that can be found in Appendix H. After that, the participants will be asked to fill out a demographic form and then the tests can begin. The tests will be paper prototypes, to ensure the participants do not change opinion because the prototype looks like a lot of effort and because there are a lot of tests that need to be done.

4.1.3: Lo-fi Test 1: Providing information

This Lo-Fi test aims at answering the practical question "*How much information should be provided to the users to make them understand the pillars, without limiting their freedom and control?*"

Goal: The goal of this test is to find out how much information the user needs to set it's own goal based on the different positive health pillars. This is necessary to implement one of the most important parts of lifestyle coaching and positive health: the ability to set one's own goals.

RQ: "How should the intervention suggest actions divided into the positive health pillars?"
      Sub-RQ 1: "How much control does the user feel like they have?"
      Sub-RQ 2: "How clear is the goal of all health pillars?"
      Sub-RQ 3: "How capable are users of setting their own goal?"
      Sub RQ 4: "How capable are users of relating their goals to the health pillars?"

The prototype
Options: Have a set of suggested actions and add options, have only add options with explanation, or provide categories. This results in a playtest with different prototype options.

Option 1: the menu of the game only has the names of the pillars and the sentence they come with.

Pillar	Explanation
Bodily Functions	I feel healthy and fit
Mental Wellbeing	I feel happy
Purpose	I have faith in my future
Quality of Life	I enjoy my life
Participation	I have good contact with other people
Daily Life	I can take care of myself

Table 5: Pillar sentences

Option 2: Now the user gets a list of categories per pillar. Based on an analysis of the questions asked in the spiderweb positive health test, Appendix C, the categories are as follows:

Bodily functions	Mental wellbeing	Purpose	Quality of life	Participation	Daily life
Movement, Nutrition (water), Sleep	Concentration, Stress management, Self love, positivity, Control, Problem solving, Happiness	Development, decision making, thankful, faith in future, goals and ideals	Safety, balance, Happiness, self love, resources (money, living situation), relaxation	Support, belonging, Social contact, acknowledgement, meaningful activities, interest in society	Work, Managing finance, household tasks, Planning, help seeking, strengths and weaknesses

Table 6: Pillar categories

Option 3: The user gets a set of example actions and can add their own goals as well. The example actions per pillar are:

Bodily functions	Get 8 hours of sleep every night	Take a walk before school
Mental wellbeing	Read 5 pages of a nice book every day	
Purpose	Write down what I am thankful for before bed	Get an 8 for my next test
Quality of life	Take every tuesday night off for myself	
Participation	Read the newspaper every morning at breakfast	Call with a friend every day
Daily life	Doing the dishes right after using them	

Table 7: Example goals

Set-up evaluation
All three prototype options will be shown to all the participants and the order will be option 1-3. The participants will be set opposite of the table from the researcher, with at least 1.5 m distance, see corona measures in Appendix G. After the consent form that can be found in appendix H, the researcher will give the following introduction speech:

"Thank you so much for participating in this research. I will ask you to fill in a demographic form first and afterwards we will start the test. I will provide three different prototypes and ask you to perform a task. After each prototype I will ask you some questions. Take all the time you need and do not hesitate to ask questions if you do not understand something. We will now start with the first prototype. As an introduction I will shortly tell you about my graduation project and what I expect from you today. My project is about lifestyle changes and I am developing an application that shows progress based on six different pillars. These pillars are determined by the positive health movement, which stands for health as being more than the absence of

illness. I also want users to be able to set their own personal goals and take control. I will present you with the six pillars that I talked about and ask you to note down the goals you would want to achieve in this pillar. The app will provide a checkbox for you to check off after reaching that goal"

Afterwards, the participant will fill in the Demographics questions on their laptop. Results from this form can be found in Appendix I. Then, they will be provided with option 1 from the prototype. Afterwards, they will be presented with option 2 or 3 and lastly the option that is left. The researcher will note the order for each test and after every options the following interview questions will be asked:

Questions all prototypes
Q: What do you think the different pillars stand for?
Q: Why did you choose these actions as goals?
Q: How complete do you feel this approach is in defining health?

Extra questions to add for option 2 and 3:
Q: Is there anything unexpected in this list?
Q: Why did you (not) change these goals?
Q: Why did you add/delete these goals?
Q: How does this information influence you?

At the end of all tests:
Q: Is there anything you are missing in the list to define health?
Q: Are there any goals you want to achieve that you cannot categories in these pillars?
Q: How does this new information affect your freedom of choice to set goals?
Q: Which information is useful in helping you formulate your goals?
Q: Do you have any final remarks?

The interview will be an open interview, so there is room for more debt and elaboration if the researcher feels like more explanation to answer the question is valuable or needed.

Results and conclusion
Results can be found in Appendix J. During the interview, it became clear that participants often explained what they were doing while they were doing it, so some questions became irrelevant. In the intelligent verbatim transcription in Appendix J, this is indicated. All participants were successful in understanding the meaning and goal of the pillars and were successful in formulating goals for all pillars that suited the pillar. They did, however, all change their goals or added goals after the second and third information sheet. All participants indicated that they would find it beneficial if both the categories and examples were mentioned in the app in some way. Most indicated that, to acknowledge one's own ability to think and motivate users to think for themselves, it would be better to make a button of some kind so that users can choose to see extra information but also not to see the information. Furthermore, they did not feel pushed in a direction or controlled by the information in any way. Most goals were still too complex

when they first had to write them down, and got to an achievable level after the second or third information sheet. Demographics did not show many differences, the only thing that stood out is that females tend to say they are more likely to change their lifestyle than males, but with a sample group of 4 this cannot be stated. The researcher can take it into account for future tests.

4.1.4 Lo-fi Test 2: User interface menus

This Lo-Fi test aims at answering the following design question: *"What should the menu set-up be like and how should the user add goals etc?"*

Goal: the goal of this test is to measure if the menus in the app make sense and if they should be adjusted to be more clear - and if so how. The test will also measure if the order in which the goal input and pillars are shown to the user influences the goals they make.

RQ: How should the menu of the application be presented to the user for the best user-technology interaction?
       Sub RQ1: How does the timing of asking the user to put in a goal influence their goals?
       Sub RQ2: How does the timing of asking the user to put in a goal influence their ability and confidence to set goals?
       Sub RQ3: How clear is the goal of the application based on the menu setups?

The prototype
Option 1: Type in goal and choose matching pillars.
Option 2: Type goal in pillar and get a question if it also matches different pillars.

This will be done by making a paper prototype to simulate the menu setup. This way, the results can be used to program the application in unity based on the results instead of having to do coding work to test the same thing. A picture of the paper prototype can be found in figure 14.

Figure 14: Lof-Fi test 2 paper prototypes

Set-up evaluation
The same participant recruitment method as in the previous lo-fi prototype tests. The introduction story will be the following:

"Thank you so much for participating in this research. I will ask you to fill in a demographic form first and afterwards we will start the test. I will provide two different prototypes and ask you to perform a task. After each prototype I will ask you some questions. The prototype will consist of menu set-ups for the application that I am making. As an introduction I will shortly tell you about my graduation project and what I expect from you today. My project is about lifestyle changes and I am developing an application that shows progress based on six different pillars. These pillars are determined by the positive health movement, which stands for health as being more than the absence of illness. I also want users to be able to set their own personal goals and take control. I will present you with the six pillars that I talked about and ask you to note down the goals you would want to achieve in this pillar. The app will provide a checkbox for you to check off after reaching that goal. To find the best method of presenting menus to you, I will ask your opinion on the menus as well."

Afterwards, the participant will fill in the demographics form and be presented with the paper prototype. The yellow phone cut-out is placed on the first menu as done in figure 14. The interview starts with the following questions:

Q: Can you view your goals?
The participant will need to press the "my goals" button. If they do, the researcher can move the phone to the next screen, which is Pillars.

Q: What do you think this page means?
Q: Does it make sense to be the next page for you?
    Q: Can you explain why?
The researcher will ask the participant to continue, when the participant clicks on one of the pillars, the Daily Life page will show in the yellow phone case.

Q: What does this page mean?
Q: Does it make sense to be the next page for you?
    Q: Can you explain why?
The researcher will now move the yellow phone case back to the main menu and ask the participant to view their globe. When the participant clicks "My globe", the globe page will be visible.

Q: What does this page mean?
The researcher will show the matching information pillars with models and ask the participant how they would want to view this information about the globe. They can use the premade buttons, or come up with their own. The researcher will always ask why the participants choses something. Afterwards, the New goals page is shown to the participant.

Q: What does this page mean?
Q: Could you explain all the buttons on this page?
Q: Does this page make sense as the next page to you?
The participant will lay all pages next to each other.

Q: Where would you prefer to have the add goals button?
Then, the researcher will walk through all pages with the participant again and show them the extra buttons they could place. The participant will also explain that the participant can make their own buttons as well. At every page, the participant will ask the following questions:

Q: Is there any information you are missing on this page?
Q: Are there any buttons you are missing on this page?
Q: Are any of the existing aspects on this page unclear?

After the semi-structured interview, the researcher will ask the participant if they are satisfied with the results and if they have any other feedback or anything they want to share. Afterwards, pictures of the resulting pages will be taken and used together with the recorded audio to form the results.

Results and conclusion
The results of the test can be found in Appendix L, which has a summary of the interviews as the interviews turned into a long conversation where many questions were answered before asking them etc. The results from the demographic form that the participants filled in before the start of the test can be found in Appendix K. Some general buttons that were missing were added by most participants, like a 'back' button. One of the participants also added an option to return to any of the pages from every page by adding a 'menu' button. All participants added a 'next' or 'save' button at the add goals page. Furthermore, all participants indicated that the information on the globe page was necessary, however the globe should be as big as possible so the information should be a pop-up. All extra information that was available about the pillars was added as pop-ups by all participants as well, never on the pages itself. The "add goal" button was sometimes placed on the pillars page, sometimes on the specific pillar pages and sometimes on both. Most participants doubted where to put the button so the safest option is to add the button at both pages and check how people react when using the app daily. Furthermore, most participants wanted information on specific pillars as well as the information on all next to each other. The clearest way to do this was a 'i' button for information. The pillars button was never used. Added buttons included the following: a history button to view accomplished goals, a statistics button to see statistics pop-up at the globe page, a save button to save new goals, next and previous arrow buttons and a menu button. One of the participants added another page with information about the pillars and positive health in general with a "don't tell me this again" button so that users can see this information when using the app first but can remove it when they are familiar with the information. The history button is a feature that could definitely be added to the app later, but first a test should be done whether users want to save their achieved goals and if they want a list, a list per pillar etc.

4.1.5 Lo-Fi test 3: Showing progress

This lo-fi test aims at answering the following design question: *"What is the clearest way to show progression feedback by growing the globe?".*

Goal: The goal of this test is to determine the clearest way to show progression feedback to the user, specifically the placement of the nature models on the globe.

> *RQ: How should feedback models be distributed over the globe to give clear feedback to the user?*

The prototype

The prototype is a paper prototype where the globe will be cut out, as well as all the nature models. They will be coloured in and put on the globe based on the test. There will also be a list of all pillars with their matching habitat to keep it clear. The different options are:

Option 1: Distribute the pillars in different regions/zones on the globe so that the user can see progress per region (per pillar).
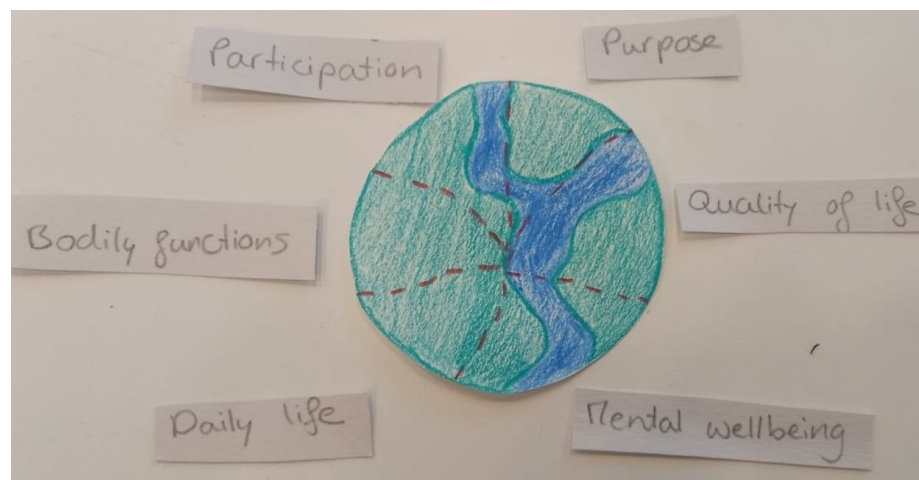

Figure 15: Paper prototype pillar zones

Option 2: Link nature models to different pillars and place them on a random spot on the globe. The same paper prototype will be used, however the globe will not be distributed in different zones.

Figure 16: Paper prototype piller models

Set-up evaluation
The participant selection and method will be the same as in previous lo-fi prototype tests. The test will be within-subject again, so all participants will be exposed to both prototypes. After filling in the consent form, the researcher will tell the following introduction text:

"Thank you so much for participating in this research. I will ask you to fill in a demographic form first and afterwards we will start the test. I will provide two different prototypes and ask you to perform a task. After each prototype I will ask you some questions. The prototype will consist of possibilities for the application that I am making. As an introduction I will shortly tell you about my graduation project and what I expect from you today. My project is about lifestyle changes and I am developing an application that shows progress based on six different pillars. These pillars are determined by the positive health movement, which stands for health as being more than the absence of illness. I also want users to be able to set their own personal goals and take control. The app will provide a checkbox for you to check off after reaching that goal. When you achieve a goal, you will start building your own globe, based on the six pillars. We will try to find the best way to do this today. "

The interview was a semi-structured interview. Questions will be as follows:

Questions after prototype 1 and 2 separately
Q: What do you think this means?
Q: What could you say about the person who's globe this is?
Q: Do you think this is a clear way to show you progression?
Q: Would this motivate you to change some lifestyle choices/actions?
     Q: If so, why?

Questions after both designs
Q: After seeing these prototypes, would one have your preference?
     Q: If so, why?
Q: Do you have any other feedback or thighs you want to say?

Results and conclusion
Results can be found in Appendix N, as well as the demographics results in Appendix M. The results are transcribed in intelligent verbatim style. Based on the results, dividing the pillars in regions seemed less clear than matching a certain nature model to the pillars. Participants indicated that one nature model is an easier match than a region with a lot of different models. They also wondered about the differences in models: What does it mean if you get a tree and what does it mean if you get a flower? Even if it would be randomized, the user would most likely wonder about the different meanings. Some also indicated that they were wondering if the size of the regions would also matter for how much they would have achieved. Explanations given of the globe were also very different from each other at the second globe where everyone gave about the same explanation for the first globe prototype. Therefore, habitat seems a better option as opposed to regions. Most participants also indicated that they liked the first prototype (habitat) more than the second (regions) because it felt more playful and the randomness was connected to "fun" for them, except for participant 1 who did not have a preference.

4.2 Conclusions

To conclude the results from the Lo-Fi test, the questions asked in the first paragraph wil be answered.

Practical questions
- *When should feedback be given: after the user puts input in, or while the user puts input in?*
  Feedback will be given when the user tells the app that they achieved a goal, which they can do by using a checkbox.
- *How can the application know which pillars to match to a goal, and if it applies to multiple pillars?*
  The user will be able to match as many pillars as they want to the goal they are adding.

- *How much information should be provided to the users to make them understand the pillars, without limiting their freedom and control? The information should not push them in directions they might not want to go.*
  The information that will be displayed includes a short explanation sentence from the positive health website, a list of categories per pillar and a list of 1-2 example goals per pillar. The information will not be displayed at all times but will be optional by clicking an information button.

Design questions
- *What should the menu set-up be like and how should the user add goals etc?*
  The menu will have a my globe and my goals button. The goals button will take the user to the pillars, where they can add a goal. They can also go to a specific pillar to see their goals, where another add goal button will be added. There will be back buttons and the information buttons will be an i icon. The information will be displayed on the pillar page and pillar specific information will be displayed on the pages of the specific pillars. The globe will have a pop-up menu with the pillars and their matching natures. The add goal page will also have a save and back/cancel button.
- *What is the clearest way to show progression feedback by growing the globe?*
  The method will be different models (tree, bush, flower, grass, mountain and house) that are connected to a specific pillar. They will be placed on the globe randomly.

After the specification of the Globe idea on these different fronts, it is time for the realisation of building the application based on the Lo-Fi tests.

5. Realisation

Now that the idea is clear, it is time to realise the concept into a true version that can be tested. To do this, multiple factors played a role. This chapter will explain the process of realising the application.

5.1 Models and pictures

First, all models had to be made. The program used to make the 3D model is Maya. The models that needed to be made are: the globe model and all pillar models.The resulting models can be found in Appendix P. The textures were added in Maya and later imported into Unity. A list of the models per pillar can be found in table 8.

Bodily functions	Tree
Mental health	Bush
Purpose	Flower
Quality of life	Grass
Participation	Mountains
Daily life	House

Table 8: Pillars and their models

For the information that needs to be provided in the app, multiple information sheets will be made based on the results of Lo-Fi test 1 in the previous chapter. Adobe Photoshop was used to make these sheets, which can be found in Appendix P. The button icons that were needed based on the results from Lo-Fi test 2 were made in Adobe Illustrator and can also be found in appendix Q. A list of all the needed pictures is:

- Background
- Main menu background
- Logo
- Explanation positive health
- Explanation pillars with categories
- Example goals
- Explanation per individual pillar including sentence, categories and example goals.
- Matches pillars and models
- Back button
- Information button
- Keep a goal or not menu

5.2 Coding process

Alongside making the models and images, the coding process started. The researcher decided to code the app using Unity and building this to android devices. The scripts were written in Microsoft Visual Studios. The code in Unity can be found in Appendix O. First, the different scenes and their interaction was established, see figure 17. The first step in the coding process was making all the scenes and giving it the buttons it needed per page, based on the results from the Lo-Fi test in the previous chapter.
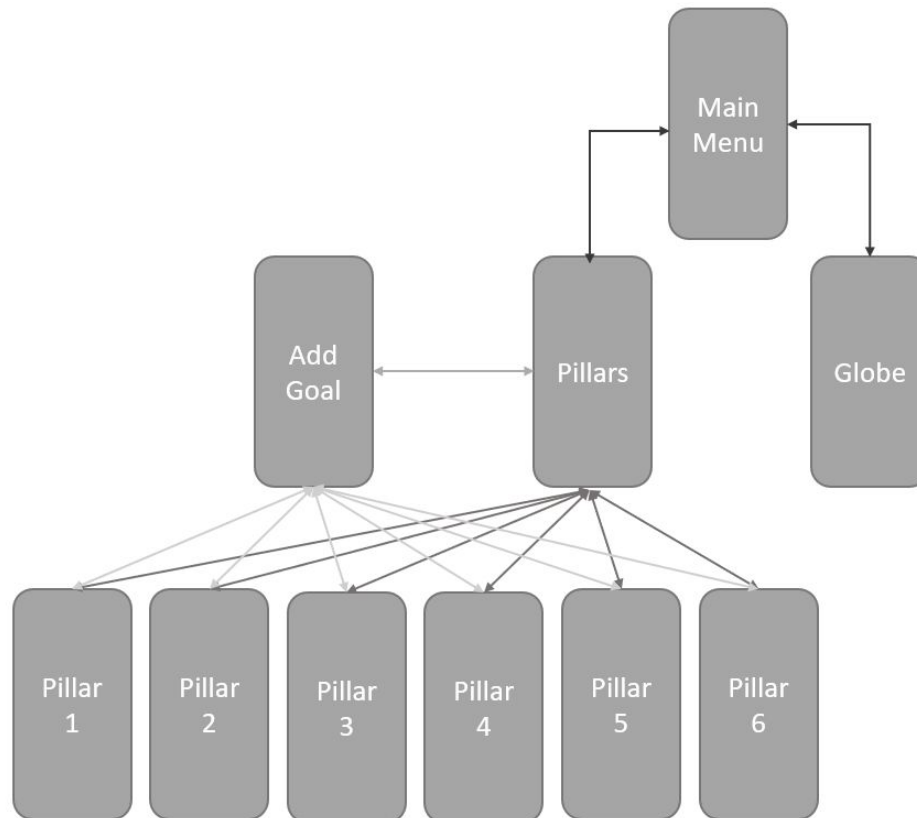
Figure 17: Unity scenes and their interaction

To start the coding process, To do lists were made to cross off when a step was finished. All scenes got their own to do list, so if something does not work and too much time is spent fixing it, another aspect can be done. The lists were as follows, and do not include the buttons to go to another scene, because those were already done based on figure 17 as the first step:

Main Menu
-   Make a Quit button to get out of the application

Pillars
-   Make an information button that has a pop-up with all positive health and pillars explanation. Also add a button to exit the pop-up.

Globe
- Load all Maya models
- Make an information button that has a pop-up with matching pillars and their habitat models. Also add a button to exit the pop-up.
- Write code to plant trees, flowers, bushes, etc. based on the achieved goals per pillar.
- Make sure the models get placed in a gravity way, not all the same direction.

Add Goal
- Make a box where users can type in their goals
- Make checkboxes for all pillars
- Make an information button that has a pop-up with all pillar information. Also add a button to exit the pop-up.
- Make an example goals button that has a pop-up with example goals. Also add a button to exit the pop-up.
- Save the input using PlayerPrefs in a way that it matches the written goal to the pillars and knows which scene it should go to.

Pillar scenes
- Add an information button that has a pop-up with information on the specific pillar. Also add a button to exit the pop-up.
- Ensure that the input goals are placed on the page as a list underneath each other.
- Make a checkbox for every goal to check off when a goal is achieved and make sure it only appears when a goal is added, not when there is no goal yet.
- Attach a pop-up menu to the checkboxes to ask whether the user wants to keep the goal or not. When pressed "yes", the checkbox should stay unchecked and if "no" the checkbox should be checked. When "no" is pressed, the users should not be able to uncheck the checkbox again. Also add a button to cancel and go to the globe scene when "yes" or "no" is pressed.
- Save the achieved goals in PlayerPrefs and whether the goal should be kept or not, based on the pillars (scene).

A "delete all" button was also created to delete all input when the researcher wants to test again. This was all accomplished using 6 scripts, which are listed below with their explanation.
- AchievementSaver
  This script saves the achieved goals.
- DeleteScript
  This script was used to delete all data to do more testing.
- TurnGlobe
  This script turns the globe and can be used to implement different methods like turning it while touching the screen etc.
- PlaceObjects
  This script places the objects based on the scene and amount.
- Goals
  This is the script that saves the goals with the pillars, scene etc.

- MainMenu
  This script is for changing to different scenes when, for example, a button is pressed.
- GetListData
  This script takes the saved data and uses it. (placing the goals, the checkboxes, etc.)

5.3 Pilot test

A pilot test was conducted where the researcher went through the application step by step. It revealed a few flaws. First, what happens to the goals when they are achieved was not well thought through. The researcher tried two different things: First, to remove the goals completely and second to keep showing them as "goals that are done". Due to difficulties in coding to remove the goals, the second option was opted for. In the evaluation this point will be discussed with the participants for feedback, as there was no more time to perform another Lo-Fi test. Second, the researcher noticed that if people had a goal that was for example daily, weekly, etc. they had to add this goal again every time. To avoid this, the researcher made an option for achieved goals to keep the goal or not keep the goal. If the user keeps the goal, they can check the achieved box again on another day. If they do not keep the goal, the goal will be noted as achieved and the checkbox cannot be clicked again. This feature will also be discussed in the test because there is no more time to perform another Lo-Fi test. The app builded successfully using the Android platform on Unity. The final design of the application can be found in figure 18. All pillar scenes look the same, so only 1 scene is included in the figure. A walk-through of the final design can be found on YouTube as well [26].
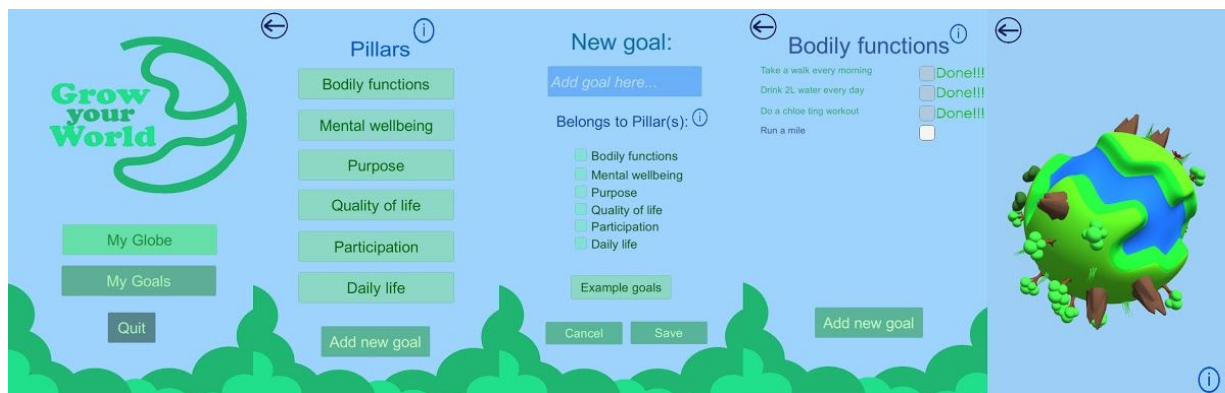

Figure 18: Final application design

6. Evaluation

This chapter describes the evaluation of the Hi-Fi prototype that was described in the previous chapter. It discusses the method of testing and the results.

6.1 Method

The participants consisted of 6 people (three male, three female) aged 18 to 23 years. All participants are students, their demographics can be found in Appendix R. The participants were asked to use the application for 5 consecutive days, including a weekend. On the first day of testing, the researcher visited the participants in a corona responsible way, see regulations in Appendix G, to guide the uploading of the prototype on the mobile phones of the participants. The participants were asked to sign the consent form in Appendix S. Then, the researcher gave the following introduction:

"Thank you so much for participating in this research. I will ask you to fill in a demographic form first and afterwards we will start the testing period. As an introduction I will shortly tell you about my graduation project and what I expect from you. My project is about lifestyle changes for young adults and I am developing an application that shows progress based on six different pillars. These pillars are determined by the positive health movement, which stands for health as being more than the absence of illness. To this end, I made an application where you can fill in your goals and actions based on these six pillars. The application will show you your progress when you achieve your goals, by growing your own globe. I want to ask you to use this application at least once a day for the coming five days."

The researcher did not give extra information about the usage of the application. The participants were asked to complete the online positive health questionnaire after the researcher had left. If any questions or problems would arise during the testing period, they should contact the researcher through the contact information on the consent form, which can be done by email or WhatsApp.

After five days, the participants were interviewed. Preferably, the interview would be done in person, however the interviews for participant 5 and 6 were online. The participants were asked to complete the positive health questionnaire again that day, before the interview. To answer the research question (How the application feedback method influences young adults), the following interview questions were asked to all participants:

Usability application
> Q: How did it go with using the application these previous days?
> Q: Did you run into anything unusual?
> Q: Was there anything unclear or hard to understand?

Positive Health

Q: Since this application is based on positive health and their pillars, what do you think about positive health?

Q: What do you think about using positive health to improve your lifestyle?

Q: How did it go with the questionnaire at the beginning?

Q: What did you think about the spiderweb?

Goals and Globe

Q: How did you experience setting goals that are divided into pillars?

Q: What do you think about the feedback of a globe?

Q: Do you feel like the globe influenced your behavior in any way?

Q: If so, how?

Q: What did you think about the models appearing on the globe (tree, bush, flower, etc.)

The application

Q: Do you think that participating in this research influenced your actions in the past days?

Q: If so, how?

Q: How do you think the application influenced your actions these past days?

Q: How motivated were you to perform your goals these past few days?

Seeing the results

Q: Can you show me your globe and explain it to me?

Q: Did you get any new insights from the globe/application?

Afterwards, the researcher will look at spiderweb first day and spiderweb last day and compare this to the globe.

The interview was a semi-structured interview, meaning that the researcher could ask multiple extra questions dependent on the participant.

6.2 Results

The results can be found in Appendix T and are summarized per category from the interview below. All interviews were transcribed using intelligent verbatim and an analysis of the spider web and globe epr participant is also included in the appendix.

6.2.1 Aesthetics

The aesthetics were generally well received and the globe seemed to add extra fun and/or motivation for all participants. The models had mixed opinions, where everybody seemed to like them but participants 3 and 4 indicated they wanted the models to represent the pillars more. Some thought the models were too different from each other in detail or color, but others indicated that this made it more fun, diverse and easier to recognize. A specific test into different models would be beneficial.

6.2.2 Technical issues

Some technical issues the participants noted were the fact that he was not aware you could keep goals after checking them at first. The menu itself was clear, but he would have preferred an explanation before setting the goals so he knew in advance he could set daily goals as well without needing to enter them over and over again. Furthermore, because this participant had a lot of goals belonging to multiple pillars, he mentioned that you have to check the goal in every pillar separately. He thinks it would be beneficial if the application recognises that a goal is the same goal but in a different pillar, so that when he checks it, it gets checked in every pillar that the goal is in. The participant did enjoy seeing his achieved goals because it showed his achievements.Table 9 has all complaints and proposed solutions that were mentioned during the interviews on the usability of the application and technical aspects. If no solution was mentioned but the researcher has a solution, the text is in cursive. The table is also categorised in necessity, where all complaints that must be adjusted are red, should be adjusted are orange, could be adjusted are yellow and will not be adjusted are green.

Subject	Complaints	Proposed solutions
Keeping goals	Not aware before menu pop-up	Explanation text
		Make it a standard function; ask users if this is a repetitive goal or not when goal is added
	You cannot see when you checked a goal already but kept it	Show achievements per day and refresh every day
		Add a counter to show how many times you achieved the goal before
Checking goals	The same goal in different pillars needs to be checked separately	Recognize when a goal is the same and check it everywhere when checked in 1 pillar
	Going to the globe when checking 1 goal, even if you want to check multiple; bad flow	Not going to the globe scene after checking a goal.
	Needing to go to all the different pillar pages to see all the goals.	Making a list of all goals to scroll through on 1 page
Adding new goals	Overwhelming amount of pillars	Text to explain everyone is different and nothing 'must' be done
	Bad flow of typing when you need to look the pillars up	*Typing the goal first, than thinking about the pillar*
Future concerns	Getting a tree every day for daily goals will make the globe full way too fast	*A tree could be placed the first time a daily goal is achieved and grow every time it is done again*
	Forgetting about the app	Add reminders/notifications

	People don't know they are building the globe without the introduction talk	Add a small explanation at the beginning of the app
Design	some models (Tree, bush, etc.) did not appeal to me	Let users pick their own models
		Make the models more related to the pillars they stand for
	A lot of text on the pillars page for information	Change for "read more about the specific pillars on their page"
	Goals that were too long were not readable anymore	*Make the text a dropbox so that the longer text appears when the user clicks on the text*
Seeing achieved one-time goals	Too crowded in the long run	Make a history page with all the achieved goals
		Only leave it there for 12-24 hours
Globe	Needing to wait for it to turn around	Let users turn it themselves as well

Table 9: concerns and improvement possibilities from interviews

6.2.3 Setting and dividing goals

There were varying results about the difficulty of goal setting and dividing in pillars. Some participants had a hard time setting the goals and some had a hard time dividing them. In general, people who were already invested in their health, meaning they were already trying to improve it, did not have problems setting the goals. Dividing into pillars was also difficult for some, where one participant mentioned that setting general goals and thinking about dividing them after was easier than trying to come up with goals per pillar. Another participant came to the following realisation: *"if the goal was good, it doesn't really matter if you place it in a pillar that was not necessarily meant for it. Like, that's not what it is about.".* Most participants started with their first set of goals right after the interview, and added more spontaneously. The participants often checked their goals at the end of the day.

