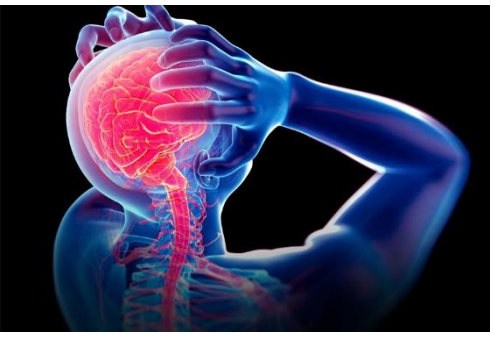


The application of a strength-based-approach: designing an eHealth platform for people with migraine

Janne Knippers
s1847724
Bachelor Thesis Psychology (PPT)
Date: 24th of June 2019

University of Twente
BMS Faculty
Department of Psychology
First supervisor: N.J. Peeters
Second supervisor: C. Bode

ABSTRACT

Background: Migraine is one of the most prevalent chronic pains and it occurs most among women. However, coping with it is complex, since the healthcare system is not actively involved. This makes self-management more applicable and for this the strength-based approach can be used. An intervention that focused on strengths and self-management is 'Raise your strengths', which is developed for people with chronic diseases. To incorporate this intervention with self-management, eHealth can be helpful, since it is easily accessible. However, for designing a low-fidelity prototype, the wishes of users about persuasive features, behavioural change techniques and other elements need to be incorporated by involving patient partners throughout the whole development process. Afterwards, it is significant to do usability tests to assure that the prototype worked as it was aimed for.

Method: The user-centred design was used and for this, purposive sampling was done to recruit two patient partners. Interviews were done about their current situation, self-management and needs to improve this. Additionally, suggestions were given about the technical needs and wishes for an eHealth platform. Coding schemes were made for those two interviews and those schemes were analysed to design the prototype, which was made on PowerPoint. To test this prototype, usability tests were done with six key-users, by using the think-a-loud method and also a coding scheme was made to analyse these interviews to see if there were suggestions for improvement.

Results: Both patients did not explicitly mentioned their needs regarding their self-management. However, they did suggest some technical needs and wishes and the main results were the wish to keep track on performance, while having a simple and clear design on a phone without loud noises and bright lights. By taking these wishes into account, the prototype could be designed and the users rated the platform as clear and usable, so they liked the overall use and it worked as it was intended for. However, there were suggestions given to improve the process of the prototype, e.g. better explanations for some buttons and screens.

Conclusion: It can be concluded that the prototype, including the worksheets, worked as it was aimed for according to the users. However, not all worksheets of the intervention were covered in this app and therefore the key-users had some questions about the content of some of the screens and they missed some elements, such as goals, since this was not part of those three worksheets, although they were included in the whole intervention. Therefore, a suggestion would be to expand this prototype by including the other six worksheets to make the prototype more complete.

TABLE OF CONTENTS

1. INTRODUCTION

Migraine is one of the most prevalent chronic pains and therefore this pain is going to be examined in this study (Gharaee-Ardakani, Azadfallah, Eydi-baygi, Zafarizade, & Tork, 2017; Martins, Gil-Gouveia, Silva, Maruta, & Oliveira, 2012). To indicate, according to self-measurements in 2017, 14% of the Dutch population mentioned that they experienced one or more migraine attacks in the past twelve months and it is stated that migraine is most prevalent among women, which can be seen in figure 1 (Volksgezondheidszorg.info, 2019a).

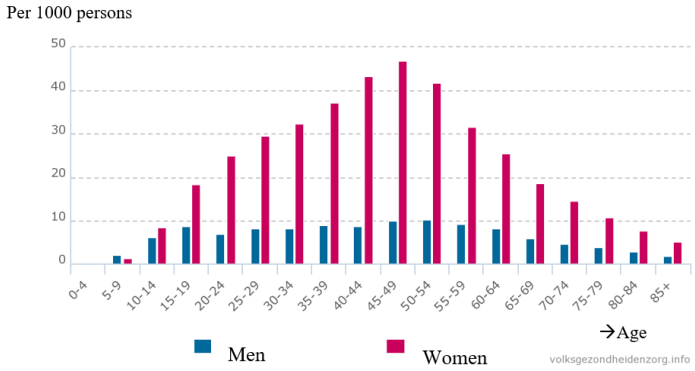


Figure 1. Prevalence of migraine among the Dutch population in 2017.

Migraine can be characterized by returning attacks of severe headaches and it is associated with vomiting or nausea (Diamond, 2007; Martins et al., 2012). While having attacks, patients are also sensitive to sensory stimuli and experience cognitive symptoms, such as feeling distracted. Other consequences are a higher chance for depression, anxiety, fatigue and stress (Diamond, 2007). Additionally, it is possible that the social, family and work/study environment are damaged, since patients sometimes need to cancel activities or appointments due to migraine and they experience that others do not understand their pain or are annoyed by it, which both can have a negative impact on the relationship (Diamond, 2007).

Coping with the aforementioned symptoms and impact can be complex, because it is known that most of the migraine sufferers have not been diagnosed, do not seek medical advice or do not take medication (Katsarava, Mania, Lampl, Herberhold & Steiner, 2018). To clarify, the healthcare system is often not actively involved with migraine patients, because the health care system simply does not have enough knowledge about the treatment of migraine and not enough money and time to constantly deliver help (Katsarava et al., 2018). Therefore, it is more applicable to use self-management strategies to help patients to cope with migraine, instead of therapies including face-to-face contact with a specialist. Self-

management is defined as: *"the individuals' ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition"* (Arends, Bode, Taal & van de Laar, 2013). By applying self-management strategies, it is essential that migraine patients are supported by focussing on this improvement of coping with migraine and the improvement of the general lifestyle (Flink, Smeets, Bergbom & Peters, 2015). To clarify, it can be stated that those improvements can enhance the overall well-being of the patient (Flink et al., 2015).

A movement that focuses on this improvement of mood and well-being is positive psychology (Flink et al., 2015; Rashid, 2015; Wood, Linley, Maltby, Kashdan & Hurling, 2011), which focuses on increasing positive feelings, cognitions and behaviours. A specific task to increase this is learning how to use one's strengths, skills, talents and abilities to optimize the well-being (Rashid, 2015). Strengths are the characteristics of a person that allows them to perform well or at their personal best (Proctor, Maltby & Linley, 2010). It is stated that strengths and accessory interventions are associated with an increased well-being and life satisfaction (Proctor et al., 2010). The accompanying approach is the strength-based approach (Chung, Burke & Goodman, 2010), which has the goal to raise awareness of developing strengths and using them to cope with pain in daily life to improve the well-being. Since, migraine patients cope with pains in daily life, it is significant to use this strength-based approach to help them to optimize their well-being.

An existing intervention based on strengths and self-management is 'Raise your strengths', which is developed by the University of Twente in cooperation with Agis and Vitaal Mensenwerk (van Veen, Peeters, Bohlmeijer & Bode, 2018). It is a stepped-care approach developed for people with chronic diseases with as goal optimizing the well-being of these people by focussing on strengths to help them to cope better with their disease. The intervention exists of three steps and the first one is the introduction of the intervention and the selection of participants (van Veen et al., 2018). The second step, 'Right on strengths', consists of nine worksheets about strengths to help the patient to learn more about his or her strengths and to use them in daily life to cope better with the disease and improve the well-being (van Veen et al., 2018). Finally, the third step, 'Right on target', is only for patients who are not fully capable to cope flexible with his or her goals. The focus in this study is on the second step 'Right on strengths', since it is important for migraine patients to focus more on this promotion of well-being (Flink et al., 2015).

To incorporate this strength based intervention with self-management, eHealth can be useful (van Beugen, van Middendorp, van der Vaart, Ferwerda & Evers, 2015). eHealth is the use of technology to improve well-being, health and health care and this technology is growing rapidly (van Gemert-Pijnen, Kelders, Kip & Sanderman, 2018). eHealth has potential advantages for patients and treatment givers, for example the ease of use, the accessibility and the decrease of costs and waiting lists (van Beugen et al., 2015; van Gemert-Pijnen et al., 2018). Contributing to these advantages, results show that eHealth interventions are useful to improve physical and psychological symptoms of people with chronic diseases (van Beugen et al., 2015; van Gemert-Pijnen et al., 2018) and since migraine patients cope with physical symptoms as well as psychological symptoms, eHealth could be a useful way to support them.

To make sure that the eHealth design is usable for migraine patients, their needs and wishes would need to be considered and this can be done by including behavioural change techniques (BCT's) and persuasive features (Yardley et al., 2016). First, BCT's are techniques that are used in interventions to promote behaviour change and some examples of techniques can be seen in Appendix I (Webb, Joseph & Michie, 2010). There are three techniques that are most appreciated by users according to Poppe et al. (2018). The first one is *feedback*, because this raised the awareness by users to change their behaviour. The second one, *action planning*, was motivating according to users, since they are then able to plan personal goals and activities. The last one, *prompting review of behavioural goals*, was helpful, because users get reminded of their own goals and progress (Poppe et al., 2018). Second, persuasive technology delivers information with as goal changing the attitudes and behaviours of users (Oinas-Kukkonen & Harjumaa, 2009). An existing model that belongs to this is the persuasive system design (PSD) model and this classifies the features as primary task support, dialogue support, social support and credibility support (Kelders, Kok, Ossebaard & Van Gemert-Pijnen, 2012). The different principles and explanations can be seen in Appendix I. Primary support principles are most often used in interventions for chronic ill patients, because this category influences the need for reflection, which in turn leads to more personal insights, which is appreciated by users (Halttu & Oinas-Kukkonen, 2017). The most appreciated principle within this category is *tailoring*, since it is widely recognized as an essential feature for effective health communication (Kelders et al., 2012). Furthermore, for dialogue support, *reminders* are mostly used, since reminders increase the adherence of users to the intervention. Moreover, for social support, *social facilitation* is popular, which is the

opportunity to contact others within the intervention. Eventually, for credibility support no results were given (Kelders et al., 2012).

To apply all those techniques and features, a low fidelity prototype will be made and for this the user-centred design can be used, which is a design in which the needs and wishes of users are fully incorporated (Gulliksen et al., 2003). The design focusses on the usability throughout the whole development process, so users are actively involved. The reasons for this are the improvement of the usability and the prevention of the inclusion of redundant features (van Velsen, Wentzel & van Gemert-Pijnen, 2013). Additionally, it delivers a deeper understanding of the skills, knowledge, needs, and preferences of users, which assures that the design is suitable for the intended purpose (Yardley et al., 2016)**.** However, to make sure that this eHealth design is suitable for the intended purpose, usability testing will be done, which is an evaluation method that can be used to measure how well the users can employ a specific platform (Zhang & Adipat, 2009). The method that will be used is the think-a-loud method, in which users participate and get tasks or are asked to explore the design freely (Bastien, 2008). It is essential that users give feedback verbatim about whether the design is used with or without difficulty and give suggestions for improvement (van Gemert-Pijnen et al., 2018; Zhang & Adipat, 2009).

To conclude, the main purpose of the current study is to design an eHealth platform for people with migraine by focussing on their strengths. This platform will be based on elements of the stepped-care intervention 'Raise your strengths' and will be designed by taking the perspectives of migraine patients into consideration. Based on aforementioned information, migraine occurs most among women and therefore this study focusses on females. The accessory research questions to make sure that the low-fidelity prototype includes the demands of the users, are:

1. What do the migraine patients need to sufficiently self-manage their behaviour with regard to the impact of migraine?
2. What are the technical needs and wishes for the self-management behaviour of the migraine patients with regard to an eHealth design?
3. How can the needs and wishes of the patient partners be transformed into a low-fidelity prototype of an eHealth design based on the existing intervention 'Raise your strengths'?
4. To what extent does the low-fidelity prototype function as it is aimed for according to the key users by means of usability testing?

2. METHODS

2.1. Participants

The study was conducted in 2019 and focused on females with migraine complaints. The inclusion criteria are that these females should be older than 18 years old, because of the written informed consent, and that they should be able to understand English written and spoken texts due to the English prototype. Six participants were recruited by using the purposive sampling method and all participated voluntarily. Two of them were patient partners and therefore involved in the whole process and the other four were approached to test the prototype. The characteristics of the participants can be seen in table 1. The study was approved by the Ethics Committee of the Faculty of Behavioural Sciences at the University of Twente and all gave written informed consent prior to participating, according to the Ethics Committee rules.

Table 1.

Demographic characteristics of the participants.

Characteristics		Mean/SD	Frequency (n=6)
Gender	Male		0
	Female		6
Age	Mean	21.8	
	Standard deviation	0.90	
	Range in years (21-23)		6
Nationality	Dutch		6
Educational level	Higher education		6

2.2. Materials

Two interview schemes were made, and the same interviews were administered to both patient partners. The interviews were semi-structured with mostly open-ended questions and were recorded with a mobile phone. The first interview (see Appendix III) was used to gain knowledge about the experiences with migraine and the needs regarding the self-management behaviour. The interview was divided into four topics and the first topic referred to demographic questions. The second topic was about the symptoms and consequences of migraine, e.g. *"Which symptoms do you have during or after an attack?".* Furthermore, two questions were asked about the opinion of others, e.g. *"How do people from your surrounding*

react to your migraine?". Eventually, the last topic referred to the self-management, e.g. *"How do you cope with the pain while having a migraine attack?"*.

The second interview (see Appendix III) was used to get insight into the needs and wishes of the patients regarding an eHealth platform. Thirteen questions were asked about their preferences with regard to a technical device or platform and the use of features and techniques, e.g. *"What kind of device do you like to use if an eHealth intervention was made?"* and *"I brought a table with examples of persuasive features, which features do you like to see on an eHealth platform to make it more usable for you?"*.

