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Faculty of Electrical Engineering,
Mathematics & Computer Science

Designing a smartphone application for supporting the COMET-program in mental health care

Bob Loos

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Supervisors:
prof.dr. D.K.J. Heylen (HMI)
dr. R. Klaassen (HMI)
dr. K.P. Truong (HMI)
drs. Y.P.M.J. Derks (PHT)

Human Media Interaction Group
University of Twente

Disclaimer

This research is based on the COMET-methodology as designed by Korrelboom (2000). Apart from COMET being used, this research is not connected to any other research by Korrelboom. The emphasis of this research is laid on the design of a concept of a mobile application. This does not include the effectiveness of the latter on the patient's progress. On 17-02-2020, Korrelboom has given explicit permission for using the COMET-methodology in the current publication as well as for making the used prototypes available to the public. In this publication and in the prototypes, two screenshots from videos from VGCt and Gedachten Uitpluizen are used. On 23-04-2020 explicit permission for using these materials is granted. Furthermore, freely available material is used from svgrepo.com, the Spotify Branding Guideline and Pexels.com. Where possible, attribution is provided. The prototype does not contain any content that is copyrighted (unless permission is granted by the relevant party).

Patients from mental healthcare organisation GGNet Doetinchem are asked to participate. During this part of the research, the researcher was following an internship at GGNet Doetinchem. Nor does this report or the prototypes contain patient information.

For this research, permission of the Ethical Committee EWI of the University of Twente has been requested and granted on 07-08-2019. The following reference number has been provided: RP 2019-79.

Abstract

The process is described of designing a concept of a smartphone application to support patients during the COMET-program in mental health care, as well as when having finished the program. Background information on COMET and the after-therapy gap is searched for, whereas the latter can be well supported by literature. Inspiration for the application is drawn from the related work. Interviews have been held with mental health care professionals who have experience with (a derivative of) COMET, resulting in a list of requirements for the application. The after-therapy gap, as discussed in the background information, is also supported by the interviews. The defined requirements are used to create a first prototype of COMET-E. A user test with this prototype has been performed to discover the experiences of the patients and professionals. The latter to test if the needs of the end users would be sufficiently met. The promising results of this user test are used to create a final prototype of COMET-E. Recommendations for future (development and research) work are provided, concluding this thesis.

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I also want to thank the professionals from GGNet Doetinchem and HSK Hengelo for participating in this research. I have learned a lot from their experiences. I want to highlight one specific group from GGNet Doetinchem, the professionals who are part of the "Herstel"-groups. They have been supporting this project from 2018, as do my supervisors, starting with my Research Topics-project and finishing with the current Master's Thesis-project. Their efforts inspired me to work on this current topic for supporting patients in their therapy or training for self-esteem.

At last, I want to thank all other participants who are not part of the above mentioned groups. Thanks a lot for supporting me with this project and for participating in the user tests. Their insights, combined with those from the professionals, have led to the final result of this thesis.

1 Introduction

Mental disorders are of great influence on the global disease burden (GDB). Mental, neurological and substance use disorders combined account for 10.4% of the global DALYs (Disability-Adjusted Life Year; one DALY is equivalent to one lost year of "healthy life"). Of this percentage, mental disorders account for 56.7% (Whiteford et al., 2015).

There is a great demand for mental health services, accompanied by its problems. E.g.: long waiting lists, a shortage of mental health care professionals and costs pressures (more has to be done in less time) are more prevalent (Bruckner et al., 2011; Comer, 2015; Hollis et al., 2015). Technology can play a role in counteracting these problems.

Lal et al. (2014) mention that usage of e-mental health solutions can improve the accessibility, reduce costs of mental health care and can offer personalization of the offered services. Ben-Zeev et al. (2013) has shown that 72% of their surveyed people with a mental disorder (n=1592), are in possession of a smartphone. 81% of the people with a mobile device and 62% of the percentage of the people without a mobile device, show interest in receiving mental health services via a mobile device. This interest is shared by care providers. Schueller et al. (2016) researched the interest of mental health providers in web and mobile-based tools. Examples of features of interest (and the percentage of the 132 participants mentioning this feature): mobile app providing lessons (59.7%), mobile app providing tools (56.8%), internet site tracking symptoms with patient feedback (50.4%), mobile app tracking symptoms with provider feedback (47.0%) and mobile app tracking symptoms with patient feedback (42.8%).

This project is based on an earlier research project focused on how smartphones with mobile applications could be supportive during (providing) therapy for minatory mental disruption. This project concluded that technology can't be a replacement of a therapy, but can be used as an addition (Loos, 2019). The latter and supplementary findings will be further elaborated on in Section 2.2. In the latter project, COMET (competitive memory training) is mentioned as use case of interest for the application of technology. This 8 weeks training focuses on improving one's self-esteem. Technology, and then explicitly smartphone applications, have proven to be able to support (therapy for) different mental disorders (e.g. (Mantani et al., 2017)). One of the many examples is the smartphone application that supports in reducing depressive symptoms for people with mood and psychotic disorders (Ben-Zeev et al., 2019). Based on the latter and my earlier research project, it is presumed that a smartphone application could also be used as a supportive tool for COMET.

1.1 Research context

The COMET-program is created to support people with a low self-esteem that hinders their daily functioning. COMET has proven to be an effective intervention for improving one's self-esteem and autonomy (Korrelboom, van der Weele, et al., 2009; Maarsingh et al., 2010). Section 2.1 describes COMET and its content more in depth.

Once having finished therapy, a patient loses the continuous loop of feedback (i.e. discussions between patient and professional) (Loos, 2019). It is presumed that this also applies to COMET. Once the program is finished, the patient gets no further support in maintaining or improving their self-esteem. It is presumed that a smartphone application could provide this continuous support. Both during and after having finished COMET.

The design of a supportive mobile application for the COMET-program is described. In order to find how a mobile application can be supportive for the COMET-program, a user-centered design approach is used. This research is done in collaboration with mental health care professionals and patients from GGNet Doetinchem and professionals from HSK Hengelo, who are involved with or follow (a derivative of) the COMET-program.

1.2 Research questions

In this project, research is done on the design of a smartphone application as a supportive tool for patients during the COMET-program and after having finished the latter. The following main research question (MRQ) fits this project:

- How to design a smartphone application for COMET in mental health care that can continue to provide support to the patients after having completed the program? **(MRQ)**

To answer the main research question, current problems with the COMET-program need to be identified. It needs to be discovered how a smartphone application can be used to solve these problems. The following sub research question fits:

- What are the current problems within the COMET-program according to the mental health care professionals? **(SRQ1)**

Once the problems are defined, the requirements for a potential smartphone application can be composed. This is done in collaboration with mental health care professionals. The following sub research question fits:

- What are the requirements for developing a supportive smartphone application for the COMET-program, according to the mental health care professionals? **(SRQ2)**

With the defined requirements, a prototype of a smartphone application can be created and tested. A user test is done in collaboration with patients and mental health care professionals who follow or are familiar with the COMET-program. Both groups are included since both groups are stakeholders. This user test has as goal to discover how patients experience or are presumed to experience the proposed application. The following sub research question fits:

- How do patients and professionals experience the proposed supportive smartphone application for the COMET-program, during a user test? **(SRQ3)**

At last we want to know how the proposed smartphone application can be further improved. The answer on this last sub research question can be used to create a final prototype; a prototype that can be tested in future work. The following sub research question fits:

- How can the proposed supportive smartphone application for the COMET-program be further improved according to patients and professionals who are following or who are familiar to this program? **(SRQ4)**

1.3 Research outline

This report follows the following outline. In Chapter 2, background information is given on the therapy program COMET, the after-therapy gap and related work. Chapter 3 describes the interviews with mental health care professionals for finding the requirements for designing an application. In Chapter 4, the designed application is described based on the input from the previous chapter. Chapter 5 describes the user test with the application. The user test is performed with both patients and professionals who are following or are involved with the COMET-program. In Chapter 6, the final prototype is discussed based on the results from the previous chapter. In Chapter 7, the findings from this research will be discussed, followed by Chapter 8 where the research questions will be answered. At last, Chapter 9 describes what further steps can be taken in the design of a supportive smartphone application to assist the COMET-program.

2 Background

This chapter provides information that can be found in the literature about COMET, the after-therapy gap and provides related work and state of the art on COMET and the use of technology for treatment, aftercare and self-help. At last, related work on notable features for smartphone applications in mental health care, is discussed.

2.1 COMET - training for improving one's self-esteem

Competitive memory training (COMET) is an intervention to positively alter one's negative self-esteem (Korrelboom, 2000). It focuses on people who know they have positive characteristics but who are are not experiencing those as such (e.g. I know I'm contributing to society, but I don't feel like I am). If the patient does not acknowledge of knowing any positive characteristic about oneself, other interventions than COMET are probably more effective. COMET has the following goal: "Finding a better balance between one's positive and negative characteristics by (emotionally) acknowledging the positive characteristics.". For patients who are following this training, their negative characteristics are more prominent. According to COMET theory, this has to be leveled to get a more realistic self-esteem. By using a learning mechanism known as counterconditioning, patients needs to experience what they already implicitly know about themselves (e.g. I know and feel like that I contribute to society) (Olij et al., 2006).