6.2.4 Positive health

All participants indicated that they relate to the broad view of positive health because all participants already had a brought view of health where they recognized physical and mental elements, but purpose and participation were often new for participants. They gained a broader view of health, meaning that they indicated to include more activities as health-related activities. Getting to know positive health and its pillars also gave them a sense of confirmation that health is indeed more than just physical aspects.

Corona was also a well discussed topic in most interviews, where participants appreciated how the study and application reminded them of the importance of taking care of oneself and giving them a reason to do so other than just themselves only. In shaky times, having an extra goal or

reason can really make the difference. The expanded health view resulted in more varying goals as well, including goals participants indicated they would not have set otherwise.

The positive health tool, including the questionnaire and spider web, was generally easy to do. No participants were surprised by the first spider web results, they generally expected the outcome they got. Some participants did indicate that people who are less self-aware might get new insights from the spider web, but did not count themselves among those people. One participant mentioned that the globe felt more positive than the spider web. Another participant indicated that the spider web felt like a summary and the application enabled her to improve and actually work with goals. And finally, one participant said that he felt like the spider web was too much of a snapshot, which made it less relevant and reliable than it appears: It is so based on how you feel that he does not think it accurately shows how someone is doing health-wise.

6.2.5 Influence on actions and motivation

Participants indicated different levels of influence from the application. All participants recognized that their view of health became more broad, so they would include more factors into their definition of health as opposed to before. Most indicated that this also resulted in a higher variety of goals and more motivation. Participants often said they also set more small goals, because the example goals were also small and because they wanted for example a specific nature model on their globe. The extra motivation came from having a goal next to the goal, namely filling your globe: when participants are not motivated to achieve a goal for themselves, they also have the motivation to achieve a goal to fill their globe. The fun aesthetics also added extra joy, as indicated by all participants. Some participants also got motivation from crossing off achieved goals, because it felt rewarding. And some indicated that just being able to write down their goals in the app already helped improve their motivation because the goals became more than just thoughts by writing them down. Motivation here is measured only by what the participants indicated during the interviews, so this measure is prone to socially desirable answers. A participant also indicated that participating in this research made her more aware of how she was taking care of herself and believed that the globe made her more aware and conscious of her behavior and gave more structure to her days. In general, participants indicated that they were more conscious in their behavior and more focused on their goals than before the study. Like another participant said about the application: *"it is quite simple and very accessible to get feedback and actually to give yourself feedback about how you are."*. Participant six stated that she was not taking care of herself well, as opposed to other participants who all indicated they were already working on their health in some type of way. She gained the insight that taking care of yourself is not about drastic lifestyle changes, but about the little things you do for yourself. She stated: *"It's the small things that do make a difference and without the app I would just think "I should probably eat healthier", but that is not concrete and very hard to do so I wouldn't do it."*. Participants who were already improving their lifestyle were often unsure how much the study and application influenced them and how much came from their initial motivation before the study. One of these participants did state the following about the application: *"The app is really nice to make it concrete and executable and give you a sense of responsibility: it's not just something you thought about once that you can*

just choose to ignore, because you actually wrote it down.". Participants indicated that the application gave a feeling of more responsibility to take care of yourself, emphasizing the importance of this.

6.2.6 Globe and spider web insights

Next to the interviews, the spider web results were also interesting. The questionnaire consists of 43 questions, which means that the participants probably do not remember the answers they gave on day 1 when they reach day 5. Because of this, the results from the spider web are less prone to socially desirable answers than the interviews. This is why it is unexpected that almost all spiderwebs improved, except for the spider web from participants 2 and 5, which stayed about the same. Improvement here is defined by the height of the average grades per pillar in the spider webs, comparing day 5 with day 1. The test should be executed again with more participants to draw real conclusions, but the fact that five of the six participants have improved spider webs without remembering their answers the first time, does indicate a few things. First, it could mean different things: it could indicate that when people are more aware or acting more consciously, they score higher. It could, however, also indicate that they were actually doing better. Some spider webs were comparable to the globes and some were not. First should be addressed that the spider web is based on how people feel like they are doing in the positive health pillars at the moment of the test. The globe as well is completely based on the goals the users sets and the pillars the user attaches to these goals. There are some notable differences. First of all, some participants had small decreases for certain pillars in the spider web, but this is not possible on the globe as it only shows progression. Remarkable mostly is that all participants had higher daily life scores, also participants 3 and 4. Many participants indicated more structure in their days because of the app, which could have to do with the improvement in daily life for all participants. Apart from participant 3, every participant had improved daily life on the globe as well. When looking at the goals, however, participant 3 had two goals in daily life where the first goal was achieved in bodily functions, but not in daily life. This means that all participants achieved goals they listed in daily life.

Bodily functions often matched in globe and spider web, except for the last participant who had an image of herself that matched the spider web, but achieved a lot of goals in bodily functions. Maybe five days were not enough to make her feel like she was more of an active person, or other explanations. Participation is also a pillar that was often different in spider web and globe, a lot of interviews mentioned corona and feeling alone. Goals also often included online interaction, which could have to do with these results. In general, it seems like the spider web matches how people feel about themselves and who they are and the globe shows progress. When it's possible to for example interact with people a lot but feel alone, the globe would show a lot of participation and the spider web would show a relatively low grade for participation. This difference is crucial, which means both the spider web and globe have different values to people. For example, people who were very self-aware, did not get insights from the spider web but people who were less self-aware did. The globe shows achievements, where the spider web shows how people feel about these achievements. In general these are in line with each other, but as explained above sometimes they were not. In general, people improve their daily life in

the globe and feel like it is improved as well, by the spider web. The globe therefore has the potential to show people how they are doing despite their own view of themselves, which could have positive effects. Like for example participant 6, who surprised herself and the amount of bodily functions goals she achieved. Also when looking at her goals, she was quite active the test days, however her score in the spider web got slightly lower. This shows how people see themselves. It is also possible that she, for example, felt particularly lazy that day or failed to achieve her goal that day which influenced her view of how she was doing. Important to note is that the globe has goals in pillars distributed by the user, so it could be that the user does not recognize that a goal has influence on a pillar and therefore the globe will not show this. However, this would be the same for the spider web. All resulting globes and matching spider webs can be found in figure 19.
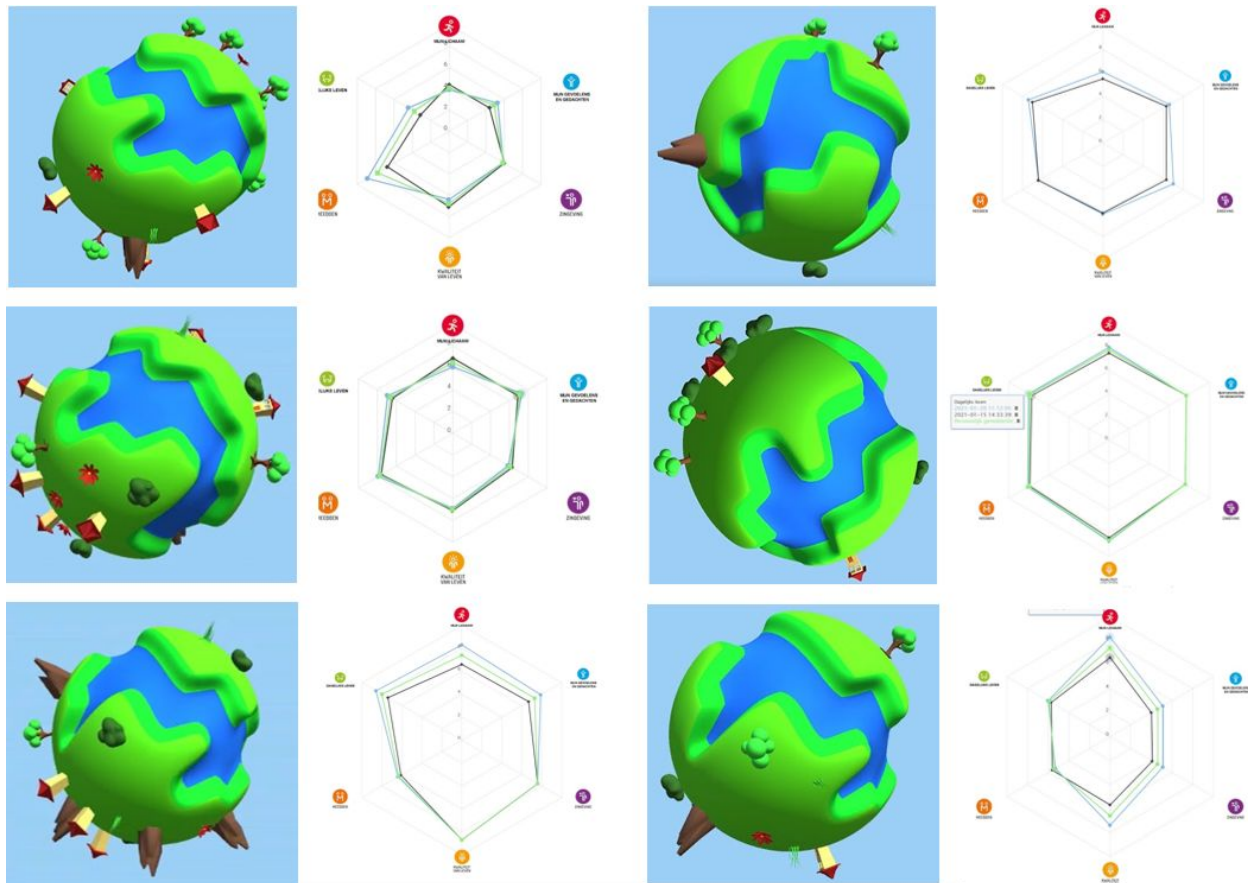
Figure 19: Globe and spider web results

6.3 Conclusion

In general, there are technical improvements needed for the next version of the application to improve usability, where the necessity of the improvements can be found in table 9. The aesthetics were generally received well. Future versions of the application could include more nature models to allow participants to choose their preferred models, but tests into the influence on user behavior should be done first. Setting and dividing goals was sometimes difficult, but

that was because of the nature of the actions not because of the application. Furthermore, the positive health tool (spider web) did not give new insights to the six participants in this test. Positive health did broaden people's perspectives on health, resulting in more varying goals. People also set smaller goals and indicated more structure and motivation because of writing goals down, checking them off, and the globe's feedback. The spider webs and globes often matched, but sometimes had some differences. Participants indicated that the globe felt more positive and more suited for helping achieve goals, where the spider web felt like a summary. 4 out of 6 spider webs improved over the 5 day span of using the app. Participants also came with suggestions apart from technical issues, participant 3 indicated that he did some research and found the Gemeentelijke Gezondheidsdiensten (or GGD) appstore. He thought maybe there could be a reference to this appstore in the application, so people could find inspiration for possible actions or get help achieving them Participant 4 wanted a different colored background, because he thought the blue had too much grey in it. He also proposed adding a fish that would swim in the water as a pillar model. In general, participants had positive notes about the application and the spider webs als showed improvement in health or improvement in how participants feel about their health.

7. Discussion and conclusion

In this chapter the project will be discussed and a conclusion will be drawn. This will include discussing the research questions, requirements and limitations of the study. Afterwards, there will be future work recommendations.

7.1 Research questions discussion

The first research question that was asked in this research was the following question:
How can an intervention be designed to coach young adults towards behavior change, without telling them what to do, using positive health and lifestyle coaching methods? This resulted in multiple sub-research questions: *What are the principles of lifestyle coaching? What are the principles of positive health? How does behavior change in young adults? How can an intervention be designed in such a way that the user is in full control?* The literature research in chapter 2 provided answers to these subquestions, resulting in a list of requirements on all different topics. Based on the literature research, the research question was refined to the following question:

"How can a positive health intervention visualize progress to motivate young adults to change behavior on all positive health components without telling them what to do?"

The ideation phase came up with multiple technological interventions that could potentially answer this research question, wherefrom an online questionnaire resulted in the final idea that fitted the target group best. Multiple tests with lo-fi prototypes were used to specify this design. The final design consisted of a mobile phone application. After the testing period, results demonstrated the following:

First, the project design succeeded in showing all different positive health pillars on one screen. A lot of participants indicated that they set broader goals to fit in all pillars which they would not have done otherwise. Second, the app seems to have successfully delivered positive feedback, as all participants experienced the globe positively. The requirement of positive feedback has been tested from the beginning of the ideation phase to ensure the app would succeed in this requirement. And third, the application aimed at not telling people what to do and leaving them in control. This requirement has been important in all phases of the project and tested against needed information in the Lo-fi testing phase. Users were completely free to fill in their own goals and choose the pillars. When asked in the interview if users felt pushed or steered towards certain answers all of them indicated to feel very free and not pushed. The research question is *how*, and based on the interview the results are as follows:

Based on a 5-day user test, the application motivated users by giving them another goal next to the goal they are trying to achieve, namely filling their globe. Also motivating was checking off goals, giving a feeling of achievement and making that achievement visible on the globe. And being able to write goals down in the application itself was a motivating factor as well, giving a higher sense of responsibility to the user. However, when asked about the influence on behavior

participants often indicated a low level of influence. Most influence was on the mindset people had about health, which expanded: they now include more factors in their view of health. Participants also mentioned that the goals they set were broader than goals they would have set otherwise or set before, matching the mindset. Users also set more small goals, gaining the insight that lifestyle change is not necessarily drastic change, but also about the little things you do to take care of yourself. The design itself seemed successful in aesthetics and clearness. To answer the current research question more successfully, a long term study should be done to find the longer-term influence on behavior and motivation.

7.2 Analysis specifications

During this research, multiple requirements were conducted by the literature research done in Chapter 2. Now that the process is concluded, these requirements will be discussed and whether the application was successful in meeting the requirements described in table 10.

Young adults analysis insights	
Motivate towards goals	Yes/No, this differs per participant, as some indicated that their motivations would have been the same without the application and some indicate feeling more motivation.
Focus on social aspect	No, there is not necessarily a focus on the social aspect, apart from the fact that one of the pillars is devoted to this means.
Focus on self-control and awareness	Yes, users make their own goals and divide it themselves and the feedback method (globe) and pillars are focused on bringing awareness.
Project should match a broad view of health	Yes, positive health is very broad
Positive health and lifestyle coaching insights	
Include all pillars	Yes, all pillars are included and have their own page
No imposed solutions or feeling like users have to perform an action	Yes, however some users indicated that they felt like they needed to perform a goal because they wrote it down, this however is their own goal and no imposed solutions. Research was done into how much information is needed to understand the pillars without pushing users in a direction and in the interview all users indicated they did not feel pushed and there was enough

	information.
All feedback should be positive and positivity should be central	Yes, there is no negative feedback (a possible decline does not show up in the visualisation), only positive progression is shown. Furthermore, when a goal is checked the pop-up menu contains a positive message. Some participants felt disappointment when not achieving a goal, but the app does not have any functions that tell them they are doing bad or have not been achieving enough goals etc.
Allow short-term goal setting	Yes, the users can enter their own goals so the application definitely allows short-term goals. The example goals are all also set up in such a way that they feel achievable and are short-term.
Related work insights	
Short-term rewards/ rewards right after desired actions	Yes, the results of achieving a goal are immediately visible on the globe
Personalisation	Yes, all goals and globes are different. More personalisation could be possible by for example personalized models etc.
Ideation insights	
Must be able to show progression	Yes, it shows progression through the amount of models per pillar. No participants indicated difficulties seeing progression.
Must stay interesting	Yes, participants indicated that the globe keeps it interesting stating things like "Oeh which model do I get where" etc. However, the length of the test was 5 days so whether it stays interesting after this time cannot be said.
Must be shareable	Yes, participants showed their globes to the researcher enthusiastically and some participants also told the researcher they showed their globe to others.
Must allow multiple factors or feedback methods	Yes, feedback of checking the goals and seeing the globe is different so this is possible.

Must show overview of health factors in one glance	Yes, all participants were able to explain their globe immediately. However, since it is in 3D the one glance does take more than one second. Letting users turn the globe themselves could improve this requirement.
Must be sustainable	No, the application seemed sustainable but when testing one participant justly mentioned that daily goals fill up the goals way too fast. This could be fixed by for example growing daily goals everytime they are achieved instead of placing new models every time, which would make this a yes.
Must be feasible to test and build	Yes, an application like the one described here could be developed and tested in a situation where one has to deal with regulations as a result of the corona pandemic.

Table 10: Requirements check application

Apart from these requirements, literature research also indicated that young adults reasons for not engaging in a healthier lifestyle included not having enough time, having low self-discipline and having an unstructured lifestyle. When looking at the results, this application takes less time than the existing positive health tool (the spider web) and participants indicated that their daily life got more structure from using the application. On top of that, the unmotivated participant found motivation in the globe design, wanting to fill her globe. This indicated that the application possibly takes care of these issues young adults have with adopting healthier lifestyles. However, participants also indicated that they might forget about the application because it is a mobile phone application that they could not open for a while for example and nothing would happen. Therefore, whether young adults would continue using this application should be researched with a longitudinal study.

There are no projects available where all positive health pillars are used in a (technological) intervention, apart from the spider web tool. This research could function as a stepping stone to research more into the possibilities positive health and it's pillars have on health and lifestyle. Not only using an application like this project, but any other type of implementation of positive health and its pillars as a tool to improve health and lifestyle. Young adults seemed to match the positive health view best based on the literature research, but studies into the differences in age groups could be done to be able to compare this, instead of only basing this assumption on expectations from the target group analysis.

7.3 Limitations

There are a number limitations in this research that need to be addressed. First, the current situation with the coronavirus pandemic has resulted in a few limitations. Practically speaking, finding participants was more difficult and during testing periods the researcher had to think about ways to minimize social contact. Due to this, only 4 participants were used per Lo-Fi test and some tests were online. Apart from this, corona itself affected lifestyle, which means it has major effects on the results of studies into lifestyle. However, many participants indicated that help in lifestyle is even more beneficial in this situation, to help keeping on track when the situation in the world is changing all the time. However, since this research is about improvement and this is relevant, this effect might be small.

Another limitation is time. The graduation semester of Creative Technology consists of half a year, but is only full time half of this period. Lifestyle changes often happen over a longer period of time, not a short one. This is why the application was used for multiple days instead of having a user test of a walk-through. This, however, still is a very short period of time and not long enough to draw firm conclusions about the sustainability of the results. Conclusions drawn in this research are only indicators of what could be the result, because the test was too short to draw conclusions about long-term effects. On top of that, the number of participants is limited. Like described above, this has to do with corona a lot. The questionnaire in the ideation chapter had 46 responses but the lo-fi prototypes all only had 4 participants and the final Hi-Fi prototype only had 6. The results do suggest conclusions but the number of participants is too low during the prototyping phase.

And finally, a limitation with any behavior study is the effect the study itself has on its participants. The fact that participants know they will be interviewed and that their results will be analyzed, might be a motivational factor to perform better or act like they performed better. A lot of research about measuring behavior has already been done, however a lot of results are based on interviews and indications made by participants themselves.

7.4 Conclusion

Concluding, positive health seems to be a very appreciated view amongst young adults, allowing an expansion of their view of health, leading to more diverse goals as well. The spider web and questionnaire from positive health seems useful as a starting position to give insights into how a person is doing, where the developed prototype of the current project enables daily use, progression and helps with goal setting and achieving. The globe visualisation as feedback seemed to be perceived as positive (important lifestyle coaching aspect) and aesthetically pleasing, adding a fun element to lifestyle change and also a motivational element where the globe functions as an extra goal on top of the goal. When participants did not feel motivated to achieve the goal for themselves, they also had the motivation of filling their globe, which worked well for some and not for others, who just found it a fun extra. The application allowed people to set smaller goals and feel good about them, which helped people realise the importance of small steps. This is a very important part of lifestyle coaching. Another important part is

self-control and awareness. The participants did not feel pushed in any way and felt free, and some even indicated more insight in how they are doing. The lo-fi tests seemed successful, as the information given was enough to understand the pillars and not too much for the user to feel out of control. Furthermore, there were no complaints about the design of the globe and placement of the models. The menus, however, could use some improvements so that lo-fi test was only a starting point of improvements. The brainstorm sessions indicated that natural growth was a positive feedback method, which seems true when looking at the results of this project. And lastly, people seemed to have improved spider webs as well, which indicates the application helped in their health behavior or their feeling of how healthy they behave. The other possibility is that people would have had the same improvement without the application, which could be investigated in future work. Concluding, the application does need a starting point that the spider web provides because the two have slightly different benefits, which could be the spider web like in this research or could be implemented in the application itself in the future. Based on the tests, the participants did experience a broadening of their view of health and goals, more awareness of their actions and themselves and more motivation to achieve actions due to the checkboxes and models on the globe. This project indicates that conscious actions and focussing on health results in improvement, or at least in making users feel like they improved.

7.5 Future work

In the evaluation chapter a table is included of potential improvements of the prototype with their necessity of adjustment. Based on this chapter future work should entail these adjustments. User tests should be conducted to find the best ways of implementation. Furthermore, some key elements should be researched as well:

First, another study can be conducted researching input methods. This has multiple elements, where from all were too large to research in the scope of this project. First, adding goals could be done differently. Now, all the goals are typed in by the user, but one could also think about speech recording or getting goals from different applications. Or different ways to match pillars to the goals. Now the users chose the pillars, however the application could also for example ask a set of questions to determine which pillars the goals are. This was not chosen by the researcher for this project to keep the user in control, however participants did often have a hard time matching goals to pillars. By answering questions, users still have some level of control.

And second, the method of checking goals. A lot of research can and should be done into this part of the application. There are a lot of options that could be explored. For example, different ways of measuring if someone slept for 8 hours or exercised etc. But also having sliders of how well something went or other ways. There are a lot of different options that could be researched and added or disregarded, like adding weights to goals to outbalance small and large goals etc. Since this application has now started its development, there is a lot of room for improvement and change before it is at a publishable level.

This project wants to propose future research into the Gemeentelijke Gezondheidsdiensten (or GGD) application store, where apps all are connected to pillars. If these applications could be connected to the Grow your world application, a lot of possibilities open. For example if goals in one of the apps are achieved, the grow your world app could grow in the pillars of the application that the user achieved goals in.

On top of that, one of the participants indicated that the spider web was a nice starting position to help realise how you are doing. Another participant indicated that the globe is more positive than the spider web and all participants indicated that the spider web gives a nice overview of how you are doing at that time. Future work could research a way of transferring this starting position to the globe application, so that the same result can be achieved without needing to fill in the spider web first. Research could also be done into the effects of this spider web by conducting a study with participants that fill in the spider web and use the application and participants that only use the application. A starting position, however, has many benefits: users can decide where to set their goals, where they think they might need or want goals, etc. This feature is probably mostly useful for less self-aware people, which in the young adult age group could be many.

All in all, this application is only at it's stepping stones, but has some great promises for the future.

Appendices

Appendix A: 93 Behavior change tactics (BCTs) or nudges

I. GOALS & PLANNING
1. Goal Setting (behavior) – Set or agree on a goal defined in terms of the behavior to be achieved
2. Problem Solving – Analyse , or prompt the person to analyse, factors influencing the behavior and generate or select strategies that include overcoming barriers and/or increasing facilitator
3. Goal Setting (outcome) – Set or agree on a goal defined in terms of a positive outcome of wanted behavior
4. Action Planning – Prompt detailed planning of performance of the behavior
5. Review Behavior Goal(s) – Review behavior goal(s) jointly with the person and consider modifying goal(s) or behavior change strategy in light of achievement.
6. Discrepancy between current behavior and goal – Draw attention to discrepancies between a person's current behavior (in and the person's previously set goals
7. Review Outcome Goal(s) – Review outcome goal(s) jointly with the person and consider modifying goal(s) in light of achievement.
8. Behavioral contract – Create a written specification of the behavior to be performed, agreed on by the person, and witnessed by another
9. Commitment – Ask the person to affirm or reaffirm statements indicating commitment to change the behavior

II. FEEDBACK & MONITORING
10. Monitoring of behavior by others without feedback – Observe or record behavior with the person's knowledge as part of a behavior change strategy
11. Feedback on behavior – Monitor and provide informative or evaluative feedback on performance of the behavior
12. Self-monitoring of behavior – Establish a method for the person to monitor and record their behavior(s) as part of a behavior change strategy
13. Self-monitoring of outcome(s) of behavior – Establish a method for the person to monitor and record the outcome(s) of their behavior as part of a behavior change strategy
14. Monitoring outcome(s) of behavior by others without feedback – Observe or record outcomes of behavior with the person's knowledge as part of a behavior change strategy
15. Biofeedback – Provide feedback about the body (e.g. physiological or biochemical state) using an external monitoring device as part of a behavior change strategy
16. Feedback on outcome(s) of behavior – Monitor and provide feedback on the outcome of performance of the behavior

III. SOCIAL SUPPORT
17. Social support (unspecified) – Advise on, arrange or provide social support or non-contingent praise or reward for performance of the behavior.

18. Social support (practical) – Advise on, arrange, or provide practical help for performance of the behavior.

19. Social support (emotional) – Advise on, arrange, or provide emotional social support for performance of the behavior

IV. SHAPING KNOWLEDGE

20. Instruction on how to perform a behavior – Advise or agree on how to perform the behavior (includes 'Skills training'

21. Information about antecedents – Provide information about antecedents (e.g. social and environmental situations and events, emotions, cognitions) that reliably predict performance of the behaviour

22. Re-attribution – Elicit perceived causes of behavior and suggest alternative explanations

23. Behavioral experiments – Advise on how to identify and test hypotheses about the behavior, its causes and consequences, by collecting and interpreting data

V. NATURAL CONSEQUENCES

24. Information about health consequences – Provide information (e.g. written, verbal, visual) about health consequences of performing the behavior

25. Salience of consequences – Use methods specifically designed to emphasise the consequences of performing the behaviour with the aim of making them more memorable

26. Information about social and environmental consequences – Provide information (e.g. written, verbal, visual) about social and environmental consequences of performing the behavior

27. Monitoring of emotional consequences – Prompt assessment of feelings after attempts at performing the behavior

28. Anticipated regret – Induce or raise awareness of expectations of future regret about performance of the unwanted behavior

29. Information about emotional consequences – Provide information (e.g. written, verbal, visual) about emotional consequences of performing the behavior.

VI. COMPARISON OF BEHAVIOR

30. Demonstration of the behavior – Provide an observable sample of the performance of the behaviour, directly in person or indirectly e.g. via film, pictures, for the person to aspire to or imitate

31. Social comparison – Draw attention to others' performance to allow comparison with the person's own performance

32. Information about others' approval – Provide information about what other people think about the behavior.

VII. ASSOCIATIONS

33. Prompts/cues – Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behavior.

34. Cue signalling reward – Identify an environmental stimulus that reliably predicts that reward will follow the behavior

35. Reduce prompts/cues – Withdraw gradually prompts to perform the behavior (includes 'Fading')

36. Remove access to the reward – Advise or arrange for the person to be separated from situations in which unwanted behavior can be rewarded in order to reduce the behavior (includes 'Time out')

37. Remove aversive stimulus – Advise or arrange for the removal of an aversive stimulus to facilitate behavior change (includes 'Escape learning')

38. Satiation – Advise or arrange repeated exposure to a stimulus that reduces or extinguishes a drive for the unwanted behavior

39. Exposure – Provide systematic confrontation with a feared stimulus to reduce the response to a later encounter

40. Associative learning – Present a neutral stimulus jointly with a stimulus that already elicits the behavior repeatedly until the neutral stimulus elicits that behavior (includes 'Classical/Pavlovian Conditioning')

VIII. REPETITION & SUBSTITUTION

41. Behavioral practice/ rehearsal – Prompt practice or rehearsal of the performance of the behavior one or more times in a context or at a time when the performance may not be necessary, in order to increase habit and skill

42. Behavior substitution – Prompt substitution of the unwanted behavior with a wanted or neutral behavior

43. Habit formation – Prompt rehearsal and repetition of the behavior in the same context repeatedly so that the context elicits the behavior

44. Habit reversal – Prompt rehearsal and repetition of an alternative behavior to replace an unwanted habitual behavior

45. Overcorrection – Ask to repeat the wanted behavior in an exaggerated way following an unwanted behaviour

46. Generalisation of a target behavior – Advice to perform the wanted behaviour, which is already performed in a particular situation, in another situation

47. Graded tasks – Set easy-to-perform tasks, making them increasingly difficult, but achievable, until behavior is performed

IX. COMPARISON OF OUTCOMES

48. Credible source – Present verbal or visual communication from a credible source in favour of or against the behavior

49. Pros and cons – Advise the person to identify and compare reasons for wanting (pros) and not wanting to (cons) change the behavior (includes 'Decisional balance')

50. Comparative imagining of future outcomes – Prompt or advise the imagining and comparing of future outcomes of changed versus unchanged behaviour

X. REWARD & THREAT

51. Material incentive (behavior) – Inform that money, vouchers or other valued objects will be delivered if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')

52. Material reward (behavior) – Arrange for the delivery of money, vouchers or other valued objects if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')

53. Non-specific reward – Arrange delivery of a reward if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')

54. Social reward – Arrange verbal or non-verbal reward if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')

55. Social incentive – Inform that a verbal or non-verbal reward will be delivered if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')

56. Non-specific incentive – Inform that a reward will be delivered if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')

57. Self-incentive – Plan to reward self in future if and only if there has been effort and/or progress in performing the behavior

58. Incentive (outcome) – Inform that a reward will be delivered if and only if there has been effort and/or progress in achieving the behavioural outcome (includes 'Positive reinforcement')

59. Self-reward – Prompt self-praise or self-reward if and only if there has been effort and/or progress in performing the behavior

60. Reward (outcome) – Arrange for the delivery of a reward if and only if there has been effort and/or progress in achieving the behavioral outcome (includes 'Positive reinforcement')

61. Future punishment – Inform that future punishment or removal of reward will be a consequence of performance of an unwanted behavior (may include fear arousal) (includes 'Threat')

XI. REGULATION

62. Pharmacological support – Provide, or encourage the use of or adherence to, drugs to facilitate behavior change

63. Reduce negative emotions – Advise on ways of reducing negative emotions to facilitate performance of the behavior (includes 'Stress Management')

64. Conserving mental resources – Advise on ways of minimising demands on mental resources to facilitate behavior change

65. Paradoxical instructions – Advise to engage in some form of the unwanted behavior with the aim of reducing motivation to engage in that behaviour

XII. ANTECEDENTS

66. Restructuring the physical environment – Change, or advise to change the physical environment in order to facilitate performance of the wanted behavior or create barriers to the unwanted behavior (other than prompts/cues, rewards and punishments)

67. Restructuring the social environment – Change, or advise to change the social environment in order to facilitate performance of the wanted behavior or create barriers to the unwanted behavior ((other than prompts/cues, rewards and punishments)

68. Avoidance/reducing exposure to cues for the behavior – Advise on how to avoid exposure to specific social and contextual/physical cues for the behavior, including changing daily or weekly routines

69. Distraction – Advise or arrange to use an alternative focus for attention to avoid triggers for unwanted behaviour

70. Adding objects to the environment – Add objects to the environment in order to facilitate performance of the behavior

71. Body changes – Alter body structure, functioning or support directly to facilitate behavior change

XIII. IDENTITY

72. Identification of self as role model – Inform that one's own behavior may be an example to others

73. Framing/reframing – Suggest the deliberate adoption of a perspective or new perspective on behavior (e.g. its purpose) in order to change cognitions or emotions about performing the behavior (includes 'Cognitive structuring')

74. Incompatible beliefs – Draw attention to discrepancies between current or past behavior and self-image, in order to create discomfort (includes 'Cognitive dissonance')

75. Valued self-identity – Advise the person to write or complete rating scales about a cherished value or personal strength as a means of affirming the person's identity as part of a behavior change strategy (includes 'Self- affirmation')

76. Identity associated with changed behavior – Advise the person to construct a new self-identity as someone who 'used to engage with the unwanted behavior'

XIV. SCHEDULED CONSEQUENCES

77. Behavior cost – Arrange for withdrawal of something valued if and only if an unwanted behavior is performed (includes 'Response cost').