After those interviews, a low-fidelity prototype (see Appendix VI) was made based on the input of the interviews, the literature and the worksheets of the intervention 'Raise your strengths' (see Appendix V). The materials that were used were first of all papers and pencils to sketch the screens, however the original version was made with the program PowerPoint. Some of the figures and tables, used in the prototype, were found on Google and the others were made on PowerPoint.

Lastly, a third interview was done to test the usability of the prototype. The interview scheme (see Appendix III) contained demographic questions and tasks that the respondents needed to do, e.g. *"You already have an account, can you please fill in your username and password."* Other materials that were needed were the informed consent, information sheet about participating in the study, the tasks and the prototype all printed on paper. Also, a phone to record the interview and a laptop to listen to the audio examples were needed.

2.3. Procedure

The researcher started the first interview with an introductory text about the goals of the study, the intervention 'Raise your strengths' and the different interviews, which can be seen in Appendix III. Additionally, it was emphasized that they could withdraw from the study without consequences. To clarify it more, an information sheet was given right before the interview started which they could read and when they agreed, they could sign the informed consent (see Appendix II). After it was signed, the interview started by asking how they were doing, to make them feel comfortable and demographical questions were asked. Then, questions were asked about the symptoms and consequences of migraine and both patients already gave information here about the opinion of others, so no further questions were asked about this topic. Lastly, questions were asked about their self-management behaviour. The interviews endured both around 20 minutes and at the end, the worksheets of the intervention

were given to them, so that they could check the content of the intervention and the structure and design of the three respective worksheets as a preparation for the second interview.

The second interview started therefore with the question if they have read the worksheets, however both patient partners forgot. Therefore, time was given to globally check them, so that they had a better understanding about the content and design of the worksheets. Then, the recording started, and it was explained what this interview was about. Probes were used to get more details, such as *"And can you tell me why?*" and both interviews endured around 15 minutes.

The third step was making the prototype including three of the nine worksheets of the intervention (see Appendix V). The first worksheet was chosen, because users gain insights about their strengths, since these might be unknown for them. Additionally, the second worksheet was selected, because migraine patients experience obstacles, such as cancelling activities, and with this worksheet patients can recognize their obstacles and find solutions for them. The third worksheet was chosen to reflect on these obstacles and the strengths to learn from it in the future. Then, regarding the needs and wishes of the patients partners for the prototype, the different answers of the patients were compared to see if there were similarities or not. When there was a gap between the opinions, an alternative was chosen that matched the wishes of both by adding optional buttons or screens, so that users could choose to use that screen or button or to not use it. Additionally, the literature about the persuasive features and BCT'S was taken into consideration, since one feature, that was not mentioned by them, was incorporated in the prototype, because it was an appreciated feature according to the literature. After this was done, different sketches per screen were made on paper and afterwards, a contour of a phone was found on the internet and pasted in PowerPoint and then the sketches that were most similar to the wishes of both patients could be transformed into PowerPoint by adding figures from Google or self-made figures and tables via PowerPoint. The audio examples that were included were recorded by using the voice of the researcher.

Lastly, an interview was done to test the usability of the prototype based on the think-a-loud-method. First, an information sheet was given to the participants, which they could read and the informed consent was given which they could sign if they agreed. Then, the interview and the recording started and while doing the tasks, it was important that the respondents thought aloud and when this did not happen, encouraging questions were asked, e.g. "*Can you tell me what you think about this screen?"*. All six interviews endured between

22 and 28 minutes and after the interview, all participants received a bar of chocolate to thank them for their participation.

2.4. Analysis

For analysing the data, the three interviews were recorded and transcribed verbatim in Microsoft Word, except for names, dates, and locations to secure the anonymity of the participants. Then, the data was imported in Atlas.ti 8.0 to do an analysis on it and the approach that was used was inductive, so it started from the data instead of theories. The interviews were first carefully read to get impressions for potential codes. Then, each potentially meaningful fragment was coded by using open coding, which is reading through the data and creating labels for a specific fragment. After that, axial coding was used to compare the interviews, belonging to the same interview scheme, with each other, which is the method of constant comparison. After discussions with the supervisor, codes were again combined, separated or rephrased and the final coding schemes were finished after saturation was obtained and these schemes can be found in Appendix IV.

For the first interview, five codes were formulated and divided into the categories current situation and self-management. The first one was about the current situation of the patients and contains the codes *prevalence, symptoms* and *impact.* Then, the second category was about the current self-management of the patients and their difficulties with it. This can be divided into the codes, *self-management* and *difficulties with self-management*.

For the second interview, seventeen codes were divided into six categories. The first category, technical devices, is divided into *preferable device* and *preferable platform.* The second one, preferable BCT's, refers to the positive techniques with as codes the techniques themselves, namely *informing, barrier identification, goals, self-monitoring* and *action planning*. Then, the third category, avoiding BCT's, involves negative techniques with as codes *informing, modelling* and *action planning*. Moreover, the fourth category, preferable persuasive features, is about positive features and the codes are the different categories of persuasive features, namely *primary task, dialogue* and *credibility* and for the category, avoiding persuasive features, the codes are *dialogue* and *social*. The last category, the application, contains the codes *design,* which is about the design elements and *the worksheets,* which is about the transformation of the worksheets into an eHealth platform.

After the first two interviews, the needs and wishes of the patient partners needed to be transformed into an eHealth platform and therefore, their needs and wishes were analysed and

compared to each other. This was done by using the abovementioned categories and codes that were made for the second research question, because it was helpful to classify the needs and wishes of both patients per category to get an overview of the elements that should be included or avoided within the prototype.

For the last interview, the main themes were process and design. Process is about the ease of use and design is about the design features of the developed prototype. Four categories were made and the first one, positive feedback about the process, is divided into the codes: *general, log in screens, personal settings, strengths screens, overview attacks, time schedule* and *online chat.* The second category, improvement points for the process, is divided into the codes: *general, log in screens, home page, personal settings, strengths screens, obstacle screens, evaluation screens, overview attacks, migraine diary, timetable* and *online chat*. Furthermore, the third one, positive feedback about the design, is divided into the codes *general, log in screens* and *strengths screens*. The last category, improvement points for the design, contains the codes *home page, strengths screens, obstacle screens* and *evaluation screens*.

3. RESULTS

The main purpose of the current study was to develop a prototype of an eHealth platform for migraine patients by taking the perspectives of two patient partners into consideration. Four questions were made to accomplish this and those questions are answered below based on the two interviews with the patient partners, the design of the prototype and the last interview about the usability testing with the six participants.

3.1. What do the migraine patients need to sufficiently self-manage their behaviour with regard to the impact of migraine?

To answer this question, it is important to first outline the current situation of the patients with regard to the prevalence, symptoms and impact. Afterwards, insights will be given into their self-management behaviour and their difficulties with it. By acknowledging the difficulties, a conclusion can be made about what the patients still miss, so what their needs are regarding their self-management. To get a deeper understanding of some of the codes and quotes, table 2 can be seen and the complete table can be seen in Appendix IV.

Current situation

Both patient partners indicated that proper migraine attacks do not occur regularly, however circumstances as busy days and feeling excited or tired can enhance the chance of getting an attack. This has unpleasant symptoms, such as nausea, losing part of the sight, painful headaches and losing strength in certain body parts. Due to these symptoms, the impact of migraine is big, since they sometimes have to cancel social and study-related activities and have difficulties with studying due to the lack of focus. They also mentioned that others do not always understand them and participant 2 added that her classmates sometimes shut her out because of her absence, which makes her feel left out.

Self-management

Regarding the self-management, both patients use strategies, because they both try to get enough sleep, take medication, and go to the doctor when it is needed. Participant 2 added that she tries to avoid daily things in life which can trigger migraine, such as caffeine, although she mentioned that it is not always possible, since some daily things, e.g. sunlight, are hard to avoid. However, overall, both patient partners are happy with their current self-management and respondent 1 clarified this by saying that she is strict with her planning and medication intake, which helps her by coping with migraine. Moreover, participant 2 mentioned that

writing triggers for getting an attack in a diary can be helpful for her, but she added that she is not good in this, since she does not always remember exactly what happened that day.

Despite their overall satisfaction, they both mentioned anxiety with regard to migraine, such as the fear of forgetting to take medication, the fear to quit activities due to migraine and the fear of feeling left out. However, they both did not mention what exactly they need to overcome those fears.

Conclusion

To conclude, both patient partners are quite happy with the self-management strategies they currently use. Additionally, participant 2 suggested that a helpful strategy might be to keep track of triggers which enhance the chance of getting a migraine, which can be done by writing it down with as a consequence that she can avoid those triggers. However, they both still struggle with fears and anxieties, which indicate that they do not fully succeed in their self-management. However, they did not mention their actual needs regarding their self-management behaviour.

Table 2.

Part of the coding scheme about the current situation and self-management of the patients.

Categories	**Codes**	**Example quotes**
Current situation	Prevalence	R1: " it mostly starts on the days that you have very busy days or things to do, or you are excited or a little bit stressed and then maybe tired even. That when it starts, like I kind of feel like it always starts at a point in the day when I can't really have a migraine.."
	Symptoms	R1: "I feel nauseous, lose part of my sight. It is like looking in the sun, the little spots you see, that is what I get, and I lose strength in my left arm and sometimes in my mouth."
	Impact	R2: "…it kind of has a very big impact. I have to miss a lot of classes and that is not good for the study and uh.. I have to miss social activities as well…"
Self-management	Current self-management	R1: "I am quite strict with everything, so I tend to plan out things, so I tend to take my medication at this time, so I think my self-management is pretty good.. I don't think that that is actually something that I struggle with right now." R2: "So, I try to get some fresh air, or I use sunglasses, or just avoid some perfumes and smoking and yeah.. sometimes alcohol…"
	Difficulties with self-management	R2: "…I think I can do better in that, like maybe try to sleep in more consistent pattern or completely avoid caffeine and alcohol and … I can also try to write in a diary what I am doing the whole day and try to see if there is a pattern in getting a migraine attack, but, I am not very good in that" R2: "Well I think there is always this fear of getting it, like when you are doing something exciting, so I always take my medication with me. In case I forgot, I tend to kind of stress out, because it might happen."

3.2. What are the technical needs and wishes for the self-management behaviour of the migraine patients with regard to an eHealth design?

To formulate an answer on this question, it is important to first mention which kind of devices and platforms the patient partners prefer to use. After this, preferable and avoiding techniques and features will be pointed out and lastly it will be mentioned how the worksheets should be applied in an eHealth platform according to the patients. In table 3, the different categories, codes and quotes can be seen for an elaboration on the text and the complete table can be seen in Appendix IV.

Technical devices

With regard to the platform, an app was chosen by both and participant 1 clarified this by saying that an app is more compact, better organized and easier to use. They both preferred to use this on a phone with as reason that people often have a phone with them.

Behavioural change techniques

The first preferable technique according to both was that they would like to get useful information, such as short explanations and tips about what to do. However, they do not want too much information and especially not about migraine itself, since they are familiar with this. Furthermore, self-monitoring was mentioned by both, because it is nice according to them to see your own change. Moreover, participant 2 mentioned goal setting and reviewing behavioural goals, since she has difficulties with reaching goals, because she easily forgets about it. Lastly, barrier identification was mentioned by participant 1, which means coming up with solutions for specific barriers.

However, they also mentioned avoiding techniques. The first one, modelling, was mentioned by participant 1, because she thinks that this is not practical for migraine patients, but she does not give arguments for this. Moreover, action planning was mentioned by participant 2, since she has difficulties with planning and therefore she rather avoids it.

Persuasive features

Regarding the primary task support, both liked self-monitoring, which is keeping track on their performance. Additionally, participant 2 liked rehearsal features, since she often forgets to rehearse tasks and only does it once. Furthermore, participant 2 mentioned reduction, personalisation and simulation, but she did not argue about why she wants these features.

Moreover, for the dialogue part, participant 2 mentioned reminders, because she forgets easily the things she needs to do. On the contrary, participant 1 did not want this, but

did not give a reason for it. Moreover, participant 1 disliked attractive systems, since she does not need a lot of images. Furthermore, participant 2 did not want virtual rewards, because she thinks that this is more useful for a game and not for an app like this one.

Then with regard to the credibility, only preferable features were mentioned. First, trust worthiness and surface credibility were rated as important by both participants. Additionally, expertise was mentioned, but participant 1 added that it should only be done with simple facts. Lastly, participant 2 wanted to have some kind of authority, because she is more tending to keep track on her health when there is someone watching it.

Finally, for the social part, only avoiding persuasive features were mentioned and only participant 2 mentioned those. She said that social comparison is not her thing, because she does not like to compare herself with others. Additionally, she does not like competition, social learning and cooperation, but did not give clear reasons for it.

Application

First of all, both wanted an easy, simple and clear design without a lot of information and images. Furthermore, they both disliked lights and sounds when they just had an attack and participant 2 added therefore that she would like to have a button where she can dim the lights of the app. Moreover, respondent 1 mentioned that she would like to have a time schedule, because when she is busy, she feels overwhelmed and then it is useful to plan activities. She also suggested to make a centred menu where users can click on to go to another screen.

Then, with regard to the worksheets, suggestions were given by the patient partners. First of all, participant 1 mentioned that she would like to do the questionnaire about strengths in front, since she does not exactly know her strengths right now. Participant 2 added that she would like to fill in her strengths once and the obstacles and evaluations more often, since they can differ per attack. Furthermore, participant 2 would like to have a screen where she can write down patterns related to migraine which can enhance the chance on an attack, for example sleep patterns or food intake.