2.1.1 Counterconditioning stimuli

The long-term memory contains cognitive networks of stimuli (representations of an event that can influence the interests of an individual, e.g. a barking dog), meaning (meaning of the event, e.g. a barking dog is angry and dangerous) and response representations (possibilities of fitting behaviour for a certain event, e.g. a barking dog needs to be avoided so I can keep myself safe). Once there are enough triggers to activate a cognitive network, an emotion follows that influences the behaviour of the person (Korrelboom, 2000). According to Lang (1988), an emotion can mostly be influenced by altering response representations on certain events. I.e. the fear for the dog (emotion) can be influenced by what a person considers as possibilities of fitting behaviour (response representations) for seeing a barking dog. Based on the latter Korrelboom states that if one wants to alter negative self-esteem, the focus needs to laid on the response representation of the negative self-esteem (Korrelboom, 2000). More elaborated on, the emotions that are shown because of the low self-esteem, can be influenced by what one considers as possibilities of fitting behaviour for an event that triggers low self-esteem.

During COMET, the counterconditioning technique is used to alter one's negative self-esteem. The patient is simultaneously confronted by two (emotionally) incompatible situations. Situation #1: I feel like I'm worth nothing and I don't contribute to the society. Situation #2: I am a good parent for my children. The negative self-esteem is activated by an event. E.g. "During a family event, my uncle tells me that I'm just wasting my time and I should start doing something useful with my live". Such events (i.e. critique from family members) activates the negative self-esteem of not being worth anything and not contributing to society. These events can be described as conditioned stimuli. A conditioned stimulus has as meaning: a representation of an event which is accompanied by a predefined behaviour (response) because of earlier experiences. These events inhibit (in other words, block) the positive self-esteem. I.e. the patient who is being criticized on, will not not think of being a good parent for his children.

The goal of COMET is to couple the positive self-esteem of being a good parent, to those family-events that normally cause a negative self-esteem. Techniques (e.g. keeping

a strong body posture, imaging yourself of being able to calm down your child that has fallen when playing a game) are used that lead to the feeling of being a good parent. These techniques and these feelings activate a positive self-esteem. Once that feeling is established, the thoughts are switched to a family event. The patient tries to couple the positive self-esteem of being a good parent to the (conditioned) family event that would normally cause the low self-esteem of being worth nothing. By maintaining the positive feelings of being a good parent while switching thoughts to the (conditioned) family event that causes a negative self-esteem, the patient can (by practice) inhibit the latter. The table has turned proverbially. Figure 1 shows a representation of the latter.

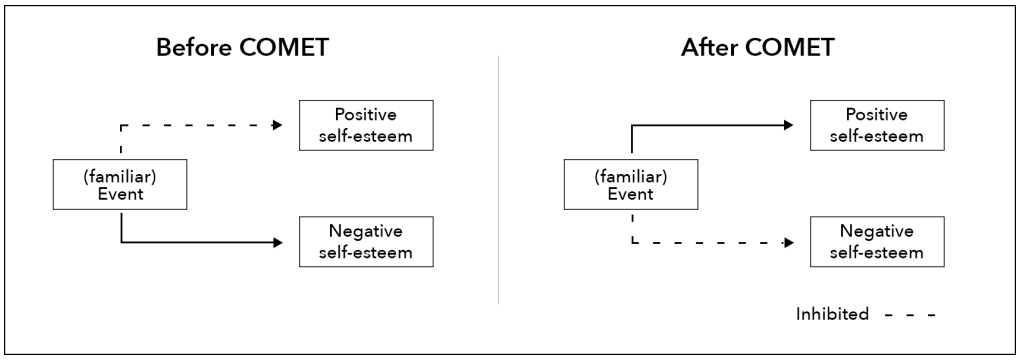

Figure 1: COMET explained for altering conditioned stimuli.
Based on: (Korrelboom, 2000)

Above, COMET is described as to alter conditioned stimuli. The negative self-esteem can also be evoked by unforeseen and inevident, unconditioned (difficult) situations. Again we have two situations. Situation #1: the prior described family-event that causes a negative self-esteem. Please note: this situation is only defined to practice an unexpected and/or unconditioned situation. Situation #2: I am a good parent for my children. The patient needs to think of the family-event that normally activates the negative self-esteem. Due to activation of the negative self-esteem, the positive self-esteem is inhibited. Now, the same techniques as before (i.e. keeping a strong body posture, imaging yourself of being able to calm down your child that has fallen when playing a game) have to be used to cope with the negative self-esteem and replace the latter with aspects from one's positive self-esteem. This application of COMET can be used as a method to cope with (new) difficult situations. Figure 2 represents the latter described application of COMET.

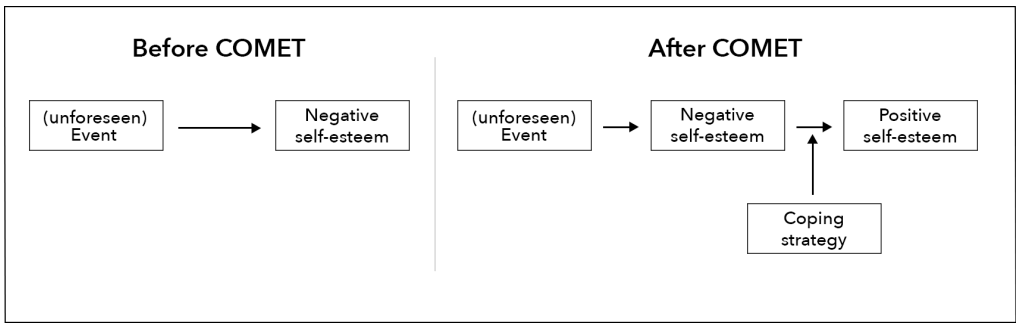

Figure 2: COMET explained for coping in case of unconditioned stimuli.
Based on: (Korrelboom, 2000)

2.1.2 Contents of the training

COMET is an individual therapy within a group. At the start of the 8 weeks training, each patient gets a workbook with all steps of the training and background information on COMET. The multiple exercises are performed within a group, but every patient applies the exercise in such a way that it fits the individual problems. For each session, assignments are prepared individually at home (Korrelboom, 2011a).

This research uses the official protocol for the professional (Korrelboom, 2011a) and the workbook for the patients (Korrelboom, 2011b) as base. These materials describe COMET as a training that consists of the following seven subsequent steps divided over eight sessions. Each of them will be elaborated on:

1. Defining the low self-esteem: patients describe the negative self-esteem they will be working on during the training. Most often this is already discussed in an earlier private conversation with a professional.

2. Rationale: the goal and course of the training is discussed / repeated.

3. Defining the incompatible positive self-esteem: qualities of the patient are searched for that either correct or compensate the negative self-esteem. An example of correcting low self-esteem: A chef in a high-end restaurant who thinks he is actually bad in cooking. The chef needs to experience that he is better in his job than he thinks. An example of compensating low self-esteem: a person who is allergic to sunlight and therefore thinks he is worthless. He needs to accept his allergy and compensate this thought with a positive quality of, for example, always being helpful to those people who need his support.

4. Illustrating the counterparts: patients write stories that elaborate on the positive qualities they have written down during the previous step. By getting familiar and mentioning these qualities more often, they also become more present in the memory of the patient. Their positive self-esteem becomes more solid.

5. Emotionally strengthening the counterparts with imagination, self-talk, locomotion (body posture and facial expressions) and music.

6. Counterconditioning - immunize: the previous steps have strengthened the positive self-esteem of the patient. The positive self-esteem will now be linked to triggers that previously caused the negative self-esteem. The patient learns to become immune to those triggers. The patient has to evoke their positive self-esteem. Once succeeded, the patient has to retain the positive feelings while switching thoughts to a trigger that causes the negative self-esteem. By retaining the positive feelings in combination with the negative triggers, with practice the negative self-esteem will be inhibited. The patient becomes immune for the triggers that cause the negative self-esteem. Figure 1 shows a visual representation of the latter.

7. Counterconditioning - coping: the patient learns to use the earlier taught methods to cope with a sudden presence of the negative self-esteem (possibly due to an unforeseen event). The patient replaces this negative self-esteem with the positive self-esteem by making use of the earlier taught methods (e.g. altering posture and facial expression). Figure 2 shows a visual representation of the latter.

Over the last 20 years, COMET has been tested multiple times on effectiveness. The training seems to favorably improve autonomy, depression and social optimism of the patient (Olij et al., 2006). The effectiveness has been tested for different (combinations of) disorders: e.g. depression (Korrelboom et al., 2012), eating disorders (Korrelboom, de Jong, et al., 2009) and personality disorders (Korrelboom et al., 2011)

2.2 The after-therapy gap

When a patient finishes therapy, the patient loses support they earlier received from a mental health care organization. In this project, this period of time is called the after-therapy gap. Findings from a preliminary project and from literature are discussed.

2.2.1 Findings from a preliminary project on the use of technology in mental health care

In a previous project (Loos, 2019), research has been done on potential use cases for technology for patients with a minatory mental disruption, who are following the Herstel 1-program at GGNet Doetinchem. GGNet is one of the larger mental health care organisations in the Netherlands. The Herstel 1-program focuses on acute (recent) problems of patients with any disorder. Once having finished the Herstel 1-program, patients most often follow up with a (Herstel-)program that focuses more specifically on their disorder(s). This preliminary project consisted out of three parts: 1) a literature review on the use of technology within mental health care; 2) a field study where parts of the Herstel 1-programs are experienced in order to gain a better understanding of the program; 3) interviews with patients and professionals involved with Herstel 1 on the subject (and application of) learned lessons. This project resulted in six identified problems when learning lessons about oneself, 15 found requirements for the development of mobile technology for mental health care and eight examples of potential use of technology. An impression of the project is given with three examples for each of the following topics: 1) identified problems, 2) requirements for the development of mobile technology for mental health care, and 3) examples of potential use of technology. Three examples on identified problems when learning lessons:

- Translation from therapy to the home situation
- Getting back to old habits
- Thinking realistically is difficult during crisis

Three examples of requirements for the development of mobile technology for mental health care:

- ... should be usable at home (and during therapy)
- ... should support in giving a better understanding of oneself
- ... could be an addition to current therapy but is not a replacement

Three mentioned potential examples of use of technology for mental health care:

- Promoting the positive self-esteem
- Digital crisis plan
- Virtually (re-)creating situations

This project concluded with that technology has many ways to be supportive for both patients as well as mental health care professionals. Though technology will not be able to replace a therapy, it has the potential to be (part of) an extension of an existing therapy. Technology can therefore be well used to bridge the therapy in the clinical setting to the home situation and therefore makes the therapy and the learned lessons more accessible.