78. Punishment – Arrange for aversive consequence contingent on the performance of the unwanted behavior

79. Remove reward – Arrange for discontinuation of contingent reward following performance of the unwanted behavior (includes 'Extinction')

80. Reward approximation – Arrange for reward following any approximation to the target behavior, gradually rewarding only performance closer to the wanted behavior (includes 'Shaping')

81. Rewarding completion – Build up behavior by arranging reward following final component of the behavior; gradually add the components of the behavior that occur earlier in the behavioral sequence (includes 'Backward chaining')

82. Situation-specific reward – Arrange for reward following the behavior in one situation but not in another (includes 'Discrimination training')

83. Reward incompatible behavior – Arrange reward for responding in a manner that is incompatible with a previous response to that situation (includes 'Counter-conditioning')

84. Reward alternative behavior – Arrange reward for performance of an alternative to the unwanted behavior (includes 'Differential reinforcement')

85. Reduce reward frequency – Arrange for rewards to be made contingent on increasing duration or frequency of the behavior (includes 'Thinning')

86. Remove punishment – Arrange for removal of an unpleasant consequence contingent on performance of the wanted behavior (includes 'Negative reinforcement')

XV. SELF-BELIEF

87. Verbal persuasion about capability – Tell the person that they can successfully perform the wanted behavior, arguing against self-doubts and asserting that they can and will succeed

88. Mental rehearsal of successful performance – Advise to practise imagining performing the behavior successfully in relevant contexts

89. Focus on past success – Advise to think about or list previous successes in performing the behavior (or parts of it)

90. Self-talk – Prompt positive self-talk (aloud or silently) before and during the behavior

XVI. COVERT LEARNING

91. Imaginary punishment – Advise to imagine performing the unwanted behavior in a real-life situation followed by imagining an unpleasant consequence (includes 'Covert sensitisation')

92. Imaginary reward – Advise to imagine performing the wanted behavior in a real-life situation followed by imagining a pleasant consequence (includes 'Covert conditioning')

93. Vicarious consequences – Prompt observation of the consequences (including rewards and punishments) for others when they perform the behavior

Appendix B: Consent form lifestyle coach interview

Information sheet and consent form lo-fi evaluation
"Healthy lifestyle for young adults: a positive health based intervention"
YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Purpose of the study
The main question for this research is "How to empower people for a sustainable healthy lifestyle". The project is based around positive health and lifestyle coaching and to understand this entirely this interview is conducted. This research is part of a graduation project in the Creative Technology bachelor at University of Twente.

Procedures for withdrawal from the study
You are free to leave this interview and the study at any moment, upon which all collected data from you from our research will be removed, unless you give consent for using this data. There will be no repercussions for this.

Use of personal information
For this research, personal information will be gathered. This will be done to find if there is a consistent difference between certain aspects of people (gender, age, interests etc.). This information will not enable anyone outside the researcher to identify you, keeping your identity anonymous. You have the right to ask for access to your personal information which will be used for this research, and the right to ask to erase it.

Usage of data during the research
This data from this research will be kept in an online data cloud only the researcher can access. Every piece of data concerning your personal information that could identify you, such as this consent form and audio recordings, will be kept offline and safe. Audio recordings will not be made public and will only be accessible for the researcher. Potential audio transcripts will be made anonymous. The data you give can also be used in the graduation report about this research. This will be made public but the data used in the report will be anonymous. After the research is complete, all personal data will be destroyed, only anonymous data and the final report will be kept online. For any further information/questions, you can contact the researcher:
l.h.m.uhlhorn@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente by
ethics-comm-eemcs@utwente.nl

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Please tick the appropriate boxes

Taking part in the study

I have read and understood the study information dated [/ /], or it   YES / NO
has been read to me. I have been able to ask questions about the study and my
 questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can   YES / NO
refuse to answer questions and I can withdraw from the study at any time, without
having to give a reason.

I understand that taking part in the study involves an audio recorded interview.   YES / NO
After the research is complete, all personal information and audio recordings will be destroyed,
only anonymous data and the final report will be kept online.

Use of the information in the study
I understand that information I provide will be used for publication of the report for   YES / NO
this research. This report will be made public, available for everyone. However, the
data used in the report will be anonymous.

I understand that personal information collected about me that can identify me, such   YES / NO
as gender and age, will not be shared beyond the researcher.

I agree that my information can be quoted in research outputs   YES / NO

I agree with audio being recorded.   YES / NO

Signatures

_____   _____   _____
Name of participant   Signature   Date

I have accurately read out the information sheet to the potential participant and, to
the best of my ability, ensured that the participant understands what they are
freely consenting.

_____   _____   _____
Researcher name   Signature   Date

Study contact details for further information:
Lyanne Uhlhorn, l.h.m.uhlhorn@student.utwente.nl

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Appendix C: Positive health questionnaire and spider webs

Nr	Vraag	Sco
1	Ik voel mij gezond	6
2	Ik voel mij fit	4
3	Ik heb geen klachten en pijn	8
4	Ik slaap goed	6
5	Ik eet goed	6
6	Ik herstel snel na inspanning. Bijvoorbeeld na het sporten.	5
7	Ik kan makkelijk bewegen. Bijvoorbeeld traplopen, wandelen of fietsen.	8
8	Ik kan dingen goed onthouden	6
9	Ik kan mij goed concentreren	4
10	Ik kan zien, horen, praten, lezen	8
11	Ik voel mij vrolijk	6
12	Ik accepteer mijzelf zoals ik ben	5
13	Ik zoek naar oplossingen om moeilijke situaties te veranderen	5
14	Ik heb controle over mijn leven	5
15	Ik heb een zinvol leven	5
16	Ik heb 's morgens zin in de dag	6
17	Ik heb idealen die ik graag wil bereiken	6
18	Ik heb vertrouwen in mijn eigen toekomst	4
19	Ik accepteer het leven zoals het komt	5
20	Ik ben dankbaar voor wat het leven mij biedt	8
21	Ik wil mijn hele leven blijven leren	8
22	Ik geniet van mijn leven	6
23	Ik ben gelukkig	6
24	Ik zit lekker in mijn vel	5
25	Ik ervaar evenwicht in mijn leven	5
26	Ik voel mij veilig	7
27	Ik ben tevreden over waar ik woon en met wie	5
28	Ik heb genoeg geld om mijn rekeningen te betalen	6
29	Ik heb goed contact met andere mensen	8
30	Andere mensen nemen mij serieus	5
31	Ik heb mensen met wie ik leuke dingen kan doen	8
32	Ik heb mensen die mij steunen als dat nodig is	5
33	Ik heb het gevoel dat ik erbij hoor in mijn omgeving	7
34	Ik heb werk of andere bezigheden die ik zinvol vind	5
35	Ik ben geïnteresseerd in wat er in de maatschappij gebeurt	4
36	Ik kan goed voor mijzelf zorgen. Bijvoorbeeld wassen, aankleden, boodschappen doen, koken.	7
37	Ik weet wat ik wel kan en wat ik niet kan	5
38	Ik weet hoe ik mijn gezondheid kan verzorgen	8
39	Ik kan goed plannen wat ik op een dag moet doen	4
40	Ik kan goed omgaan met het geld dat ik elke maand krijg	5
41	Ik kan werken of vrijwilligerswerk doen	4
42	Ik weet hoe ik zonodig hulp kan krijgen van officiële instanties	4

Nr	Vraag	Sco
J1	Ik voel mij gezond	6
J2	Ik heb energie	5
J3	Ik heb geen lichamelijke klachten en pijn	8
J4	Ik eet gezond	6
J5	Ik slaap goed	6
J6	Ik herstel snel na inspanning. Bijvoorbeeld na het sporten.	5
J7	Ik sport en beweeg voldoende	4
J8	Ik ben tevreden over mijn uiterlijk	6
J9	Ik kan mij goed concentreren	4
J10	Ik kan omgaan met mijn gevoelens	5
J11	Ik sta positief in het leven	6
J12	Ik accepteer mijzelf zoals ik ben	5
J13	Ik heb vertrouwen in wie ik ben en wat ik kan	6
J14	Ik zoek naar oplossingen om moeilijke situaties te veranderen	5
J15	Ik heb grip op mijn leven	5
J16	Ik heb een zinvol leven	5
J17	Ik heb vertrouwen in mijn eigen toekomst	4
J18	Ik heb 's morgens zin in de dag	7
J19	Ik heb mijn eigen doelen en dromen	6
J20	Ik kan keuzes maken	6
J21	Ik accepteer het leven zoals het komt	6
J22	Ik ben dankbaar voor wat het leven mij biedt	6
J23	Ik ben gelukkig	6
J24	Ik kan genieten	7
J25	Ik ervaar evenwicht in mijn leven	5
J26	Ik voel mij veilig	8
J27	Ik leef in een fijne omgeving	5
J28	Ik ben tevreden over waar ik woon en met wie	5
J29	Ik heb genoeg geld om mijn rekeningen te betalen	7
J30	Ik heb voldoende sociale contacten	8
J31	Andere mensen nemen mij serieus	5
J32	Ik heb mensen met wie ik leuke dingen kan ondernemen	8
J33	Ik heb het gevoel dat ik erbij hoor in mijn omgeving	7
J34	Ik kan mijzelf goed uiten bij anderen	5
J35	Ik heb mensen om mij heen die belangrijk voor me zijn	5
J36	Ik krijg voldoende steun en begrip van anderen	4
J37	Ik kan goed voor mijzelf zorgen bijv. wassen, boodschappen doen, koken en vervoer	8
J38	Ik kan werken en/of een opleiding doen	8
J39	Ik weet wat ik wel kan en wat ik niet kan	5
J40	Ik weet hoe ik mijn gezondheid kan verzorgen	8
J41	Ik kan goed omgaan met tijd en geld	5
J42	Ik weet hoe ik zonodig hulp kan krijgen van personen en/of instanties	5
J43	Ik rook niet en gebruik geen alcohol of drugs	2

Spiderweb diagram (top): LICHAAMSFUNCTIES 6.1, MENTAAL WELBEVINDEN 5.6, ZINGEVING 6, KWALITEIT VAN LEVEN 5.7, MEEDOEN 6, DAGELIJKS FUNCTIONEREN 5.3

Spiderweb diagram (bottom): MIJN LICHAAM 5.8 / 5.2, MIJN GEVOELENS EN GEDACHTEN 5.1, ZINGEVING 5.7, KWALITEIT VAN LEVEN 5.1 / 5.6 / 6.1, MEEDOEN 6, DAGELIJKS LEVEN 5.9 / 4.9
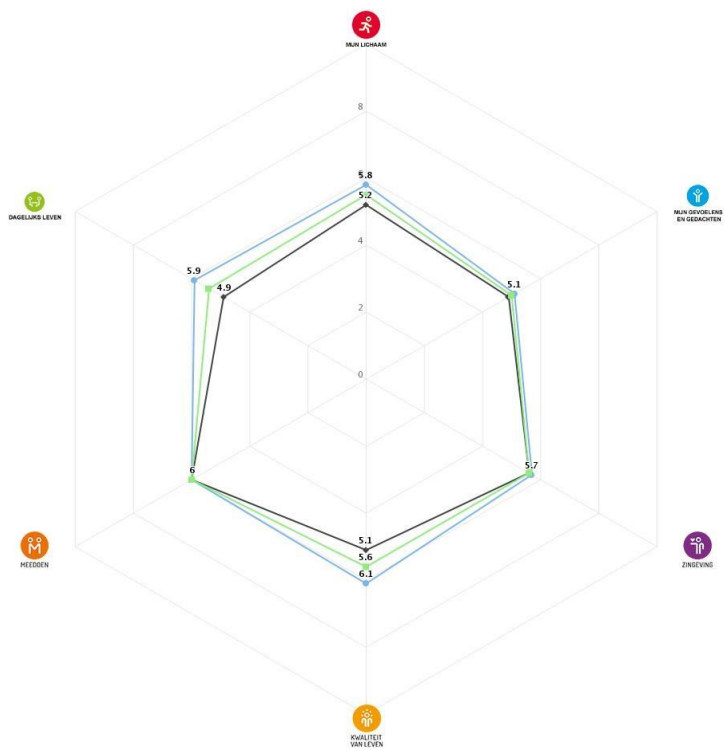
Appendix D: Form to use brainstorm content

Information sheet and consent form lo-fi evaluation
"Healthy lifestyle for young adults: a positive health based intervention"
YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Purpose of the study
The main question for this research is "How to empower people for a sustainable healthy lifestyle". You will be asked to participate in a brainstorming session about possible feedback methods.

Procedures for withdrawal from the study
You are free to leave this session at any moment, upon which all collected data from you from our research will be removed, unless you give consent for using this data. There will be no repercussions for this.

Use of personal information
For this research, no personal information will be gathered, apart from this consent form.

Usage of data during the research
Every piece of data concerning your personal information that could identify you, such as this consent form, will be kept offline and safe. The data you give in the form of ideas can be used in the graduation report about this research. This will be made public but the data used in the report will be anonymous so there will be no credits. After the research is complete, all personal data will be destroyed, only anonymous data and the final report will be kept online. For any further information/questions, you can contact the researcher: l.h.m.uhlhorn@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente by ethics-comm-eemcs@utwente.nl

Please tick the appropriate boxes

Taking part in the study

I have read and understood the study information dated [/ /   ], or it   YES / NO
has been read to me. I have been able to ask questions about the study and my
 questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can   YES / NO
withdraw from the study at any time, without having to give a reason.

Use of the information in the study

I understand that ideas I provide will be used for publication of the report for   YES / NO this research. This report will be made public, available for everyone. However, the data used in the report will be anonymous.

I agree that my information can be quoted in research outputs   YES / NO

Signatures

_____   _____   _____

Name of participant   Signature   Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands what they are freely consenting.

_____   _____   _____

Researcher name   Signature   Date

Study contact details for further information:
Lyanne Uhlhorn
l.h.m.uhlhorn@student.utwente.nl
0612835114

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Appendix E: Ideas questionnaire

Graduation Project

Hello, my name is Lyanne Uhlhorn and I am a Creative Technology Student at the University of Twente!
I would love some feedback from you on my design graduation project design ideas. The idea is to improve lifestyle among young adults. All ideas are shortly explained with sketches and then a few questions about the design will follow. Before the questionnaire starts, a few questions will be asked. Furthermore, there will be room for open feedback and thoughts! It will not take long, thank you so much for your time!

The data gathered in this questionnaire will be processed anonymously and published in Lyanne Uhlhorn's graduation report. The report will be public, available for everyone.

For any further information/questions, you can contact the researcher: l.h.m.uhlhorn@student.utwente.nl or project supervisor: a.m.schaafstal@utwente.nl

If you have questions about your rights as a research participant or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente: ethics-comm-eemcs@utwente.nl

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I am aware that my answers to this questionnaire will be used as data for the graduation project research of Lyanne Uhlhorn *

☐ Yes

I am aware that all my collected data will be processed anonymously *

☐ Yes

I hereby give permission to Lyanne Uhlhorn to use my answers, anonymously, in her graduation project report, which will be publicly available. *

☐ Yes

Information

Before starting the questionnaire and looking at the designs, please answer the following questions

What is your age?

Short answer text

What is your gender?

◯ Male

◯ Female

◯ Prefer not to say

◯ Other…

how likely are you to change your lifestyle (to improve your health) in your current situation? *

	1	2	3	4	5	
Not likely	◯	◯	◯	◯	◯	Very likely

Would you say you are interested in nature and the environment? *

	1	2	3	4	5	
Not interested	○	○	○	○	○	Very interested

Would you say you are interested in music and making music? *

	1	2	3	4	5	
Not interested	○	○	○	○	○	Very interested

General explanation

There is a new view of health: Positive Health. This view argues that health is more than not being sick, it describes health in six pillars:

Bodily functions: I feel healthy and fit
Mental wellbeing: I feel happy
Purpose: I have faith in my future
Quality of life: I enjoy my life
Participation: I have good contact with other people
Daily life: I can take care of myself

I will be building an intervention that will show you your lifestyle progress on all these different aspects. To find the best way to show you this feedback, please share your opinion on the following ideas:

Idea 1: Growing/Building

This is an application for your phone that shows you your progress in the different pillars using nature! This can be done in two different ways:

1.1 Grow your own globe
This idea includes growing your own globe! All different health pillars are connected to nature (one is trees, the other is water, the other mountains, etc.). When you improve your bodily functions for example by exercising, you will grow a forest with trees. And if this improves your mental health, mountains will also start to form. You can choose which habitat is which health pillar, to personalize the globe as your own.

How do you perceive this form of feedback? *

◯ Negative

◯ Somewhat negative

◯ Neutral

◯ Somewhat positive

◯ Positive

How likely would you be to make some lifestyle changes (big or small) based on this application? *

	1	2	3	4	5	
Not likely	◯	◯	◯	◯	◯	Very likely

Do you have feedback on the aesthetics of this design?

Long answer text

Do you have any additional feedback on the effect this design would have on you?

Long answer text

idea 1.2: Tree

2. Grow your own tree
This is an application where each different branch represents a health pilar. When you perform an action in that pilar, the tree will grow and branch out. For example: eating healthy will grow a new branch on your bodily functions branch. If you also drink more water, a branch will grow from your grown nutrition branch etc.

Idea 2: Symphony of life

This is an idea to make an application using music. All different health pillars will be connected to an instrument of a song. By working on all different pillars, you will get closer to the entire song. There will be different genres to choose from to make it more personal.

Same questions as before

Idea 3: Color movement

This is an idea to make a physical object of glass (or different see-through material) with colors inside. Different colors will be connected to different health pillars and when you improve a pillar there will be more of that color. The colors will be moving to make it an aesthetically pleasing object to keep on your desk or wall.

Same questions as before

After seeing all ideas: What is your preferred design? *

◯ Idea 1.1: Globe

◯ Idea 1.2: Tree

◯ Idea 2: Music

◯ Idea 3: Color movement

◯ I do not like any of these ideas

Please elaborate on your answer to the previous question (what is your preferred design) *

Long answer text

The sketches were also included in the questionnaire, which can be found in figure 12 t/m 15.

Appendix F: Results questionnaire

Demographics

Information

What is your age?
45 responses
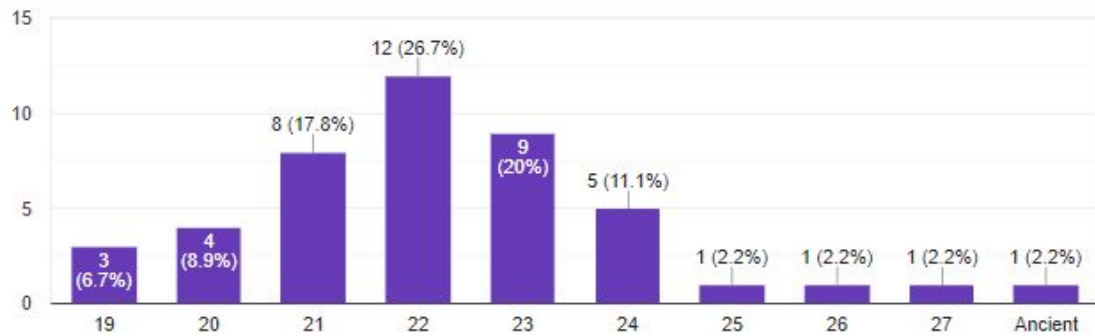
What is your gender?
46 responses
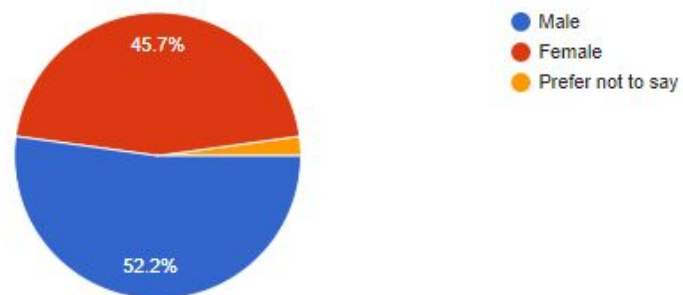
- Male
- Female
- Prefer not to say

45.7%

52.2%

how likely are you to change your lifestyle (to improve your health) in your current situation?

46 responses
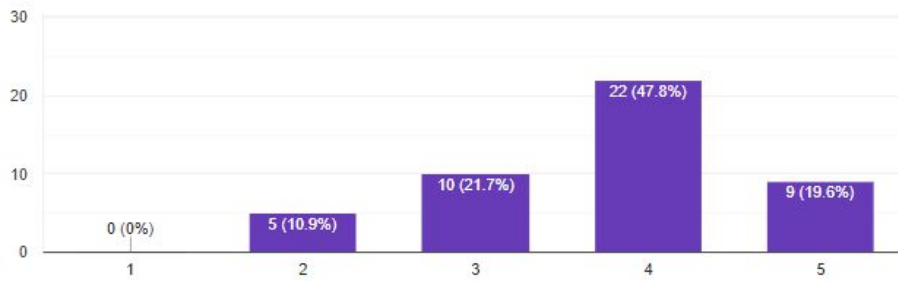
Would you say you are interested in nature and the environment?

46 responses
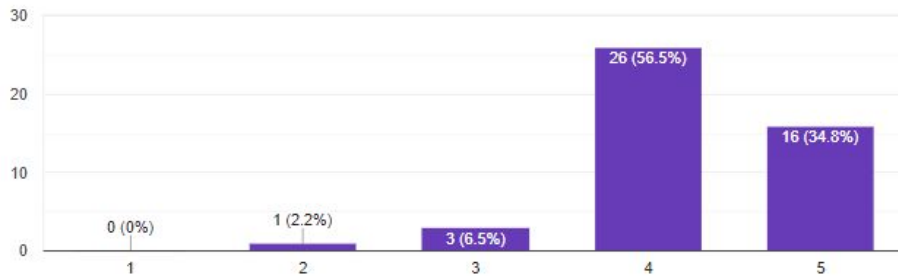
Would you say you are interested in music and making music?

46 responses
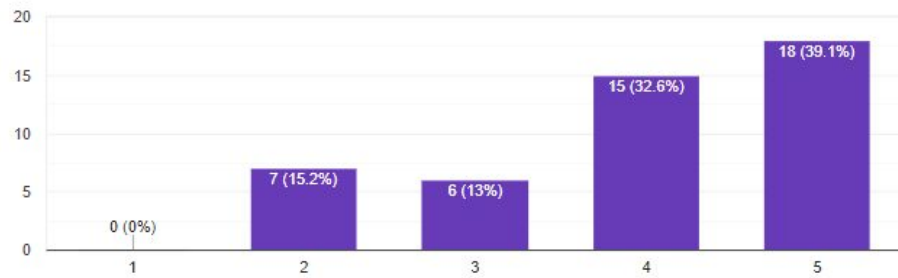
Idea 1.1: Globe

Idea 1: Growing/Building

How do you perceive this form of feedback?
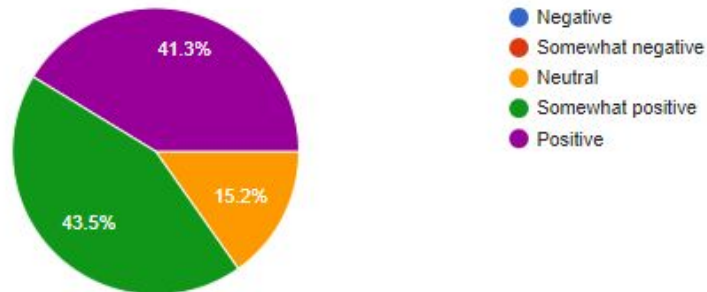
46 responses

- Negative
- Somewhat negative
- Neutral
- Somewhat positive
- Positive

41.3%
43.5%
15.2%

How likely would you be to make some lifestyle changes (big or small) based on this application?

46 responses

1 (2.2%)
10 (21.7%)
10 (21.7%)
21 (45.7%)
4 (8.7%)
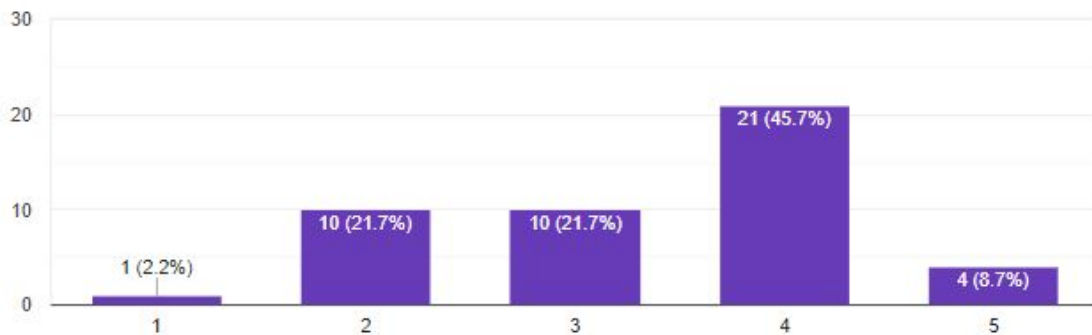
Notes aesthetics:
- Could be more detailed
- Cartoon or realistic style? Both fine, just do not mix
- What happens when you leave it for a long time (set you back)?
- Use and annotate regions to show flourishing as you improve
- Perfect combi art & realistic / represents real world
- Cute / interesting / creative / exciting / promising / looks good/great / original
- What is the start: desolate planet or base value of everything?

- Can the planet be 'maxed out', like grow infinitely? Or can different habitats get in the way of each other etc.
- Nice overview, calm feeling
- Is there a direct link between health pillars and the associates' health natures?
- Let habitat be influenced by negative health choices: dirty water, dying trees, crumbling mountains, polluted air etc.
- A personalized individual could walk around and give tips and advice on how to save your planet.
- Reminds someone of the app "Forest" for studying, which they use.
- You don't want to let your world die so you keep going
- Good if the user gets immediate visual feedback on how much they have done for their body.
- How will the app register improvements?
- How big will the globe be?
- Maybe categorise with colors as well to make it more clear
- Looks childish/ not professional
- Could be nice to see other planets from other people to motivate to grow together
- Feels too much like fiction for me, but see how it could help others

Notes effect:
- When you collect something in the game (trees etc), will it get harder to make progress? Like in other collecting games
- Sounds like a great idea / would motivate me / sounds fun to be able to build your own planet by being healthy
- Not sure about the effect, it would depend also on how much data I have to provide myself and how much time that takes, whether I would get notifications and reminders etc.
- Would it be possible for people to pick their most favourite feature and match it with the easiest achievable pillar for themselves? Maybe this would encourage them to do the easy thing but less encouraged for the hard tasks as those are connected to less favourite features.
- Would not motivate me too much because it is too far removed from my personal health
- Does the app record me exercising or do I have to put it in manually? Like for mental health, do I have to keep saying I am happy?
- I feel like in the beginning the progress would be clear, but when you use it for example for 5 years I think it would be hard to see the progress: what happens
- I seriously doubt an app can motivate me to improve my life significantly, but I could always try it. I do think bodily functions are easiest to motivate, but I already am pretty motivated in that pillar so..
- This application represents a world full of nature, which positively triggers me because I like being in nature and enjoying the power of it: I think it would have a positive effect on me
- I like the idea of recreating a world
- I would animate the world a bit (moving trees making it a bit more interactive),
- Might be fun to add small interactivity in this

- I think my health is already pretty good so I wouldn't change it
- I feel like it would only affect me if there is actual gain (apart from growing) maybe unlocking things etc.
- Maybe get more details when you click on a certain element
- It might help if you can zoom in on a habitat and see local growth on health
- I think it could work, but would be better to keep it realistic and educational, like an avatar
- You can create a population that gets happy/sad based on your planet
- I would keep the design clean
- Content needs to be properly adjusted to individuals: what is healthy varies each person. Adjusting this through settings should be possible no matter the design! I like the idea of the planet, it is interesting and could be fun if well executed. I probably won't use it.
- I would need an incentive to care about this world, rather than it being something else I also have to take care of..
- I like that it is gamelike, and would motivate me.
- It might result in competitive behavior among users to get the best globe, which could later demotivate the ones who just start out or don't have a lot of time for their globe.
- Concern: the novelty might run out since it is encouraging people to do something themselves but relying on external fiction systems. This can mean that when that stops being exciting they lose changes they have made because it is not a habit. It could also go negatively as it could make people feel like they are failing. For this idea to be sustainable, they should ideally have people actually engage with themselves and their lives and not only gamifying this process.