Table 3.

Part of the coding scheme about the needs and wishes of the patient-partners with regard to the eHealth design.

Categories	**Codes**	**Example quotes**
Technical devices	Preferable device	R2: "Uh maybe a mobile phone or a tablet because yeah.. you have them with you all the time. More than a computer"
	Preferable platform	R1: " I like the use of apps more than a website, basically because it is more compact and most of the time it is more organized.."
Preferable Behavioural Change Techniques	Informing	R1: "… I like to read some tips and tricks sometimes. Like weird things that I don't know that help you"
	Barrier identification	R1: "…like maybe acknowledging the barriers and come up with solutions, barrier identification."
	Goals	R2: "…and maybe goal setting and something … yeah reviewing behavioural goals."
	Self-monitoring	R2: "…Maybe, self-monitoring."
	Action planning	R1: "...a time schedule wise where you can plan activities on maybe"
Avoiding Behavioural Change Techniques	Informing	R1: "I like to read that but not especially about the migraine and what it is and stuff, I know that now."
	Modelling	R1: "Uhm…. The modelling, using imitation to learn from. I don't think that it is really practical for migraine"
	Action planning	R2: "Maybe action planning, because I am very bad at planning."
Preferable persuasive features	Primary task	R1: "…self-monitoring, keeping track on performance, I like that."
	Dialogue	R2: "Uh reminders.."
	Credibility	R2: "some kind of authority, because I uh… I am more tend to keep track on my own health when there is someone somehow watching that"
Avoiding persuasive features	Dialogue	R1: "…the use an attractive system… like I said I don't need that. I don't need a lot of images and stuff."
	Social	R2: "Social comparison, I don't need to compare myself with others I guess, but maybe it's nice for some people, but not me I guess. Uh.. social learning.. no"
The application	Design	R1: "I just like it to be easy, simple and clear"
		R1: "..the lights and the sounds, I don't like it when I have a migraine."
	Worksheets	R1: "…Maybe you could do a questionnaire in front about the strengths that I have, because I don't necessarily know my strengths."
		R2: "Maybe to write down in like… when you have an attack, like what you did that day and what you eat that day. Those kinds of stuff."

3.3. How can the needs and wishes of the patient partners be transformed into a low-fidelity prototype of an eHealth design based on the existing intervention 'Raise your strengths'?

For designing the prototype, it was important that the needs and wishes of the patient partners were incorporated and therefore the design was made as an app on a mobile phone. The complete prototype can be seen in Appendix VI, and the explanation with clarifying figures can be seen below.

Behavioural Change Techniques

With regard to *informing*, it was decided to start most screens with a small text about the function or goal of that screen (see figure 2). Then, *barrier identification* was covered with the obstacle screen, since users try to mention obstacles or barriers here and find solutions for them (see figure 14 on page 21). Also, *self-monitoring* was covered by 'My progress' where 'Overview of previous attacks' and 'Migraine diary' can be found. The overview gives a table of attacks that happened in the past regarding obstacles users experienced, strengths they used to cope with them and learning points (see figure 2). Also, a graph is given where users see their satisfaction level regarding their self-management per attack (see figure 3). The migraine diary (see figure 4) functions as a logbook where users can write down everything that might help them to see if there are triggers or patterns that enhance the chance of getting an attack.

Figure 2. Table previous attacks.

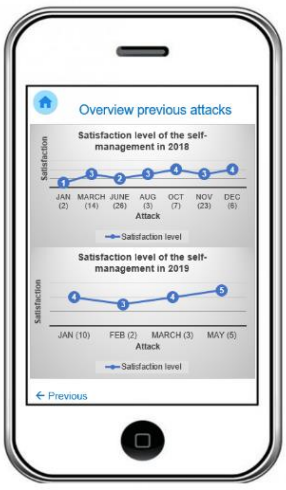


Figure 3. Graph previous attacks.

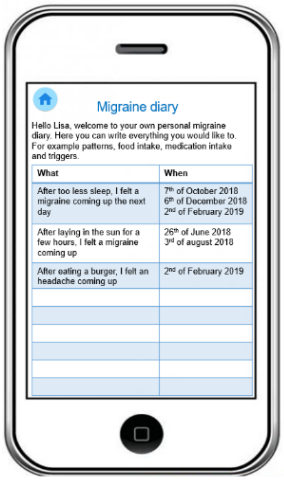


Figure 4. Migraine diary.

Furthermore, regarding *action planning*, one participant wanted a timetable, but the other participant did not like to plan things. Nevertheless, an optional timetable was made (see figure 5), because busy days can be a trigger for getting an attack and therefore it is clever to use a timetable to prevent busy days. Lastly, goal setting and reviewing behavioural goals were not covered, since the worksheets used for this prototype do not include goal setting.

Figure 5. My weekly timetable.

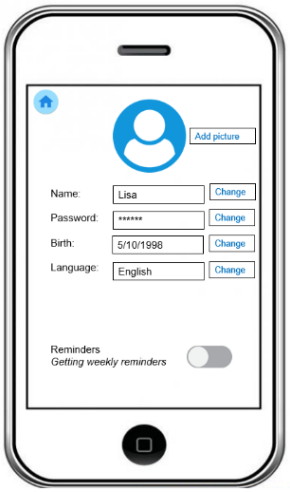


Figure 6. Personal settings.

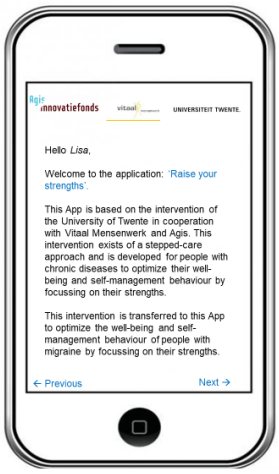


Figure 7. Log in screen (info).

Persuasive features

For primary task support, *rehearsal* was covered by doing the obstacle and evaluation screens every time the user experienced an attack, since users repeat it and this prevents them from using the app once. Moreover, personal settings were used to cover *personalisation* by adding information, such as a picture, name and birth and this information can be adjusted (see figure 6). Lastly, *reduction* and *simulation* were not covered, since the patients did not give context for them. Furthermore, for the dialogue part, *reminders* were covered (see figure 6), however since one of the patients did not like them, there is an option to switch it on or off. Third, for credibility, *trustworthiness* and *expertise* were covered, because in the beginning of the app, an introductory text was shown where it was mentioned that the intervention was made by the University of Twente in cooperation with Agis and Vitaal Mensenwerk to ensure that it was made by trustworthy people (see figure 7). Additionally, there was a request for authority and therefore a chat with professionals was made who emit authority, such as a psychologist (see figure 8)

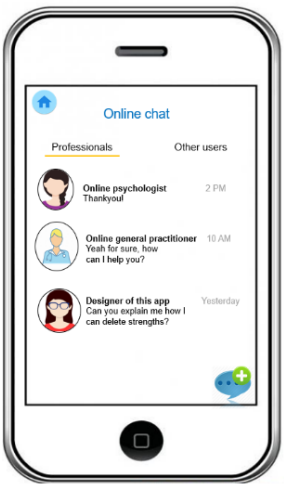


Figure 8. Chat professionals.

Eventually, for the social part, only avoiding features were mentioned and therefore not included. However, *social facilitation* was used, because both patient partners mentioned that they feel anxious about cancelling activities and the opinion of others and because Kelders et al. (2012) stated that social facilitation is an appreciated feature according to users. Therefore, a chatroom was added (see figure 9), where users can talk to other users. When chatting with others about those anxieties, they have the opportunity to talk to people who understand them and therefore can share experiences.

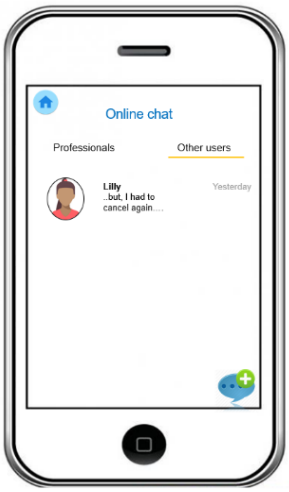


Figure 9. Chat other users.

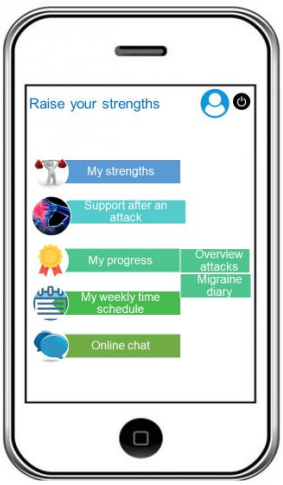


Figure 10. The home page.

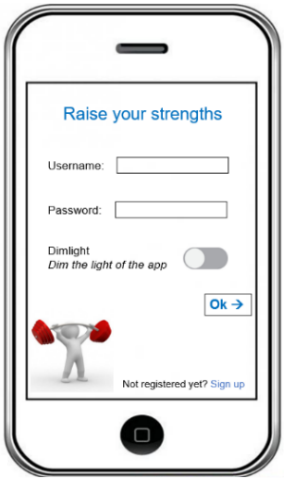


Figure 11. Log in screen.

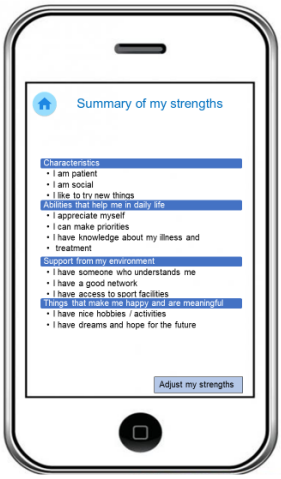
Application

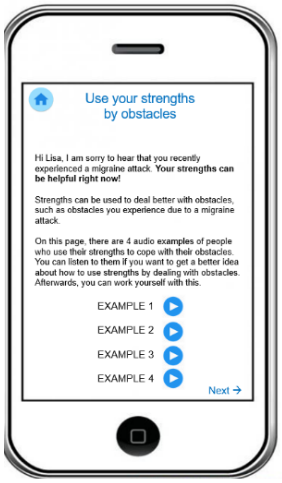
Regarding the design, a simple and clear design was chosen by using consistent font and colours and not using too much information and images. Additionally, a centred menu was made on the home page according to the wish of one participant (see figure 10). The heading 'my progress' is divided into 'overview attacks' and 'migraine diary'. Eventually, a dim light button was made on the first screen of the app, since both indicated that lights are not pleasant right after an attack (see figure 11). The choice for putting this button on the first screen was made, because otherwise users still experience the first screens with bright lights.

Second, regarding the worksheets, the strengths should be filled in in the beginning, so that users know their strengths before doing the other worksheets (see figure 12).

Figure 12. Strengths screen

The filling in system for those statements is circling yes or no and to make sure that they do not fill it in more than once, a summary of the strengths is given in the end (see figure 13). However, there is an option to add or delete strengths when they do not agree on them anymore. Additionally, the obstacle and evaluation screens should be done every time the user had an attack, since they may vary per attack (see figure 14). To make this clearer, the menu bar states ‘support after an attack’, which indicates that users click on this after an attack and, when clicking on that screen, it is stated: ‘I am sorry to hear that you recently experienced a migraine attack’, which indicates that the user just experienced an attack. When starting those screens, figures of speakers can be seen (see figure 14), where examples of persons who use strengths to cope with obstacles can be heard. The choice for doing the examples in audio or text was hard, since migraine patients do not like noises, but also do not like to read after an attack. However, since audio is livelier than text, the choice was made to do it in audio.





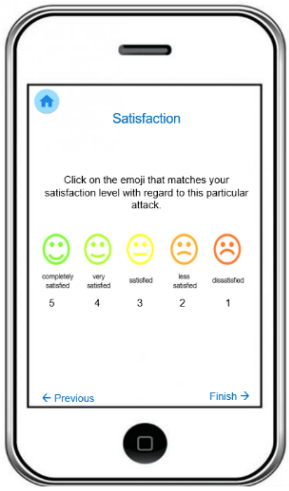


Figure 13. Summary strengths *Figure 14.* Obstacle screen *Figure 15.* Satisfaction level

Furthermore, both worksheets did not change regarding the content, but there is something added, namely an evaluation about the satisfaction level of the self-management with regard to a specific attack (see figure 15). Here, emojis are shown and the user has to click on the emoji that fits her satisfaction level with regard to the coping behaviour of that attack. The choice for using emojis was made, because it has been researched that users have in general a positive attitude towards emojis and emojis can promote the playfulness among . users (Prada et al., 2018).

3.4. To what extent does the low-fidelity prototype function as it is aimed for according to the key users by means of usability testing?

To formulate an answer on the last question, it is important to mention the positive feedback and improvement points for the process and design of the prototype. This will be done per screen and for elaboration on the text, table 4 can be seen. The complete table with all the categories, codes and quotes can be seen in Appendix IV.

Positive feedback about the process

First, regarding the *general* comments, all six respondents liked the overall use, since it is an easy, usable design. Then, for the *log in screen*s, everyone managed quickly to fill in their username and password and all participants liked the presence of the dim light feature on the first page, because otherwise it is still unpleasant when starting the app. Furthermore, for *personal settings* they all thought that the page was clear and complete. Moreover, the *strengths screens* were clear according to all and they rated the filling in system with tapping on the bullets as an easy system, since everyone was able to fill it in without instructions. Another point that was mentioned by five respondents was that the summary in the end was pleasant, because of the headings that were used in the table and two respondents added that the opportunity to change the strengths afterwards was useful, since strengths may change overtime. Moreover, *the time schedule* was clear according to all, since they could find the buttons for adding new activities and for going to another week. Finally, the opinions of all respondents were positive about the *chat*, since they all thought it was nice to chat with professionals, since it is more accessible than meeting face-to-face with those people.