One potential example of use of technology for mental health care has become the base for this current project. The choice for this topic has been made because it defines

a clear frame for the project (i.e. the therapy program COMET), because there are no known examples of available smartphone applications that are supportive to COMET (examples are known for a digital crisis plan) and where the use of technology can be limited to a smartphone application.

During this preliminary project, the importance of the role that feedback plays during therapy became evident. Patients provide and receive feedback from both mental health care professionals as well as from other patients. But once having finished therapy, the patient loses this constant loop of feedback. In the upcoming section, findings from literature are presented on relapses to previous behaviour after having followed a therapy.

2.2.2 State of the art on the after-therapy gap

The state of the art on the after-therapy gap is discussed including the topics: readmissions to hospitalization, after-hospitalization initiatives by the community and mental health care professionals, and the potential for technology. They are included to support the existence of the after-therapy gap and to show potential counter measures.

A major challenge for mental health care is the relapse of patients. E.g. a depressive disorder is known for having a recurring course. There is a high risk for relapse, a risk that increases with each occurrence (Bockting et al., 2015). To prevent a relapse, methods are searched for the prediction of the latter. E.g. a method to predict time to a relapse of the depressive symptoms (Brouwer et al., 2019).

Predictors are searched for hospitalization. Sfetcu et al. (2017) searched for predictors for psychiatric hospitalization by performing a literature review. One of their results, having a follow-up within 30 days after discharge lowers rates of readmission. This is also tested for follow-up within seven days after discharge, but with mixed results including even an increase in the readmission rate. This period of around 30 days after discharge has also been found of importance for patients with a high risk for suicide (Geddes & Juszczak, 1995). Explanations for the latter are searched for and found by Cutcliffe et al. (2012). They found the following relevant themes (a selection is provided): "Feeling scared, anxious, fearful and/or stressed", "Feel like a burden" and "Leave the place of safety". Owen-Smith et al. (2014) found that having to be confronted with stressors (i.e. a stressful event) as before the hospitalization or because of prompted stressors because of hospitalization, can make the period after discharge more difficult. The latter two findings support the findings on the after-therapy gap as was found in the preliminary project discussed in Section 2.2.1. Though, the difference between inpatient treatment (i.e. the patients stays at the clinic) and outpatient treatment (i.e. the patients goes home after a therapy-day) needs to be considered.

There are a number of ways to cope with the after-therapy gap. To ease the transition of hospitalization to independent living, several aftercare initiatives could be joined. Examples are the Post-Discharge Network Coordination Program (PDNC-P) (Hengartner et al., 2017) or the community residential aftercare (CRA)-program, as is introduced in Norway and is specifically meant for the transition of hospitalization to independent supported living (Roos, Bjerkeset, & Steinsbekk, 2018). CRA has no organised activities but the patient is informed about the available activities in the neighbourhood and the community. The patient can voluntarily stay at CRA. The benefit for the mental health care system is reduction of total consumption of health services and costs, without having more hospital admissions (Roos et al., 2018).

The previous two examples are after-hospitalization initiatives that involve the community and mental health care professionals. Research can also be found on the usage of technology during therapy, for aftercare and for relapse prevention. The remainder of this subsection does not make a distinction between inpatient and outpatient mental health care. Josephine et al. (2017) performed a systematic review of internet and

mobile-based interventions (IMIs) for people who are diagnosed with depression. It has been found that IMIs can be effectively used for reducing depressive symptoms of people that are diagnosed with a depressive disorder. Hennemann et al. (2018) performed a systematic review of internet and mobile-based interventions (IMI) for aftercare and prevention of relapses. Sixteen Randomized Controlled Trials (RCT) are included in this research. Because of the limited amount of studies, conclusions on the efficacy of IMIs for aftercare and follow-up interventions could not be drawn. Though, small effects are found for symptom severity of anxiety and depression. Since the interventions are used after the main intervention where the bulk of symptoms has been tackled, finding only small effects for aftercare and relapse prevention interventions is expected. The usage of IMIs for aftercare and relapse prevention is promising. Though, further research is required to create a solid evidence base of the effects of IMIs.

The use of technology for treatment of disorders, for aftercare and prevention of relapses is promising. Though, it still is in its infancy. We have to be cautious with solely trusting on technology for a task that is ordinarily done by a professional. The use of technology could pose a negative effect on the patient's well-being. O'Toole et al. (2019) tested an app-assisted treatment for suicide prevention. Although expected differently, the treatment group who received treatment as usual (TAU) with the addition of a mobile app, showed a smaller decrease on self-reported suicide risk at the end of the treatment compared to the TAU-group. Using technology as an addition to a treatment provides a number of gains, but steps to do so have to be cautiously taken. The latter research aligns with what has been found in the preliminary project (Loos, 2019). Participants showed interest in usage of technology for mental health care. Though, it should not be a replacement for a therapy.

Above we discussed the literature on the after-therapy gap. It has been found that especially the 30 day period after discharge of hospitalization is of importance for mental health care patients. This could suggest that patients might benefit from guidance once having finished a therapy. This guidance might be provided via one of the aftercare initiatives with support from mental health care professionals and the community. Providing this support through internet-based and mobile-based interventions has also been found promising, though it is still in its infancy. Section 2.3.2 will go more in depth of examples of technological interventions for during therapy, aftercare and self-help.

2.3 Related work and state of the art

Related work and state of the art on a variety of topics will be discussed. The presented information is used as inspiration for the remainder of this project, with specific focus on features that could be beneficial for a smartphone application for COMET.

2.3.1 Related work: COMET as self-help intervention

COMET can be used as addition to many different therapies. OCD (obsessive–compulsive disorder) is one of the earlier disorders that is included in a pilot for COMET (Korrelboom et al., 2008). Schneider et al. (2015) tried to convert COMET to a self-help intervention for people with OCD. COMET has been translated to a PDF-file in order to be used as a self-help intervention. The PDF-file contained the known background information and exercises of COMET. The participants that have stated to suffer from OCD were divided in two groups: the COMET-group and the wait-list control group. After 4 weeks, a post-assessment is done of obsessive and depressive symptoms for both groups. The COMET-group in this research did not show a greater decline of OCD-symptoms and depression compared to the wait-list control group. The findings therefore suggest that COMET might not be suitable for a self-help intervention. The authors discussed

a few points that can be of interest for the remainder of this current project. A selection of this discussion, that could be of interest for the current project, is provided:

- The intervention phase took only 4 weeks. This amount of time might be too short to observe significant changes in OCD behaviour. Furthermore, around 47.8% of the participants indicated that the manual was not applicable to their OCD. The authors pose that perhaps the patient needed to get familiarized with the manual and its exercises.
- Only 26% of the participants read the entire manual and 56% stated to regularly perform the exercises. The authors already provide suggestions on how to improve adherence. E.g. calendar reminders and interactive components.
- Certain tasks of the training are difficult to perform without the support of a therapist. Specific examples are the definition of the low self-esteem and its counterpart. Apart from support with the latter, the therapist could also provide clarification on provided instructions.

Pearcy et al. (2016) performed a systematic review of self-help interventions for OCD. From this research is concluded that small effects are identified if the self-help intervention is self administered with increasing effects when therapeutic contact increased. Further research on using COMET as a self-help intervention is lacking. Though, the current findings (with specific attention to the last discussed point) and findings from the preliminary project (Loos, 2019), suggest that a tool for COMET might benefit from (partial) involvement of mental health care professionals.

2.3.2 State of the art: technology for treatment, aftercare and self-help

The state of the art is discussed on usage of (web) applications in mental health care. In the Introduction (Chapter 1), some state of the art has already been mentioned; this section extends the latter by making a subdivision in the following three topics: (technology for ...) treatment, aftercare and for self-help. The goal of this section is to provide a general overview of current research for the mentioned topics. This overview provides inspiration for the design of this research and the accompanying application.

Treatment

Usage of internet-based or mobile-based interventions within a face-to-face therapy program (also known as "blended therapy") becomes more prevalent and is promising for (at least) primary mental health care that includes patients who suffer from mild to moderate issues (van der Vaart et al., 2014; Government of the Netherlands, 2019). Blending a technology-based intervention with a current treatment enables to deliver at least similar results compared to traditional interventions (Nakao et al., 2018; Topooco, 2018; Fitzpatrick et al., 2018). To emphasize; Thase et al. (2017) performed an efficacy-study on a computer-assisted cognitive behavioural therapy program for people with depression. The computer-assisted Cognitive Behavioral Therapy-program (CBT) delivers similar results compared to traditional CBT and less time of a therapist was required.