Idea 1.2: tree

idea 1.2: Tree

How do you perceive this form of feedback?
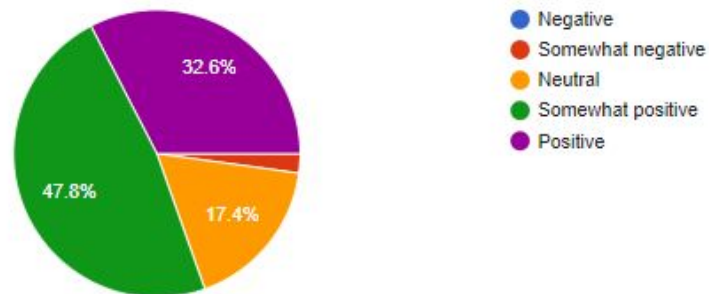
46 responses

- Negative
- Somewhat negative
- Neutral
- Somewhat positive
- Positive

32.6%
47.8%
17.4%

How likely would you be to make some lifestyle changes (big or small) based on this application?

46 responses

4 (8.7%)   11 (23.9%)   13 (28.3%)   14 (30.4%)   4 (8.7%)
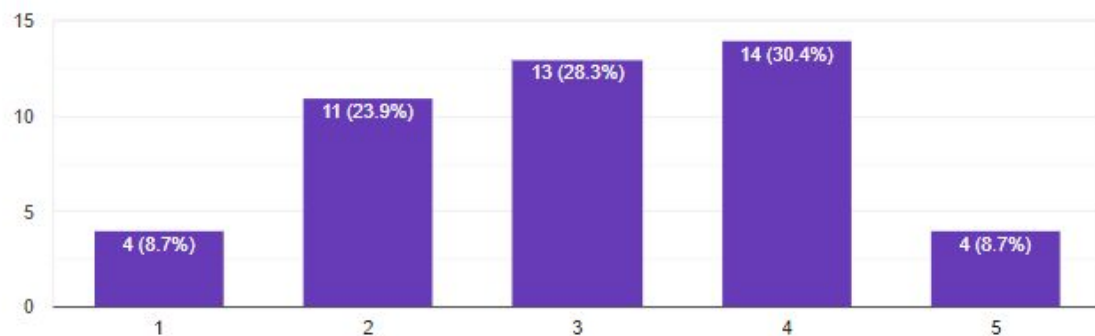
Notes aesthetics:
- Clearer than a globe, well explained / looks more clear to me
- Nice, maybe explain the colors of the branch
- I like that it gives a nice and comparable overview of my health pillar and shows growth literally.
- A bit boring / maybe too simple
- Maybe allow people to pick from a variety of trees/flower colors

- Would be cool if you could personalize with labels and change colors.
- Just like the previous idea, too fiction for me
- More leaves / use leaves not dots / adding leaves would make it look less barren: small goals per leave could be nice / growing leaves with each change to make it less empty
- It's very clear but not convincing, I can't link colors to consequences of my behavior.
- I like trees, but it is a much smaller perception than the world.
- A living tree is an interesting / creative way to represent well being, I like the colors on the branches as well.
- The idea is really cool and the water colour gives it a nice aesthetics, maybe implement this digitally as well as it is different from the usual slick and futuristic style, but gives a minimalistic feel still (calm)
- This feels like a slimmed down version of the previous design. It would be hard to apply various aspects of bodily functions in an interesting way: different colored branches won't be enough. Maybe more interesting: different colour tree bark / size of the tree / growing fruit / presence of birds or other animals. Entire planet is more interesting though
- Nice, but less clear because the pillars are different branches. Your tree might grow very awkwardly when you develop a certain pillar more than another.
- A little simple: less motivating than an entire world
- Looks good, use of colours makes it more clear!
- I like the aesthetics of this design
- I think this displays the results more clearly than the globe idea.
- Maybe it would be impactful if the tree also dies a little bit when stopping improvement for a while (like the app forest)
- I like the colourfulness of this design
- Very nice, have not seen this before
- Will the tree grow leaves/flowers/fruits after hitting a certain milestone in self-improvement?
- Will the tree grow lopsided because one branch is improved more heavily than others?

Notes effect:
- More feedback when trees are growing would motivate the user more (detail)
- I totally see this as the local growth in idea 1.1
- Are there milestones? Maybe I get a flower on my branch f I run 10km for the first time or if I feel really confident about my future
- The world seems a bit more dynamic
- Same as before: I like that it provides more details with each section, very interesting
- I feel like my health is already pretty good, so I don't think I would change it very likely..
- This design is more likely to motivate me to even out all pillars, because you want your tree to bloom as a whole
- Same as I said at the globe: for me, it is too far away from reality: something with a human would work better for me
- Maybe you could make a cool distinction between branch growth and the amount of leaves. Or if you neglect the tree the leaves could be sad and the tree could die.
- I really like this drawing

- I perceive this to be limited to some extent, because a tree might grow a lot in the beginning but at some point kind of stagnates. Visually there might be a time when there won't be room for the tree to grow more but a healthy lifestyle should not come to a halt eventually.
- It could be a nice stimulus to invest time in your overall health if the tree and its branches grow as you grow yourself. If the tree would also lose branches/die from performing bad that would be a reason to stop using the app or lose motivation I think
- It would be interesting to see my personal tree grow, but I am not sure if I would keep coming back to use it. It would serve as a nice reminder to measure progress though.
- It would have less effect on me taking responsibility on my health choices because it is slimmed down: why would a tree make a difference. Especially if you compare it with a human or pet by choice. You can see if one is fit, healthy, happy, hungry, thirsty, angry etc. Most people have more affection for lovable moving creatures than a static mass of wood and flowers.
- If you go with this concept, add more birds etc. when the person is doing better. I think it would be nice: animated stuff, music etc.
- One tree is less motivating to me than an entire world like before.
- One thing: what happens when you have a lot of branches? Not sure how easy a massive tree with branches would be to navigate: will there be some function to see new entries being formed?
- The tree of life is a very sensible thing to think about, but I don't think you can really grow a tree because it needs decline too
- I think the beginning would motivate me more than when the tree is quite grown already
- Maybe it would be fun to make fruits grow on the tree: make you feel like you made something substantial to earn from your actions.
- I would care more about my tree than about a globe, it feels more personal and has an easier overview on how I am doing.
- I like that this really shows how balanced all pillars are, if you do well in one pillar but not in others the tree will look weird, which will motivate you to change more
- If the tree grows lopsided it might motivate users to even out the growing of the tree by improving pillars that are visibly lacking in the tree.

Idea 2: Music

Idea 2: Symphony of life

How do you perceive this form of feedback?
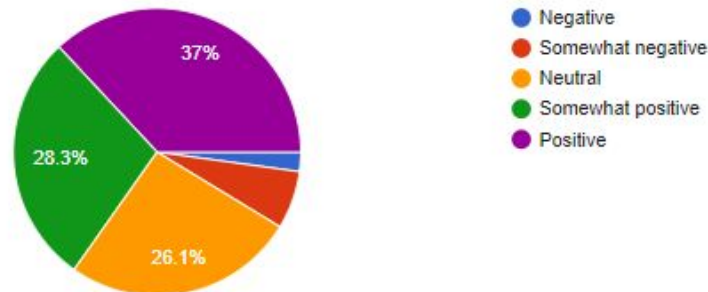
46 responses

- Negative
- Somewhat negative
- Neutral
- Somewhat positive
- Positive

How likely would you be to make some lifestyle changes (big or small) based on this application?

46 responses
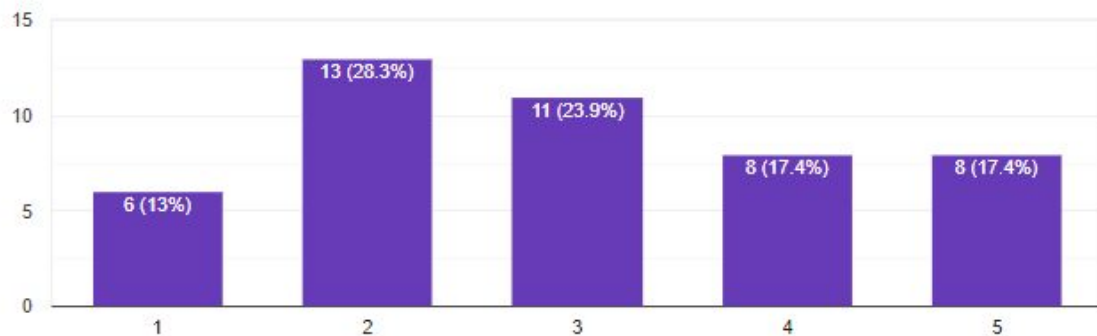
Notes aesthetics:
- The icon/illusion of different health pillars could be clearer
- Cool! Colours could match frequency: frequency - colour - mood interrelations
- Aesthetically it sounds cool
- I like the idea, but it might start to feel 'old' quickly, since it's just 1 song.
- I like this idea a lot / sounds great / I like / I like the positive rewards / looks amazing / I like the look alot / great idea / I like the idea of making music / very cool!

- It looks really cool, but personally I'm not that into music. It would be cool to listen to a song with an effect applied to them based on my progress.
- Idea: Link certain aspects or frequencies. Ranges to pillars, muffle them if that pillar is not doing well and make them go back to the original state as your health is improving again. This provides an additional dimension of auditory feedback
- Maybe if you could see the waves being formed in the app, that would be cool
- This is even more fiction compared to growing something. I like the idea, but it looks too much like a game now.
- Maybe make the sound waves related to nature? Wind, waves, fire or rain could be interesting
- It's hard to give good feedback on a sketch but the design looks good
- I like that the idea is somewhat unexpected. It might get a bit boring or annoying hearing the same music all the time though, especially if you don't improve and it does not change. You might feel pressured to improve yourself, which may both be a good and bad thing..
- It seems very original, a bit tricky to notice small improvements though
- A user might consider one of the instruments "ugly-sounding" and not want to continue using the app.
- This would need to be a very good non existing song to be very successful, otherwise the step to just look up the music on youtube/spotify is really small
- Issues: People have a lot of flavors in music. For someone to be interested in completing a song it needs to be adjusted in their flavor in all levels (from just the bass to the completed product). If the user is disappointed anywhere along the way, the user will lose interest. Even if you make use of real songs that are widely accepted as good songs people will lose interest fast when they know what song it is. If you make your own songs people might not be interested at all, even if the quality is good. Furthermore, having only feedback of sound itself and not visuals (note: hertz differences or decibels are feedback of the sound, not the related health pillar) is unnecessarily limiting yourself. For people who are blind you may not have that choice but I assume this is not the group you are focussed on.
- I like that this way f you make it continuous you could choose to show if you did better in a certain pillar or not on that day

Notes effect:
- The interaction of the music created with the user is very interesting! But perhaps you can also think of other ways of interaction with music (for example creating a music game)
- Curious to see if the negative effects could be build in too, but in a supportive way
- I think in the beginning the small beginnings of the song have to sound nice, because silence turning into a little bit of noise may not be very appealing and engaging
- I feel like my health is already pretty good, so I don't think I would change it very likely..
- I would personally only use this if I could pick a song. I would not have the motivation for a song I don't care about.
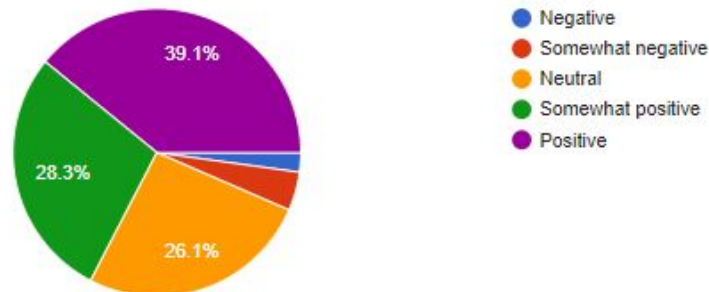- Something more close to reality would work better for me
- I like

- Music and lifestyle have always been connected, perfect combinations!
- Same as before: What happened after a song is complete, how do you motivate people to start all over again. Might be fun in the beginning, but not really functioning in the long-term
- I am not a person that enjoys making music that much, as I am not the most creative person, so I don't think this function appeals to me.
- I enjoy listening to music, however making it is not my thing. Also since I am pretty genre specific I don't think this would be for me. Cool idea though!
- I would maybe try it, to see what it does. But most probably I will lose interest fast. When maintaining being healthy is translated to completing a song will limit my interest. Once its complete, do I have to do another one again? Will there be a negative effect once I neglect a health aspect, or will just that part of the song not be completed? In any of these cases, it does not interest me enough.
- Maybe let users create their own song instead of completing one.
- I like this idea! It stimulates to work on all the pillars, because it is the only way to finish the song.
- I'm not a huge fan of making music, as it is a challenge in itself so I would find it hard to change my lifestyle and also make a song.
- It would be extremely hard to make a design that does not become repetitive this way. Either you need a large sample base or it will become repetitive sounds and possibly even annoying.
- Very nice idea, however something visual would work better for me, I think.
- The curiosity of what song would come out is, in my opinion, more stimulating than a tree growing since I know what will happen there.
- Personally I am not interested enough in music to care. But I am sure there would be people who would like it and it is quite unique as well.
- If the user works towards 'unlocking' a song, when they figure out what the song (end goal) is, they might be more likely to quit halfway because they already know what the song will sound like.

Idea 3: Color movement

Idea 3: Color movement

How do you perceive this form of feedback?

46 responses

- ● Negative
- ● Somewhat negative
- ● Neutral
- ● Somewhat positive
- ● Positive

39.1%

28.3%

26.1%

How likely would you be to make some lifestyle changes (big or small) based on this application?

46 responses

5 (10.9%) 7 (15.2%) 11 (23.9%) 16 (34.8%) 7 (15.2%)
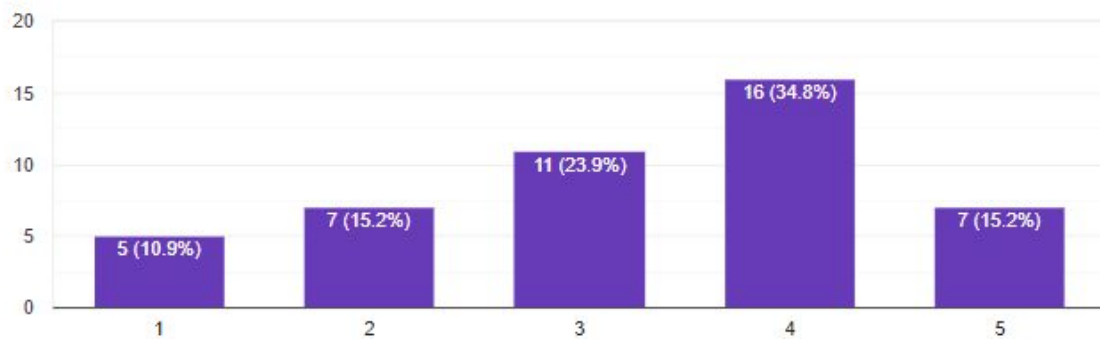
Notes aesthetics:
- Attractive / seems cool! Could be aesthetically pleasing / Looks cool / Is pretty / It's pretty! Aesthetics are very good / Love the colors / I love it
- I think it is very interesting and if done well could look very cool.
- It is very confusing
- Extremely cool idea! Probably hard to implement as well though
- I really like that it is a physical object! / I like that it is something physical you can have at home

- Other people can see how you're doing, maybe not ideal for everyone
- Really cool as this could be made into an actual product (like a light box or cloud)
- I like it as a piece of art!
- It should be very obvious and directly visible what colors mean what improvement, otherwise it is hard to get the feedback from only looking at the colors.
- The abundance of colors is very appealing, although it might be because of the actual water paint that the real human made, which makes it feel 'alive' more. A real application cannot really look like its painted by a human, that is why I like the idea now, but find it hard to see it in a working application.
- The aesthetics looks great. It would almost feel like a magical object that reflects your current mental/physical health status and that's an idea I find really cool.
- Just moving colours? What if I like the colour red more than blue, how will this motivate me in completing blue? Red makes me aggressive, blue makes me passive etc: What aspect of colours relates to emotions? Or what about the fact that red is related to bad and green is related to good? It might look nice having this somewhere in my house but I won't be able to get a detailed measure of how well I am doing, just a loosely interpreted idea of it.
- I think it could act as a nice light, makes me think of some sort of lava lamp. Could be really cool that it means something to yourself, but not necessarily to others. I like that you do not have an app but something tangible.
- Might not give enough incentive if a person really likes red for example
- I like the look alot! It would be very cool to have
- Looks very nice, but I fail to see how this shows improvement. It seems to shift only in focus of the different pillars
- I like the part that it's not an app, but physically. This way you are always reminded when you see the object and I think the app you start not using after a while.
- I would probably focus more on certain pillars then the others just to get more of the colours I like
- This is a very creative idea! / Very colorful and visible reminder

Notes effects:
- This idea is not as functional and effective as the last ideas
- Less excited to be honest, I could see it happen that a certain colour would dominate meaning that people might focus on the fact a certain colour is less present and if a person thinks they are doing well in that pillar but it is dominated it might have counterproductive effect
- Having a physical reminder of what you're working on is cool. You could walk past it everyday and passively notice your device becoming more of the desired colours. Instead of having to actively look it up on an app and probably forgetting after a month that you have that app.
- I feel like my health is already pretty good, so I don't think I would change it very likely..
- This would motivate me even more, as it is in a physical space, not an application. Which means I see it more often without additional effort and its more personal feeling.
- This is too abstract for me
- Aesthetically beautiful, yet not motivating for me

- I love to have something physical and I like pretty lights!
- I think the fact that it's physical is a better reminder since I don't have to actively click on things on my phone to see my progress but it's always there. Again it would be nice if one could pick colours, otherwise I would say I'm doing great in mental health because that is pink for example just so I can make it look pretty when I might not be making progress
- It might be nice to look at, but I think it wouldn't help much for behavioural changes as the feedback is not very clear and the link to specific improvement is rather diffuse. How much more of a color is good? What distribution in colors should one seek for?
- Stimulates me less than the others, don't know if it would do much for me.
- I like this one a lot, it is a way to measure progress without having to open an app to check up on the design. Data will probably have to be submitted through an app but it would be nice to have a cool visual reminder whenever you pass by the lamp (I'm gonna call it lamp) you can quickly see how you are doing. Again I love the visual feedback without having to open an app.
- It won't motivate me at all. Having soothing moving colours on my wall or desk may look nice, but it won't make me live a better healthier life. It's like having a smart watch with only colors: It might look nice, but loses almost all of its functions. Especially in this case since its an object on your desk or wall and not on your wrist at all times.
- This in combination with an app would be nice: in the app the user could set personal colors for example and input data.
- I think this would have less of an effect for me, because it's just pretty and I don't think it is entirely a reward if the colours change. That makes it less motivating for me, but I do think it is really pretty, so I would give it a try!
- I think it would be hard to determine your progress when all the colours are mixed up together. So, if I can't tell my progress then I wouldn't use it.
- I think I'd like how one color looks - You can achieve a "test" version of this by adding wool to an acrylic case and have individual leds shine a single color brighter or less bright!
- I think this way of showing would stimulate me the most in the long run, since I probably would stop using the apps
- i would like it and try to make it pretty but it is a bit sad that I can't take it with me, maybe add an app to it, also to get more detailed information
- I like that this is something physical you can put or hang in your room, and not just an ap
- It is a very subtle reminder of what users have been doing and what they could improve on, so that's very nice
- It does not

Final
Notes "Globe" +2
Female:IIII Male:IIIIIIIIII Other:

After seeing all ideas: What is your preferred design?

46 responses
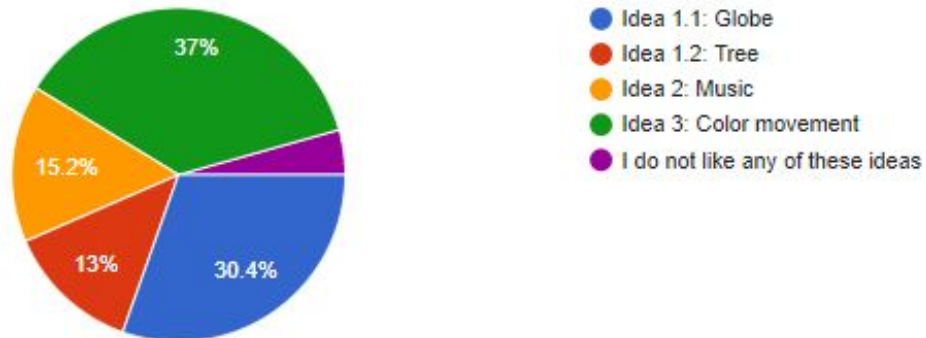
- My preferred design was the globe, as it encompassed the most flexibility and ability to change habitats and I find the idea with one habitat being one health pillar a very nice idea, as it illustrates the progress of more than one single tree or a song. :)!
- I really like the idea of growing/making my own world by improving aspects of my life!
- I like the idea of building my own globe
- Having a planet Tamagotchi will keep me most interested in looking back on how well I'm doing in living healthy. Seeing my planet grow more healthy would give me a good feeling. The tree is a slimmed down version of this. Both the music and colours wont make any difference to my motivation to get a healthier life. I may complete one song and I'm done. Doing exactly the same but with a difference would bore me. Making a object have more colours by living healthier makes no sense. It could change my mood slightly, but in that aspect it might even make my motivation worse than better, because only the colour blue has been filled, and I'm already feeling a bit blue. Of all these, the planet could be interesting if well executed.
- It's very gamelike and has a simpler and clearer visualization. I also feel like the progress would be clearer to see as opposed to some of the other ideas.
- it feels the most like a game and seems to have the most potential in my opinion
- I am a big fan of games that incorporate the possibility of building a region to your own liking so I personally could see myself using that for fun, let alone have it help with my health situation
- I think I like idea 1.1 and 1.2 equally, both are living 'things', which the human of course relates to. It can be really motivating. I believe to watch something grow, which you contribute to yourself.

- I like idea 1.1 and 1.2 both, however the first excites me a bit more. Idea 3 doesn't really seem to show how I am doing overall, so I fail to see how this will motivate me to improve.
- I guess the World is best as there is most room for development and creation. However, a question relevant for all App Designs- how do you keep the people continuously using the App? How do you make them using it at all?
- I prefer the globe. Since I feel like I have my own world
- Tree is too one sided. With the globe you really promote all health aspects
- I like the globe most, but the colour movement is also very interesting. I think those should both give me the most fulfilment, but the globe could provide more and clearer information I think
- Looks the most interesting, could be done with much cute details

Notes "Tree" +2
Female:IIII Male:II Other:
- Focusing on one thing (tree) gives the idea that you have less thing to work out. The globe , for example, is kinda giving a pressure of building a globe
- In my opinion, the tree is more logical and more clear to read from
- Still love the idea of growing from actions that lays parallel with what you want to do.
- I prefer the tree! Because of the symbolism and design. When I was losing weight, I used an app to show my progress. But only my physical health, not other areas of health. In my opinion the tree design has the best representation of progress compared to the other ideas. In addition, the tree in my opinion is a symbol of life as you grow to be healthier. Like a tree growing up with you. Which is super cute
- It's more direct feedback than idea 2 and 3 while it's more specific than idea 1.1 for a better overview and idea of where you're at
- Nice

Notes "Music"
Female:III Male:IIII Other:
- The music would stimulate me most for the reason I want to know the song (the unknown), the others you kind of already know the outcome, so it is less exciting.
- Most effective and functional. And I also like the way of interaction by combining music and health pilors.
- Music is always good
- I think the combination with those 2 elements in life! (Lifestyle and music)
- I myself do a lot of things which have to do with music and therefore I think that it will work best for me
- I think it would motivate me the most but the globe sounds promising as well

Notes "Color movement" +1
Female:IIIIIIII Male:IIIIIIII Other:I
- I like the idea of a physical object the most, because I feel spending too much time on my phone is not good for my health as well (so an app to monitor health improvement

would be a bit ironic in a way). Furthermore, in general, I would not be very inclined to change my lifestyle based on an application, so that explains my negative answers on those questions

- Idea 3 confronts me with my personal growth since the object will constantly remind me of my undertakings and current state. We all have many apps on our phones and in my experience, these apps are at risk of gathering dust after being used for a while. The downside of this idea is of course that the user would have to invest in it financially, but for some people this might force them to get the most out of the product.
- I like both the globe and the color movement idea! The color movement seems the most original of all, but also the hardest to nail. The globe also would work pretty well I think!
- Like I said ai like the physical reminder and it actually looks like a cool room decor piece
- I think the color movement one is one that is aesthetically pleasing, and something that can be a physical daily reminder of what you need to work on.
- As mentioned above I like the design and the magical/fantasy feeling such an object would give me. Also the fact that I can simply notice my status when walking by the lamp and not having to open an app would work way more effectively for me since I can't really forget about it.
- The colour movement is perhaps the best as it can be the most ambiguous and doesn't actively assign good/bad. The idea of an obvious good or bad is different since i'll always wonder who is judging if i'm doing enough for it to be a positive change. Also having a physical object would mean I'd be more invested as I'd probably have to invest more to even start. Also a physical object is more positive as feedback since it doesn't involve an app and looking at your phone screen again that is exhausting and will probably only negatively affect the general pillars.
- This design is the least intrusive in the sense that it could be used as decoration anywhere, thus the user could simply look at it and see what they are doing well (or not). And this design, even if the results are shared, is the least competition inducing, as they are just random blobs of colors
- I think most health supporting systems these days are app, so I feel like the color movement stands out more than the others
- I like two ideas actually, nr3 and nr1.1. (Globe)
- I personally would forget or lose interest if the idea is not appealing enough or doesn't grasp my attention, I think that with the lights I will be able to passively observe my progress and not forget about it. I would lose something in a digital phone, but physical in my wall is difficult to lose
- i really like the physical object, but again I would want an app or website with extra info and more details
- Having an interactive conversation piece in your room is something I am very interested in, especially based on lights.
- It is something that you will see in your room everyday, and I think that would work better to motivate me than an application that I have to click on myself. If I don't want to see my progress in an app I just don't open it, but with the physical thing you will have to look at it.

- I like the visual representation with the colors. Since it is a clear visual object (on your desk, in your room) it will confront you with the status of your health everyday. I think it is a good motivation to improve!
- If made into a product, it is in a physical space, not an application. Which means I see it more often without additional effort and its more personal feeling
- Just because I like something physical more than an app, I prefer this one. But it will probably be more expensive.

Notes "I do not like any of these ideas"
Female:II Male: Other:
- If I had to pick one, I would go for the globe. But as I mentioned before, I think they are too far from reality and abstract. I think something with an Avatar, which could work like a Sims/tamagotchi, would have a good effect on me. A mini me version I need to keep happy and at the same time I keep myself happy.
- I think that all ideas are pretty to look at/listen to, but I doubt they would have a big effect. They might motivate me for a few days, but I don't think they would help me achieve an improvement of my lifestyle unless I was already determined enough to achieve it without these designs. Other than that, I would suggest what behaviors count for positive feedback. For example, I already eat healthy most of the time, so it would not be much of an achievement to eat healthy. But I don't go outside much, so that should count more, e. g. by making the tree grow faster.

Appendix G: Corona form for in-person testing

To make in-person testing corona proof, a few regulations are established:

- There will always be at least 1.5m distance between the researcher and the participant.
- There will always be alcohol gel available at the test for before and after the test.
- There will be a different pen for the participants and the researcher.
- The researcher will use alcohol gel in between tests
- The maximum number of participants per day will be in accordance with the corona regulations set by the dutch government at that time.

Appendix H: Consent form lo-fi tests

Information sheet and consent form lo-fi evaluation
"Healthy lifestyle for young adults: a positive health based intervention"
YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Purpose of the study
The main question for this research is "How to empower people for a sustainable healthy lifestyle" and this specific research will be testing feedback methods to help young adults achieve a healthier lifestyle. You will be asked to perform some small tasks to introduce the interface and there will be

an interview afterwards. This interview and prototype testing will help find the most effective methods of giving lifestyle related feedback in a fun sustainable way. This research is part of a graduation project in the Creative Technology bachelor at University of Twente.

Procedures for withdrawal from the study
You are free to leave this proto-typing and interview and the study at any moment, upon which all collected data from you from our research will be removed, unless you give consent for using this data. There will be no repercussions for this.

Use of personal information
For this research, personal information will be gathered. This will be done to find if there is a consistent difference between certain aspects of people (gender, age, interests etc.). This information will not enable anyone outside the researcher to identify you, keeping your identity anonymous. You have the right to ask for access to your personal information which will be used for this research, and the right to ask to erase it.

Usage of data during the research
This data from this research will be kept in an online data cloud only the researcher can access. Every piece of data concerning your personal information that could identify you, such as this consent form and audio recordings, will be kept offline and safe. Audio recordings will not be made public and will only be accessible for the researcher. Potential audio transcripts will be made anonymous. The data you give can also be used in the graduation report about this research. This will be made public but the data used in the report will be anonymous. After the research is complete, all personal data will be destroyed, only anonymous data and the final report will be kept online. For any further information/questions, you can contact the researcher:
l.h.m.uhlhorn@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente by
ethics-comm-eemcs@utwente.nl

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Please tick the appropriate boxes

Taking part in the study

I have read and understood the study information dated [/ /], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	YES / NO

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

YES / NO

I understand that taking part in the study involves an audio recorded interview and a survey questionnaire completed by the participant. After the research is complete, all personal information and audio recordings will be destroyed, only anonymous data and the final report will be kept online.

YES / NO

Use of the information in the study

I understand that information I provide will be used for publication of the report for this research. This report will be made public, available for everyone. However, the data used in the report will be anonymous.

YES / NO

I understand that personal information collected about me that can identify me, such as gender and age, will not be shared beyond the researcher.

YES / NO

I agree that my information can be quoted in research outputs

YES / NO

I agree with audio being recorded.

YES / NO

Signatures

_____   _____   _____
Name of participant   Signature   Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands what they are freely consenting.

_____   _____   _____
Researcher name   Signature   Date

Study contact details for further information:
Lyanne Uhlhorn, l.h.m.uhlhorn@student.utwente.nl

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Appendix I: Demographics Lo-fi test 1

What is your age?