Improvement points for the process

As *general* improvements, three respondents mentioned that it is unclear whether to use this app during or after an attack. Those respondents added that during an attack would be a bad idea, since they might have difficulties with sensory stimuli.

Then, for the *log in screens*, two participants suggested to put the dim light button on multiple screens within the app instead of only on this screen, since it is possible that people do not have trouble with the lights anymore during the use and then want to shut the dim light off. Additionally, for the screen with the information about the app, two participants suggested to transfer some text in an image, since they thought it was a bit too much text.

Regarding the *home page*, three respondents did not directly connect ‘migraine diary’ to ‘my progress’ and one of them therefore suggested to make a new heading in the menu for

it. Also, one participant acknowledged that she was curious while seeing this page, because online chat and time schedule raised questions according to her, since she was not sure what the functions of those screens were. Moreover, for the *personal settings*, three participants were unsure about the function of the reminder button, but they did not give suggestions for it.

Then, regarding the *strengths screens*, five participants suggested to use a Likert Scale for filling in the statements instead of the options yes and no. Furthermore, for the *obstacle screens*, four respondents suggested to put a button on this screen where users can see the summary of their strengths, since they did not remember them anymore while answering the questions. Additionally, one participant suggested to use multiple choice questions where possible, since she did not like to fill in everything by herself and another suggestion for this screen was that one respondent did not understand the connection between the audio examples and migraine, since the examples were not about migraine, so this should be made clearer. Moreover, for the *evaluation screens*, five respondents indicated that it was unclear what exactly they needed to fill in on the page about the satisfaction level, because, it seemed that they had to fill in their satisfaction level about the attack instead of about their coping behaviour and therefore the question on this page should be rephrased.

Then for the *overview of attacks*, it was unclear for four respondents that the numbers in the graph were dates, because they thought it were the couple of attacks per month. Moreover, two participants suggested for the *migraine diary* that adding a plus or save button would make it clearer for users how to add something in this table.

Furthermore, for the *timetable* it was recommended by one respondent to add an option to tap between weeks and one respondent suggested to leave the timetable out, since she has a calendar in Google Calendar and does not need to have more calendars.

Lastly, regarding the *online chat*, one respondent suggested to add a forum where general questions can be asked to all the users, because then everybody can respond to it.

Positive feedback about the design

As *general positive feedback*, all participants liked the easy design and four of them added that they liked the tables, because they were clear and structured. Additionally, two of them mentioned that they especially liked the use of neutral colours, since this prevents distraction during the use.

Moreover, all respondents liked the dim light function on the *log in screen*, because when having an attack, people do not want to be confronted with bright lights. Lastly, two participants liked the headings of the *strengths* summary, since it is easy to see what it is for.

Improvement points for the design

First, one participant gave as recommendation for the *home page* that she would rather see the colours of the menu bar the other way around. To clarify, strengths are positive and green is a positive colour and therefore she would like to have the heading 'my strengths' in green.

Moreover, for the *strengths screens*, one respondent commented that the 'adjust my strengths' button was more emphasized than the 'home page button' with as result that she had to look around where to press. However, she did not indicate in what way this button was more emphasized.

Then, with regard to the *obstacle screens*, one respondent suggested to also make an option to read the examples, since users do not always have earphones with them. Also, it was recommended by one participant to use an example that speaks a bit slower. Additionally, one respondent suggested to use a name or other personal information on the screen instead of 'example one' with as reason that users can then better relate to them.

Eventually, for the *evaluation screens*, two recommendations were made. First, one participant suggested to turn the figure with the emojis about the satisfaction level around, because, she is used to start with dissatisfied and end with satisfied. Second, a suggestion was made by one respondent to add a button which states that there are more questions coming on the next screen, since the user then knows that she is not finished yet.

Conclusion

To conclude, the prototype was clear, simple and usable according to all respondents and the use of tables and neutral colours contributed to this ease of use according to two of them. However, there were some improvement points and most of them were related to the process of the application. Some of the important points were that it should be clearer when exactly to use this app and some of the buttons and screens should have more explanations, for example the migraine diary and the reminder button.

However, besides those improvement points, the low fidelity prototype was well rated by the participants and it worked as it was aimed for according to all, since they could easily tell what to do and how to do it.

Table 4.

Part of the coding scheme for the usability testing of the low-fidelity prototype.

Categories	**Codes**	**N**	**Example quotes**
Positive feedback about the process	General	6	R1: "I really liked the overall use.. it is really easy. I think it speaks for itself. I do not think there is anything that you missed"
	Log in screens	6	R6: "… when you do not have that option at the beginning, maybe you will not use the app, because it just hurts when you look at very bright light when you have migraine.."
	Personal settings	6	R2: "I guess all the useful information is in there and it is nice that it has a reminders switch"
	Strengths screens	2	R6: "it is nice that you can change them afterwards, because maybe something is just a moment that you are in, so..."
	Time schedule	6	R2: "This is plus, then I guess I would click on the plus."
	Online chat	6	R5: "Yeah, that is clear. When you want to respond to her, you can just type a message there and you can also add an emoji"
Improvement points for the process	General	3	R4: "…. do you use this when you already have a migraine or before or afterwards?"
	Log in screens	2	R2: "People do not always have troubles with dealing with lights and then it is more convenient if the light is more attend, because they can read it better, so I miss the option to adapt that during the use"
	Home page	3	R1: "…I would not necessarily say that it was in this one under my progress."
	Personal settings	3	R6: ".. I am wondering about which reminders that are."
	Strengths screens	5	R5: "… a five point scale from disagree to totally agree."
	Obstacle screens	4	R1: "which strengths am I going to use.. I do not remember the things that I filled in"
	Evaluation screens	5	R2: "you should put that it is for your coping behaviour, so that the satisfaction is with that. Because, if I am reading it, I would fill it in how shit the attack was"
	Overview attacks	1	R4: "maybe it would be nice to have an option to select a certain time frame. I can image when you filled in a lot of months of attacks, then the list would get quite long."
	Migraine diary	2	R5: "Maybe you can add a plus or something, just a button…".
	Timetable	1	R3: "I think I would leave it out, because I have my calendar in Google Calendar and there is a great overview on that.."
	Online chat	1	R3: ".. maybe like a forum thing where you can just ask a general question to all the users and then everybody can just respond" (R3)
Positive feedback about the design	General	2	R6: "…overall it looks very neutral, neutral colours, I think that is also nice when you have migraine, that you do not have 20 colours and like neon colours. Blue is a very calm colour"
	Log in screens	6	R2: "I like the dim light feature, because I do not like bright screens"
	Strengths screens	2	R1: "I like the headings and stuff, because you can easily see what it is for."
Improvement points for the design	Home page	1	R5: "this could be green, because strengths are positive, then blue and green, you turn it around. That green is my strengths, yeah.."
	Strengths screens	1	R4: "Just a minor thing, because this button is more emphasized than this one. I really had to look around where do I need to press."
	Obstacle screens	1	R5: " Maybe it is better when you use a name or only women, 21 or something … then you know which one you want to hear, because you can relate to them."
	Evaluation screens	1	R5: "You always start with 1, 1 is dissatisfied. 1 is bad, 5 is good, so I would turn it around."

4. DISCUSSION

In this discussion, a reflection is made with regard to the process for developing the prototype. This reflection is divided into the four research questions stated above. Afterwards, the strengths and limitations and a conclusion of this research will be given.

1. What do the migraine patients need to sufficiently self-manage their behaviour with regard to the impact of migraine?

Within this first interview, the patient-partners mentioned that they use medical advice when needed, which is a form of self-management. However, this is contradicting to the results of Katsarava et al. (2018), since it is stated there that patients are often not diagnosed and that the health care system is not actively involved. This difference might be due to the fact that both patient partners need medication for migraine and therefore are in contact with a doctor, while Katsarava et al. (2018) stated that most migraine sufferers do not take medication.

Furthermore, within this interview, too less information was obtained about the needs of the patients regarding their self-management. To clarify, questions were made beforehand about this theme, but the questions were mainly focused on the current self-management instead of on their needs. However, when using an intervention, it is significant to focus on the needs of the users instead of the strategies they already use, since an intervention is developed to help the key users with something they do not possess or do yet. Therefore, it is necessary that the questions are formulated in a way that they are useful to answer the research question.

2. What are the technical needs and wishes for the self-management behaviour of the migraine patients with regard to an eHealth design?

First, enough information was received from the patient partners to get a clear picture about the technical needs and wishes regarding the self-management of the patient partners. This was due to the elaborative answers that were given by the patients and due to the reasonable amount of questions that were made beforehand.

However, during the interview, tables were given with persuasive features and BCT's including their explanations (see Appendix I), although the patients did not understand the meaning of some of them. This was probably due to the short explanations and therefore it might be helpful to use examples of each technique or feature as an elaboration to make sure that the patient partners get an idea of what exactly is meant by it. This is important, because

then the patients have knowledge about all features and techniques and can consider therefore the pros and cons of all of them instead of only the ones they understand.

Moreover, sometimes the patient partners mentioned that they desired a feature or technique, although they not give clarification about why they would want this and therefore some of them could not be incorporated in the prototype, because it was not clear how the patients wanted to see those features and techniques in the prototype. Therefore, it is necessary to ask for clarification about why exactly they liked that feature or technique.

3. How can the needs and wishes of the patient partners be transformed into a low-fidelity prototype of an eHealth design based on the existing intervention 'Raise your strengths'?

Overall, enough information was collected for designing the prototype and the needs and wishes of the patients were quite comparable, which made it unnecessary to make multiple prototypes. Sometimes there were contrary wishes, however this was solved easily by using optional buttons or screens, so that the users could choose to use them or not. However, more information could be collected about the transformation of the worksheets into the prototype, since the patients did not give much input about this. The reason for this might be that they did not thoroughly check the worksheets before the second interview and therefore did not have a good understanding of the content and design.

Moreover, it can be stated that the chosen sample was not presentable for a bigger group. First, only women between 21 and 23 years old participated, while the target group was women above 18 years old, so, women above 23 years old are not taken into consideration, while it might be the case that those women have different needs and wishes regarding eHealth. This can be because technology develops rapidly (van Gemert-Pijnen et al., 2018), which might cause differences in use and expectancies of eHealth between these age groups. Also, only women with a higher educational level took part in this research and it is possible that women with a higher education rate the app as easier and therefore it might be that women with lower education criticize the app with another perspective, which makes this app less usable for women with a lower education. Therefore, it is important to include the perspectives of different age groups and of a group with different educational levels.

Lastly, an online chat was incorporated in the prototype and the users are shown with their real name. This choice was made without taking the opinion about anonymity of the users into consideration, since no questions were asked about the preference of anonymity.

Therefore, it is important that for a future prototype, the key users are asked about if they would like to use nicknames to secure anonymity or if they prefer to use their own name.

4. To what extent does the low-fidelity prototype function as it is aimed for according to the key users by means of usability testing?

According to Bastien (2008) and Zhang & Adipat (2009), usability testing is useful to assure that an eHealth platform works as it is aimed for. For this study, it was indeed helpful, because when working on a prototype and checking it multiple times, it is hard to see mistakes and therefore, people who are not involved in the process can give helpful new insights. However, a struggle was that all respondents gave comments about the content of the worksheets, although this was not the goal, since the worksheets were already approved before. The next time, it should be better explained that they should not give comments about the content of those specific screens by showing them the concerning screens beforehand.

Strengths and limitations

By addressing three strong points of this research, it can first be stated that the user-centred-design was a useful method for designing a prototype. To clarify, the understanding of the skills, knowledge, needs and preferences of users assures that the design is suitable for the intended purpose (Yardley et al., 2016) and indeed the two patient partners liked it that their suggestions were taken into consideration for the prototype and they were content with the prototype. Another strength is that all participants were overall positive about the prototype, which suggests that using an eHealth platform might be a helpful way for migraine patients to support them with coping with the migraine. Moreover, a part of the existing intervention is tested as an eHealth prototype, which is a step for further development of this intervention, since the intervention can already be used face-to-face, although it is also possible that it can be used as an eHealth platform in the future.

In contrast to the strong points, there were also two limitations. First, for this research only three of the nine worksheets from the intervention were used. This indicates that some important elements from the intervention were missing within the platform and therefore some tasks were harder to understand for the users, since also one of the respondents wanted to have goal setting elements in the app, but because this was not part of those three worksheets, it was not incorporated. Therefore, a suggestion would be to use all the worksheets of the intervention in future research instead of only three. Another limitation is the design of the prototype on paper, since there was a certain order for the printed papers and the tasks were structured in this order too, which made it harder to let the users explore the

app freely during the testing. Therefore, a suggestion will be to make the prototype as an app or program, because then respondents are freer to click on buttons and screens, since the researcher does not have to search for all those screens then. It also makes the testing livelier, because the users can use the real device and can click on the buttons instead of pretending to click on buttons.

Conclusion

In short, by improving the limitations, an effort can be made. To explain, this research can help migraine patients to better cope with their disease by focussing on their strengths and their self-management behaviour. This study was useful to see if an eHealth design, including the worksheets of the intervention, is usable for migraine patients and it can be concluded that migraine patients liked the overall use of the app that has been made, so the application worked as it was aimed for.