Face-to-face contact is not necessary for treatment. Therapy can be followed online and feedback can be provided by professionals through a digital medium. An example is BDD-NET for people with Body Dysmorphic Disorder (BDD) (Enander et al., 2016). BDD-NET provides interactive modules scoped to specific themes. For each module the patient completes homework assignments and reports to their therapist. The therapist provides feedback and answers to questions (online). A follow-up showed that gains of the therapy are maintained two years after treatment. Being able to follow an online program also lowers the threshold for people with BDD to ask for help (Enander et al., 2019).

Aftercare

Zwerenz et al. (2017) created a self-help intervention for discharged patients with as goal to increase emotional competence (i.e. being able to recognize and respond to your and other's emotions). Though, the completion-rate of the intervention was low which makes the authors come to the conclusion that it is of importance to focus an intervention to the needs and capabilities of the participants. Jacobi et al. (2017) tested a web-based aftercare program (IN@) for women who suffer from bulimia nervosa (i.e. an eating disorder including binge eating followed by behaviour to compensate the latter). In@ targets maintenance of inpatient gains and the reduction of relapses after the patient is discharged. The aftercare program covers relevant topics and includes interactive features for logging symptoms and includes a diary. Three psychologists provide feedback and answer to chat messages. Moderate effects are found for In@, i.e. women who still suffered from symptoms after the inpatient treatment benefited from the program, whereas women without these symptoms did not.

Self-help

This last category focuses on interventions without any contact with mental health care professionals. Ebert et al. (2016) describe an intervention for self-guided stress management. The intervention is internet-based and consists of mandatory and optional modules (e.g. psycho-education, problem-solving and time-management) based on the needs and preferences of the participant. The intervention has a strong focus on transferring new skills into daily life. Motivational messages and exercises can be provided. The intervention has been found effective for reduction of perceived stress and other relevant mental health issues. A comparable example is the online therapy program for chronic insomnia where effects including sleep and daytime functioning could be maintained for up to 18-months after the intervention (Vedaa et al., 2019).

The presented research shows that for each of the topics, recent research is known. Technology-based interventions can be promising for each of them. Using a technology-based intervention can lower the threshold to seek for help, can be more specified to the needs of the patients and can make mental health care more accessible since less time is required from a professional per patient. It could be used as a way to guide patients who are just discharged from therapy, by still providing them support in case necessary.

2.3.3 Related work: notable features of smartphone applications

The goal of this section is to create an overview of features that are known to be interesting for mental health care applications. This overview can be used as inspiration for creating the COMET smartphone application. This overview is based on the found related work. The related work is based on other research and on findings of mental health care applications in the Google Play Store and Apple App Store. The search is limited to applications for patients, since this is also the user group of the to be developed smartphone application for COMET. For each of the related work, notable features are registered to eventually lead to a list of notable features as to be described in this section. Each of the features are observed by the researcher, will be supported by literature (where possible) and will be illustrated by examples from the related work. The selected related work is chosen because of uniqueness of its features; the selected related work includes the following:

- Connections (CHESS Health, 2019): for aftercare and relapse prevention of people who are recovering from substance use disorders. A randomized clinical trial presents positive results; patients report fewer risky drinking days compared to the control group(Gustafson et al., 2014).
- The Journey (Mental WEALTH, 2019): can be used during therapy for psychotrauma and addictions. A standalone versions is available that can be used for self-help and for the period of time that a patient has finished treatment. It is intended to be used for a limited time, until support is not needed anymore.
- Pocket Skills: a mobile web app that uses a conversational agent to provide Dialectical Behavioral Therapy. Schroeder et al. (2018) found that a conversational agent is able to help a patient to engage more in therapy, to practice and implement new skills, and to increase self-efficacy.

A list of promising features for mental health care applications is separately discussed and (where applicable) supported by literature. All mentioned figures can be found at the end of this chapter, after the conclusion.

Feature #1: Modules of content and flexibility

By providing content in modules and provide flexibility to the user to choose to follow a module, at tool might better fit the personal goals and situation of the user. E.g. Zwerenz et al. (2017) recommends in a research of the creation of a self-help intervention, to focus more on the needs and capabilities of the user in order to improve completion rate of the intervention. Hilliard et al. (2014) supports this statement. The Journey shows an example of how modules can be implemented. The Journey lets the user choose subjects to focus on (e.g. crisis plan, setting goals). Figure 3 shows a screenshot of the Journey where a user can voluntarily select the subject to work on, by clicking on one of the subjects represented as buttons.

Feature #2: Monitor yourself / monitor a patient

Smartphones and wearable devices provide the capability to monitor on symptoms of persons with mental health disorders (Ben-Zeev et al., 2015). Interest for such capabilities are shown by both mental health care professionals as by patients (Torous et al., 2014; Hendrikoff et al., 2019). Self-monitoring with a smartphone application on a personal device can deliver the same results as traditional survey measure techniques (Torous et al., 2015). As example, Connections (CHESS Health, 2019) provides such monitoring capabilities. It can be used for monitoring oneself but also for monitoring others (e.g. a professional who monitors a patient). Connections bases monitoring on self-reports and self-assessments. If necessary, the system alerts the professionals about a potential relapse of a patient. Figure 4 shows a screenshot of Connections where the user can see the recovery progress based on provided answers on daily or weekly surveys.

Feature #3: Tracking your progress

In line with the previous topic, a smartphone application is also capable of showing progress within a treatment or therapy that's being followed. Heffner et al. (2015) mention that the ability to track progress, is one of the 10 most popular features of their piloted smartphone application for smoking cessation. These features that have their roots at Cognitive Behavioural Therapy, tend to be most used. E.g. Connections (CHESS Health, 2019) shows graphs of the overall recovery based on self-assessments. With the Journey, the user decides their own "path" to follow (literally and figuratively). The application shows progress on a chosen path and stores the achievements and insights (e.g. setting a alarm helps me completing my goals) for later reference. Figure 5 shows a screenshot of The Journey that represents progress by representing a path.

Feature #4: Virtual companion

The virtual companion guides the user through the application. The companion could help with choosing next actions in the application and explains tasks to perform with the app. The Journey and Pocket Skills both have a virtual companion, though with a different integration. The Journey does not have a conversational agent as Pocket Skills has. The application does not support self-written input to be used by the companion, though the companion can perform "predefined" actions based on selected options (e.g. provide you a video with relaxing music because of selecting the option in a menu that says "I feel too much"). Figure 6 shows a screenshot of The Journey with one of the actions and explanations provided by the companion. Figure 7 shows a screenshot of the Pocket Skills application where the conversational agent provides therapy.

Feature #5: Peer support

Connections enables users to ask and provide peer support to tackle their substance use disorders. Naslund et al. (2016) mention that people who suffer from serious mental illnesses, report to benefit from interacting with peers online. New insights can be gathered, challenges can be discussed and hope can be provided. The downside is that the information can be misleading, offending and could confuse the patient. Figure 8 shows a screenshot of Connections where users can ask and provide peer feedback to others.

Feature #6: Emergency button

The Journey and Connections each provide an always visible emergency button. The functioning of the button is different. The emergency button of The Journey provides the user tools that can be helpful for difficult situations. The emergency button of Connections provides the user with a method to ask for (professional) support. Aguirre et al. (2013) mention that for suicide prevention and other life-threatening situations (e.g. sexual violence and child abuse), a crisis hotline is essential. Figure 4 shows a screenshot of how the (red) emergency button is prominently presented in Connections.

2.4 Conclusion

Background information on COMET is presented. State of the art on the after-therapy gap is discussed, as was found in the preliminary research project. For hospitalized patients, especially the 30 day period after discharge has been found of importance. The found information supports the existence of the after-therapy gap and the assumption can be made that the found results also apply to patients without hospitalization.

Related work has been presented including a research on the usage of COMET as self-help intervention. Although the latter intervention of COMET has not been found suitable as a stand-alone self-help tool, the topics of its discussion can be used as input for the current project. It has been suggested that (partial) involvement of mental health care professionals might be beneficial for an intervention, as is also found in the preliminary research project. Subsequently the state of the art on technology for treatment, aftercare and self-help has been presented. For each of the latter three topics, technology-based interventions are found promising. At last, related work on smartphone applications and their notable features for use in mental health care are discussed. The latter state of the art and the related work can be used as inspiration for the smartphone application that will be designed in the remainder of this project.