4 responses
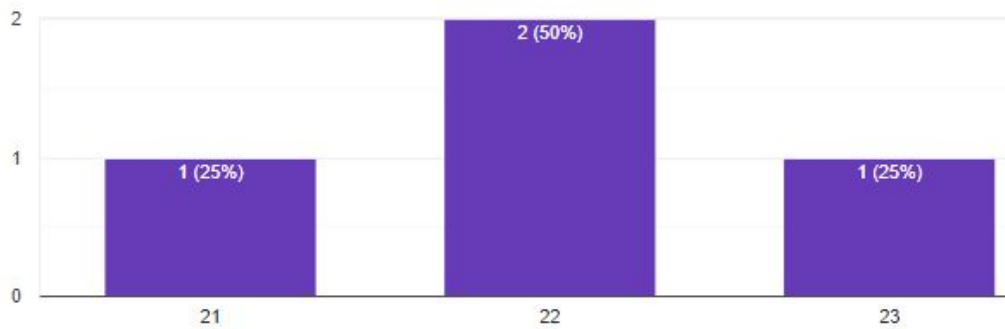
What is your gender?
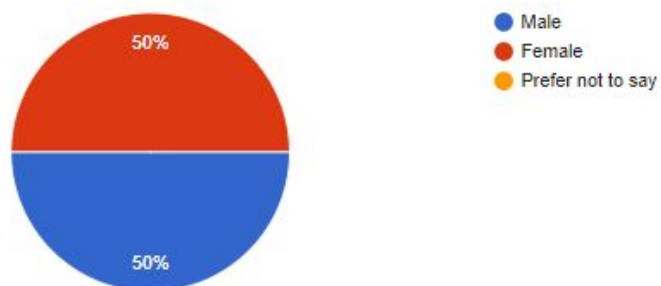
4 responses

How likely are you to change your lifestyle?

4 responses
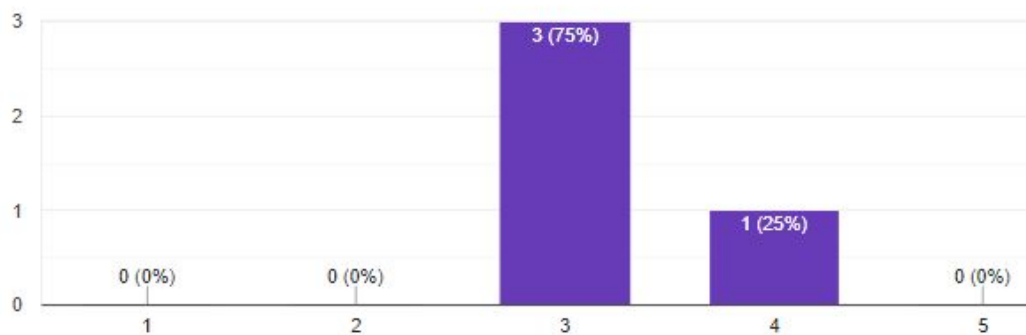
Appendix J: Results Lo-fi test 1

Participant 1
Option 1: sentence
Q: What do you think the different pillars stand for?
I think bodily functions is the body, mental health the mind, purpose what you want in the future, quality of life how you match everything (balance), participation with who you do everything and daily life how it all comes together every day.
Q: Why did you choose these actions as goals?
It is very broad now, not ready for the app I realise.
Q: How complete do you feel this approach is in defining health?
There might be things to add, like seeing nutrition apart from the physical. I feel like I am missing something but I don't exactly know what. Actually, I think it is complete, nothing comes to mind that is missing.

Option 2: categories
Actions: Participant adds a goal about sleep and indicates that concentration is tied together with getting enough sleep so there is no reason to add a concentration goal. Also states he/she does not get stressed a lot. Adds a development goal and asks what 'resources' means. After the explanation from the researcher this is clear. Adds a goal about support and seeking help. States that he/she likes "being thankful", but would put that with participation.
Q: What do you think the different pillars stand for?
Not different, only purpose is somewhat different than I thought. I was thinking more mentaly "what is my purpose in life" but it seems more about the future in general, it's just a different wat of looking at it I guess. The purpose in life is a part of it I think though.
Q: Why did you choose these actions as goals?
There were some things I did not think about but that made sense, so I added a goal about them.
Q: How complete do you feel this approach is in defining health?
It feels more complete, yet still like something is missing. I don't know what it is though still.
Q: Is there anything unexpected in this list?
I did not expect participation to also have the societal interest, but reading it now that does make sense.
Q: Why did you (not) change these goals?
Not applicable
Q: why did you add/delete these goals?
Adding already explained.
Q: How does this information influence you?
Yeah I think it gave me some ideas that I did not think about before that actually make a lot of sense, but it doesn't really influence me like I don't feel like I need to add everything or anything, just some things that I did not think of myself that really fit me.

Option 3: examples

Q: Is there anything unexpected in this list?

I don't think so no, personally for mental wellbeing this goal would not really help me but you know that is personal I get it.

Q: Why did you (not) change these goals?

I added some time stamps, so in the examples they say like daily or something so I added that a bit, makes it much easier to actually do it.

Q: why did you add/delete these goals?

Not applicable, did not add new goals or delete goals.

Q: How does this information influence you?

People need to start thinking smaller and that is exactly what this does: If you are not confident for example it is really hard to achieve that and you need to start small and work towards something bigger.

End interview

Q: Is there anything you are missing in the list to define health?

I still did not come up with anything so I think not. I just feel like it is important to mention that you need to be open to change like not be completely down.

Q: Are there any goals you want to achieve that you cannot categories in these pillars?

I don't think so no*.*

Q: How does this new information affect your freedom of choice to set goals?

It does not, I think you are still free to chose anything. It just gives some perspective of the size of the goals, I think people will understand how individual all goals are and otherwise maybe mention it in a sentence or something. Some are also harder to achieve goals for, like the entire scope. It all depends on what the person using the app needs and wants, very personal. So if the person has goals that are too difficult it will be hard to achieve goals. Also for quality of life for example to think of easy goals is a little harder.

Q: Which information is useful in helping you formulate your goals?

I think all the information was useful up till now so everything. The sentence makes you understand, the categories show you multiple options you might not think of and the examples show you how big the goals should be. I do think maybe just make it optional so add like an information button, an i with a circle around it, and add it all there. I also think add a little story at every pillar, not all together but separate.

Q: Do you have any final remarks?

When you open the app it should have a positive quote like "Have fun, have a good day" or something like that. Maybe a scheme of everything they have already accomplished. Just make it positive because that is nice. Also, notifications always help but don't make it pushy because people can get annoyed at that fast. Cute animal pictures are always a plus.

Participant 2

Option 1: sentence

Q: What do you think the different pillars stand for?

> 1: Bodily functions is about the physical state of your body and be able to do anything
> 2: Mental health about the condition of your mind and how happy and comfortable you are with yourself.

3: Purpose: How do I continue what I am doing in the future and am I confident I will get there and taking away insecurities about the future.

4: Quality of life: how you stand in life. Are you happy with how you are doing? Like, do you enjoy what is happening or is it passing you by?

5: Participation: being a part of other people's life. How you deal with other people, the social aspect of health.

6: Daily life: the here and now, how you solve your problems at this very moment and handle yourself. On a daily basis, dus not generally but focused on 'per day'.

Q: Why did you choose these actions as goals?

1: Nice small goals that are achievable, but still long term because that is what I want to achieve.

2: It's about sharing your feelings and calming your mind.

3: My future is very focused on finding a masters and job opportunities.

4: Enjoying nights with friends and other moments of free time.

5: sharing positivity with others and keeping contact with spontaneous messages for example.

6: Cooking enough and doing my laundry, because I'm really bad at that.

Q: How complete do you feel this approach is in defining health?

I feel like it is more complete than the general view right now because it feels like when you are not sick you should not wine because you are healthy. I think the mental aspect is very important and often overlooked in lifestyle stuff, so with these 6 points you really hit the nail on the head and I like that it gives you the opportunity to draw conclusions about how you are doing on a deeper level that otherwise would be very hard to see or grasp.

Option 2: categories

Q: Is there anything unexpected in this list?

Concentration and control make a lot of sense for mental wellbeing, I just did not think of it and don't know if I would have. I also like that self love and positivity are on there because it's good to name those and it gives a more positive spin to mental wellbeing: instead of how do I need to improve it is also about what is good and how do we keep it like that, which I appreciate the feel of. Being thankful in Purpose was unexpected, but I understand that it is there because we need to be thankful that we can, for example, go to uni because it is so good for our future etc. Resources is another one I did not think of myself, but is a really good one and safety as well, especially in times like these (corona). And I like that it also says balance, because I can relate to that so well: the balance between rest and being busy. Interest in society is another unexpected one that is really good and could even be done together with debates etc. Belonging is also something I did not think of that is so important because everyone should feel wanted in the setting they are in. Seeking help in daily life sounds more like mental wellbeing to me, but I understand it does not have to be only mental.

Q: Why did you (not) change these goals?

Not applicable.

Q: why did you add/delete these goals?

Nutrition and sleep is very important, it just did not pop in my mind before but it is a great addition to my goals.

Q: How does this information influence you?

I like this bigger guideline more, it is really hard to come up with stuff yourself and especially because some concepts can be vague. I don't think there should be any obligations but I think it's nice to have the possibility to see all these options. A part of course comes from within yourself but sometimes support is necessary. And sometimes something is not applicable, like some things on this list do not apply to me, but then you don't have to use them you know. I don't feel like I have to use all of these at all so I think it should be fine.

Option 3: examples

Q: Is there anything unexpected in this list?

Nothing unexpected, all fit with the image I had. With mental wellbeing I might have had something different but that is very hard to generalize for people so an open way like this is actually nice. It's all very open for interpretations despite being clear and that is nice and feels unforced.

Q: Why did you (not) change these goals?

Not applicable.

Q: why did you add/delete these goals?

Water is an easy one to achieve which is nice and super beneficial so I added it, also was one of my goals already but I just didn't come up with it I guess in the moment.

Q: How does this information influence you?

The goals are not very intense so that is very nice. If I would see this when using the app I would feel more motivated to do little things instead of running every day which can be very intense for some people. I think because they all fit it also helps form my image of the pillars even more, like having these examples I think you'll have a better idea of how big it all can be and how I put my personal ideas in that form. It does not scare, it is something I can and even want to do.

End interview

Q: Is there anything you are missing in the list to define health?

/

Q: Are there any goals you want to achieve that you cannot categories in these pillars?

No

Q: How does this new information affect your freedom of choice to set goals?

I don't think it takes away my freedom or anything but if you don't want to affect people too much just make it optional. If people don't need more information, they won't get it. So add like a button to make the information pop-up. It's always good to give people the space to think for themselves and have the possibility to acces more information. And it's not mandatory you know, it's just options.

Q: Which information is useful in helping you formulate your goals?

For me the examples are really nice, so you can see how other people do it and that is really motivating to me. Notifications would also be useful by the way, if they are positive. I think a combination would be best though because some categories are more abstract than other so I would like to see some examples, but the categories did give me ideas for new goals.

Q: Do you have any final remarks?

I don't know the rest of the project but something positive and visual would really motivate me, like get something when you did something or when you did something for every pillar maybe to spike the motivation, that would help me look at all pillars for example. I really like the concept of positive health and I do think that bringing something on the market would make me try it out. Ik appreciate that they look further in health and don't see it as one thing and that it allows you to build your own understanding about yourself, it has this reflection element to it.

Participant 3
Option 1: sentence
Q: What do you think the different pillars stand for?
      1: Being physical: appearance, stamina, etc.
      2: how you are feeling: depressed, happy, etc.
      3: Knowing what you want to do and having some faith that you wil actually do it too.
      4: How well organised your life is (day in and day out), improving your routine.
      5: How social you are
      6: things in life that happen everyday: Food, getting dressed, etc.
Q: Why did you choose these actions as goals?
      1: Two different goals because it is a big pillar.
      2: going on vacation with friends makes me happy.
      3: Having a plan for my master is the most important aspect of my future right now.
      4: A bigger room, two rooms or just less housemates would really improve my life I think.
      5: I want to be more in touch with old friends from high school.
      6: I need to cook some more because my cooking percentage in my student house is very low right now.
Q: How complete do you feel this approach is in defining health?
      I don't think anything is missing but I do think that these are things that have been on my mind but not a priority, like I have not really been doing any of these or thinking about all these factors intensively. I can't think of anything that is missing though.

Option 2: categories
Q: Is there anything unexpected in this list?
      Sleep makes sense but I just didn't think of it and for nutrition I actually thought that was more daily life as well. Mental wellbeing is good, I agree. Being thankful at purpose feels more like mental wellbeing for me but I get why it has to do with purpose too. Decision making is good also, did not think of that one. I do think that hygiene would be good to add to quality of life because it is really important for that.
Q: Why did you (not) change these goals?
/
Q: why did you add/delete these goals?
Like I said, they were just things I did not think about. Like, cleaning my room is a good one that I thought about because of the category of living situation. And I have a very bad sleep schedule so that is a great one for me.
Q: How does this information influence you?

I think it added some goals I would have thought of eventually but now can think of right now. I also understand better what the difference between quality of life and daily life is, because they were very similar to me before.

Option 3: examples
Q: Is there anything unexpected in this list?
The wellbeing one is only if you like reading and getting an 8 for a test is also well being because you got yourself to focus for studying. I would add the goal to both. Also 30 minutes of free time feels more like mental wellbeing. And I think doing the dishes also fits quality of life, because of the hygiene that I mentioned earlier.
Q: Why did you (not) change these goals?
/
Q: why did you add/delete these goals?
I just fine tuned the goals a little because they are too broad right now to really carry through. Maybe it's nice to be able to add steps to goals so you can add the small goals but still see the big goal you are working towards. But then maybe make that limited because it could also be overwhelming and demotivating.. Okay I'm not too sure about this but yeah.
Q: How does this information influence you?
Some things are hard to achieve like writing down what you're thankful for everyday, I don't

End interview
Q: Is there anything you are missing in the list to define health?
No it has everything and more than any other thing I have thought about before
Q: Are there any goals you want to achieve that you cannot categories in these pillars?
No it's good like this, I would add some goals to multiple pillars but that is logical.
Q: How does this new information affect your freedom of choice and ability to set goals?
It does not really affect my freedom or anything, just helps me out to think about my own goals. I did not agree with some of the example goals and that is totally fine.
Q: Which information is useful in helping you formulate your goals?
I do think it would be best to add like an arrow or information button for more information, but on the other hand it doesn't really matter if they put it in the 'wrong' pillar because you'll get positive progression and feedback. Option for more info would help with ideas though. It personally helped me way more to look at the categories but the examples also helped because it made me think about how to make my goals smaller as well, which would make it easier to do so higher chance of me actually doing it.
Q: Do you have any final remarks?
About the examples that are like three times a week and stuff, maybe make it so that the users can refresh the goal for multiple uses? That way you can still check it every time.

Participant 4
Option 1: sentence
Q: What do you think the different pillars stand for?
1: I think mostly if you are fit physically speaking and also if you feel fit but mostly eating healthy and like exercising and stuff.

2: Asking yourself whether you are happy and then look at it critically, don't just say you're fine but really look at where you are standing at that moment.

3: Mostly avoiding the feeling of uselessness. Thinking about your function in life, you are working towards something that should make it all worth it.

4: Well you can study CreaTe and get good grades but if you don't enjoy it why are you doing it so this is about what am I good at and what do I enjoy and that balance between the two.

5: Social contacts: Do I have enough, am I happy with the ones I have, do I have people to go to when things are going bad, am I happy with the people around me basically. Oh and also showing some interest.

6: Especially based on the sentence I think that it's about daily life and getting by well so sleeping enough and nicely, having a roof above your head, good hygiene etc.

Q: Why did you choose these actions as goals?

1: three times a week seems like a good amount but not too overwhelming.

2: Daily 1 hour me time, like having some actual quality time and not just watching netflix or my phone for an hour you know but really taking a moment to clear my head and reflect would give me so much more rest and help me a lot.

3: Reminding myself that every report and assignment is useful would help em a lot in motivation but also enjoying it I feel like.

4: Reflecting on what activities/decisions in the day make me happy. I thought about this because I was struggling with it the other day. Something really fun was happening but I also still needed to do a lot of work. Which do you choose and why and which would help you the most in the long run is not as clear as some people might think so it's good to think about.

5: Asking people more often how they are doing and what they are busy with. Like for my housemates I know I don't do that enough because they will talk about something I knew nothing about and should have known about because I live with them. It also results in more quality conversation so that would help me even more.

6: Reflecting on decisions I made and if they were worth it like eating an apple or eating chips. If I learn that I get just as happy from eating the apple, I can remember that when I'm tempted to get chips and remember I got just as happy from the apple and take the apple and so improve knowing I don't take away my joy if that makes sense.

Q: How complete do you feel this approach is in defining health?

I feel like the focus is more on the mental aspects instead of the body and I think I agree with that because it is so so important. It is of course the combination of a healthy mind and healthy body because the healthy mind will pick and do healthy stuff for the body as well.

Option 2: categories

Q: Is there anything unexpected in this list?

I like the problem solving in mental being because it is actually really practical and I was thinking more only about feelings so that was unexpected but a nice surprise. Being thankful in purpose makes a lot of sense but I did not think of that. Also, self-love and happiness are both in mental wellbeing and quality of life, which I like that it shows the overlap. I find the meaningful activities in participation a bit odd but I get it though: Something can be not useful but still matter. I also think daily life is more practical than I thought so I was a bit off there. The seeking help there is something I would also add to participation, so to both.

Q: Why did you (not) change these goals?
I am not changing them right now but my goals are very much about thinking about things and less about doing things I am realizing.
Q: why did you add/delete these goals?
Some things I did not think of so I added them.
Q: How does this information influence you?
Like I said before, it made me realise some more possible goals but also made me realise my goals are maybe too much about thinking and less practical like these categories are practical.

Option 3: examples
Q: Is there anything unexpected in this list?
It all makes sense and has the same concept. Of course mental wellbeing is very personal but it's clear it's about something that will make you happier. Purpose is about aiming higher than the bare minimum, makes sense. I do think quality of life is the hardest pillar because I feel like if you improve in one of the other pillars your life will improve so this pillar almost always also matches the goal. Daily life has more practical goals again than I had, but this conversation is making me think more deeply the longer we go.
Q: Why did you (not) change these goals?
Did not, the goals are comparable to my goals and my goals all point to the same me I think.
Q: why did you add/delete these goals?
/
Q: How does this information influence you?
I think it shows me consequent quality of life goals which helps. Also, I like the timeframes at the goals because it makes it way more achievable and clear so I would add that to next goals. Like, my goals could all be easily changed to fit the app better. For example the housemates one I could change to a practical "walk to the living room and ask how people are doing before diner" for example. Also, what stood out to me is that I wrote reflecting about things of daily life and they wrote doing things of daily life. To get somewhere the doing is of course important so that helps. Thinking I might need to do the dishes and what that would do to mevs.r just doing them and finding out what it does to you might work better.

End interview
Q: Is there anything you are missing in the list to define health?
Q: Are there any goals you want to achieve that you cannot categories in these pillars?
Q: How does this new information affect your freedom of choice to set goals?
I don't think my freedom is affected, like it did change my opinion on some things but that was good. It was more of a realisation moment than being pushed or anything. Also because I am very aware that everyone is different right, so I understand that the examples do not have to fit me, it just helps how specific I should be.
Q: Which information is useful in helping you formulate your goals?
I think the categories really help because it also shows how the pillars are connected, which the sentences don't and helps you avoid forgetting about things. The sentences are clear though, but categories just add value to that. It's also nice to have an overview of examples to get going.

What I am imagining now is bodily functions with a button to type in where you could see the example and that would disappear if you start typing yourself. And then add a button to show the categories onscreen, like an extra info button.

Q: Do you have any final remarks?

Not really!

Appendix K: Demographics Lo-Fi test 2

What is your age?

4 responses

What is your gender?

4 responses

- Male
- Female
- Prefer not to say
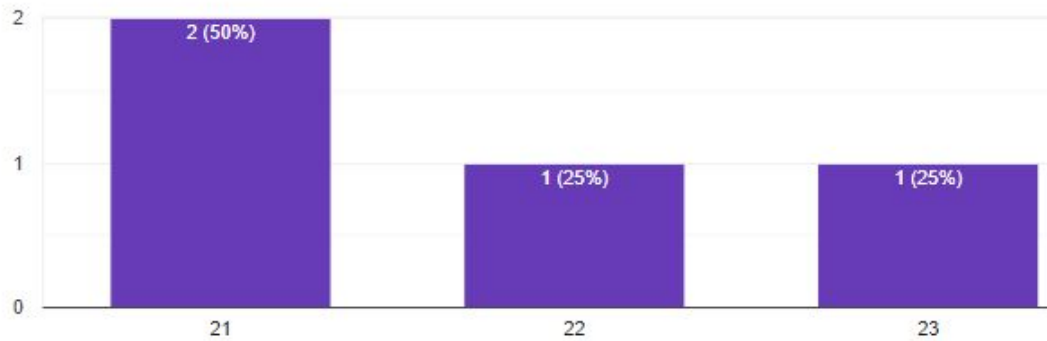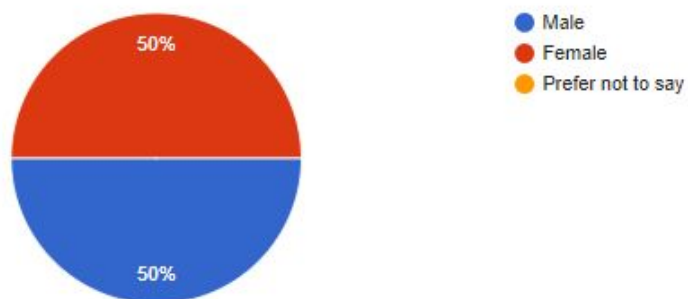
How familiar are you with using mobile applications?

4 responses
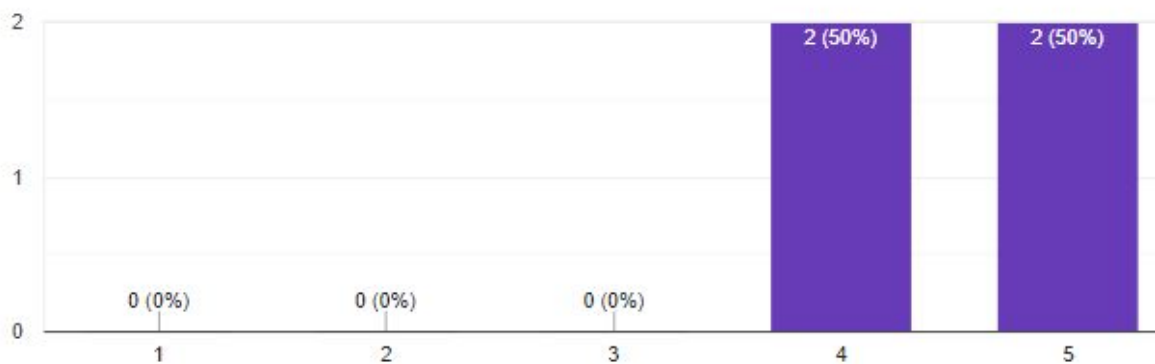
Appendix L: Results Lo-Fi test 2

Participant 1

Notes interview: the participant added the add goal to the pillars page and the example goals to the specific pillar page. The participant also came up with a history page for all the achieved goals and added an "X" behind the goals to bring them there.

Participant 2
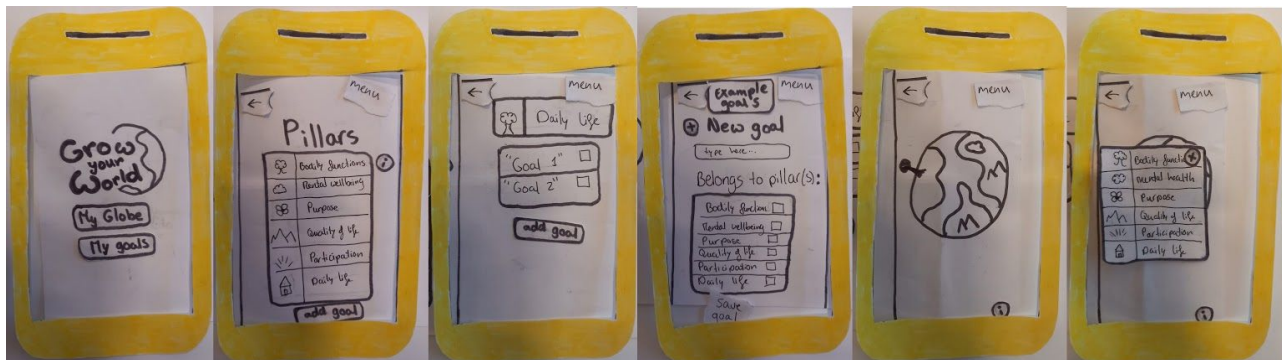
Notes interview: The participant added the add goal button to both the pillars and specific pillar pages. All information was pop-ups and the participant added a back button on every page, as well as a menu button to hover from every page to every other page.The legenda of the globe was a pop-up. The example goals was added to the new goals page.

Participant 3
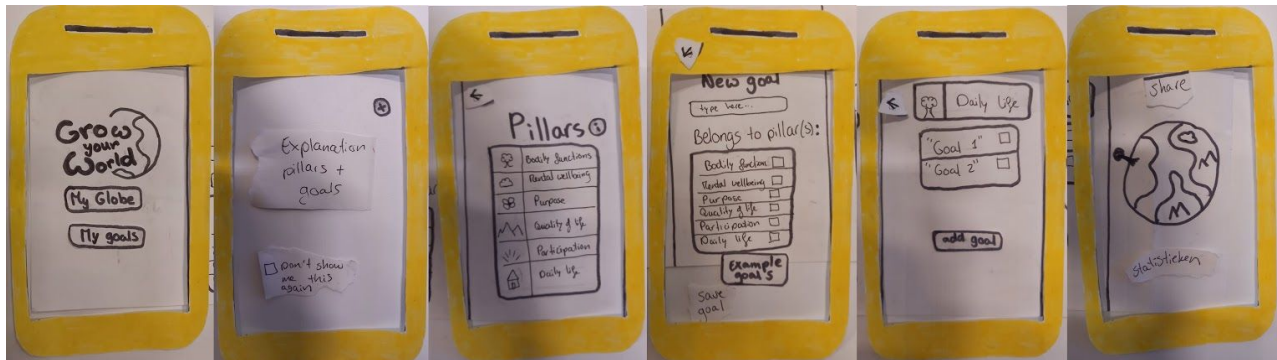
notes interview: The participant thinks it makes sense to go to the pillar page when clicking on my goals, however an explanation about pillars should be given first, so she made an extra screen for this in between. She placed the add goal on the specific pillar page and added a share button on the globe, as well as different statistics. The example goals was added to the new goal page.

Participant 4

Notes interview: The participant added the add goals to the specific pillar page and made the add goal page a pop-up. All information was linked as pop-up, as well as the globe legenda. The example goals were added to the new goals page and the participant added back buttons.

Appendix M: Demographics Lo-Fi test 3

What is your age?

4 responses

22
20
24
23

What is your gender?

4 responses

- Male
- Female
- Prefer not to say

50%

50%
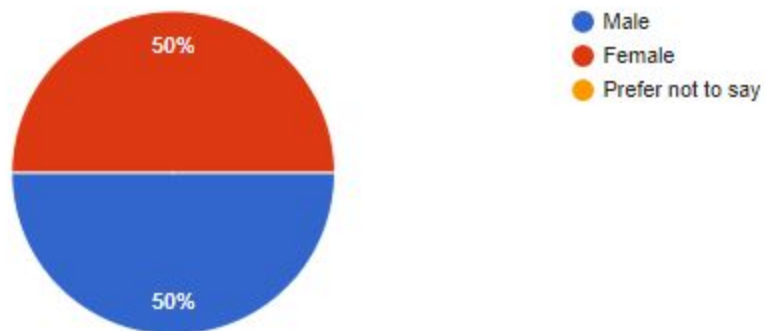
Appendix N: Results Lo-Fi test 3

Participant 1
Prototype 1
Q: What do you think this means?
I think this means that the health pillars all have their own thing on the globe and the more you have the better, or maybe even the bigger the better.
Q: What could you say about the person who's globe this is?
I think this person is doing really well because they are doing well in a lot of different pillars, nly maybe not mentally which is why they also not have a quality of life thingy.
Q: Do you think this is a clear way to show you progression?
Yes, I think it is a clear way. The different things make are different enough from each other to make it clear, so yeah clear categories.
Q: Would this motivate you to change some lifestyle choices/actions?
    Q: If so, why?
  Especially in the beginning I think I would be motivated from it, because you can get some insight etc. And then in the long run I'm not sure if I would keepup, I don't care for apps that much in general so yeah.

Prototype 2
Q: What do you think this means?
I think this means the same? I'm not sure what the different things mean and what the planes mean, I think the planes just distribute the pillars and then the things show you if you are doing well so the more things you have on the bodily functions plane, the better you are doing. I don't know if the different things also mean different things, like a tree and a bush etc.
Q: Would it be more clear if there were for example only trees?
I'm not sure, having a real ecosystem is more fun I think, so if it means nothing it's fine I just think maybe it could confuse people, but then having only trees is not fun. So I'm not sure.
Q: What could you say about the person who's globe this is?
I think this person knows what he wants because he has two things on purpose and then is also exercising, but not the rest so maybe he knows what he wants but now has to do it to be happy?
Q: Do you think this is a clear way to show you progression?
Yes I think it is clear and you can see in one glance how you are doing.
Q: Would this motivate you to change some lifestyle choices/actions?
    Q: If so, why?
Same as before.

End
Q: After seeing these prototypes, would one have your preference?
    Q: If so, why?
It's nice to see multiple things mixed together to make it whole. I think I prefer the first one, at the beginning the second one was confusing but maybe the second one is more clear to see in one glance how you are doing because it all has its own corner. But the first one is more fun.

They both have something logical, like clear distinguish between the pillars so well categorized. But the first one does need a legenda and the second one does not. I'm not sure.

Q: Do you have any other feedback or things you want to say?

I think it is really cute!

Observation: This participant took more time answering what prototype 2 means as opposed to 1, which could indicate more confusion. The participant did not have a clear preference for a design as she kept going back and forth.

Participant 2

Prototype 1

Q: What do you think this means?

The amount of trees or whatever is equal to the six pillars and the more you have the better.

Q: What could you say about the person who's globe this is?

That this person is physically healthy and likes to participate in activities, and that he has a good healthy rhythm, because of daily life.

Q: Do you think this is a clear way to show you progression?

Yeah reasonable, it does not necessarily make sense that a tree is bodily functions for example, but I think you get used to that. Other than that it's good.

Q: Would this motivate you to change some lifestyle choices/actions?

> *Q: If so, why?*

If my goal was to improve I think it would motivate me to see something change outside of yourself as well, it seems like you are taking care of the world so to say.

Prototype 2

Q: What do you think this means?

The same, where you are standing on the platforms is connected to what is standing next to it, so the pillars. And the more you have on the platform the better. So in the end it will all be platforms with many flowers or trees etc but then they are categorized in platform parts.

Q: What could you say about the person who's globe this is?

That he thinks, because you all fill it in yourself right, so he thinks he has a good rhythm, quality of life and is doing well mentally.

Q: Do you think this is a clear way to show you progression?

I do think it is a bit like a pie chart, I get that it would be 3D but i like the other one more because of the randomness.

Q: Would this motivate you to change some lifestyle choices/actions?