However, it would be recommended to make a new prototype with all the worksheets of the intervention included to see if the whole intervention is applicable for an eHealth design, because then no important tasks of the intervention are missing. This should be done by incorporating the remaining six worksheets into this prototype. It should be tested among females above 18 years old with migraine again by using usability testing, since this method was useful to gain new insights from the key-users.

5. REFERENCE LIST

Arends, R.Y., Bode, C., Taal, E., & van de Laar, M.A.F.J. (2013). A goal management intervention for polyarthritis patients: rationale and design of a randomized controlled trial. *BMC Musculoskeletal Disorders, 14*.

Bastien, C.J.M. (2008). Usability testing: a review of some methodological and technical aspects of the method. *International Journal of Medical Informatics, 79*. 18 -23. doi: 10.1016/j.ijmedinf.2008.12.004

Chung, R.J., Burke, P.J., & Goodman, E. (2010). Firm foundations: strength-based approaches to adolescent chronic disease. *Current opinion in pediatrics, 22*(4), 389 397. doi: 10.1097/MOP.0b013e32833a468e

Diamond, M. (2007). The impact of migraine on the health and well-being of women. *Journal of Women's Health, 16*(9), 1269-1280. doi: 10.1089/jwh.2007.0388

Flink, I.K., Smeets, E., Bergbom, S., & Peters, M.L. (2015). Happy despite pain: pilot study of a positive psychology intervention for patients with chronic pain. *Scandinavian Journal of Pain, 7*¸71-79. doi: 10.1016/j.sjpain.2015.01.005

Gharaee-Ardakani, S., Azadfallah, P., Eydi-baygi, M., Zafarizade, A., & Tork, M. (2017). Effect of acceptance and commitment therapy on the acceptance of pain and psychological inflexibility among women with chronic headache. *Journal of Research & Health, 7*(2), 729-735. doi: 10.18869/acadpub.jrh.7.2.729

Gulliksen, J., Göransson, B., Boivie, I., Blomkvist, S., Persson, J., & Cajander, A. (2003). Key principles for uses-centred systems design. *Behaviour & Information Technlogy, 22*(6), 397-409. doi: 10.1080/01449290310001624329

Halttu, K., & Oinas-Kukkonen, H. (2017). Persuading to reflect: role of reflection and insight in persuasive systems design for physical health. *Human-Computer Interaction, 32* (5), 381-412. Doi: 10.1080/07370024.2017.1283227

Katsarava, Z., Mania, M., Lampl, C., Herberhold, J., & Steiner, T.J. (2018). Poor medical care for people with migraine in Europe – evidence from the Eurolight study. *The Journal of Headache and Pain, 19*(10). Doi: 10.1186/s10194-018-0839-1

Kelders, S.M., Kok, R.N., Ossebaard, H.C., & Van Gemert-Pijnen, J. (2012). Persuasive system design does matter: a systematic review of adherence to web-based interventions. *Journal of Medical Interent Research, 14*(6). doi: :10.2196/jmir.2104

Martins, I.P., Gil-Gouveia, R., Silva, C., Maruta, C., & Oliveira, A.G. (2012). Migraine, headaches, and cognition. *Headache: The Journal of Head and Face Pain, 52*(10), 1471-1482. doi: 10.1111/j.1526-4610.2012.02218.x

Oinas-Kukkonen, H., & Harjumaa, M. (2009). Persuasive system design: key issues, process model, and system features. *Communications of the Association for Information Systems, 24*(1). doi: 10.17705/1CAIS.02428

Poppe, L., Van der Mispel, C., Combez, G., De Bourdeaudhuij, I., Schroé, H., & Verloigne, M. (2018). How users experience and use an eHealth intervention based on self-regulation: mixed-methods study. *Journal of Medical Internet Research, 20*(10). doi: 10.2196/10412

Prada, M., Rodrigues, D.L., Garrido, M.V., Lopes, D., Cavalheiro, B., & Gaspar, R. (2018). Motives, frequency and attitudes toward emoji and emotion use. *Telematics and Informatics, 35*(7), 1925-1934. doi: 10.1016/j.tele.2018.06.005

Proctor, C., Maltby, J., & Linley, P.A. (2011). Strengths use as a predictor of well-being and health-related quality of life. *Happiness Stud, 12*, 153-169.

Rashid, T. (2015). Positive psychotherapy: a strength-based approach. *The Journal of Positive Psychology, 10*(1), 25-40. doi: 10.1080/17439760.2014.920411

Van Beugen, S., van Middendorp, H., van der Vaart, R., Ferwerda, M., & Evers, A.W.M. (2015). eHealth cognitieve gedragstherapie voor patiënten met chronische somatische

aandoeningen. *Tijdschrift voor Gezondheidswetenschappen, 2.*

Van Veen, Y., Peeters, N., Bohlmeijer, E., & Bode, C. (2018). Stapsgewijze aanpak sterker in je kracht.

Van Velsen, L., Wentzel, J., Van Gemert-Pijnen, J. (2013). Designing eHealth that Matters via a Multidisciplinary Requirements Development Approach. *JMIR Research Protocols,2*(1). doi: 10.2196/resprot.2547

Volksgezondheidenzorg.info(2019a):https://www.volksgezondheidenzorg.info/onderwerp/migraine/cijfers-context/huidige- situatie#node-aantal-personen-met-migraine zelfgerapporteerd, RIVM: Bilthoven, February 16th, 2019

Webb, T.L., Joseph, J., & Michie, S. (2010). Using the Internet to Promote Health Behavior Change: A Systematic Review and Meta-analysis of the Impact of Theoretical Basis, Use of Behavior Change Techniques, and Mode of Delivery on Efficacy *Journal of Medical Internet Research, 12*(1). doi:10.2196/jmir.1376

Wood, A.M., Linley, P.A., Maltby, J., Kashdan, T.B., & Hurling, R. (2011). Using personal and psychological strengths leads to increases in well-being over time: A longitudinal study and the development of the strengths use questionnaire. *Personality and Individual Differences, 50,* 15-19.

Yardley, L., Spring, B.J., Riper, H., Morrison, L.G., Crane, D.H., Curtis, K., Merchant, G.C., Naughton, F., & Blandford, A. (2016). Understanding and promoting effective engagement with digital behaviour change interventions. *American Journal of Preventive Medicine, 51*(5), 833-842. doi: 1016/j.amepre.2016.06.015

Zhang, D., & Adipat, B. (2009). Challenges, methodologies, and issues in the usability testing of mobile applications. *International Journal of Human-Computer Interaction, 18*(3), 293-308. Doi: 10.1207/s15327590ijhc1803_3

6. APPENDIX

Appendix I. Behavioural Change Techniques and Persuasive Design Principles

Table 5.

Different behavioural change techniques.

Technique	**Explanation**
Goal setting	Setting personal goals for yourself
0Informing	Providing information
Feedback	Providing feedback on the performance
Action planning	A planning about what to do and when to do it
Barrier identification	Acknowledging the barriers and coming up with solutions
Prompting self-monitoring	Keeping track of the behavioural change
Planning social support	Listing people you can ask for help
Reviewing behavioural goals	Reflect on the goals
Modelling	Using imitation to learn from

Table 6.

The different principles of the persuasive system design (PSD) model per category.

Support category	**Principles**	**Explanation**
Primary task	Reduction	Reduce complex behaviour into simple tasks
	Tunnelling	Guide users through a process or experience by providing means for action
	Tailoring	Tailor information to the needs, interests and personality of the target group
	Personalization	Use personalized content or services
	Self-monitoring	Keep track of one's own performance or status
	Simulation	Provide simulations so that users can see the link between cause and effect
	Rehearsal	Information about how to rehearse a behaviour

Table 6.

Continued.

Support category	**Principle**	**Explanation**
Dialogue	Praise	Use praise via words, images, symbols or sounds to give feedback
	Rewards	Virtual rewards
	Reminders	Remind users of their goals and strengths
	Suggestion	Offer suggestions
	Similarity	Imitate users in a specific way
	Liking	Use an attractive system
	Social role	Adopt a social role
Credibility	Trustworthiness	Provide information that is truthful, fair and unbiased
	Expertise	Show knowledge, experience competence
	Surface credibility	Competent look of the system
	Real-world-feel	Provide information about the people behind its content
	Authority	System should refer to people in the role of authority
Social	Social learning	Observe others performing the behaviour
	Social comparison	Comparing with other users
	Social facilitation	Opportunity to contact others within the same intervention
	Competition	Opportunity to compete with other users
	Cooperation	Opportunity to cooperate with other users
	Recognition	Public recognition for people who perform their behaviour

Appendix II. Information sheet and informed consent

Information sheet for: 'The application of a strength-based-approach: designing an eHealth intervention for people with migraine'.

The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study.

Purpose of the study

The main purpose of the current study is to design an eHealth intervention for people with migraine by taking the perspectives of two migraine patients into consideration. This intervention is based on elements of a strength-based-approach, called 'Raise your strengths'. The data is only used for designing a low-fidelity prototype; so the intervention is not implemented for real use.

Benefits/risks of participating and procedures for withdrawal from the study

There are no benefits/risks for participating, since the intervention is only designed as low-fidelity prototype and not implemented in real life. The study is reviewed and approved by BMS Ethics Committee. You have the right to decline to participate and withdraw from the research at any time, without any negative consequences and without providing any reasons.

Personal information of the participant

Personal information is collected during the interviews and this will be audio-recorded. Additionally, this data will be transcribed and coded with the purpose to get your input for the design of the eHealth intervention. You, as the participant, has the right to request access to this personal data. The data is confidential; so the data will be anonymised.

Contact information

If you have any questions about this study, please feel free to contact me (j.knippers@student.utwente.nl). Furthermore, if you have questions about your rights as a 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

Consent Form for 'The application of a strength-based-approach: designing an eHealth intervention for people with migraine'.

	Yes	No
Taking part in the study		
I have read and understood the above-mentioned study information, 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.	□	□
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and can withdraw from the study at any time without giving a reason.	□	□
I understand that taking part in the study involves giving personal information to the researcher during audio-recorded interviews	□	□
Use of the information in the study		
I understand that information I provide will be used for the design of a low-fidelity prototype (eHealth) for people with migraine	□	□
I understand that personal information collected about me will be anonymized, so names, places and times will not be named.	□	□
I agree that my information can be quoted in research output	□	□
I agree that the researcher shares the information with the supervisor of the University of Twente only	□	□
I agree to take part in this research project	□	□

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 to what they are freely consenting.

_____	_____	____
Researcher name	Signature	Date

Appendix III. Interview schemes

Interview scheme 1

For my Bachelor Thesis, I have to develop a low fidelity prototype of an eHealth technology for people with migraine. This will be done based on the already existing intervention 'Raise your strengths' on which this study will be based. It is an intervention developed by the University of Twente in cooperation with Agis and Vitaal Mensenwerk. This intervention exists of a stepped-care approach and is developed for people with chronic diseases. The goal of this intervention is to optimize the well-being of people with chronic disorders by focussing on their strengths. One of the steps is 'Krachtbewust' and this is the step I am going to focus on in this study. This step exists of nine different worksheets about strengths to help the patient to learn more about his/her strengths and to use them. I will give you those worksheets afterwards so that you can check them before the second interview. However, due to lack of time, I only focus on three worksheets.

The reason that the existing intervention needs to be converted into an eHealth design is that within this intervention, the help of specialists was used. However, most of the migraine sufferers do not seek medical advice and therefore self-management is more applicable. A useful way to stimulate self-management, is the use of internet, so eHealth.
To create an eHealth design that matches your needs and wishes, I want to get more insights into your experiences with migraine and about your preferences regarding the technology. Therefore, three interviews will be done in total. During this first interview, I want to know more about your experiences with migraine and how you try to cope with it. During the second interview, I want to get insight about your suggestions for designing an eHealth intervention, so this interview will be focused on the technology and the implementation of the already existing intervention. Finally, there will be a third meeting in which you are going to test the prototype and give suggestions for improvement.

Before I start the first interview, I would emphasize that I am interested in your own perception of migraine and your personal experiences, there are no right or wrong answers because you are the expert on this topic. You can stop or pause the interview at any time, and you can decide to withdraw from the study at any time. I would like to know if you agree to the above-mentioned conditions. If so, could you please read the information sheet and sign the informed consent?

Demographical questions

1. Who are you and how are you?
2. How old are you?
3. Where are you from?
4. Since when do you know that you have migraine?

Symptoms and consequences

1. Can you tell me something about having migraine?
2. What does migraine mean to you?
3. How often do you have a migraine attack?
4. Which symptoms/complaints do you have during or after an attack?
5. Do you feel an attack coming? If yes, what are you doing then?
6. Are there mental consequences you experience due to migraine?
7. Are there physical consequences you experience due to migraine?
8. Do you experience any impairments in your social life, because of the migraine? If yes, what kind of impairments?
9. Do you experience any impairments in your educational life/ job/ career? If yes, what kind of impairments?

Opinion of others

1. How do people of your surrounding react to your migraine?
2. In what way do you feel understood by others?

Self-management

1. How do you cope with the pain while having a migraine attack?
2. Are there some strategies that you use in your daily life to prevent migraine attacks or to cope with it better? If yes, in what way do they work for you?
3. Are there strategies that you tried before, but which did not work?
4. How would you describe your overall self-management regarding to migraine? Do you experience any problems with this self-management?
5. Is there any behaviour that improves your current situation?
6. Do or did you consult a doctor or other medical professionals? Why/why not?

Interview scheme 2

In the first interview, I mentioned that this second interview will be more focused on the converting of the already existing intervention into an eHealth intervention. Last time, I left the worksheets for you, so that you could check them a bit. However, due to a lack of time I can only focus on three of the nine worksheets. Today, I want to know about your preference of technical devices, about some features and other elements that you would like to see in an eHealth platform.