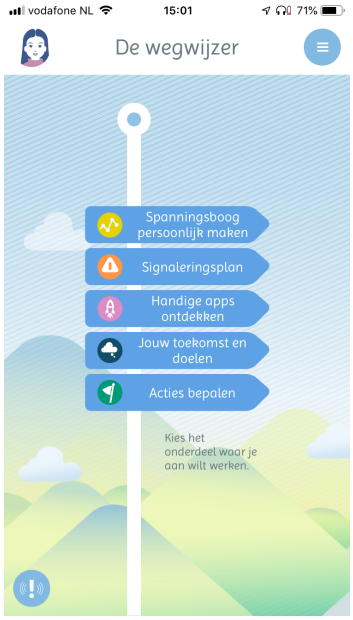

Figure 3: Modules to work on
Presented app: The Journey
Source: Apple App Store

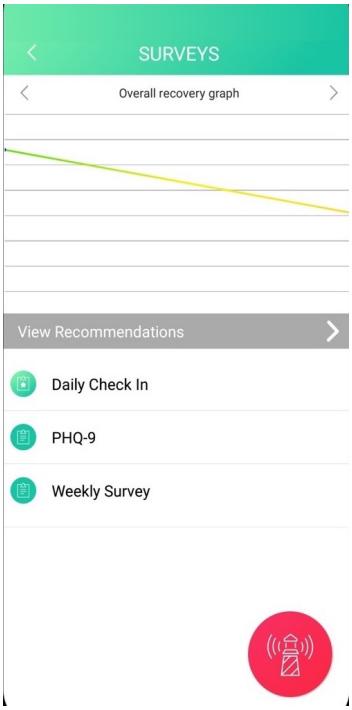

Figure 4: Monitor by answering surveys
Presented app: Connections
Source: Apple App Store

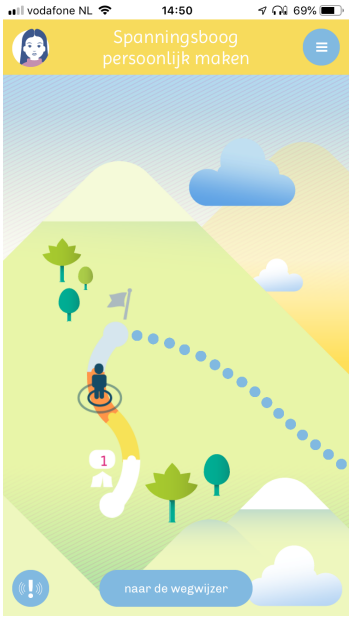

Figure 5: Progress visually presented
Presented app: The Journey
Source: Apple App Store

Figure 6: Virtual companion
Presented app: The Journey
Source: Apple App Store

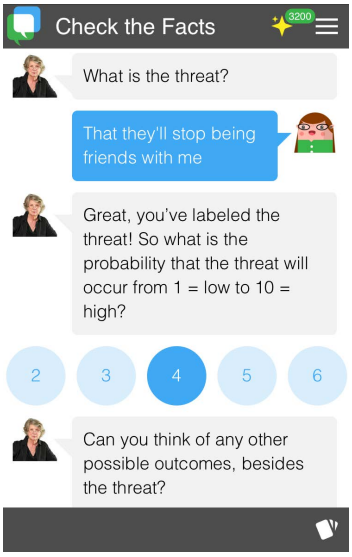

Figure 7: Conversational agent
Presented app: Pocket Skills
Source: (Schroeder et al., 2018)

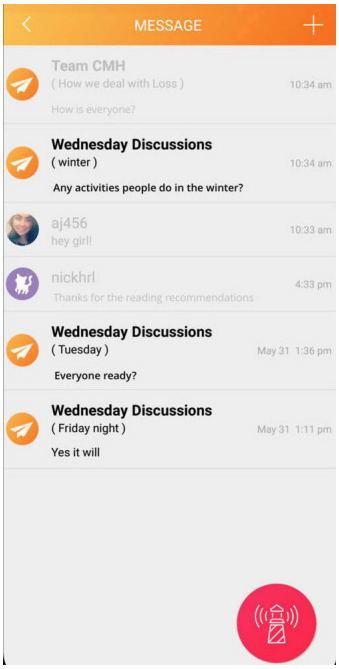

Figure 8: Peer support by messages
Presented app: Connections
Source: Apple App Store

3 Professionals about COMET

This chapter discusses the design and results of interviews with professionals who have experience with COMET (or a derivative of the latter). With the results of the interviews, the requirements for the to be designed application can be defined. The to be designed application will be further discussed in Chapter 4.

3.1 Goal

The goal of the interviews is to gather insights and experiences from mental health care professionals who use (a derivative of) COMET. With this information, a set of requirements can be created that are to be used for the creation of the first prototype of a mobile application that could support patients who follow or have followed COMET.

3.2 Participants

Participants are searched for that are familiar with, have followed or are following (a derivative of) COMET. All participants are mental health care professional. There is not searched for participants with a specific role in the mental health care organisation (e.g. psychologist or social psychiatric nurse), though the role is noted as result. Participants from two different Dutch mental health care organisations are included. Professionals are included from GGNet Doetinchem and from HSK Hengelo.

3.3 Method

In order to achieve the intended goal, interviews are held with the participants. These interviews can be held individually as well as in a group, depending on the preference and availability of the participants. The interview will be performed semi-structured to enable the interviewer to ask specifically for topics of interest and to permit also the discussion of (new) topics that either the interviewee(s) or interviewer ought of importance. The prepared set of questions for this interview is included in Appendix A. The interview will be held in a closed room to enable the participant(s) to speak openly and to prevent any disturbance. The interview will be (audio-)recorded.

The audio recordings are transcribed, anonymized and analysed. For the analysis, the "onderzoeksslang" methodology by Boeije (2014) is used. The result of this analysis will lead to a list of requirements for the to be designed prototype of a mobile application. These requirements are prioritised by making use of MoSCoW (Clegg & Barker, 1994). Section 3.5.4 goes into details on the analysis of the data by using the latter methods.

The results will present short summaries of the answers participants provided in the interviews. The results are discussed to eventually derive the requirements. For every requirement, also a (translated) citation that supports the requirement will be included. These requirements are prioritized by using MoSCoW and then mapped to the persuasive design model (Oinas-Kukkonen & Harjumaa, 2009). The latter will be further discussed in the discussion, Section 3.7.

3.4 Materials

The following materials are required to perform the interview with the professional.

- Zoom H1 - microphone
- Information letter
- Informed consent form
- Template with interview questions

3.5 Procedure

The procedure of the interview will be explained, including how the participants are recruited and how the data is analysed.

3.5.1 Recruiting participants

As mentioned earlier, the participants are mental health care professionals from GGNet Doetinchem and HSK Hengelo. The researcher got referred by other mental health care professionals from GGNet Doetinchem or HSK Hengelo. Each participant has been contacted in person, by phone or by email. An appointment is made with each of the participants and an email address is asked if this was not known yet. Depending on the chosen method, the information letter (Appendix B) is sent before or after the first contact moment. I.e. if the first contact moment has been in person or via a phone call, the information letter is sent after the appointment is made. If the first contact moment has been via email, the information letter is sent as attachment of this first email.

3.5.2 Introduction and signing the informed consent form

In an introduction, the participant is informed in short what the goal of the research is and what kind of questions are asked. In case the participant did not read the information letter yet, this time is now provided. Any questions from the participant about the information letter and the informed consent form, will be answered. After signing the informed consent (Appendix C), the interview will commence.

3.5.3 Activity #1: the interview

The interviewer will use a prepared set of questions as base (Appendix A). After the Zoom H1-microphone has been started to record the session, the interview can start. Since the interview is semi-structured, the interviewer and interviewee can deviate from the prepared set of questions. This enables them to discuss matters that are of interest but were not included in the prepared set of questions. This interview will take around 30 minutes.

3.5.4 Analyses of the data

The audio recordings are transcribed and anonymized. For the analysis of the data, the "onderzoeksslang" methodology by Boeije (2014) is used. This methodology consists of three types of coding that are performed in the respective order: open coding, axial coding and selective coding. One coder is involved which is the author of this project. With open coding, the transcript is scanned for relevant information and labeled accordingly. With axial coding, the coded fragments are reordered and restructured to create a more dense coding scheme with linked fragments. With selective coding, the most important findings are derived, interpreted and presented as requirements in Section 3.7.1.

The most important findings, the requirements for a mobile application for COMET, are prioritised by using the MoSCoW methodology (Clegg & Barker, 1994). For every requirement also a (translated) citation that covers the requirement, will be included. MoSCoW knows the following priorities:

- Must Have (MH): these requirements must be included in the project
- Should Have (SH): these requirements would be of significant added value but, if necessary, can be missing
- Could Have (CH): these requirements are nice to have but less important and impactful.
- Won't Have (right now)(WNH): these requirements are nice addittions but are not included (right now).

The above describes the analysis of the interview and therefore the analysis of the raw data, the results, of this interview. This is further discussed in the discussion (Section 3.7). In the results (Section 3.6), a short summary will be presented for each of the discussed topics during the interview.

3.6 Results

In total five participants from two different mental health care organisation (two from GGNet Doetinchem and three from HSK Hengelo) have participated with the interviews. Four participants are psychologists; one participant is social psychiatric nurse. In total, three different applications of COMET are found and presented in Table 1.

Application	**Number of participants**
A derivative of COMET in personal setting	3
A derivative of COMET in group setting	1
COMET as designed in group setting	1

Table 1: Participants sorted by different applications of COMET

Open coding of the interviews resulted in nine main codes and 305 sub-codes. For an overview of all codes after open coding, see Appendix N. With axial coding, the coded fragments are reordered and restructured to create a more dense coding scheme with linked fragments. With axial coding, a total of eight main codes and 174 sub-codes are found. For an overview of all codes after axial coding, see Appendix O. In the following paragraphs, each of the discussed topics will be summarized. The topics are based on questions used during the interview (see Appendix A); they are presented in the same chronological order.

Usage and experience:
The above presented information is based on the answers provided on this topic. Additional information is presented. Patients are never solely treated for low self-esteem since it is not a diagnosis presented in a DSM (Diagnostic and Statistical Manual of Mental Disorders) and therefore not reimbursed by the insurance companies. COMET is used as part of or as addition to another therapy.

Advantages of COMET: An advantage is the experiential way of working. The patient experiences others being respectful to their problem and experiences how specific elements of the training can help them with their self-esteem. The impact of the training is acknowledged, whereas patients are most often more self-assured when finished the training. The training is experienced as empowering, primarily focusing on a patient's positive qualities. The integration of different elements (e.g. music) is experienced as positive.