> *Q: If so, why?*

Yeah I think so, same as before actually.

End

Q: After seeing these prototypes, would one have your preference?

> Q: If so, why?

I think option 1, mostly because you are really growing a world there, instead of having platforms with flowers or trees etc..

Q: Do you have any other feedback or things you want to say?
No

Participant 3
Prototype 1
Q: What do you think this means?
That you achieved a goal in the three, what do you call that, bodily functions, metal wellbeing and daily life.
Q: What could you say about the person who's globe this is?
That he is busy with his life quality, well not quality of life but…. *Pause*… This is hard. I think he's just busy with himself, with his appearance and how he is mentally and with his daily life so things he does every day and is just busy with improving those.
Q: Do you think this is a clear way to show you progression?
Yes, it indicates which pillars you spend more time or attention on. But sometimes pillars can overlap I think so that makes it more difficult.
Q: Would this motivate you to change some lifestyle choices/actions?
    Q: If so, why?
I don't know if it would do a lot to me if there are for example flowers on my globe, I think that for me it would be more of an overview that is handy to have than a motivation.

Prototype 2
Q: What do you think this means?
This shows the percentage of what you have done I think so it's all distributed in cubicles so I think the size of the cubicle means more and more attention on that pillar.
Q: What could you say about the person who's globe this is?
Well the cubicles are all about the same size so I would say this person is doing well on all important aspects, very balanced
Q: Do you think this is a clear way to show you progression?
I think it gives you the idea with respect to each other, but does not say that much because it's all just relative to each other you know, like with a pie chart or something.
Q: Would this motivate you to change some lifestyle choices/actions?
    Q: If so, why?
Same as before.

End
Q: After seeing these prototypes, would one have your preference?
    Q: If so, why?
I think design 1, it shows the difference better, like it shows the difference and is clearer and more fun so to say.
Q: Do you have any other feedback or thighs you want to say?
No, it looks good.

Observation: This participant seemed slightly nervous, not being able to explain some answers well.

Participant 4
Prototype 1
Q: What do you think this means?
I think it means that in 3 of the 6 pillars I did something good, so either it is in progress and I am working on it or I already achieved is. The fact that nothing is at the oter pillars shows that either I am still working on it or am not doing so well there.
Q: What could you say about the person who's globe this is?
Uhm, I think this person might not be doing so well mentally, because mental wellbeing, purpose and quality of life are missing. I do think the person is doing it's best and is not so down that they cannot get out of bed anymore, because he did achieve small goals in participation and daily life.
Q: Do you think this is a clear way to show you progression?
Yes, it is quite clear. Clear pictures and differences, it's only 6 pillars so that makes it clear: you don't have to scroll through an entire legenda or work with colors etc. And if you know the pictures after a while you can see how you are in immediately.
Q: Would this motivate you to change some lifestyle choices/actions?
> *Q: If so, why?*

I think so yeah, it shows clearly in which pillars I might be missing something so if I see that mental wellbeing is running behind I can do something about it instead of muddling through thinking "eh I don't feel nice".

Prototype 2
Q: What do you think this means?
I think this means that the globe is divided in parts so you can see which one belongs to which pillar, which is clear. And I think in this case, because there are pictures there, that there are goals achieved in daily life and purpose. What is not clear to me is if the size of the parts matters or if it does not.
Q: What could you say about the person who's globe this is?
I think this person has reasonable motivation and has a goal in mind, so I guess this person thinks it is doing useful activities. But I do think that this person is missing social interaction and this caused him to feel down mentally. So either he feels like he should do better or he set his goals too high.
Q: Do you think this is a clear way to show you progression?
I have to say, like I did before with the distribution of the parts, I don't know if the size of the parts matters and if so how it matters so not necessarily or less than the other one. I do think the floating title of the pillars at the parts is clear and shows what the pictures are for as well.
Q: Would this motivate you to change some lifestyle choices/actions?
> *Q: If so, why?*

I do think I would still know where to improve like before, but I am thinking now that because there are 4 pillars empty and they are all quite different as well I would not know where to start. Maybe it would be nice if the application could advice on some good goals to set per pillar.

End

Q: After seeing these prototypes, would one have your preference?
      Q: If so, why?

Yes, for the one with the legenda instead of the parts. I think it is more clear and I feel like the globe also looks more fun and cheerful and so be more motivating. And of course the unclarity about the size of the parts.

Q: Do you have any other feedback or things you want to say?

Yeah the idea is really cool, I think it would definitely motivate me.

Appendix O: Unity Code

Main Menu script
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.UI;
using UnityEngine.SceneManagement;

public class MainMenu : MonoBehaviour {

    public void ChangeScene(string scene_name)
    {
        SceneManager.LoadScene(scene_name);
    }
}
```

Goals script
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.UI;
using UnityEngine.SceneManagement;

public class Goals : MonoBehaviour {

    public InputField goal;

    string goalText;

    public GameObject[] CheckBoxes;

    int[] PillarName;
    int[] GoalsLeft;

    private void Start()
    {
        PillarName = new int[CheckBoxes.Length];
        GoalsLeft = new int[CheckBoxes.Length];

        for (int i = 0; i < PillarName.Length; i++)
        {
            GoalsLeft[i] = PlayerPrefs.GetInt("GoalsLeft" + i);
        }
    }

    public void Save()
    {
```

```
      goalText = goal.text;
      print(goalText);
      PlayerPrefs.SetString("GoalNames", goalText);

      for (int i = 0; i < PillarName.Length; i++)
      {
         PlayerPrefs.SetInt("PillarName" + i, PillarName[i]);
         Debug.Log(PlayerPrefs.GetInt("PillarName" + i, PillarName[i]));

            if (PillarName[i] == 1 && GoalsLeft[i] < 11)
         {
            PlayerPrefs.SetString("List" + i + GoalsLeft[i], goalText);
            GoalsLeft[i]++;
            PlayerPrefs.SetInt("GoalsLeft" + i, GoalsLeft[i]);
         }
      }
   }

   void Update()
   {
      for (int i = 0; i < PillarName.Length; i++)
      {
         if (CheckBoxes[i].GetComponent<Toggle>().isOn)
         {
            PillarName[i] = 1;
         }
         else
         {
            PillarName[i] = 0;
         }
      }
   }

}
```

PlaceObjects script

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class PlaceObjects : MonoBehaviour {
   public GameObject[] locations;

   public Transform Tree;
   public Transform Flower;
   public Transform Bush;
   public Transform Mountain;
   public Transform House;
   public Transform Grass;
```

```csharp
    bool[] isFull;

    int Counter;

    // Use this for initialization
    void Start()
    {
        isFull = new bool[locations.Length];
        for (int i = 0; i < 6; i++)
        {
            Build(i);
        }
    }
    void check (int Scene) {
        int l = Random.Range(0, locations.Length);

        if (!isFull[l])
        {
            if (Scene == 0)
            {
                Instantiate(Tree, locations[l].transform.position, locations[l].transform.rotation,
locations[l].transform.parent);

            }
            if (Scene == 1)
            {
                Instantiate(Bush, locations[l].transform.position, locations[l].transform.rotation,
locations[l].transform.parent);

            }
            if (Scene == 2)
            {
                Instantiate(Flower, locations[l].transform.position, locations[l].transform.rotation,
locations[l].transform.parent);

            }
            if (Scene == 3)
            {
                Instantiate(Grass, locations[l].transform.position, locations[l].transform.rotation,
locations[l].transform.parent);

            }
            if (Scene == 4)
            {
                Instantiate(Mountain, locations[l].transform.position, locations[l].transform.rotation,
locations[l].transform.parent);
```

```
        }
        if (Scene == 5)
        {
            Instantiate(House, locations[l].transform.position, locations[l].transform.rotation,
locations[l].transform.parent);

        }
        isFull[l] = true;
        Counter++;
    }
    else if(Counter < locations.Length)
    {
        check(Scene);
    }

}

    void Build (int Scene) {
    int a = PlayerPrefs.GetInt("AchievementsAmount" + Scene);

    for (int i = 0; i < a; i++)
    {
        check(Scene);
    }
}
}
```

TurnGlobe script

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class TurnGlobe : MonoBehaviour {

        // Use this for initialization
        void Start () {

        }

        // Update is called once per frame
        void Update () {
    transform.Rotate(Time.deltaTime *8, Time.deltaTime *12, 0);
        }
}
```

DeleteScipt script

```
using System.Collections;
using System.Collections.Generic;
```

```
using UnityEngine;

public class DeleteScript : MonoBehaviour {
    public int Scene;

    public void DeleteData()
    {
        for (int i = 0; i < 11; i++)
        {
            PlayerPrefs.DeleteKey("List" + Scene + i);
        }
        PlayerPrefs.SetInt("GoalsLeft" + Scene, 0);
    }
}
```

DeleteGoal
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class DeleteGoal : MonoBehaviour {
    public int Scene;
    public int Goalnumber;

    public void GoalDelete ()
    {
        PlayerPrefs.SetInt("IsAchieved" + Scene + Goalnumber, 1);


    }
}
```

AchievementSaver
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class AchievementSaver : MonoBehaviour {
    public int Scene;
    int Achievements;

        // Use this for initialization
        void Start () {
        Achievements = PlayerPrefs.GetInt("AchievementsAmount" + Scene);
    }

    public void SaveAchievements ()
    {
        Achievements++;
```

```
        PlayerPrefs.SetInt("AchievementsAmount" + Scene, Achievements);
        print(Achievements);
    }
}
```

GetListData

```csharp
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.UI;

public class GetListData : MonoBehaviour
{
    public GameObject[] Texts;
    public GameObject Canvas;

    public int Scene;

    string Goal;

    void Start()
    {
        GameObject FullText = GameObject.FindGameObjectWithTag("FullText");
        FullText.SetActive(false);
        GameObject FullButton = GameObject.FindGameObjectWithTag("FullButton");
        FullButton.SetActive(true);

        for (int b = 0; b < 11; b++)
        {
            RawImage Done = Texts[b].GetComponentInChildren<RawImage>();
            Done.enabled = false;

            Toggle toggle = Texts[b].GetComponentInChildren<Toggle>();
            toggle.interactable = true;

            if (Texts[b].GetComponent<Text>().text == "")
            {
                Goal = PlayerPrefs.GetString("List" + Scene + b);
                Texts[b].GetComponent<Text>().text = Goal;
                Texts[b].GetComponent<DeleteGoal>().Goalnumber = b;

                if (Goal == "")
                {
                    toggle.gameObject.SetActive(false);
                }

                if(PlayerPrefs.GetInt("IsAchieved" + Scene + b) == 1)
                {
```

```
                toggle.interactable = false;
                Done.enabled = true;
                Color newColor = new Color(0.1f, 0.6f, 0.3f, 0.8f);
                Texts[b].GetComponent<Text>().color = newColor;
            }
        }
    }
    if(PlayerPrefs.GetInt("GoalsLeft" + Scene) > 10)
    {
        FullText.SetActive(true);
        FullButton.SetActive(false);
    }
  }
}
```

Appendix P: Maya models

- Tree
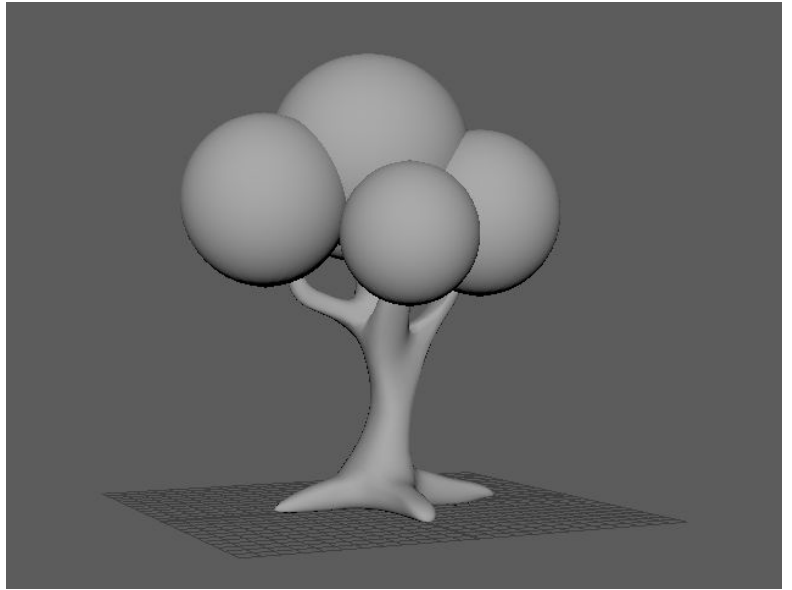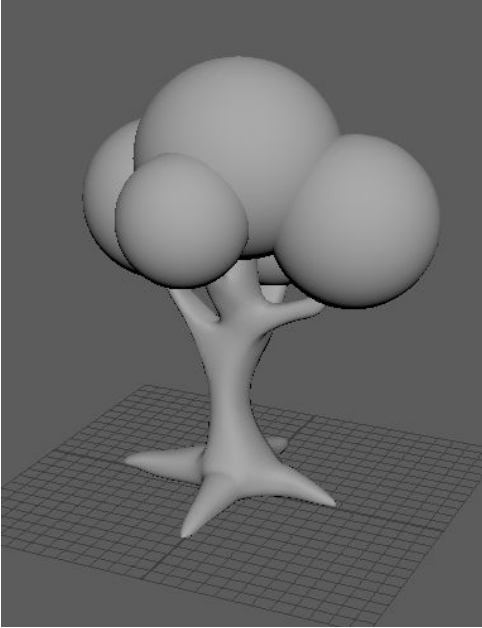
- Bush
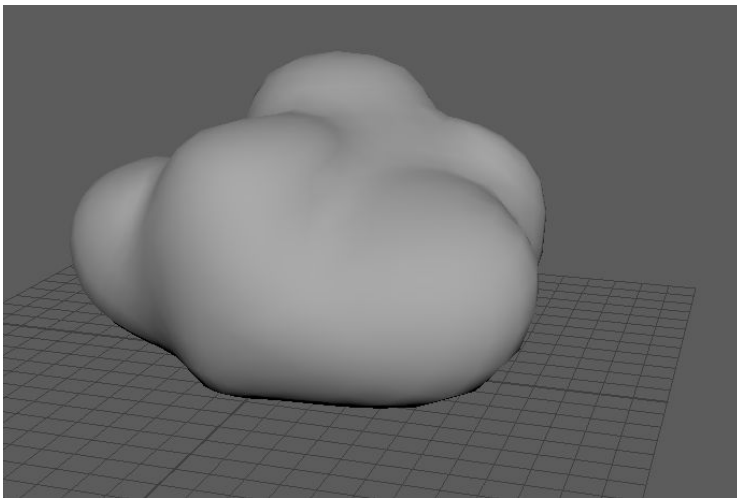
- Flower
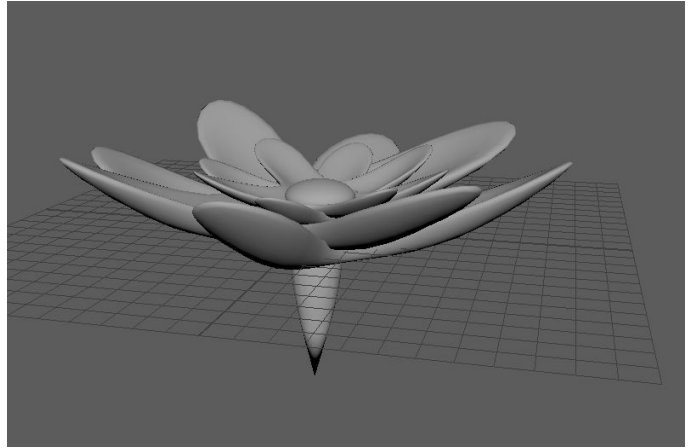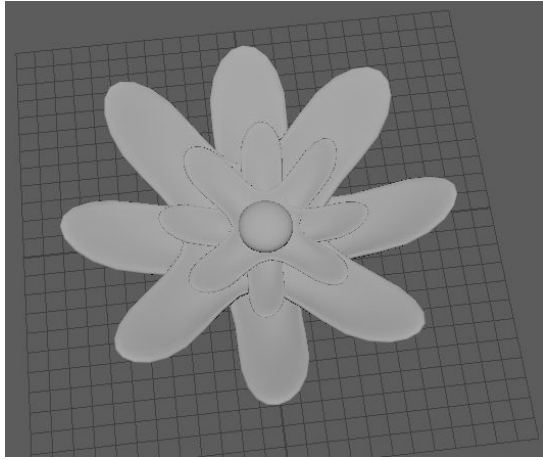
- Grass
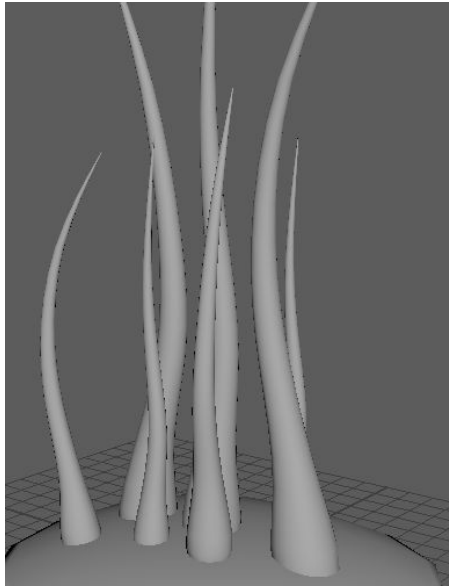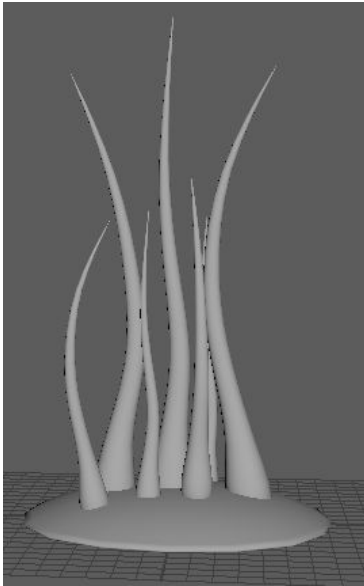
- Mountain
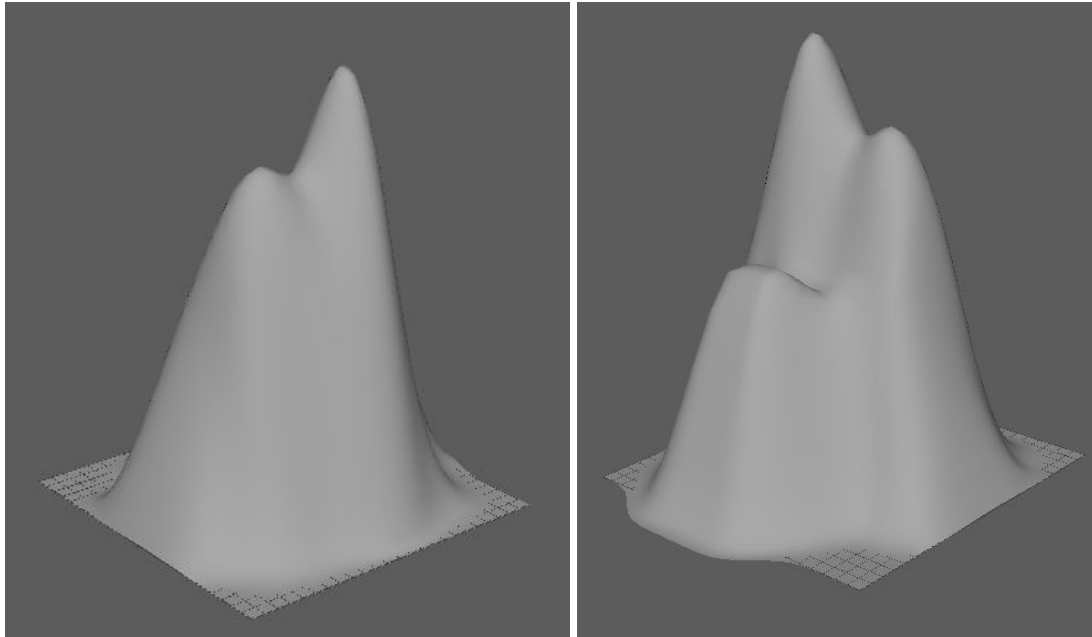
- House

- Globe
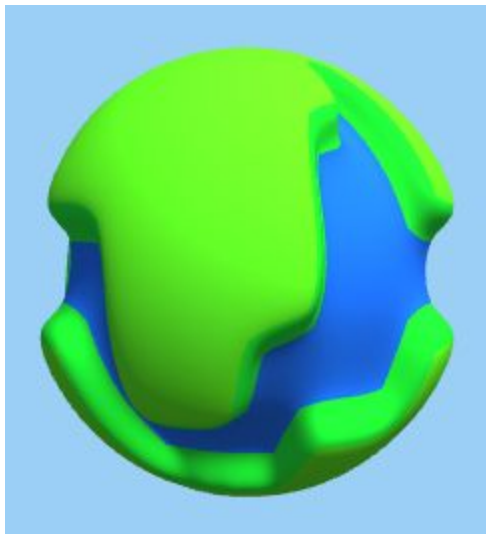
Appendix Q: Adobe pictures

- Background
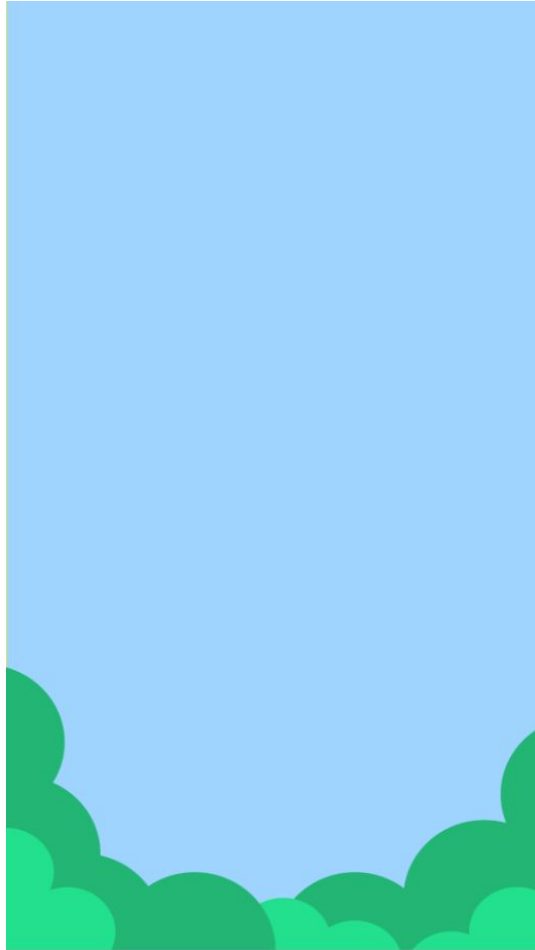
- Main Menu Background
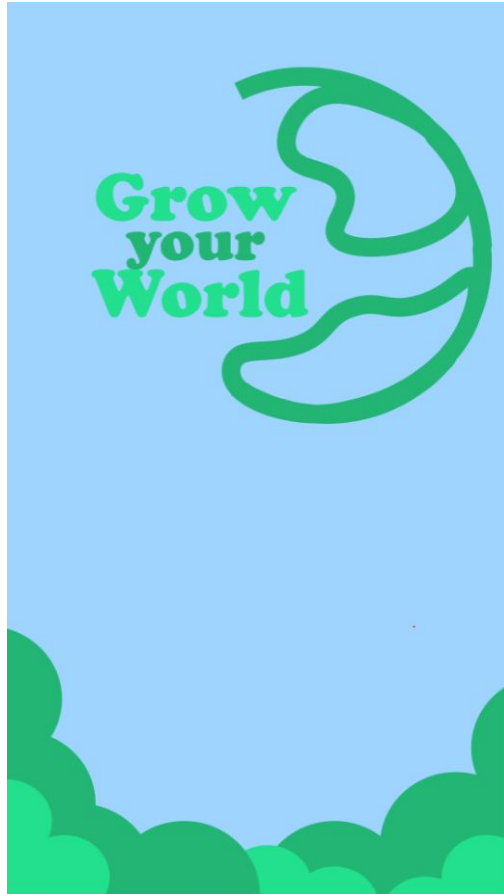
- Logo

- Explanation positive health

Pillar explanation

Positive health is a new view of health that goes beyond not being sick.
It is divided into six different pillars:

Bodily functions:	I feel healthy and fit
Mental wellbeing:	I feel happy
Purpose:	I have faith in my future
Quality of life:	I enjoy my life
Participation:	I have good contact with other people
Daily life:	I can take care of myself

To practice positive health you can use this app!
Just type in your own goals and actions you want to achieve and match them to one or more pillars! When you check your action or goal as achieved, you will start building your own world.

To help you understand the pillars, here are some categories you can think of:

Bodily functions	Mental wellbeing	Purpose	Quality of lfie	Participation	Daily life
Movement Nutrition Water intake Sleep	Concentration Stress management Self love Positivity Control Problem solving Happiness	Development Decision making, Practicing Thankfulness Faith in future Goals and ideals	Safety Balance Happiness Self love, Resources Living situation Relaxation	Support Belonging, Social contact Acknowledge ment Meaningful activities Interest in society	Work Managing finance Household tasks Planning Help seeking strengths and weaknesses

Remeber, everyone is different!
So match your goals to the pillar(s) that match the results for you and how you feel!

- Explanation pillars with categories

The 6 pillars:

Bodily functions: I feel healthy and fit
Mental wellbeing: I feel happy
Purpose: I have faith in my future
Quality of life: I enjoy my life
Participation: I have good contact with
                    other people
Daily life: I can take care of myself

The categories:

Bodily functions	Mental wellbeing	Purpose	Quality of lfie	Participation	Daily life
Movement Nutrition Water intake Sleep	Concentration Stress management Self love Positivity Control Problem solving Happiness	Development Decision making, Practicing Thankfulness Faith in future Goals and ideals	Safety Balance Happiness Self love, Resources Living situation Relaxation	Support Belonging, Social contact Acknowledge ment Meaningful activities Interest in society	Work Managing finance Household tasks Planning Help seeking strengths and weaknesses

- Example goals

Example goals per pillar:

Here are some examples of goals you could put in this app. But remember that everyone is different and that your goals could belong to multiple pillars! *

Bodily functions
- Get 8 hours of sleep every night
- Take a walk before school

Mental wellbeing
- Read 5 pages of a nice book every day

Purpose
- Write down what I am thankful for before bed
- Get an 8 for my next test

Quality of life
- Take every tuesday night off for myself

Participation
- Read the newspaper every morning at breakfast
- Call with a friend every day

Daily life
- Doing the dishes right after using them

* Call a friend could also be added to mental wellbeing, for example.

- Explanation per individual pillar with sentence, categories and example goals
  - Bodily functions

Bodily functions
"I feel healthy and fit"

Categories:
- Movement
- Nutrition
- Water intake
- Sleep
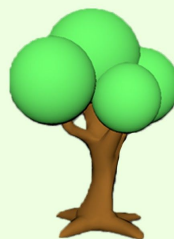
Examples:
- Get 8 hours of sleep every night
- Take a walk before school

- Mental wellbeing

Mental wellbeing
"I feel happy"

Categories:
Concentration
Stress management
Self love
Positivity
Control
Problem solving
Happiness
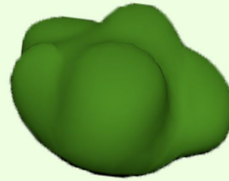
Examples:
- Read 5 pages of a nice book every day

- Purpose

Purpose
"I have faith in my future"

Categories:
- Development
- Decision making
- Faith in future
- Goals and ideals
- Practicing thankfulness

Examples:
- Write down what I am thankful for before bed
- Get an 8 for my next test

- Quality of life

Quality of life

"I enjoy my life"

Categories:
- Safety
- Balance
- Happiness
- Self love
- Relaxation
- Resources (money, living situation)

Examples:

- Take every tuesday night off for myself

- Participation

Participation

"I have good contact with other people"

Categories:
- Support
- Belonging
- Social contact
- Acknowledgement
- Interest in society
- Meaningful activities

Examples:

- Read the newspaper every morning at breakfast
- Call a friend every day

- Daily life

Daily life

"I can take care of myself"

Categories:
- Work
- Managing finance
- Household tasks
- Planning
- Help seeking
- Strengths and weaknesses

Examples:
- Doing the dishes right after using them
- Get a new bank account

- Matches pillars and models

	Bodily functions
	Mental wellbeing
	Purpose
	Quality of life
	Participation
	Daily life

- Back button

- Information button

- Keep a goal or not menu

Goal achieved

Well done!!

Do you want to keep this goal?

:)

Appendix R: Demographics Hi-Fi test

What is your age?

6 responses
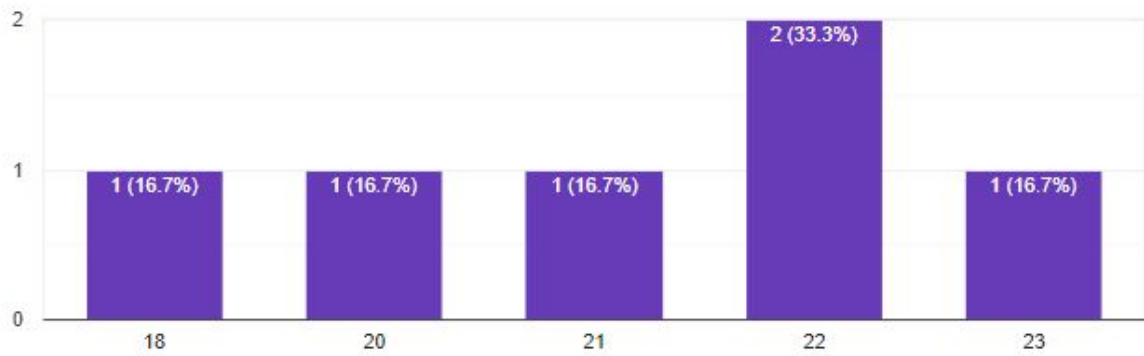
What is your gender?

6 responses

- Female
- Male
- Prefer not to say
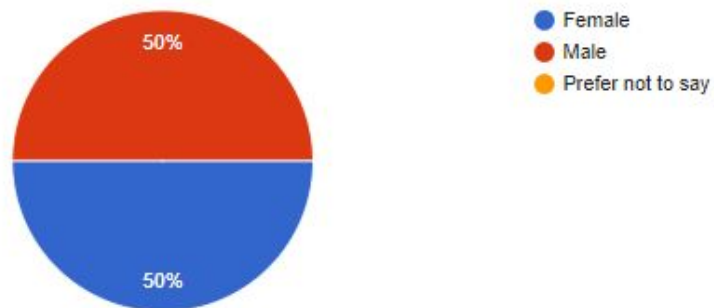
How likely are you to change your lifestyle?