Technology

1. Do you use technical devices? If yes, which ones?
2. How often do you use them?
3. Are there technical devices which helps you with coping with migraine?
4. What kind of device do you like to use if an eHealth intervention was made?
5. On what kind of platform do you want to have this?
6. Do you have any wishes or requirements for this specific platform?
7. I brought a table with examples of behavioural change techniques, which techniques do you like to see on an eHealth platform to make it more usable for you?
8. Which techniques do you want to avoid on a platform?
9. I brought a table with examples of persuasive features, which features do you like to see on an eHealth platform to make it more usable for you?
10. Which features do you want to avoid on the platform?
11. Are there any other elements you can think of that you want to include?
12. Are there any other elements you can think of that you want to exclude?
13. You have seen the three worksheets; do you have any idea about how you would like to see them in an eHealth platform?

Interview scheme 3

Welcome today, for my bachelor thesis I had to develop a low fidelity prototype of an eHealth technology for people with migraine. This prototype is based on an already existing intervention 'Raise your strengths'. It is an intervention developed by the University of Twente in cooperation with Agis and Vitaal Mensenwerk. This intervention exists of a stepped-care approach and is developed for people with chronic diseases. The goal of this intervention is to optimize the well-being and self-management behaviour of people with chronic disorders by focussing on their strengths. However this specific prototype is focused on people with migraine. The prototype is made according to the user-centred design, so I used two patient partners with migraine who gave their suggestions and according to their wishes and needs I made this prototype.

Now it is important to test the usability of this prototype and that is wat I am going to do today. During this interview I will give you some tasks that you need to perform with regard to this prototype. It is important that you think out loud, so you can say everything you want regarding to a specific screen, the usability, the design, missing elements, redundant elements, the ease of use and other elements that you want to mention.

I would like to know if you agree to the above-mentioned conditions. If so, could you please read the information sheet and sign the informed consent?

Demographics

1. How are you doing today?
2. How old are you?
3. Where are you from?
4. What is your education level?

Tasks

1. You already have an account, so please log in and dim the light of the app.
2. Go to your personal settings and put the button for getting weekly reminders on.
3. Fill in your strengths.
4. You just had an attack and you need help by dealing with the obstacles of this attack. Go to this screen, read the instruction and listen to the first and second example.
5. Go on with the following worksheets and fill them in.
6. Go to the screen where you can find an overview of the previous attacks you had.
7. You concluded that the smoke of cigarettes can be a trigger for migraine. Go to the screen where you can write this down in your migraine diary.
8. You want to see your time schedule for this week.
9. You want to see what Lilly, one of the other users of the intervention, texted you. So, open this conversation.

Appendix IV. Coding schemes

Table 7.
Complete coding scheme about the current situation and self-management of the patients.

Categories	**Codes**	**Example quotes**
Current situation	Prevalence	R2: "Sometimes more times a week and sometimes there is a few weeks or months that I don't have attacks, so it is not really regular." R1: "… I mean it mostly starts on the days that you have very busy days or things to do, or you are excited or a little bit stressed and then maybe tired even. That when it starts, like I kind of feel like it always starts at a point in the day when I can't really have a migraine.."
	Symptoms	R1: "I feel nauseous, I lose part of my sight. It is like looking in the sun, the little spots you see, that is what I get, and I lose strength in my arm, in my left arm and sometimes in my mouth." R1: "…and then you start not being able to tolerate sounds or lights and that kind of stuff. You just want to be alone." R2: "…moving and just walking around is not very nice."
	Impact	R2: "…it kind of has a very big impact. I have to miss a lot of classes and that is not good for the study and uh.. I have to miss social activities as well…" R2: "I am just a little tired and I don't have very good concentration for study or something else" R1: "I think it also sucks that a lot of people don't really know what it is, because a lot of people say it is a headache" R2: "… they kind of shut me out, because I am not very often there in class. And I already explained them why, but they just don't understand and, sometimes you feel a little bit left out then"
Self-management	Current self-management	R1: "but I tend to use my left arm as much as possible, because I don't want to lose strength in it" R1: "… however when I get it more, like there was a time that I got three attacks in a week for like a month time and I couldn't do anything, that's when I went to see the doctor, but normally no" R1: "…no I always tend not to think about it and when I feel a headache I am like 'okay, I don't have to stay'. I can go home if I want to."

Table 7.

Continued.

Categories	**Codes**	**Example quotes**
Self-management (continued)	Current self-management (continued)	R1: "I am quite strict with everything, so I tend to plan out things, so I tend to take my medication at this time, so I think my self-management is pretty good.. I don't think that that is actually something that I struggle with right now." R2: "…I try to get home and get some sleep" R2: "So, I try to get some fresh air, or I use sunglasses, or just avoid some perfumes and smoking and yeah.. sometimes alcohol, I try to not take that much but sometimes you have a party and then I might have the next day a migraine attack instead of a hangover, so yeah… "
	Difficulties with self-management	R2: "I try to avoid a few things in daily life, but it is not always possible to do" R2: "…I think I can do better in that, like maybe try to sleep in more consistent pattern or completely avoid caffeine and alcohol and … I can also try to write in a diary what I am doing the whole day and try to see if there is a pattern in getting a migraine attack, but, I am not very good in that" R1: "…but I am quite anxious to start playing sports again because I do not know if I have to quit trainings again." R2: "Well I think there is always this fear of getting it, like when you are doing something exciting, so I always take my medication with me. In case I forgot, I tend to kind of stress out, because it might happen."

Table 8.

Complete coding scheme about the needs and wishes of the patient-partners with regard to the eHealth design.

Categories	**Codes**	**Example quotes**
Technical devices	Preferable device Preferable platform	R2: "Uh maybe a mobile phone or a tablet because yeah.. you have them with you all the time. More than a computer" R1: " I like the use of apps more than a website, basically because it is more compact and most of the time it is more organized and at least it depends on the app of course, but I think an app is easier to use than a website"
Preferable Behavioural Change Techniques	Informing	R1: "… I like to read some tips and tricks sometimes. Like weird things that I don't know that help you"
	Barrier identification	R1: "…like maybe acknowledging the barriers and come up with solutions, barrier identification."
	Goals	R2: "…and maybe goal setting and something … yeah reviewing behavioural goals."
	Self-monitoring	R2: "…Maybe, self-monitoring."
	Action planning	R1: "...a time schedule wise where you can plan activities on maybe"
Avoiding Behavioural Change Techniques	Informing	R1: "I like to read that but not especially about the migraine and what it is and stuff, I know that now."
	Modelling	R1: "Uhm…. The modelling, using imitation to learn from. I don't think that it is really practical for migraine"
	Action planning	R2: "Maybe action planning, because I am very bad at planning."
Preferable persuasive features	Primary task	R1: "…self-monitoring, keeping track on performance, I like that."
		R2: "And maybe rehearsal because I am mostly do it one time and then I forget to do it another time."
		R2: "maybe reduction and personalisation. And… maybe simulation."
	Dialogue	"Uh reminders"

Table 8.
Continued.

Categories	**Codes**	**Example quotes**
Preferable persuasive features (continued)	Credibility	R2: "And, trust worthiness is I guess important..." R1: "Expertise, show knowledge and experience, competence, just with like the simple facts." R1: "Surface credibility, competent look of the system, I like that." R2: "some kind of authority, because I uh… I am more tend to keep track on my own health when there is someone somehow watching that"
Avoiding persuasive features	Dialogue	R1: "…the use an attractive system… like I said I don't need that. I don't need a lot of images and stuff." R2: "… virtual rewards .. yeah .. I don't know if that's a good thing." R1: "Oh no, I don't like the notification things no." R2: "And praise I don't like to be praised for doing stuff.."
	Social	R2: "Competition is not really my thing I guess" R2: "Social comparison, I don't need to compare myself with others I guess, but maybe it's nice for some people, but not me I guess. Uh.. social learning.. no"
The application	Design	R1: "I just like it to be easy, simple and clear" R1: "I like the little centred thing that you can click on and then you have the three things apart .." R1: "..the lights and the sounds, I don't like it when I have a migraine." R2: "…not all apps do have a button where you can dim the lights of the screen, because that's not nice for your eyes the day after or the same day. So that's maybe nice.."
	Worksheets	R1: "…Maybe you could do a questionnaire in front about the strengths that I have, because I don't necessarily know my strengths." R2: "…And yeah obstacles can be different each time so that would be nice to see that more and evaluation can also be different as well." R2: "Like you have daily exercises and you can choose which one you want to do and how often you want to do that and like you can click on the finish button when you have done something." R2: "Maybe to write down in like… when you have an attack, like what you did that day and what you eat that day. Those kinds of stuff."

Table 9.

Complete coding scheme for the usability testing of the low-fidelity prototype.

Categories	**Codes**	**Example quotes**
Positive feedback about the process	General	R1: "I really liked the overall use.. it is really easy. I think it speaks for itself. I do not think there is anything that you missed"
	Log in screens	R6: "It is clear where you have to fill in your username and password"
		R6: "… when you do not have that option at the beginning, maybe you will not use the app, because it just hurts a lot when you look at very bright light when you have migraine, so .."
	Personal settings	R2: "I guess all the useful information is in there and it is nice that it has a reminders switch"
	Strengths screens	R5: "it is clear that you only have to do it once, you explained that in the text above"
		R4: "It is easy to tap, so..."
		R5: "Yeah this is nice, because you can see what you just filled in in one overview, so I think that is a good thing"
		R6: "… it is nice that you can change them afterwards, because maybe something is just a moment that you are in, so maybe in a few weeks you feel like you have other strengths or weaknesses.."
	Overview attacks	R3: "I think this is a really good overview that helps people to see how they are doing or where they can still improve"
	Time schedule	R2: "This is plus, then I guess I would click on the plus."
	Online chat	R6: "… I think it is very nice that you have the option to chat with those persons when you have questions and it is also very accessible to ask your GP in the app instead of just going there."
		R5: "Yeah, that is clear. When you want to respond to her, you can just type a message there and you can also add an emoji"
Improvement points for the process	General	R4: ".. just as a question, if you use this application, do you use this when you already have a migraine or before or afterwards?"
	Log in screens	R2: "People do not always have troubles with dealing with lights and then it is more convenient if the light is more attend, because they can read it better, so I miss the option to adapt that during the use"
		R5: " Maybe it is a little bit too much text, maybe it was nice to have a picture or an image."

Table 9.

Continued.

Categories	Codes	Example quotes
Improvement points for the process (continued)	Home page	R1: "…I would not necessarily say that it was in this one under my progress."
		R3: "But I do get questions like okay my time schedule, why does it have to be in there? And my progress… uh… so it seems to be that it is an app that is going to be used more often, but from the beginning I got the idea that you just fill it out once and you get information that you can use and .. like the first thing, I am curious about the online chat and stuff, what all those things are."
	Personal settings	R6: ".. I am wondering about which reminders that are."
	Strengths screens	R5: "… a five point scale from disagree to totally agree."
	Obstacle screens	R5: "I do not know the connection between this and migraine."
		R1: "… which strengths am I going to use… I do not really remember the things that I filled in though…"
		R5: "And maybe this one with strengths, you already filled it in, so maybe you can multiple choice"
		R6: "I only was not really sure about what the action plan was. That really came out of the blue for me, but the rest was very clear"
	Evaluation screens	R2: "maybe you should put that it is for your coping behaviour, so that the satisfaction is with that. Because, like if I am reading it like this, I would maybe fill it in how shit the attack was"
	Overview attacks	R5: "…But I first thought that it were maybe first were the couple of attacks per month."
		R4: "maybe it would be nice to have an option to select a certain time frame. I can image when you filled in a lot of months of attacks, then the list would get quite long."
	Migraine diary	R1: "…it is fine, only after I typed it in, is it immediately saved?"
		R5: "Maybe you can add a plus or something, just a button… or new… how do you name it… new pattern, new experience or".
		R6: "I think I would make a very clear table about which food did you take, how was your sleep, which medication did you take. So .. that it is really mandatory to fill this in to get a better overview."

Table 9.

Continued.

Categories	**Codes**	**Example quotes**
Improvement points for the process (continued)	Timetable	R4: "Would it also be intuitive to have a button to tap between weeks?" R3: "I think I would leave it out, because I have my calendar in Google Calendar and there is a great overview on that.."
	Online chat	R3: ".. maybe like a forum thing where you can just ask a general question to all the users and then everybody can just respond" (R3)
Positive feedback about the design	General	R6: "… I think overall it looks very neutral, neutral colours, and I think that is also nice when you have migraine, so that you do not have 20 colours and like neon colours. Blue is a very calm colour" R2: "…tables are very clear and structured, so I like it this way."
	Log in screens	R2: "I like the dim light feature, because I do not like bright screens"
	Strengths screens	R1: "I like the headings and stuff, because you can easily see what it is for."
Improvement points for the design	Home page	R5: "this could be green, because strengths are positive, then blue and green, you turn it around. That green is my strengths, yeah.."
	Strengths screens	R4: "Just a minor thing, because this button is more emphasized than this one. I really had to look around where do I need to press."
	Obstacle screens	R2: "I think it is nice. But I would also like it if there is an option to just read the text, because sometimes you do not have earphones" R4: " … I would have an example which speaks a bit more slowly" R5: " Maybe it is better when you use a name or only women, 21 or something … then you know which one you want to hear, because you can relate to them."
	Evaluation screens	R5: "You always start with 1, 1 is dissatisfied. 1 is bad, 5 is good, so I would turn it around." R5: "maybe the previous one could have some button or something from there are two more, so that you know that the questions were not finished."