Disadvantages of COMET: On the downside, COMET is not sufficient for patients with severe problems. Damaging experiences defining the self-esteem require additional attention. COMET focuses mostly on one's positive qualities; damaging experiences will only be minimally discussed. Especially being used in a personal setting combined with a different therapy, a shortened (predefined) version of COMET would be beneficial. Additionally, not all elements of COMET are applicable to all patients. An example is given where music is not supporting a patient's self-esteem. The original workbook (if) provided to the patient, is experienced as though. Additionally, comprehensibility of the workbook might depend on the received education.

During therapy - Using a smartphone application for COMET: The attitude towards using a smartphone application during COMET is positive. It can support the patient with collecting positive moments that add to their positive self-esteem. It can help, motivate and remind a user to work on their assignments and self-esteem. An experienced issue: assignments are not actively worked on during the week. Assignments are done last-minute, just before the session. Additionally, an application could be a guide for the assignments. The therapy could be improved by making it more playful, more fitting to needs of the patient (e.g. altering speed and amount of content that is provided) and having improved integration of elements of COMET (e.g. supporting music can be searched for and listened to; positive memories can be recalled by viewing photos). Though and as found in earlier research (Loos, 2019), the app would not be a replacement of professionals. It can be an addition to therapy, used as a tool.

During therapy - When a smartphone application will not be experienced beneficial: The situation of the user should be acknowledged; content and text should be presented with a neutral to motivating tone. If the text is too positive or too negative, the app will only be counter-intuitive. As mentioned above, the app should be presented as a tool supporting the therapy instead of suggesting to replace it. The app should not be promoted in progressed crisis; it's not expected to be supportive in these situations. Though, it should provide ways to easily contact people who are able to provide this support. Furthermore, the app should not take away the responsibility of the patient. The patient is responsible for their own well-being. Dependency on the application should be prevented; the patient should not get the feeling that the availability of the application is the main reason for doing well.

After therapy - The gap between being in therapy and having finished therapy: The opinions on the existence of the after-therapy gap between therapy and having finished a therapy are mixed, though mostly in favor. The existence of the gap is recognized; the transition from following a therapy to having finished a therapy can be harsh. In case of working with a group, losing that group can be experienced as difficult. Sometimes patients try to stretch therapy by mentioning new difficulties. It might depend on the severity of complaints of the patients, if finishing therapy is experienced as difficult. Patients receiving more specialized mental health care often experience this as more troubling. To limit harsh transitions, the intensity of therapy moments could be lowered in final stages of therapy. Having a possibility for contact in case necessary and a follow-up session 3 months after the last appointment, are also supporting measures.

After therapy - Using a smartphone application once having finished COMET: The app could be used to recall what is earlier treated and motivate to keep practicing. The attitude towards using an app after therapy is positive; it could (re-)activate what is previously learned in therapy. The provided content after therapy should be based on content created during therapy. A summary could be provided with all learned lessons. Additionally, it might support the patient with monitoring oneself and support with preventing relapses. At both mental health care organizations, a relapse prevention plan is created. This could be incorporated in the app.

After therapy - When a smartphone application will not be experienced beneficial: No new comments are made apart from the potential beneficial influences of knowing and having fellow sufferers (from group treatment). They are more important than earlier considered and can't be replaced by an app. Comments mentioned for "During therapy - When a smartphone application will not be experienced beneficial", also apply.

3.7 Discussion

Results are interpreted to define requirements by using the MoSCoW-methodology, followed by relating the requirements to the persuasive systems design-model. Limitations of the current results are discussed before pursuing to the conclusion.

3.7.1 Requirements based on the results

Defined requirements, including the source, an explanation and a supporting quote, are presented in Table 2. These requirements will be used for the Application Design (Chapter 4) of a first prototype of the mobile application.

Priority-code (MoSCoW)	Requirement	Source	Explanation	Quote
MHRQ1	Uses original content and theory as base for the content of the application.	Foundation of this research	The application is an extension of COMET, therefore using the original content. It should encourage translating learned lessons in day to day live.	Participant 2: The training should always, of course, be as it is and the steps for COMET should be according to the methodology. But that you in between add uh or create some things that make it something of your own with some images.
MHRQ2	Motivates to work on (homework assignments for) self-esteem (problems) during the full week instead of only during therapy sessions.	Interview	A common experience is that patients work on their assignments only moments in advance of the next session. By motivating users to work on their self-esteem during the week, the training might become more effective.	Participant 4 (combined quotes): If people get reminders, that's when I notice. To prevent them that they do it just before the session; to really stimulate them during the week. That's difficult. People do their assignments, but just moments in advance.
MHRQ3	Keeps motivating, reminding and reactivating users about learned lessons, also when therapy is finished.	Interview	Without further attention on the issue, it is common to fall back to previous behaviour and thoughts. The application should nudge the user to keep working on their self-esteem, also when the therapy is finished.	Participant 4 (combined quotes): ... which part was most valuable for you? Lets walk through it one more time. You know. That you really see that part, with explanation, see what you have written before.
MHRQ4	Flexible in when and how content of COMET is shown.	Discovering field of work	COMET has multiple applications (i.e. in a group, individually or only parts are used). The mobile application should provide support for each of the applications. This requirement is based on the different discovered applications of COMET.	-
MHRQ5	Is a personal tool of the patient; no data is shared with professionals (unless intended by the patient).	Interview	The application is a tool for the patient's use. Collected data is for personal use, only to be shared by the patient.	Participant 2: No no no, the app should be really something of the client. Their thing to work with. It is more like a tool, a dexterity, a thing, yes.
SHRQ1	Should integrate with the different parts of the therapy.	Interview	The app should integrate with the different parts of the therapy. I.e. music that is used for bringing up the positive self-esteem or a picture of an event that is associated with the positive self-esteem, should be easily accessible.	Participant 1: To make it easier to integrate in your, in your self-perception, that it is different then you always have thought, that it might be handy that you now have tools available that make that even easier than before.
SHRQ2	Keeps the patient responsible for their own behaviour and actions.	Interview	Should not make patients dependent on the app and should not take away their responsibility. Information and suggestions can be provided but decisions are to be made (independently) by the patients.	Participant 5 (two combined fragments): Yes they should not uhm, they actually should not take over the responsibility of the client... that the app does not get the function of that because the app is there, uh, things are going well with me.

SHRQ3	All content is verified and substantiated by professionals.	Interview	All content should be verified to ensure that the correct information is shared with patients. Also to ensure adoption of therapists who recommend the application to their patients.	Participant 4 (when talking about an initiative of a web-page about depression): And he said: "I came out of my depression because I used XTC once and that made it easier for me to reach my negative thoughts. Uhm. And it was way easier for me to openly talk about it with somebody." Uhm. But it was actually presented in such a way that, he used XTC and then his depression was gone. Then I thought, that's super dangerous, and it was only one of six examples I believe but this is not what I want to recommend to my clients.
SHRQ4	Text is simple, short, neutral, occasionally motivating.	Interview	The used text should be applicable to all users with different academic backgrounds. The text should be simple and short so that it can be understood by anyone. Furthermore, the used text should have a neutral tone and can occasionally be motivating. By presenting the application too positive, it can lose credibility.	Participant 3: I think that if the assignments are presented with, uh, what, I think that in psychology happens more often, with too expensive words, that people will be dropping out. So that it is simple, not, not uh childish but just simple. Just pure.
SHRQ5	Text should acknowledge the situation of the user and that is is not an easy situation.	Interview	The application should not present the situation of the user as a simple problem. For the user the problem has significant influence on daily functioning. It should acknowledge that tackling the problem can be challenging, just as the user experiences it.	Participant 1: That is a bit like a pat on the back. If somebody is in complete despair, that doesn't work. So I think that, anything that uhm suggests that it is a simple thing, that is what you should prevent.
SHRQ6	Is easy to get started with.	Interview	The user does not need any high education for using this tool. By providing examples in the app of e.g. what a positive self-esteem may exists of or by providing templates on how to report on a positive moment, it may be easier to get started with the app and its content.	Participant 3: ...it should be recipient. That it is easy to get started with and not that people already think, "oh alright, what am I starting with". Because I note that often when starting, people say, "Oh but that's something I'm not able to do".
SHRQ7	Should help the patient with monitoring during and after completion of therapy.	Interview	The application should support the user by monitoring oneself. Both during and after completion of the therapy. It should help the user with reflecting on the current state of self-esteem and provide suggestions of possible actions.	Participant 4: Maybe that you sometimes are reminded, "hey, are you still doing fine?". Recall what you, uhm, have learned the past time for example, right. So that the app perhaps also sends a notification, uh, "Are you still working on the topic?".
SHRQ8	The tempo of (parts) of the training can be defined manually.	Interview	A benefit of a personal tool is that users can decide when to work on therapy content. Difficult parts can be repeated, additional information can be read or the user can continue to work on next parts.	Participant 3: That are the advantages if they would have an app that they can read that and uh, they can read the pieces at their own pace. Because if I give them a worksheet, I am deciding the pace.