6 responses
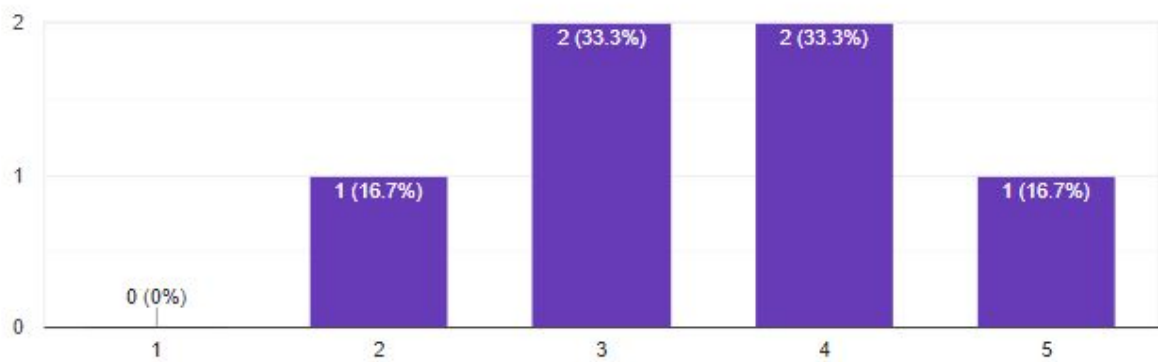
Appendix S: Consent form Hi-Fi test

Information sheet and consent form lo-fi evaluation
"Healthy lifestyle for young adults: a positive health based intervention"   YOU WILL BE
GIVEN A COPY OF THIS INFORMATION SHEET

Purpose of the study
The main question for this research is "How to empower people for a sustainable healthy lifestyle" and this specific research will be testing feedback methods to help young adults achieve a healthier lifestyle. You will be asked to use the designed intervention for 5 days. The researcher will explain how to use the intervention. After this time period, an interview will take place where you can share your experience.

Procedures for withdrawal from the study
You are free to leave this proto-typing and interview and the study at any moment, upon which all collected data from you from our research will be removed, unless you give consent for using this data. There will be no repercussions for this.

Use of personal information
For this research, personal information will be gathered. This will be done to find if there is a consistent difference between certain aspects of people (gender, age, interests etc.). This information will not enable anyone outside the researcher to identify you, keeping your identity anonymous. Results from the tests that include information on your lifestyle will also be shared, but will stay anonymous for anyone except the researcher herself. You have the right to ask for access to your personal information which will be used for this research, and the right to ask to erase it.

Usage of data during the research
This data from this research will be kept in an online data cloud only the researcher can access. Every piece of data concerning your personal information that could identify you, such as this consent form and audio recordings, will be kept offline and safe. Audio recordings will not be made public and will only be accessible for the researcher. It is possible for parts of the audio recordings to be quoted in the research papers.

The data you give can also be used in the graduation report about this research. This will be made public but the data used in the report will be anonymous. After the research is complete, all personal data will be destroyed, only anonymous data and the final report will be kept online.
For any further information/questions, you can contact the researcher. During the testing period you will also keep in contact:

l.h.m.uhlhorn@student.utwente.nl
06-12835114

Contact Information for Questions about Your Rights as a Research Participant
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-bms@utwente.nl

UNIVERSITY OF TWENTE.

Please tick the appropriate boxes

Taking part in the study

I have read and understood the study information dated [/   /   ], or it   YES / NO

has been read to me. I have been able to ask questions about the study and my
 questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can   YES / NO

refuse to answer questions and I can withdraw from the study at any time, without

having to give a reason.

I understand that taking part in the study involves an audio recorded interview and   YES / NO
Lifestyle information gathering over a longer period of time. After the research is complete, all audio
recordings will be destroyed, only anonymous data and the final report will be kept online. Information
on lifestyle will only be shared in progression and actions, not in actual numbers.

Use of the information in the study

I understand that information I provide will be used for publication of the report for   YES / NO
this research. This report will be made public, available for everyone. However, the
data used in the report will be anonymous.

I understand that personal information collected about me that can identify me, such   YES / NO
as gender, lifestyle and age, will not be shared beyond the researcher.

I agree that my information can be quoted in research outputs   YES / NO

I agree with audio being recorded in the final interview.   YES/NO

Signatures
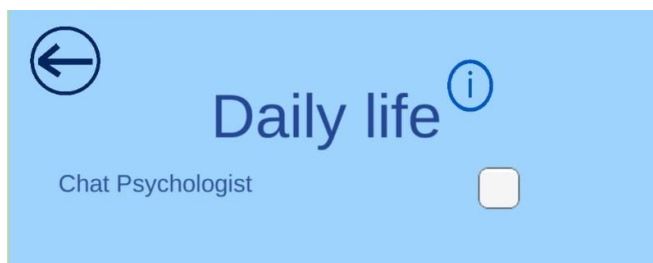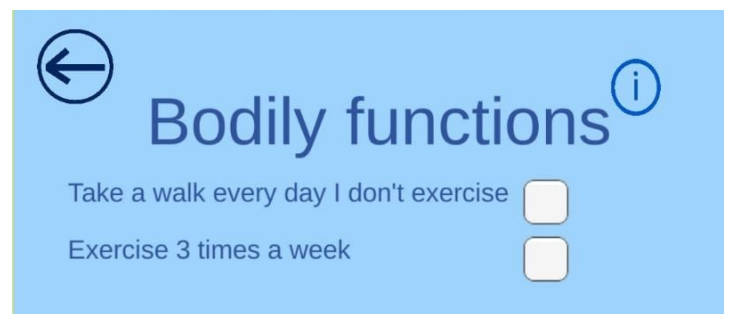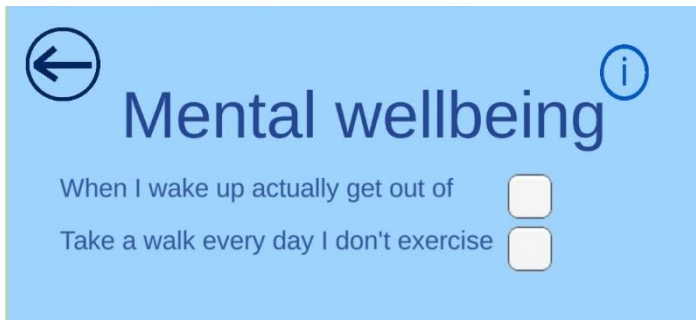
_____   _____   _____
Name of participant   Signature   Date

I have accurately read out the information sheet to the potential participant and, to the
 best of my ability, ensured that the participant understands what they are freely
 consenting.

_____   _____   _____
Researcher name   Signature   Date

Study contact details for further information:
Lyanne Uhlhorn, l.h.m.uhlhorn@student.utwente.nl

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Appendix T: Results Hi-Fi test

Participant 1

Usability application

    Q: How did it go with using the application these previous days?

    Yeah it went fine, everything worked like it was supposed to. I didn't have any issues.

    Q: Did you run into anything unusual?

    No

    Q: Was there anything unclear or hard to understand?

    At first, I did not know I could "renew" a goal, I thought checking off was a one time thing. And then when I checked off a goal I found out that you can keep the goals as well, which is nice for daily goals.

    Q: Was the menu unclear to you?

No I understood the menu immediately, the only problem was that I didn't know about it before I made my first goals. So it might be nice to have an explanation about checking the goals, where it says you can have one time goals or daily ones.

Positive Health

Q: Since this application is based on positive health and their pillars, what do you think about positive health?

In general it gives a good overviews, only certain pillars did overlap for me. I also had a lot of goals that were for multiple pillars. Then I found out I had to check everything individually to get all the different plants. So if I had a goal that was attached to multiple pillars, I still had to check the goal separately at every pillar. Maybe something to recognize that the goal is the same could be nice, so that if I check it in one pillar it gets checked in all.

Q: What do you think about using positive health to improve your lifestyle?

I think it can help you to check your own goals and see what you want to achieve. If it also really helps in achieving this I am not sure about because a lot of things that I did were things I was planning on doing anyway.

Q: How did it go with the questionnaire at the beginning?

That went well, some questions were a bit like "why this question, what do I do with this" but other than that it was okay.

Q: What did you think about the spiderweb?

It looked nice, but I don't think it really helped me. After answering the questions you already knew which aspects would be higher and which would be lower.

Goals and Globe

Q: How did you experience setting goals that are divided into pillars?

Setting goals went fine, I did it right after you were here. When I looked at them again, I noticed that I did not have any goals in the last two pillars. But other than that it went fine, I thought setting goals was not that difficult.

Q: What was the process of setting goals, timestamps, etc.?

Especially at the beginning I filled in all the goals at once and yesterday I also wanted goals in the final two pillars so I added those. Because it was empty, I felt like I should set some goals, especially because they were also my lowest pillars at the questionnaire.

Q: What do you think about the feedback of a globe?

I thought it was nice, I did not look at it much though. I would see it and think "Ah funny, nice", close it and move on.

Q: How do you feel about seeing the goals you achieved?

I liked it, it showed that you achieved something.

Q: Do you feel like the globe influenced your behavior in any way?

Q: If so, how?

Yes I think because I of course had to check all the goals etc., but I do not feel like it influenced me so much because I set goals that I wanted to achieve anyway. It added something fun, but I don't think it changed my behavior.

Q: What did you think about the models appearing on the globe (tree, bush, flower, etc.)

I thought they were cute. I mostly have trees and bushes because most of my goals were in those pillars. I do think that the flower and the house have very bright and different colors as opposed to the other ones.

The application
    Q: Do you think that participating in this research influenced your actions in the past days?
        Q: If so, how?

I think it influenced me because I had to check all the goals, like I said before. But the goals were goals I wanted to achieve anyway and I was already quite aware of myself, so I don't think it did too much.

    Q: How do you think the application influenced your actions these past days?

I do think I had and achieved more small goals that I would not normally do, because I wanted goals in those pillars where I did not before, even if they were small.

    Q: do you think it's too easy to set small goals just for the sake of having them?

I think it might matter if you use this app for a longer time, but for now it was just for some extra fun. I wanted a house so I made up a small goal for it that I did do. I don't think it matters, small is also good.

    Q: How motivated were you to perform your goals these past few days?

Pretty motivated! I do think that has to do with the fact that I have been focussing on improving my lifestyle lately even before these tests.

Seeing the results
    Q: Can you show me your globe and explain it to me?
    Q: Did you get any new insights from the globe/application?

I don't think so, I was already aware that I for example want to be alone more, but I liked the confirmation.

    Afterwards, the researcher will look at spiderweb first day and spiderweb last day and compare this to the globe.

I do think the globe is more positive because you can set your own goals and say what it counts for for you and show you "you did well here, good for you", that's what it felt like
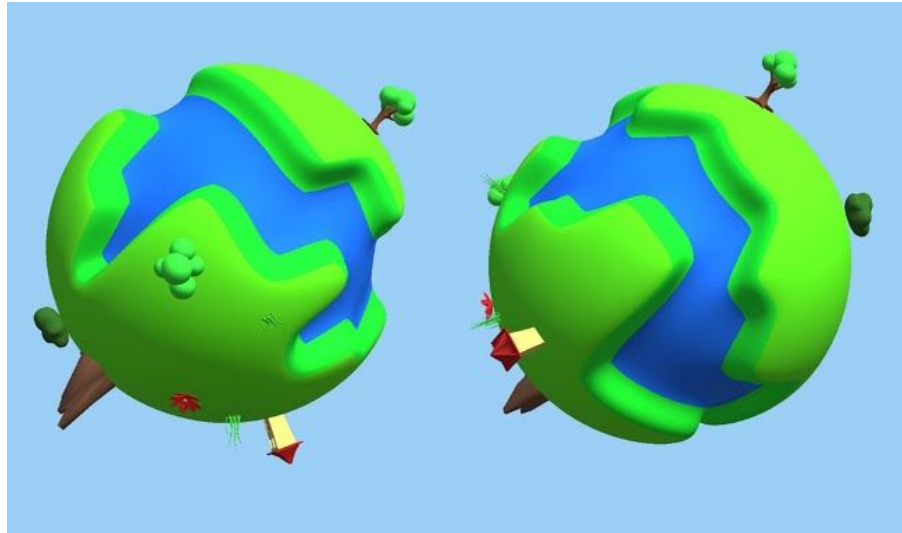
The black line is day 1, the blue line is day 5 and the green line is the average of the two. The positive health website automatically draws the average line, so if participants did not turn that off, the visualisation has the line. When comparing the different pillars to the globe, some things stand out. First, the spiderweb indicates improvement in all pillars except for participation, where the improvement is very small for daily life compared to the other pillars. The globe on the other hand shows improvement in all pillars. Mostly in bodily functions and quality of life, which both have two models on the globe (trees and grass). There is, however, improvement in participation based on the globe, but not on the spider web. The participant did mention that he was aware participation would be low for him/her, and that he had difficulties making up a goal for the pillar. When discussing the spider web one should consider that it is a snapshot moment

that is dependent on the mindset of the participant at that very moment. The improvements, however, are quite strong which does indicate that the participant is at least feeling better about most pillars. This participant did mention corona as a difficulty for participation in the interview a few times as well. In general, this person seems to have become more balanced.Compared to the globe he did say *"I do think the globe is more positive because you can set your own goals and say what it counts for, for you"*, indicating a preference for the globe.

Participant 2
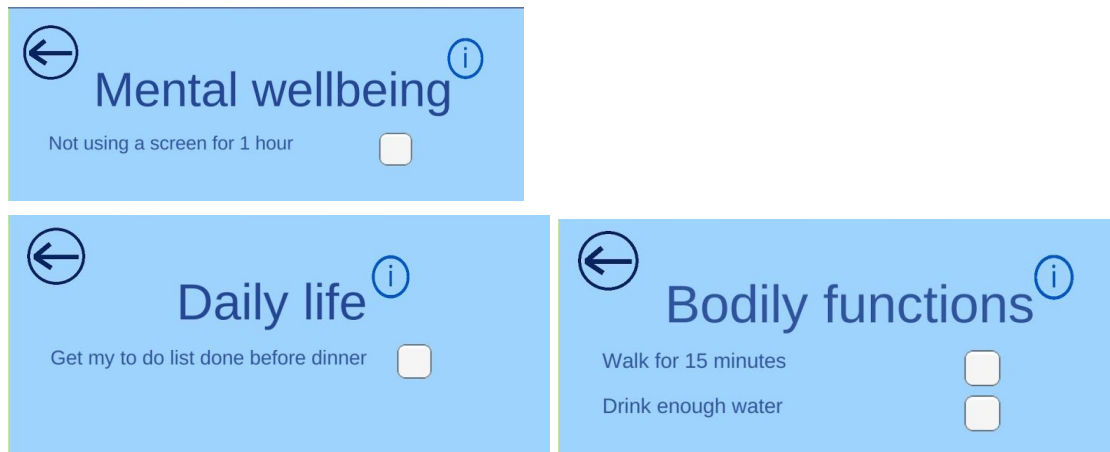
Interview: Usability application

    Q: How did it go with using the application these previous days?

    I think it went well, I thought it was really fun to try it out. I noticed that I was more into it in the first few days and it was easier to achieve the goals and set them. I stayed at my partners house over the weekend so some of my goals were not relevant or doable there anymore. It all depends on my life at the moment, I am at my own place sometimes and sometimes in a different environment (my partners). Every place has a different set of goals almost. I did really enjoy getting a thing on my globe everytime I did achieve a goal. I also really liked the differences in the designs. Purpose was really hard for me, but I really liked the flower so I almost got the tendency to just come up with something for it.

    Q: Did you run into anything unusual?

    I really struggled with the fact that you can't see what you have achieved if you keep the goals for daily use. For example I would forget if I had already checked the goals that I wanted to keep daily that day, because it doesn't say that in the app. I do think I am missing some because of that, I just was not sure. I did not notice anything unusual about myself or anything.

    Q: Was there anything unclear or hard to understand?

    No it was really clear for me.

Positive Health

    Q: Since this application is based on positive health and their pillars, what do you think about positive health?

    I really enjoy it and I think it is very useful as well. I was already pretty invested before this study and I already thought that your mental health is so dependent on your physical health and visa versa. Also because I study medical study I think sometimes it can be really "You have

this disease? Take this medicine for it", that you really miss the mental aspect. Maybe that is why I think things like positive health are very important.

Q: What do you think about using positive health to improve your lifestyle?

I do think it is good, but I do think that if you want goals in every pillar and improve in every pillar it can be a very big overwhelming thing. I think it is important to look at what you want to achieve, what is important for you and where you are struggling. Positive health has space for this for everyone, but I do think it would be nice to have a little guidance in this. Not like a person, but maybe a little story in the app that tells you not to go too ham on all pillars or get too carried away or something like that.

Q: How did it go with the questionnaire at the beginning?

Yeah fine I think, I felt like I had small marges for my grades, no big outliers. On day 5 as well I think. I did feel like the questions were very open for interpretation. For example the question whether you do drugs, drink alcohol and smoke: I drink alcohol but not the other two. Which grade would that be?

Q: What did you think about the spiderweb?

I really enjoy when you can see things visually, especially because when I did it again on day 5 there were actually some differences that I did not expect. So I think it is very useful to see progress or decline, of course hopefully not decline though.

Goals and Globe

Q: How did you experience setting goals that are divided into pillars?

Dividing the goals in pillars went fine, I had very concrete goals that were pillar specific. I do think that the example goals are really nice to see what fits where. I did not have goals in multiple pillars, but I knew that you could. I think I am quite good with my goals lately, even before this test, so I really enjoyed being able to put them somewhere (write them down). And getting the DONE!! and check when you achieve the goal is really nice. I did notice that when I was with my partner I did walk because I could walk with him, but when alone I was less motivated to go walk all by myself so I did not achieve that goal those days. Or that my days looked very different when I was there so some things just did not work. But also the other way around: the goals of the weekend were not relevant when I got back during the week.

I set two goals on friday after our meetup, because you want to try the app immediately after, you become curious. Those were things I was planning on doing that week already. And for example with drinking water I noticed I did not drink so much so I made it a goal for the next day. Also, one of the goals is to get everything done before 6 so I don't have to work after dinner anymore, which I would set as a goal in the morning. Almost like an agenda, but not really.

Q: Did that have any effects on your motivation?

I don't think it demotivated me but I do know myself and if I would not be able to achieve the goal for more than 2 days I think it would take more motivation to get back at it.

Q: What do you think about the feedback of a globe?

I think it's really fun, you feel like 'Wow another house", which is nice to see. I also have an app where you grow a tree when you are studying for a while without using your phone and that works really well for me as well, I like how visual it all is.

Q: Do you feel like the globe influenced your behavior in any way?

    Q: If so, how?

Not necessarily, you don't feel like you can disappoint your globe which is nice and even though you really want a house for example, that is not so urgent that I would need to screw up my planning for a goal that matches the house pillar. But it does add some extra joy when you can check something as completed and see the house as a result.

Q: how did you feel about still seeing the goals that you had achieved?

I think it was convenient, because it allowed you to consciously think about what you want to do the next day. I think it would be nice to attach a date to it though so you can see your achievements per day. Nicest would be if you can see which goals you have checked that day, even if you want to keep them, like I said before. I did not have any goals that I did not want to keep, but I can imagine it is nice to also see the ones you do not want to check again as achievements.

Q: What did you think about the models appearing on the globe (tree, bush, flower, etc.)

I liked them! Especially the flower is very nice. I do think the tree and bush are more similar than the other icons, but for functionality that does not matter. I liked the house and flower the most so it might make you want the icon more than the goal. I do think it would be different if you use it longer, because it is not like sims: you do not have to build it in a way that sims have to live there or anything so it does not really matter.

The application

Q: Do you think that participating in this research influenced your actions in the past days?

Q: If so, how?

I really enjoy making list and crossing things of the lists, which was possible in the app, so I think it made me more aware which made me do more conscious things. For example, I drank too little on saturday so I would make the goal for sunday to drink more water very important to me, which was because of the app. Otherwise I might not have consciously noticed or tried. Also, having a confirmation of the importance of your mental state and other things for your health is nice, not just physical things.

Q: How do you think the application influenced your actions these past days?

Same as previous question, participant already answered there.

Q: How motivated were you to perform your goals these past few days?

I think I was more motivated the first days than later days, but I think that was because of the environment switch I talked about before. I do think it is mostly about how motivated you are to achieve goals anyway. The app is really nice to make it concrete and executable and give you a sense of responsibility: it's not just something you thought about once that you can just choose to ignore, because you actually wrote it down.

Q: did this make it feel like an obligation to achieve the goal?

I think it did feel like that a little yes, but in a good way because it is really easy for me to put all these things on hold or to the side because I for example need to study, but doing those things would make me feel so much better. It is important to take care of yourself but I always forget that when I think I need to do other things, or I just tell myself other things are important. With the app it became somewhat more important.

Seeing the results

*Q: Can you show me your globe and explain it to me?*

I started with the trees for walking for example and then I wanted variety so I put in daily life goals for the houses. After the first few days I became much slower to achieve the goals though, again because the goals did not fit my surroundings anymore.

Q: Did you get any new insights from the globe/application?

I am actually not sure. I think I am very self-aware already because I think that is very important. I have a to-do list in my google calendar everyday with some things that I also put in the app for example. So being busy with goals is not completely new to me. But for example purpose I never thought about. I am planning to think about the pillars I did not fill later, but with the exam week this week it didn't happen. I think there would be more variety if I used it in a longer period of time or when I am less busy studying. Also, corona made it quite difficult to fill for example participation because so much is not allowed. I do think that now with exam week and corona at the same time, it really helped me a lot to use this app and be more aware of how I take care of myself.

Afterwards, the researcher will look at spiderweb first day and spiderweb last day and compare this to the globe.

Extra notes participant: The app feels more like a goal to make progress and get better and the spider web more as a summary or something. You can't use it every day either. I think if the app was not there I would be less conscious and aware, but I was already bettering my fitness and eating patterns. The app really helped with giving me more structure though, that is why the improvement in the spider web also does not surprise me.
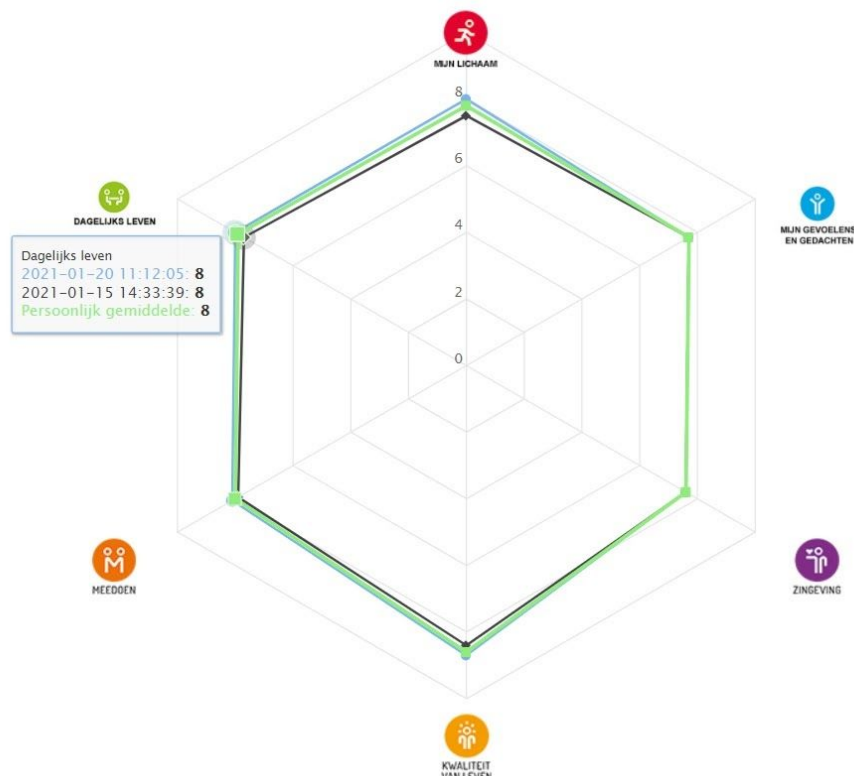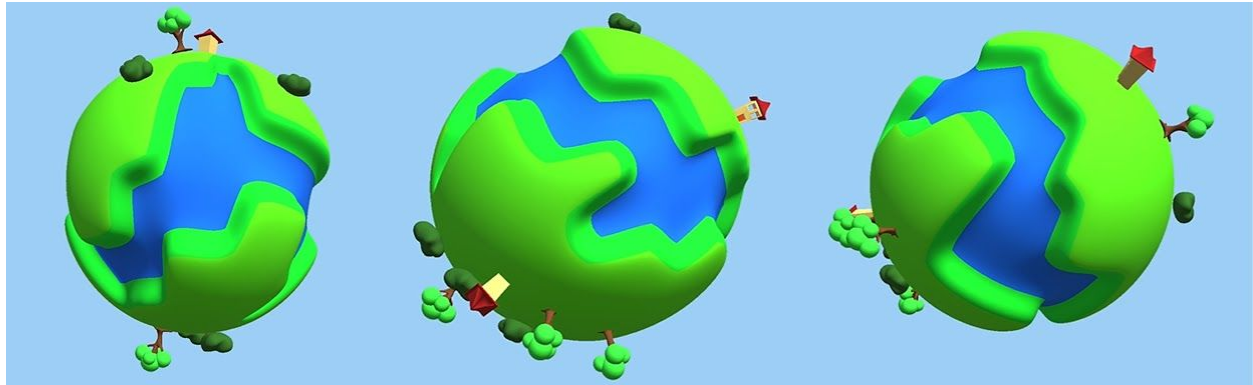
Interesting about this participant is that she only has achieved goals in pillars bodily functions, mental health and daily life. The participant also only set goals in these pillars. The globe shows that she did achieve a lot of goals in bodily functions and mental wellbeing and two in daily life. When looking at the spider web, the numbers are very similar in day 1 and 5. The green line is again, the average of the two. Remarkable is that mental wellbeing and purpose stayed exactly the same, and all other pillars improved slightly. Most improved is daily life, which makes sense when talking to the participant because she indicated to have a much better daily structure with the application. Bodily functions is most improved in the spider web and globe but mental wellbeing is not improved in the spider web. Participation could be improved because the participant was at her partners house over the weekend. Here, the participant also mentioned it was nice to walk together, which she noted down as bodily functions, but could also be noted down for participation.

Participant 3

Usability application

Q: How did it go with using the application these previous days?

Pretty well, I did mostly have goals that were daily and I had some issues with checking those off, because I had to do it again the next day. For example, I wanted to get up to date with the news every morning during breakfast: You can check it off every day but I didn't really do that. I would see in the morning if there were any goals etc. to think about and then check at night if I had done them, sometimes I was simply too lazy to actually check them off though. Not because I thought it was pointless or anything but I was often just way too tired and would look if I achieved the goals but not actually check them off because I was too tired to keep living that day.

Q: Was the menu to keep the goals for daily use clear?

Yes, I didn't know about it beforehand but when it popped up I immediately understood. I think it would have been nice to know beforehand though.

Q: What did you think about being able to see the goals that you did not keep?

I actually only had daily goals I think, but I can imagine it would be satisfactory to see your achievements, also for motivation purposes. It would have been nice, however, for the daily goals to see how many times you had achieved it before.

Q: Did you run into anything unusual?

No, but I did have a thought: If you check the goal and you keep it you get something on your globe which is nice, but imagine using it for a year and it working well. Wouldn't there be way too many things on the globe? Not that I ran into that because it was only 5 days but it did run my mind. There were no issues or anything.

Q: Was there anything unclear or hard to understand?

I had some difficulties understanding the pillars, which became clear mostly from the examples in the app and the categories image. That helped clear things up, but I did have to go look at those things very often. However, whichever page I was on, there was information so I appreciated that I did not have to go back etc. but if you were typing a goal and you were halfway you had to leave the typing box and click the i for information and then I was reminded.Not a big problem, just the flow of writing down a new goal was a little hindered.

Positive Health

Q: Since this application is based on positive health and their pillars, what do you think
about positive health?

Yeah I thought it was very pleasant. When I did the test there was also a link to an app store where it recommended apps distributed in the pillars and I thought that was really nice and interesting. If you feel like you are struggling with bodily functions, there would be a lot of apps available to download. I thought it was really nice and I enjoyed scrolling through the apps, also to get more of an idea of the pillars which I could then link with the categories in the app, which was great. So maybe you could add a feature somewhere referring to this app store?

Q: What do you think about using positive health to improve your lifestyle?

I think it's pleasant, I used to do a lot of bullet journaling about how I felt etc. and at the end of like a month I would see how I was doing and try tackling the issues of that month in the next, which is a really positive thing. It's not too hard and very insightful. Like, especially with the app it is quite simple and very accessible to get feedback and actually to give yourself feedback about how you are.

Q: How did it go with the questionnaire at the beginning?

Pretty well, there were a lot of questions. What really annoyed me is that they used a 1-10 scale instead of 1-5. I would think something is a 3 out of 5, but whether it is a 6 or 7 out of 10 I don't know.

Q: What did you think about the spiderweb?

It was like expected, not very insightful in my opinion but I can imagine if you are not that in touch with yourself that it could be like a wakeup call or show you that something is going better than you thought. I can imagine it being useful, just not necessarily for me.

Goals and Globe

Q: How did you experience setting goals that are divided into pillars?

It was quite easy because I have been doing this for a while: stop to think about what I want to do in my day and life and how I want to improve. I was already working on finding strengths and weaknesses and how to solve those. So setting goals went well, connecting them to the pillars was somewhat more difficult. For example the goals I want to achieve daily: is that than also

daily life? It felt like I could give a wrong answer there, even though you obviously cannot. I did have goals that were in multiple pillars like "meditate everyday" etc.

Q: What do you think about the feedback of a globe?

Pleasant! I thought the globe itself was really cute, especially with the things on it. It felt cute, friendly and soft, if that makes sense, round shapes, extensively long houses etc. What I think would be a great feature is if people could choose their own things for the pillars. I, for example, would want the things to match the pillars a bit like a cloud for mental health for example. It would also help me remember which one is which better. Now, the things seemed unrelated to the pillars sometimes.

Q: Do you think it would be too easy to match the things you want to the pillars that are easy to do for you?

If you can choose your own objects but you make it so that you need all of them to make a beautiful world, it might result in more motivation for the users to do all the pillars. I guess it's all about the implementation.

Q: Do you feel like the globe influenced your behavior in any way?

> *Q: If so, how?*

I don't think so necessarily, I think it was more because of the reflection moment it made me have every night: Did I do what I wanted to do? I do have to say that I was less invested in the globe also because I knew I was using it for only 5 days, so I was never going to get it completely filled so my answer might be different if I had used it for a longer period of time or undetermined period of time. Another idea I had is that maybe the things could shrink on the globe if I don't use the app for a while, could be motivating I think.