Appendix V. Worksheets of the intervention 'Raise your strengths'

Krachtbewust werkblad 1: "Ontdek je sterke kanten" (KW-1 / 2 blz)

Iedereen heeft sterke kanten. Kruis aan welke sterke kanten op u van toepassing zijn.

MIJN EIGENSCHAPPEN	**Op mij van toepassing**
Ik ben geduldig	
Ik ben een doorzetter	
Ik laat mij snel in voor iets	
Ik ben graag alleen	
Ik ben zelfstandig	
Ik ben meestal doelgericht	
Ik kan me kwetsbaar opstellen	
Ik ben zorgzaam	
Ik ben sociaal	
Ik ben behulpzaam	
Ik doe graag vrijwilligerswerk	
Ik durf mij open te stellen	
Ik ben blij voor een ander	
Ik ben meestal optimistisch	
Ik ben vaak goedgehumeurd	
Ik heb gevoel voor humor	
Ik probeer graag nieuwe dingen uit	
VAARDIGHEDEN DIE ME HELPEN IN HET DAGELIJKS LEVEN	**Op mij van toepassing**
Ik heb kennis over mijn ziekte en behandeling	
Ik zoek hulp binnen de gezondheidszorg als ik het nodig heb (bijvoorbeeld bij mijn huisarts)	
Een gezonde leefstijl (sporten, bewegen, voeding, ontspanning en nachtrust) is belangrijk voor mij	
Ik heb in het algemeen een gezonde manier van leven	
Ik heb een manier van bewegen gevonden die ik leuk vind	
Ik kan grenzen stellen en deze kenbaar maken aan anderen	
Ik waardeer mezelf	
Ik pas meestal goed op mezelf	
Ik kan goed prioriteiten stellen	
Ik weet hoe lichaam en geest elkaar beïnvloeden	
Ik kan onderscheid maken tussen mijn gevoelens en mijn verstand	
Ik durf moeilijke gevoelens toe te laten	
Ik kan negatieve gedachten en gevoelens loslaten	
Ik kies er meestal voor om positief te denken	
Ik probeer oplossingen te vinden voor mijn uitdagingen.	
Ik heb al eerder moeilijkheden overwonnen en ik denk dat ik dat weer kan	

Ik heb veel om blij mee te zijn	
Ik weet hoe ik met pijn moet omgaan	
Ik kan dingen achter me laten en vooruitkijken	
Ik kan mezelf doelen stellen waar ik naartoe werk	
Ik accepteer mijn situatie meestal en maak er het beste van	
ONDERSTEUNING IN MIJN OMGEVING	**Op mij van toepassing**
Ik heb iemand die me begrijpt	
Ik heb iemand die er voor me is	
Ik heb een goed netwerk (bijvoorbeeld vrienden en kennissen)	
Ik heb goede specialisten/behandelaars	
Ik woon in een veilige omgeving	
Ik kan me financieel dingen veroorloven die belangrijk voor me zijn	
Ik heb iemand die me motiveert om te bewegen of gezond te leven	
Ik heb toegang tot sport- of bewegingsfaciliteiten (bijvoorbeeld sportschool)	
WAT ME BLIJ MAAKT EN WAT BETEKENISVOL VOOR ME IS	**Op mij van toepassing**
Ik heb leuke hobby's en/of activiteiten	
Ik beleef plezier in mijn dagelijkse activiteiten (bijvoorbeeld werk, school)	
Ik heb waarden die belangrijk voor me zijn (bijvoorbeeld principes, eerlijkheid, respect, afspraak is afspraak)	
Ik heb een levensovertuiging (bijvoorbeeld christelijk, moslim of humanist)	
Ik heb dromen en hoop voor de toekomst	
Ik heb hobby's en/of activiteiten die betekenisvol voor me zijn	
Ik ben graag in de natuur	
Ik plan dagelijks activiteiten waar ik mij op verheug	

Krachtbewust werkblad 8: "Sterke kanten gebruiken bij obstakels" (KW-8 / 3 blz)

Sterke kanten kunnen gebruikt worden bij obstakels. Hieronder worden 4 voorbeelden gegeven van hoe mensen hun sterke kanten gebruiken om met obstakels, bij het uitvoeren van hun actieplan, om te gaan. De sterke kanten die de mensen gebruiken zijn onderstreept. Vervolgens gaat u met dit werkblad aan de slag met het inzetten van uw sterke kanten bij obstakels.

Voorbeeld 1
Dirk is een man van 56 jaar. Door zijn chronische lichamelijke klachten kan hij zijn huis niet meer in zijn eentje schilderen. Hij wil zijn buurman vragen of hij hem wil helpen. Dirk is echter bang dat de buurman het stom vindt dat hij om hulp vraagt, hierdoor stelt hij het om hulp vragen al een week uit. Dirk <u>woont in een veilige omgeving</u>, het is een fijne buurt. Dirk is <u>in staat om belastende gedachten en gevoelens los te laten</u>. Hij zet zijn twijfels dan ook aan de kant en vraagt zijn buurman om hulp. De buurman reageert enthousiast en is bereid om te helpen.

Voorbeeld 2
Else is een vrouw 28 jaar. In verband met gezondheidsklachten wil ze stoppen met roken. Ze rookte 20 sigaretten per dag en wil elke week minderen met 2 sigaretten. Echter merkt ze dat het haar niet lukt om te minderen. Voor Else is een gezonde leefstijl belangrijk. Ze probeert haarzelf hier regelmatig aan te herinneren om zichzelf te motiveren. Daarnaast heeft Else vele hobby's zoals schilderen, dansen en paardrijden. Else probeert zichzelf af te leiden als ze weer trek heeft aan een sigaret. Hierdoor lukt het haar om te minderen in het aantal sigaretten per dag.

Voorbeeld 3
Manon is een vrouw van 39 jaar. Ze is een alleenstaande moeder van 2 kinderen van 6 en 8. Manon heeft een druk leven met haar werk, kinderen en het huishouden. Daarnaast zijn er de laatste tijd een aantal lichamelijke klachten bijgekomen. Manon denkt dat haar klachten worden verergerd door de stress die zij ervaart. Ze heeft zich dan ook voorgenomen elke dag als ze terug komt van haar werk een half uur op de bank te zitten om thee te drinken. Echter merkt ze dat dit niet lukt en dat ze toch weer dingen gaat doen. Manon kan zich kwetsbaar opstellen en heeft goede behandelaars. Ze bespreekt haar probleem met haar behandelaar in de huisartsenpraktijk en die geeft haar tips waardoor het haar beter lukt om pauze te houden.

Voorbeeld 4
Lisa is een vrouw van 45 jaar. Door haar chronische lichamelijke klachten moest zij stoppen met haar baan als verpleegkundige in het ziekenhuis. Zij is op zoek naar een nieuwe daginvulling en heeft zich voorgenomen om het verpleeghuis in haar dorp te vragen of zij nog op zoek zijn naar vrijwilligerswerk. Echter krijgt ze te horen dat er daar geen mogelijkheden zijn voor vrijwilligerswerk. Lisa laat zich niet uit het veld slaan. Ze probeert altijd oplossingen te bedenken voor haar uitdagingen. Lisa heeft een goed netwerk en benadert een oude collega. Haar collega vertelt Lisa over een mogelijkheid voor vrijwilligerswerk bij een andere organisatie. Lisa gaat hier achter aan.

Pak uw "Top 5 Sterke kanten" kaartje (KW-2), en de werkbladen "Ontdek je sterke kanten" (KW-1) en "Actieplan" (KW-6) erbij.

1. Welke obstakels bent u tegengekomen bij het uitvoeren van uw actieplan? Als u geen obstakels bent tegengekomen, bedenk dan welke obstakels u nog tegen zou kunnen komen in de toekomst.

2. Welke sterke kanten zou u kunnen gebruiken om met deze obstakels om te gaan?

3. Op welke manier zouden deze sterke kanten u kunnen helpen om met deze obstakels om te gaan?

4. Maak een concreet plan voor wanneer u sterke kanten gaat gebruiken bij obstakels die u tegen bent gekomen of eventueel tegen gaat komen. Gebruik hiervoor het schema op de volgende pagina.

Bij welke obstakels ga ik mijn sterke kanten gebruiken?	Welke sterke kanten ga ik gebruiken?	Op welke manier ga ik mijn sterke kanten gebruiken?	Wanneer ga ik mijn sterke kanten gebruiken om met het obstakel om te gaan?	Hoe voelde ik me doordat ik mijn sterke kanten heb gebruikt bij dit obstakel?

Krachtbewust werkblad 9: "Wat neem ik mee" (KW-9)

1. Wat heeft u geleerd? Wat neemt u mee naar de toekomst?

2. Wat zijn signalen dat het minder goed met u gaat? Hoe kunt u en hoe kunnen anderen deze signalen opmerken?

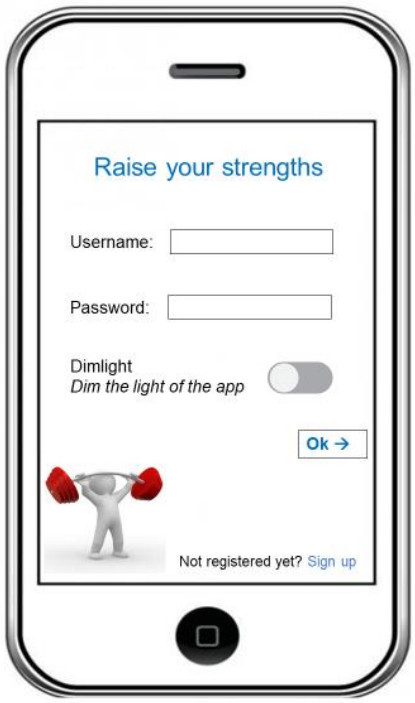
3. Wat gaat u doen en wat kunnen anderen doen op het moment dat bovenstaande signalen worden opgemerkt?

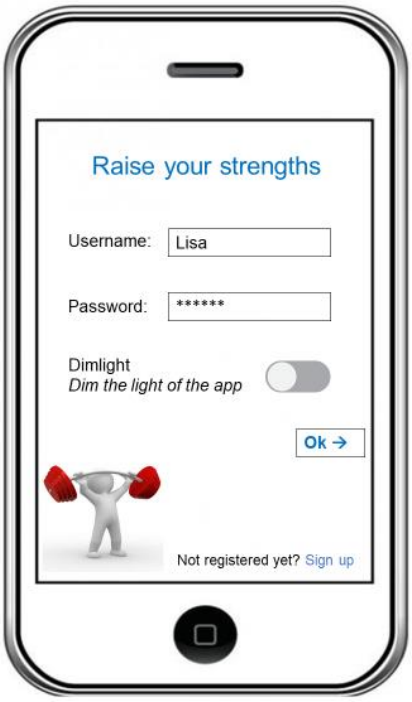
4. Wat zijn signalen dat het goed en/of beter met u gaat? Hoe kunt u en hoe kunnen anderen deze signalen opmerken?

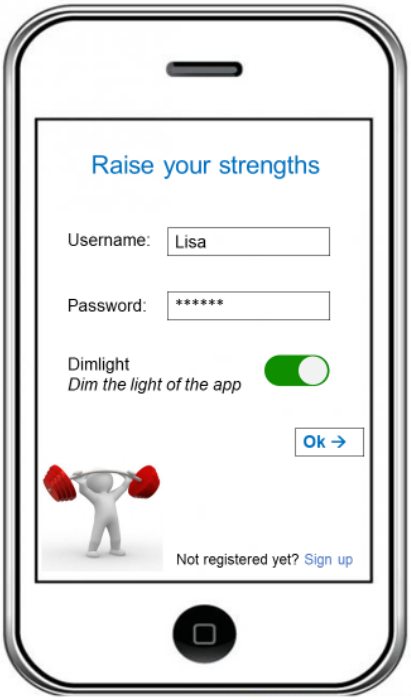
5. Wat gaat u doen en wat kunnen anderen doen zodat het goed met u blijft gaan? Hoe kunt u dit vasthouden en uitbouwen?