SHRQ9	Should motivate to perform / use behaviour the patient experiences as being supportive.	Interview	The app should motivate to use behaviour or perform actions that are earlier found beneficial. Something stored in the app should be recited later. E.g. reports of positive events or actions that positively influence self-esteem.	Participant 1: Make every day a picture of yourself, but only when you feel really good. Look in the mirror and make or make a selfie. Not made, not with a grimace but that you are really feeling, I am making a selfie. Yes. And look back to yourself on the moment that you feel bad. And think about what made you feel so good.
CHRQ1	Flexible in when and where the application is used.	Interview	A mobile application can add flexibility to when and where the user works on their self-esteem. All required information is in close reach and no additional materials are required (e.g. a book, an instruction paper or a diary).	Participant 2: We always promote that, don't limit yourself to the 1.5 hour but spend daily at least half an hour on this topic, because then it will become more solid. It is really about learning new behaviour. And what else would make it easier than grabbing your phone at any place during the day, compared to this book that you might have on the shelf.
CHRQ2	Support and help is easily found.	Interview	If the user needs professional help, the correct information should be easy to find. Having the correct information accessible in the app, could help users in difficult situations or when relapsing.	Participant 4 (context: when a patient is not doing well): If things are going really bad with somebody... Yes then you mostly want to stimulate. So I think that it should always show something like uh, ask for help in case necessary.
CHRQ3	Is personified to wishes and likes of the user.	Interview	The content that is used (e.g. memories of positive events) should relate to the user and not be generic content. This also accounts for the appearance of the application (e.g. by using preferred colors of the user).	Participant 2 (combined quotes): Yes I think that when you can compose something yourself, it becomes more something of you. I becomes more your app. You also notice that with telephones with your own background and color thing and everything uh. That, I believe, that makes it more appealing.
CHRQ4	Shows the progress of therapy and assignments.	Interview	The user can be shown their progress through the therapy and view a summary of previously completed assignments. This summary can be created while using the app during therapy, instead of writing the summary at the end of the therapy.	Participant 4 (combined quotes): Yes that an, that an, that the app maybe can generate a summary from the assignments that you may have done earlier, that you get a summary or something alike... that you can easily review for example. That is something we often do at the end of a therapy, making a summary of everything that somebody has learned.
WNHRQ1	(Not be) a self-help intervention that replaces current therapy and therapists.	Interview	The severity and comorbidity of disorders are dependencies that influence the self-help tool's success. The intention in this project has always been to make a supporting tool for a current therapy.	Participant 2: Yes I am thinking about. Because an app, of course, will never replace uh, uh, the group interaction that I was just talking about.

Table 2: Requirements based on interviews with professionals

Legend: MHRQ = Must have requirement, SHRQ = Should have requirement, CHRQ = Could have requirement, WNHRQ = Won't have requirement

3.7.2 Translation to the persuasive systems design (PSD) model

The requirements can be mapped to the persuasive systems design (PSD) model, a model for analysis and design of persuasive systems (Oinas-Kukkonen & Harjumaa, 2009). Oinas-Kukkonen and Hajumaa defined persuasive systems as "computerized software or information systems designed to reinforce, change or shape attitudes or behaviors or both without using coercion or deception" (Oinas-Kukkonen & Harjumaa, 2008). According to Onias-Kukkonen and Hajumaa (2009) there are three successful possible outcomes of persuasive systems: 1) reinforcement of current attitudes and behavior, 2) changing how an individual responds to an issue, and 3) shaping (new) patterns for handling situations. The PSD-model knows 28 design principles for persuasive systems which are categorized in four main categories: primary task, dialogue (supporting users in working on their goal or target behaviour), system credibility, and social support (motivating users by using social influences).

The goal of this project is to create an information system that reinforces what has been taught during therapy. It can be seen as a persuasive system. The system will not change an individual's response or shape new patterns, it will support and reinforce what has been taught. Most requirements from Table 2 can be linked to one or more of the 28 design principles of the PSD-model. This is represented in Table 3.

In total 12 of 24 design principles are found with the following distribution: four belonging to primary task support, four to dialogue support, three to credibility support and one to social support. The involved design principles will be shortly explained (based on (Oinas-Kukkonen & Harjumaa, 2009)) and are the following:

- Tailoring (Primary task): Presented information will match the needs, interests, personality and any other factors that are relevant for the group.
- Tunneling (Primary task): The system guides the user through the system by providing relevant content at the right time.
- Self-monitoring (Primary task): Keeping track of one's status or performance.
- Personalization (Primary task): The content appeals to the user and uses provided information to make it more personal.
- Reminders (Dialogue): Helps with achieving goals or target behaviour by reminding.
- Suggestion (Dialogue): Presenting fitting suggestions at fitting moments.
- Liking (Dialogue): By having a system that is aesthetically pleasing or uses methods that make it more pleasant to use, the system is likely to be more persuasive.
- Similarity (Dialogue): Systems that are more easy to relate to, are more likely to be persuasive.
- Trustworthiness (Credibility): A system that is presented (and experienced) as being trustworthy.
- Expertise (Credibility): By incorporating expertise, the system could feel more credible.
- Real-world feel (Credibility): A system that involves the people behind the application and the people involved with the therapy, will feel more credible.
- Normative influence (Social): Including positive peer pressure to achieve goals.

As seen in Table 3, most requirements can be mapped to the PSD-model. This implies that the requirements are well-fitting for the persuasive system to be used. The requirements will be used for designing a prototype of the application for COMET; this will be described in Chapter 4.

Req. (code)	Design principle of PSD-model	Explanation
MHRQ1	Trustworthiness (Credibility) Expertise (Credibility)	By using original content of COMET, it becomes more easy to make the system feel more trustworthy and belonging to the original training.
MHRQ2	Reminders (Dialogue) Suggestion (Dialogue)	The application can remind and suggest a user to perform assignments (during the week).
MHRQ3	Reminders (Dialogue)	Used to repeat and reactivate what has been taught before.
MHRQ4	Tailoring (Primary task) Tunneling (Primary task)	The content can be provided to each application of COMET while maintaining freedom of how and when it's treated.
MHRQ5	Liking (Dialogue) Normative influence (Social)	The user is not forced to share how they use the app. Though if desirable, content can be shared with e.g. their therapist.
SHRQ1	Liking (Dialogue)	For ease of use and simplicity (and making it more fun) to work on COMET, each core element of COMET should be included (e.g. music)
SHRQ2	-	(Can't be linked to PSD)
SHRQ3	Trustworthiness (Credibility) Real-world feel (Credibility)	By having content double-checked and verified by professionals, the app should feel more trustworthy and more easily match the real world.
SHRQ4	Similarity (Dialogue) Liking (Dialogue)	By having text simple, short and neutral (not too difficult, too long or too positive) it will become more easy to relate to.
SHRQ5	Similarity (Dialogue)	Same as for SHRQ4
SHRQ6	Similarity (Dialogue)	Examples are provided the user might be able to relate to. Simultaneously, they make the application more easy to use.
SHRQ7	Self-monitoring (Primary task) Personalization (Primary task)	The app monitors the state of the user and could suggests self-provided activities to help the user in the current state.
SHRQ8	Similarity (Dialogue) Liking (Dialogue)	The user decides the pace, therefore deciding when to continue to a next part of the training. The system better represents the patient.
SHRQ9	Personalization (Primary task)	Suggestions are based on what users reported earlier in the app.
CHRQ1	Tunneling (Primary task)	The app tunnels the user to the best next step in the content, while maintaining the freedom for the user to choose otherwise.
CHRQ2	Normative influence (Social) Expertise (Credibility)	By having the possibility to easily contact professionals, you keep the expertise principle and social support by normative influence.
CHRQ3	Personalization (Primary task)	Inclusion of wishes and likes is a form of personalization.
CHRQ4	Reduction (Primary task) Tunneling (Primary task)	By presenting content in separate modules, COMET is split up in smaller parts. It enables to see the current status, the previous and next steps, and it enables to see made progress.
WNHRQ1	-	(Can't be linked to PSD)

Table 3: Mapping the found requirements to the PSD-model

3.7.3 Limitation of the current results

Limitations are involved with the presented results. The following limitations have to be taken into account and will be elaborated on:

- Low amount of participants (n=5)
- Three types of applications of COMET

The participant base consists out of a low amount (n=5) of participants. A larger number of participants could have led to more saturated results. Expected results would be additional requirements and the importance of each of the requirement could more easily be estimated (by counting how often the requirement is mentioned). Though, in total three types of applications of COMET are included, being 1) COMET according the traditional format of Korrelboom, 2) Parts of COMET being used within a group setting and 3) Parts of COMET being used during 1-to-1 sessions. By having included participants who are familiar with one or more of the above applications of COMET, without the expectation of having missed a user group, the assumption can be made that the most common and important topics are found and discussed. Additionally, having these different applications of COMET shows that a tool to support COMET, should provide flexibility in the way it's used. It should fit each application of COMET. I.e. the tool should enable users to skip modules that are of less interest, but also support those users who follow traditional COMET where all modules are used.

3.8 Conclusion

Based on the results, two sub research questions can be answered. They will be answered individually, starting with:

What are the current problems within the COMET-program according to the mental health care professionals? ***(SRQ1)***

The current problems relate to keeping patients actively involved in the therapy during the week (assuming therapy is provided on a weekly base), the written content does not fit all patients and the pace of the therapy is maintained by the therapist instead of by the patient. The gap between following a COMET-program (or similar) and having finished the program is recognized. The attitude towards using a mobile application during and when having finished COMET (or similar) is positive. During therapy, the mobile application can support and guide users through the content and remind them to work on their self-esteem. Once therapy is finished, the application can support the user with monitoring oneself and support in reactivating (and summarizing) what is learned before. In accordance with the preliminary project (Loos, 2019), a supportive tool for COMET would rather be an addition to a current therapy than it would be a standalone intervention and thereby replacement of the therapist.

Also the second sub research question can be answered:

What are the requirements for developing a supportive smartphone application for the COMET-program, according to the mental health care professionals? ***(SRQ2)***

Nineteen requirements are found for a supportive smartphone application for the COMET-program. They differ from: "Motivates to work on (homework assignments for) self-esteem (problems) during the full week instead of only during therapy sessions." **(MHRQ2)** to "Text should acknowledge the situation of the user and that it is not an easy situation" **(SHRQ5)**. Seventeen of the requirements could be mapped to the PSD-model which suggests that the requirements are well usable for the design of a persuasive system, a supportive smartphone application for the COMET-program.