Q: What did you think about the models appearing on the globe (tree, bush, flower, etc.)

I had this weird thing about the bush for mental wellbeing where I did not think it fitted with the others, neither did I think it did not fit.. I think the design was a little different from the rest. Especially when looking at the house and the grass, which was very detailed where the bush was more of a 'blob'. Apart from that I thought it was very pleasant.

The application

Q: Do you think that participating in this research influenced your actions in the past days?

Q: If so, how?

Yes? I was working on it anyway but I think that it was like a 'reconfirmation' as something good and handy to be working on. I think it helped my motivation go up, but not necessarily how intense I was working on it.

Q: How do you think the application influenced your actions these past days?

I think I tried to set broader goals than before, because many of my goals before the application were bodily functions, mental health and daily life. I never really thought about purpose, quality of life and participation so that motivated me towards a broader way of thinking for the goals I was setting.

Q: How motivated were you to perform your goals these past few days?

Looking at the circumstances, corona, personal stuff, exams, etc., I was pretty motivated. I meditated more and I went for a run more!

Seeing the results
Q: Can you show me your globe and explain it to me?
Q: Did you get any new insights from the globe/application?
Yeah because I did realise that I might need to think a bit broader: Like I said before, I have only been looking at 3 pillars before this, not 6.

Afterwards, the researcher will look at spiderweb first day and spiderweb last day and compare this to the globe.
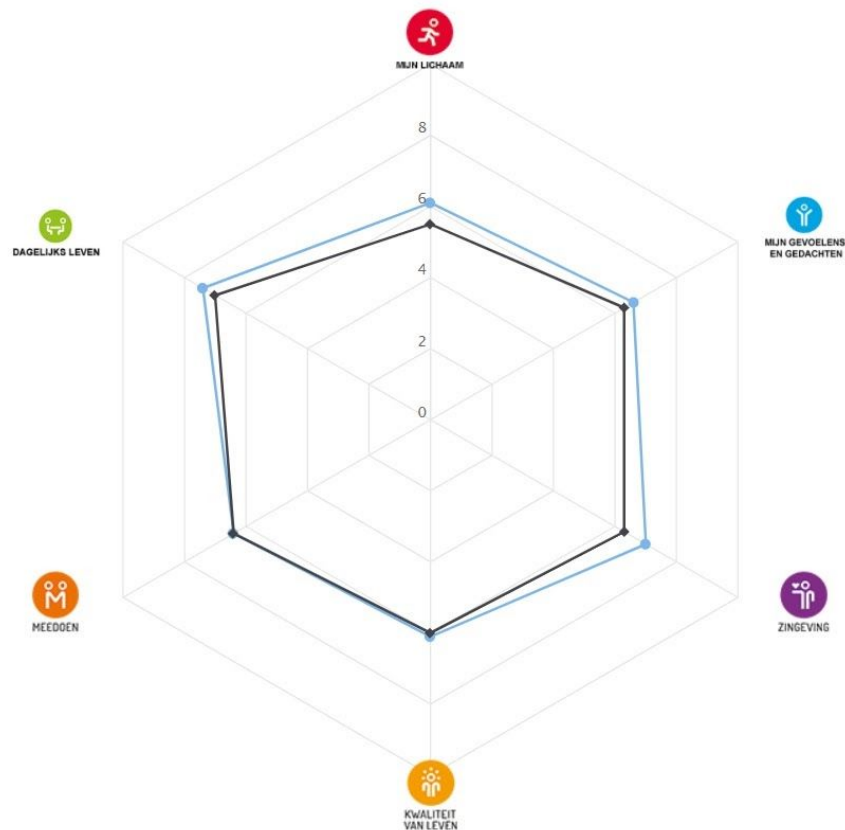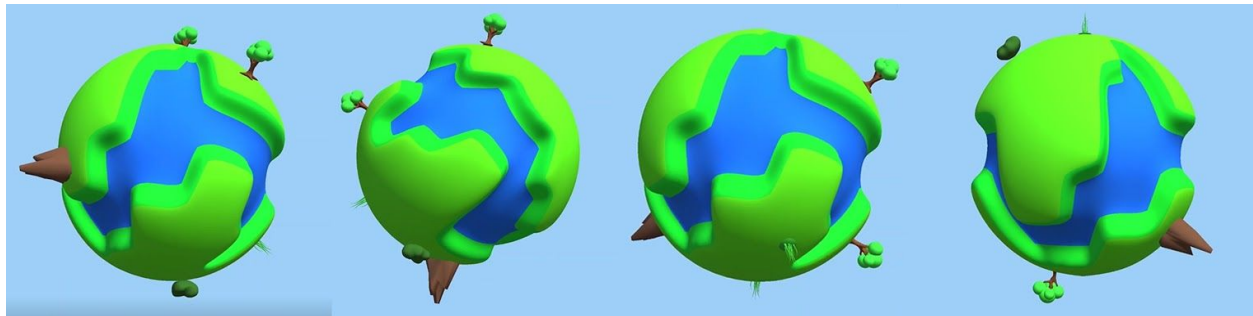
This spider web only has day 1 in black and day 5 in blue. From the spider web it seems like all pillars improved, except for participation which stayed the same. The improvement in quality of

life is very minor,, also compared to the rest of the pillars. Most improvement is in bodily functions and purpose. This participant did indicate that he did not always check the daily goals in the app, but did always check at night if he did do the goals. Therefore, the globe is quite empty compared to other globes, however the participant also indicated that because he knew there would only be 5 days to fill the globe, he was less focussed on filling the globe. Interesting here is that the participant did not have any goals in the purpose pillar, however did improve most in the purpose pillar when looking at the spider web. The participant did indicate that meditating every day and checking goals gave him/her a moment of reflection, which could have to do with this improvement. The multiple trees on the globe match with the improvement in the spider web, Participation stayed the same, despite having a mountain on the globe but it is understandable that achieving one goal in participation will not make the score higher. The improvement in mental wellbeing and daily life match the globe. In general, this person seems very balanced.

Participant 4

Usability application
Q: How did it go with using the application these previous days?
The only disadvantage of the app is that I tend to forget about it and there are no reminders or notifications on the phone. But because it was for this study I did use it everyday and that made me think about it, atleast at the end of the day. Also, it was hard to set the goals for all pillars. If you want goals in all pillars it can be hard because you don't naturally know what they all mean and even if you do, setting practical goals can be difficult. Other than that, the app is easy to use. The menu to keep the goals, however, might be easier to just make it a standard thing above every goal instead of asking it everytime. The globe made me happy, I thought it was really amusing. Also, every time I got something new I thought to myself "Ahh I'm doing better and better actually, nice".
Q: Did you run into anything unusual?
Neh? I think that there was a lot of text for a tiny screen especially at the pillar scene to explain positive health and the pillars, maybe it could say something like "go to the specific pillars for more information or explanation" so you can put less in that one. It was not an issue for me, but someone with bad eyes or of older age will definitely not be able to read it.
Q: Was there anything unclear or hard to understand?
No I thought everything was clear and good. Maybe older people will have a hard time understanding, but no issue for me. Alles stond ook gewoon goed. Misschien dat oudere mensen het niet allemaal begrijpen maar verder prima. Some sentences seemed just not aligned, but that could have to do with my phone's screen size. And another small note: I think the background blue color has just a little too much grey in it.

Positive Health
Q: Since this application is based on positive health and their pillars, what do you think
about positive health?
Yeah I think it's nice, most of the time I just do what feels right and that works completely fine. I still do that now, but I have a new vision that I know about and can use. I don't think I would set goals that fit into one pillar often but I can now.
Q: What do you think about using positive health to improve your lifestyle?
I think it could work for some and not work for others: some things, I think, just kind of happen to you. Like, participation is something you have to work for but if you are not in the mood you will not do it even if it would be beneficial for your lifestyle and health etc. also with bodily functions, exercising and eating healthy, if you don't feel like it you won't and you're not going to convince people to do so, even if their other pillars are good. I also think that all 6 pillars are needed to really be good and healthy but I do think you have to be at a certain level of mental state to make this work. Like if you are really feeling down no app or view will help before you fix that you know, go to a psychologist.
Q: How did it go with the questionnaire at the beginning?
It was very easy, Ithink it is a snapshot so I just answered on feeling. You can try and think about your answers for 3 hours but why would I do that. I don't know if all questions are as useful, but it does touch upon every subject which is good.
Q: What did you think about the spiderweb?

I thought it was nice, the outcome was correct with the scores. The only disadvantage I think is that it is such a snapshot that it does not say as much as it appears to. And also if you have had a depressed week, it will really show yet not be representative, especially in corona times some days are mentally very different from others. It might be better to fill it in everyday, but that takes way too much effort. I think it's interesting doing it on day 1 and 5 as well.

Goals and Globe
Q: How did you experience setting goals that are divided into pillars?
Dividing the goals into pillars was okay, but you did need to come up with goals first. I think the key is to see it generally and not try to make it for one pillar, but make the goal and then think about what it does to you, so which pillars that is. Most of my goals were general goals, so in multiple pillars, and often they were daily goals. I think you can have a goal of seeing someone for example for one time, but most goals especially for lifestyle are repetitive.
Q: What did you think about the menu to keep an achieved goal or not?
The menu was nice, but as I said before I think it is easier to just ask the user when they set the goal if it is a repetitive goal or one time goal. You could have different menus like for example daily, weekly, monthly, etc. that also makes it easier to see what you should do everyday and you could attach reminders to it. Of course don't let it turn into spam.
Q: What was the process you went through setting the goals?
It was very spontaneous, when I thought of something I added it. Most of the time the checking was a set time though, mostly at the end of my days when I got my tea or something around eight.
Q: what did you think about seeing the goals you achieved and did not keep?
I would make a history page in the app where all these goals are saved, I definitely think it is nice to see your achievements, but you don't want to overload the screen with text.
Q: What do you think about the feedback of a globe?
I think it is annoying that you go to the globe immediately after achieving a goal, because sometimes you want to check multiple goals and you have to go back to the page all the time etc. The globe itself was really satisfying and fun to look at. When it got bigger it made me smile and I thought "ahh this is quite fun actually". I do think that being able to spin it around yourself would be beneficial if you're trying to analyze it.
Q: Do you feel like the globe influenced your behavior in any way?
      Q: If so, how?
I think because of corona times it did not really, because there was only so much I could do. I do think it would be interesting to do this test again when things are finally back to normal again. It is a weird time with constant changing rules, so I don't really know.
Q: What did you think about the models appearing on the globe (tree, bush, flower, etc.)
I liked the tree and flower a lot, the bush could maybe become a cloud because that really fits with mental health. I didn't really like the grass because it reminded me of seaweed, maybe an animal would be super fun. Maybe the flower could even open and close like the purpose of life. I really liked the house and the mountains were cool too, only did not really match participation. Mountains can feel kind of lonely in a sense. I appreciate it more if the models represent the pillars. It did, however, not influence me towards a specific pillar or anything, it was just all fun. Maybe a fish that swims in the water is cool too!

The application
Q: Do you think that participating in this research influenced your actions in the past days?
       Q: If so, how?
Yes, because I had never thought about health this way or this much. When you participate in a study you automatically delve into the subject so this directly influences you of course. Normally I would delve into something when I feel like it, but now you automatically do.
Q: How do you think the application influenced your actions these past days?
Same as previous answer.
Q: How motivated were you to perform your goals these past few days?
I think I was very motivated because the goals I set were goals I generally always want to achieve. I was planning on changing my lifestyle already so I think this mindset really helped. The app is still just an app so I doubt how much it can change my behavior, but I would keep using it if reminders were added.

Seeing the results
Q: Can you show me your globe and explain it to me?
I do think the globe is still somewhat empty, but I had a little difficulty setting goals, also in corona there is only so much you can do. I did sometimes forget to check some goals I think, because I would have the same goal in multiple pillars. It might be nice if these were connected, so that the app could recognize I checked the goal and can apply that in the other pillars as well.
Q: Did you get any new insights from the globe/application?
I do think that I don't know what my purpose is yet, but that is completely fine and might have to do with my mental state and corona as well.
Afterwards, the researcher will look at spiderweb first day and spiderweb last day and compare this to the globe.

When looking at the spider web, quality of life and purpose stayed exactly the same, which was already very high. The mental wellbeing, bodily functions and daily life all improved quite a lot, and participation also improved. The total seems more balanced, with participation being a little less than the other pillars, but the participant did mention corona to make this very difficult as he also lives alone. When looking at the globe, all pillars have achieved goals. Also when looking at the goals the participant set, which can be found in Appendix U, he had multiple goals in all pillars. What did stand it is that some goals were checked in a pillar, but not in another pillar even though it was the same goal which did influence the globe. When analyzing the globe, most goals are achieved in participation and daily life, but all pillars have at least 2 achieved goals. Purpose has two achieved goals, however no improvement in the spider web and quality of life has two achieved goals as well and no improvement in the spider web. Despite the many achieved goals, participation did not improve as much as other pillars in the spider web, but all is relative to the situation so even if the participant is glad about the achieved goal, in general when living alone in the epidemic the grades do not get as high.

Participant 5

Usability application

Q: How did it go with using the application these previous days?

Yes good, I opened it everyday and it is really clear and readable for me and I really liked watching my globe get more and more complete. Easy and clear to use.

Q: Did you run into anything unusual?

No, not really. I did notice some things. Like first, if you write down a goal that is really long it doesn't show the entire goal anymore. And that you could not check off multiple goals, because when you check off a goal you immediately go to the globe. I understand that you want to see the effects of reaching a goal, but if you check them all off before going to the globe it's probably even more satisfactory.

Q: Was there anything unclear or hard to understand?

No, I thought it was clear, good explanations.

Q: What did you think about the menu to keep or not to keep your goals after checking them?

It was clear, I immediately understood what it was for.

Q: What did you think about being able to see the goals you achieved and did not keep?

Yeah I actually thought about this yesterday, I liked it but it might be better to show it for just 12 or 24 hours or something to keep space for more goals, otherwise it gets very crowded. I did really enjoy the big "DONE" because it gives you a boost that you just did that.

Positive Health
Q: Since this application is based on positive health and their pillars, what do you think
about positive health?
Yeah interesting, especially because they are all so connected, so much overlap. Because if you exercise a lot and eat healthy it influences your mental and daily life, rhythm etc. It is logical and I feel like it all really complements each other.
Q: What do you think about using positive health to improve your lifestyle?
It makes it all a bit clearer. For example that everything overlaps, if you see the 6 pillars underneath each other you can see your strengths and weaknesses in one glance, what you can work on where you might need help. It is broader yet also more clear. We all somewhere know these things are connected and seeing it like this just clicks.
Q: How did it go with the questionnaire at the beginning?
Actually went well, there were a few questions that I had to think about a bit longer but went well.
Q: What did you think about the spiderweb?
Yea it really suited me I think, which makes sense because it came from the quiz. It was how I expected it to be though so I didn't really find out anything or got surprised, but it was fun to see it all so clearly visualized.

Goals and Globe
Q: How did you experience setting goals that are divided into pillars?
Pretty good actually, I was very enthusiastic to start using the app after the explanation, so I just started at the top and worked my way down. The first day I set my goals for that day and the day after, and after that it became more spontaneous. I would think of something and write it down in the app immediately. Normally I would check every night to see which goals I had done that day and sometimes when I was really proud of something I would check it in the app right after, like when I managed to get up before 10.
Q: What do you think about the feedback of a globe?
Yeah I got a lot of satisfaction from the globe, it was extra motivating for me. It's not just "yes I have to drink 2L of water" but also "Oeh I will get a house if I drink 2L of water". You're really building something and I like that.
Q: Do you feel like the globe influenced your behavior in any way?
        Q: If so, how?
Yes, like I said before. It adds something extra, instead of only doing it for yourself you are also working on something else so when you are missing the motivation to do it for yourself you also have the other motivation: An extra goal next to the goal.
Q: What did you think about the models appearing on the globe (tree, bush, flower, etc.)
I really liked it, I thought it was super fun. Everything was very different from each other. Also because all the colors were so different, it was really easy to see what everything was for and

how you were doing.So you could tell what was going well and what maybe wasn't really easy because of the color differences.

The application
Q: Do you think that participating in this research influenced your actions in the past days?
> *Q: If so, how?*

A little bit, I don't want to say that I changed a lot or live my life differently or anything in that matter but I was reminded about what is really important: my health. Especially in times like these (corona), I am noticing everything kind of fading. Like sometimes it feels like nothing matters anymore, which really sucks because of course it matters. So it was really nice to have a reason to think about my health and be involved, remember what is important and take care of yourself. Also, remember that you do want something in life you know, like you do have goals there you go.

Q: How do you think the application influenced your actions these past days?
Same as before, making it possible to note everything down, make it something touchable if that makes sense.

Q: How motivated were you to perform your goals these past few days?
Pretty motivated actually, I have been very busy with school lately but I have been taking a break every day because that was one of my goals and also to stop studying after diner for example because I can get carried away and spend all day behind my laptop screen studying and I was motivated to find some more rest. Also with drinking water and going to bed early, I really wanted to do it because I wanted to be able to cross it off in the app when I was going to sleep.

Q: Did it make you feel disappointed if you didn't achieve one of the goals that day
Definitely a little, I don't think that's bad though because I want to do it and not being able to cross it off is just a little more disappointing I think because you see it written down there. But that is of course also motivating, for me it was not demotivating because I would be sure to do it tomorrow.

Seeing the results
Q: Can you show me your globe and explain it to me?

Q: Did you get any new insights from the globe/application?
Yes, when you start setting your goals you really start to think about what you want, what you are missing, what I need, what is healthy for me, etc. It changes your view. Like for example with the participation pillar, you start to look at social contact differently because it is more important than you think for your own health, so I think so.

Afterwards, the researcher will look at spiderweb first day and spiderweb last day and compare this to the globe.
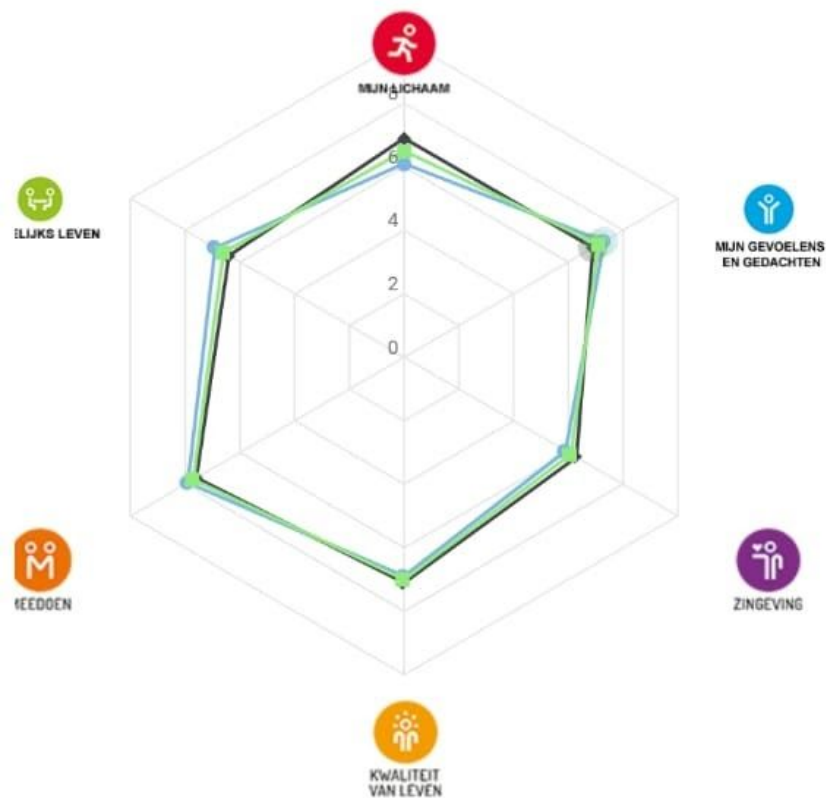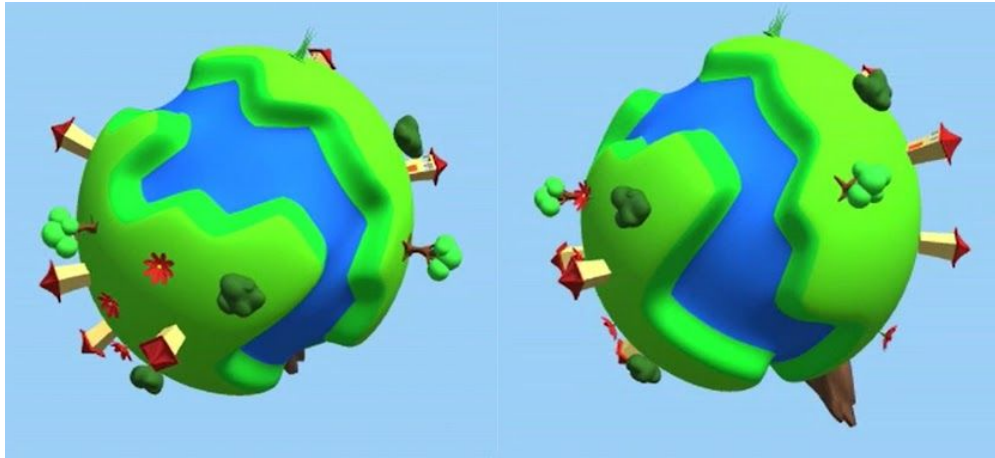
This participant does not have a very different spider web on the two different days. The differences are so small that they could be negligible. Most improvement is in the daily life pillar. When looking at the globe, this participant achieved a lot of goals, wherefrom most are daily life so this is in agreement with the spider web. The participant set a lot of goals in all pillars and seems from the spider web as well as the globe well balanced. The participant was very positive during the interview, and noted that it mostly changed her view of health, making him/her more aware. This could indicate that the general grades this participant would give do not improve based on a few days, or that the actions did not influence him/her that much, or that she would have achieved a comparable amount of goals without the app, which is in

disagreement with the interview but interviews are always prone to socially desirable statements.

Participant 6

Usability application
Q: How did it go with using the application these previous days?
I went fine, I had a hard time coming up with the goals I wanted to achieve. I also had a tip, if I may: I think it would have been nicer to also have a page with all the goals, divided or not divided, to scroll through for when you want to check them off or look at them in one go, so you don't have to go to every page to see. Otherwise I think it went well, I wanted my globe to be full so I did a lot of things.
Q: Did you run into anything unusual?
No, I think it was how I expected it to be after the explanation.
Q: Was there anything unclear or hard to understand?
Not necessarily, like I said before I had difficulties coming up with goals. I think what helped most were the example goals but I still had a hard time. I was also thinking something: When people download the app they don't know that they will be rewarded with things on their globe so it might be nice to have an introductory text at the beginning of the app to explain that aspect. Of course I knew because you told me during our first meeting, but it was just a thought because it does not say it anywhere.
Q: How do you feel about the freedom you have with the goals? Is it too free, or do you get too pushed in a direction because of the examples etc.?

No, I think it's very free, which is good. I did use some of the example goals and think that would be a good goal for me as well so I used it. I don't think that's bad though, they were good goals.

Positive Health
Q: Since this application is based on positive health and their pillars, what do you think about positive health?
I am not really a motivated person in general, like I know health is important and all but for me I don't really care about it. I do think that because I am not really invested, it was a real eye opener to see it's not just about exercising three times a week and eating healthy, there is so much more about taking care of yourself that is way more graspable.
Q: What do you think about using positive health to improve your lifestyle?
I think it really helps because you get another insight into health, like for example reading the paper is not something I thought contributed at all, but it really does and that is nice and easier to do.
Q: How did it go with the questionnaire at the beginning?
It went fine, it was not hard for me to fill it in, apart from how long it was, because I am pretty aware of myself and where I stand. I do think it's a good list because it handles a lot of aspects
Q: What did you think about the spiderweb?
Yeah mine was very crooked. I thought it was a smart because you can see in one eye-sight if you are in balance or not. Like for me, a lot of things were sticking out or in. The results were how I expected them to be, like I know my social life is high and that I don't take good care of myself and the spider web showed that too. I think if you use the app for a longer period of time it shows that too though.

Goals and Globe
Q: How did you experience setting goals that are divided into pillars?
Well, like I said before, I had a really hard time setting my goals, but dividing it in the pillars was hard too. I have a lot of goals per pillar, not a lot of overlap. But I also had the realisation that if the goal is good, it doesn't really matter if you place it in a pillar that was not necessarily meant for it. Like, that's not what it is about.
Q: What do you think about the feedback of a globe?
I really liked it, for me it gave me a lot of satisfaction. It is a representation of your work and you can see you really achieved something. Like, my globe is pretty full even though I am not a motivated person lifestyle wise so I did do something right!
Q: Do you feel like the globe influenced your behavior in any way?
     Q: If so, how?
I guess it did, when I got my first tree and saw it look all cute on the globe, I did get motivation to continue so that helped.
Q: What did you think about the models appearing on the globe (tree, bush, flower, etc.)
I really liked that they were also so different, like you were really building a world not just a forest you know. I really liked the house, I'm not sure why. I liked the variation a lot, it gave a "Oe what do I get now" feeling so extra excitement I guess.
Q: Do you think your goals were different from your regular goals because of the app?

Yes, a lot more small goals. For example putting on clothes when I get up is one that really helped mentally in these corona times, and easy to do when you have a reason to do so (achieve the goal, get something on your globe, be able to check the box, etc.). It's the small things that do make a difference and without the app I would just think "I should probably eat healthier", but that is not concrete and very hard to do so I wouldn't do it.

The application
Q: Do you think that participating in this research influenced your actions in the past days?
     Q: If so, how?
Yeah I think it made me more aware of my health. The entire thing as well, like doing the questionnaire and spiderweb first made me aware and was useful for the app as well.
Q: How do you think the application influenced your actions these past days?
The participant already answered this question above.
Q: How motivated were you to perform your goals these past few days?
Some days more than others, but like I said I am generally not really motivated for these types of things so I might not be the ideal person for this study, yet participating did help because I achieved quite some of my goals.

Seeing the results
Q: Can you show me your globe and explain it to me?

Q: Did you get any new insights from the globe/application?
Well, apparently I can do things if I put my mind to it you know, I learned that. And also, like I said before, that it's not just about exercising and eating healthy and if I think I should improve my health but I'm not in the mood to do these workouts and never eat chips it doesn't matter you can still do lots that is nice to do as well, just taking care of yourself in your way.

Afterwards, the researcher will look at spiderweb first day and spiderweb last day and compare this to the globe.
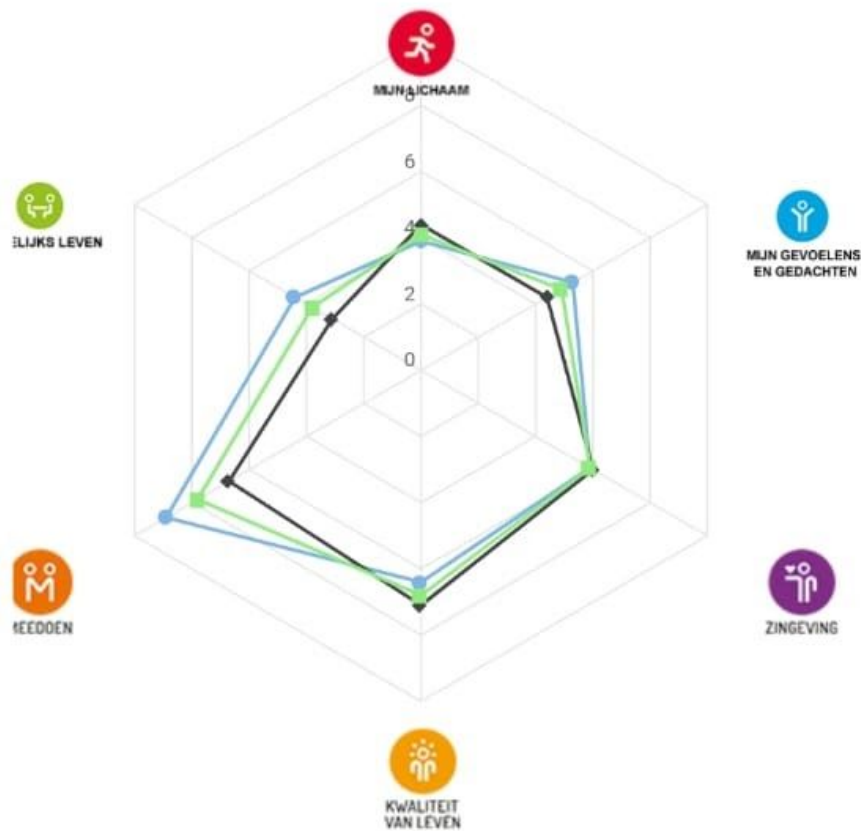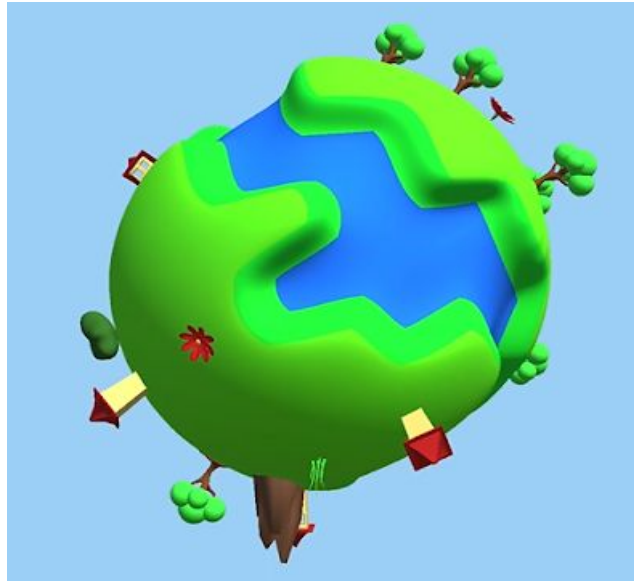
This participant indicated that taking care of him/herself was not high on the priority list, so the spider web was not surprising to the participant. This participant has some pillars that decreased slightly. Daily life and mental wellbeing improved and participation improved a lot. Purpose stayed the same. When looking at the globe, there are actually a lot of goals achieved in bodily functions. The spider web is just one specific moment in time, but it is notable that it

decreased instead of improved. Despite only having one achieved goal in participation, it went up a lot in the spider web. This could be because the goal was very significant, or because of another life event like a new partner etc. The improvements in mental wellbeing and daily life are both present on the spider web and the globe. The biggest difference is the bodily functions pillar, which could indicate the participant was not feeling good about it that specific day or that the achieved goals did not manage to change the participants opinion about her own bodily functions. The participant did indicate multiple times that they do not exercise and lack motivation etc. so the web does match her own description of herself. The globe, however, shows a lot of bodily function achievements. The participant did mention being proud of the globe and how much she got on it, also saying that her new insight was that she could do something if she put her mind to it.

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