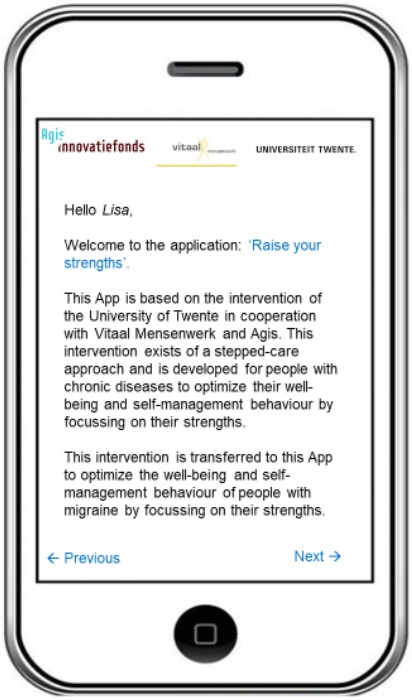
Appendix VI. The prototype

1. Log in screens including information about the intervention

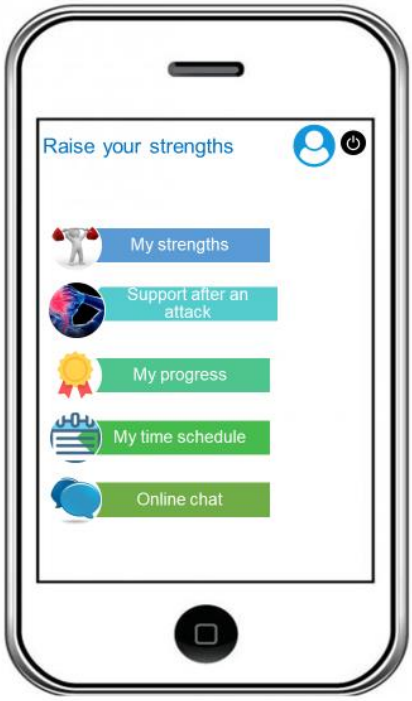




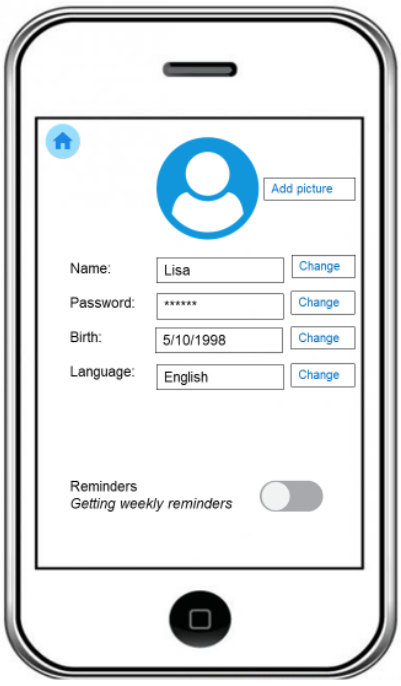


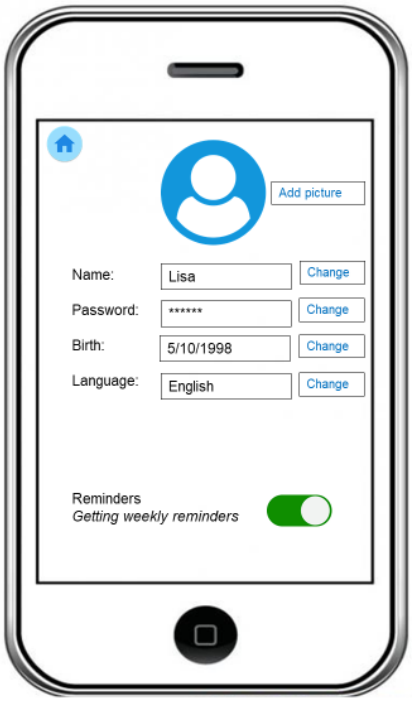


2. Home page screens

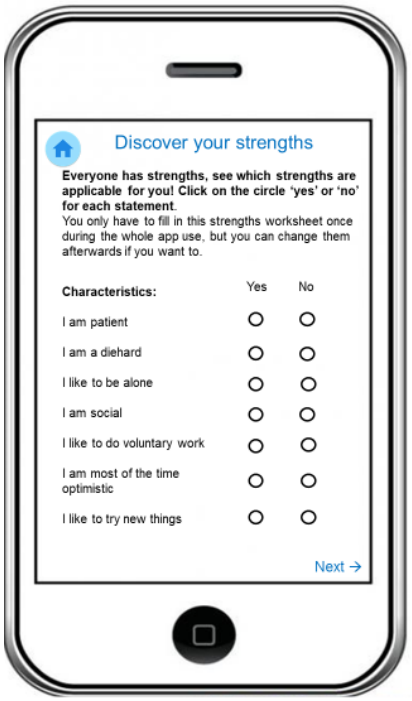


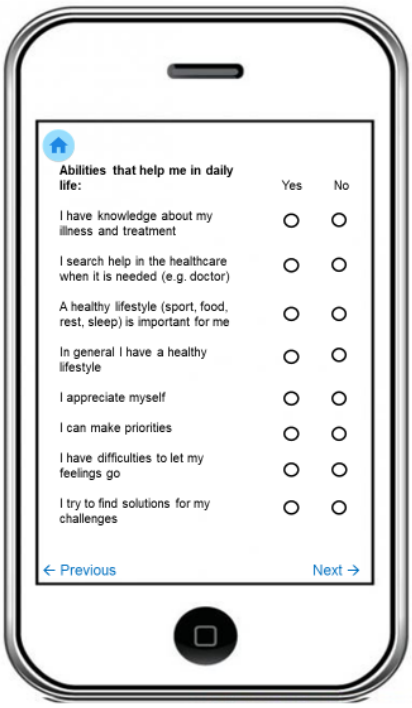
3.Personal settings

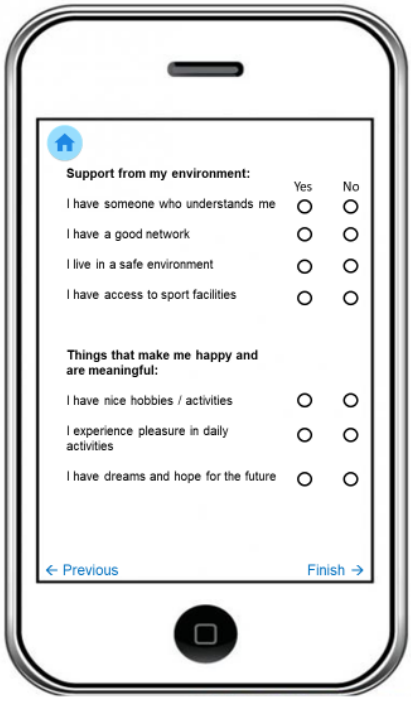


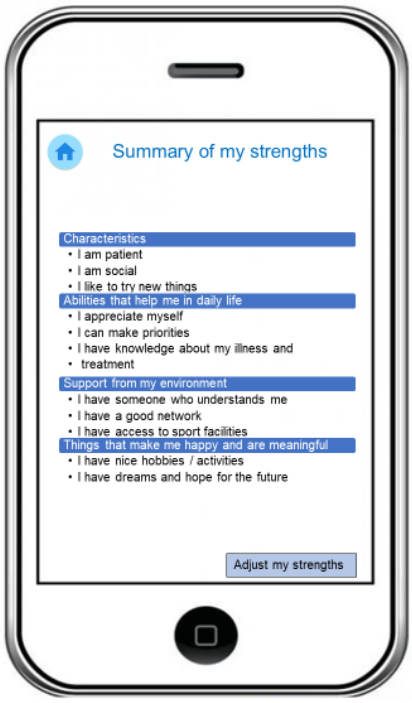


4. Worksheets ‘Discover your strengths’ including the summary

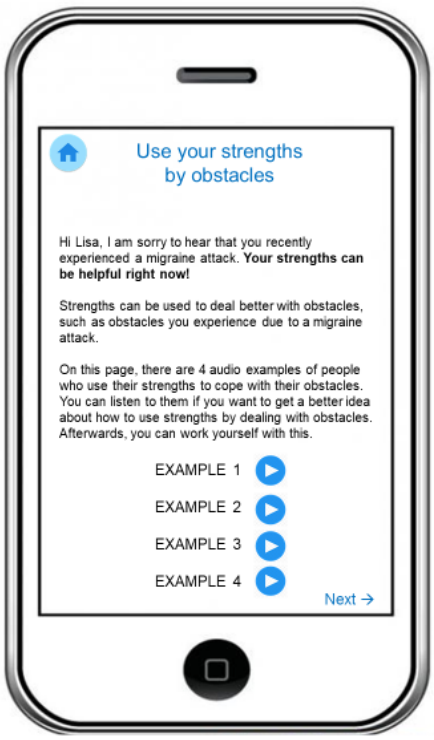


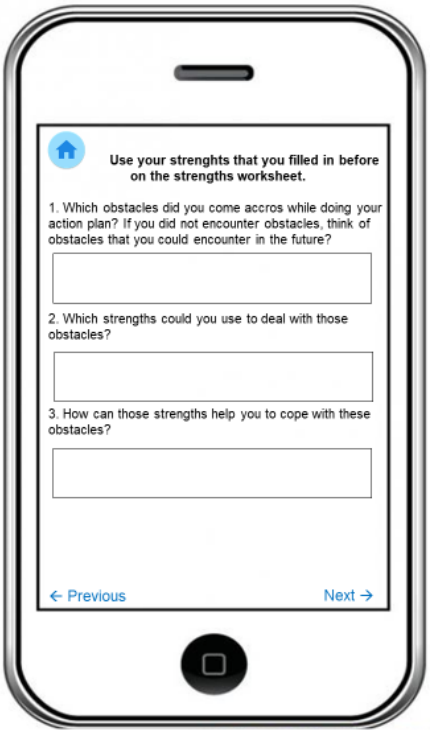


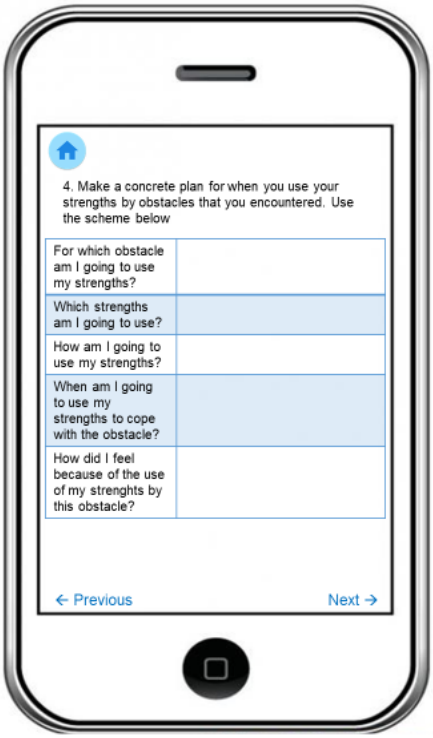


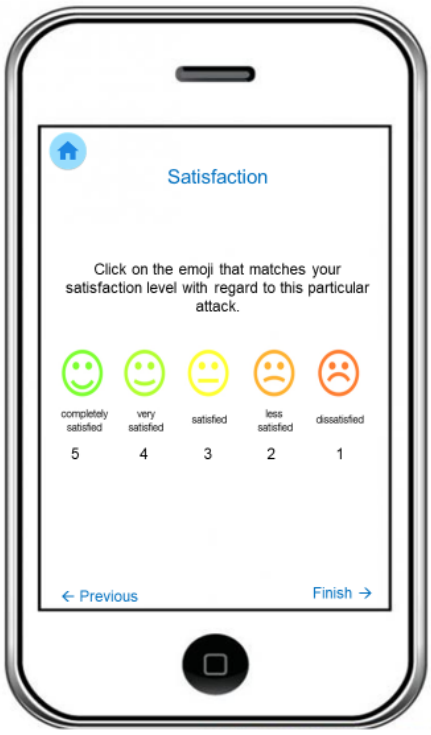


5. Worksheets about ‘Using my strengths by obstacles’ and ‘What did I learn?’

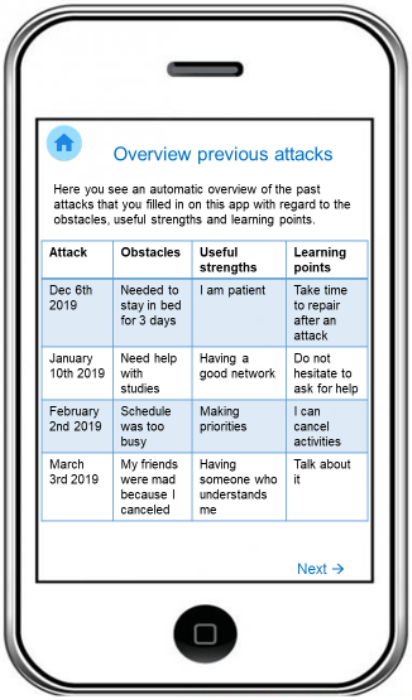


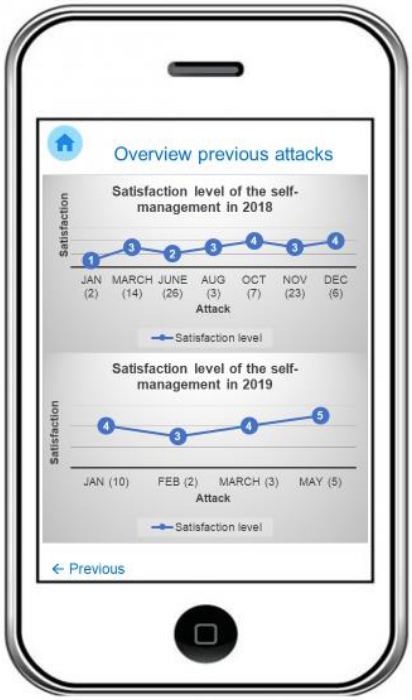


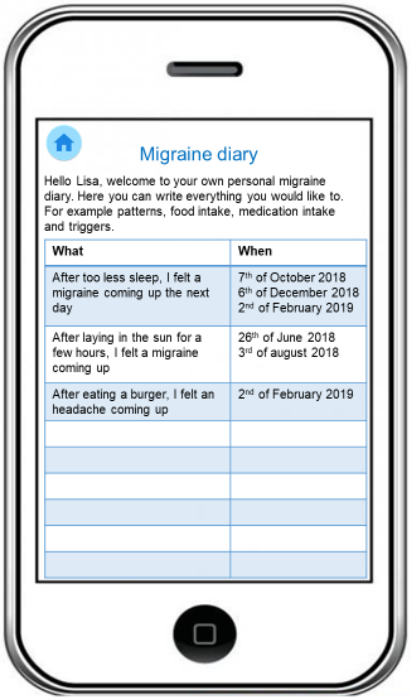




6. My progress (Overview previous attacks + migraine diary)







7. Weekly timetable

8. Online chat with professionals and other users