4 Application Design

Previously gathered information is combined to the design of the prototype of a mobile application for COMET. First the target group is introduced by means of personas followed by a description of the stakeholders. The content of the application will be discussed, followed by a description of the realisation of the latter.

4.1 Target group and personas

The target group consists of people who are suffering or have suffered from low self-esteem and follow(ed) a treatment from a mental health care organization, including COMET. The application can be used in the original 8 weeks COMET-program, though is also usable for therapies that incorporate parts of (or is similar to) COMET.

Two personas are included, differing in intensity of mental health care they receive: BGGZ (Basis geestelijke gezondheidszorg, general mental health care) and SGGZ (Gespecialiseerde geestelijke gezondheidszorg, specialised mental health care). The personas are based on the interviews from Chapter 3. The goal of including these personas is to show the diversity of the people who follow a (derivative) of COMET. The two fictional personas are John and Sarah[1], both patient at a fictional mental health care organization, respectively Manuta and Pateni. John receives mental healthcare belonging to the BGGZ. Sarah receives care belonging to the SGGZ.

Figure 9: John

Persona 1: John
Male - 35 years - patient at Manuta
Hobbies: sports and creating paintings
Story: John lives together with his girlfriend Linda. Due to external circumstances he lost his job repeatedly in the past years. Currently unemployed, he receives a reimbursement for basic needs until he finds a new job. At home he takes care of all household chores, to support his girlfriend who has to financially support two persons. Due to low success in his career, John suffers a minor depression and a low self-esteem. He thinks he is worth nothing and is only a burden to his girlfriend. Though, he agrees that he is good in creating high quality paintings. He follows the original COMET-training every Wednesday afternoon.

Figure 10: Sarah

Persona 2: Sarah
Female - 23 years old - patient at Pateni
Hobbies: playing the piano, doing yoga
Story: Sarah is a student Advanced Technology. Two years ago, she followed a treatment (with hospitalization) to learn to cope with her borderline personality disorder. Although her last day has been a year ago, she is scared others think different of her. Due to borderline she sometimes responds more intensely compared to others. Therefore she does not show her positive qualities, while she recognises to have them. She plays regularly the piano for clients of an elderly care organisation. Though, she feels worth less compared to others because of borderline. She follows the original COMET-training every Friday afternoon.

[1]Pictures originate from Pexels.com and are made respectively by Heinz Klier and Bea Lebrun. The presented persons on the pictures are not actual patients.

4.2 Stakeholders

Two direct stakeholders are involved with this application. Direct stakeholder has as meaning: having a direct influence on the application. E.g. a patient or a mental health care professional who provides the training. Those indirectly influenced, e.g. family of the patient, the mental health care organization where therapy is provided or the health insurance who pays for the therapy, are not taken into account. The purpose of this project is to create an application to support the patient. It is assumed (and limited to scope the project) that the following two direct stakeholders are of most importance.

4.2.1 The patient who follows the therapy

The patient is the person following therapy and is also the end user of the application. The patients following or who have followed (a derivative of) COMET, are the target group of this application. They are elaborated on in the previous section.

4.2.2 The professional who provides the therapy

The professional who provides the COMET-training to the patient. This can be both in a group as well as on an individual base; the original COMET-protocol can be followed or a derivative (or parts) can be used. The professional is a direct stakeholder; without support of the professional, the application will not be introduced, proposed and used during the therapy and when the latter is completed. A quote that supports this statement is given during the interviews, as described in Chapter 3:

Participant 4 (when talking about an initiative of a web page about depression): *And he has said:"I came out of my depression because I used XTC once and that made it easier for me to reach my negative thoughts. Uhm. And it was way easier for me to openly talk about it with somebody. Uhm." But it was actually presented in such a way that, he used XTC and then his depression was gone. Then I thought, that's super dangerous, and it was only one of six examples I believe but this is not what I will recommend to my clients.*

4.3 Content of the application

The possible content and features of the application are described. This section describes and thinkers on ideas on the latter, without going into too much details. Due to the thinkering-process, these ideas are susceptible to change. Sketches are included to illustrate the ideas. The actual realisation and descriptions of eventual choices, is elaborated on in the next section.

4.3.1 Inclusion of original COMET-content

Note: according to the requirements described in Table 2, the application should be flexible in when and how content of COMET is shown (MHRQ4). This to also fit derivatives of COMET or therapies that use parts of COMET. Since the original format of COMET is the most extensive and intensive form of COMET, this will be used as a base when describing the application design. Where necessary, the application for other forms of COMET will be explained.

The original COMET-content is the foundation for the application. Therapy is not replaced by the application, it expands (e.g. making it easy to collect illustrations supporting self-esteem) and extends COMET (e.g. re-using what is collected during therapy for maintaining effects and relapse prevention). This is in line with WNHRQ1

from the requirements from Table 2. The (elements of the) training are more elaborated on in Section 2.1 and the protocol for the professional (Korrelboom, 2011a). This section focuses on the inclusion of the original COMET-content in the mobile application.

COMET consists of eight sessions, collectively discussing seven steps. They are the base for the app. The patients who follow or followed COMET should be familiar with the sessions and steps, increasing trustworthiness. The sessions are presented as separate modules to highlight the individuality of each of them. Additionally, by having eight separate modules, the user has the possibility to follow only parts of COMET or choose a different order. A sketch of how modules are presented is shown in Figure 11.

The original workbook for COMET (Korrelboom, 2011b), to be used by patients during training, explains each session and step of COMET individually. The workbook is used as inspiration for the application. Each session can include multiple steps. Each session contains the following elements:

- Explanation of the session and of each individual step(s), including examples.
- Homework (reading) assignments: read until the current chapter.
- Homework (do) assignments: e.g. describe your negative self-esteem. The workbook explains the assignment and, if necessary, provides the necessary forms.

The original workbook (Korrelboom, 2011b) does not include white-space (except for the unintended white-space) that can be used for writing answers on assignments. It does explain extensively, with examples, the content of each session and step. It provides instructions for each step and for preparation of the next session. It provides forms that have to be used in some of the sessions, though only one of each is included requiring the user to copy them. The workbook has the look and feel of a stripped-down version of the protocol for professionals, specified to the patient. It is observed and experienced by the researcher that it is does not invite to write down notes in the workbook, therefore not enabling the user to look back on their previously provided answers and notes. A separate notebook would be required.

Inspired by the latter, the app will provide a similar experience as the workbook, including the possibility to provide answers on assignments. Each session is presented separately; the user is not required to follow a predefined order. Videos from VGCt and Gedachten Uitpluizen (e.g. (VGCt & Gedachten Uitpluizen, 2018)) and explanatory texts are provided to describe the content of the sessions. Homework is presented in a checklist and, where applicable, editable space is provided for answers on the assignments. If forms are required, an editable instance will be available. Finished assignments are checked of the checklist. A sketch of the latter is shown in Figure 12 and Figure 13.

The above describes how the original COMET-content will be included in the application. The next section describes the expansion and extension of COMET.

Figure 11: Each of the sessions are presented individually

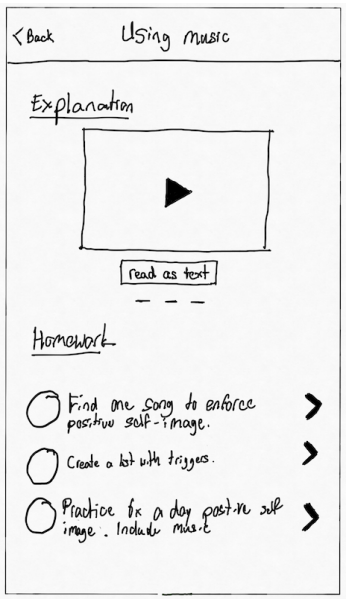

Figure 12: A checklist is shown of the homework assignments

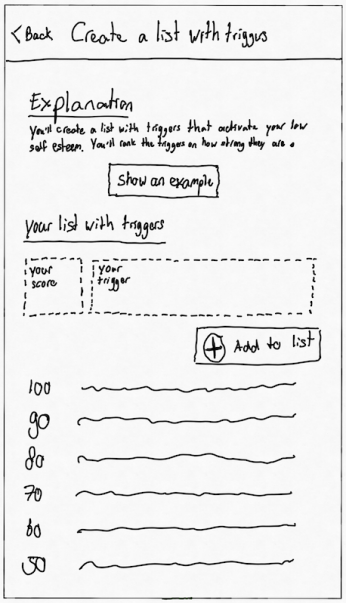

Figure 13: Answers can be provided and will be stored in the app

4.3.2 Expanding and extending COMET

This section describes the expansion and extension of COMET with a mobile application.

Originally, COMET is intended to be used in a group for a length of 8 weeks. There are different applications of COMET known, as described in Chapter 3. COMET can be used in a group or individually; parts or the full-length training can be followed. To tailor the app to how COMET is used, the app asks the user a few questions during first usage. The answers adjust the layout of the application, ensuring it to fit to the user. A sketch of the latter is shown in Figure 14.

Whereas a book can only provide text, a mobile application can use interactive media. Think of (animated) videos, music and games. Videos are used to provide explanations and examples. Additionally, the transcripts of the videos are provided, giving the user the possibility to read the content of the video. Users choose their own method of receiving information. Additionally, rich media can be used in assignments. Pictures, videos and audio fragments can be added to reports supporting the positive self-esteem. A sketch of the latter is shown in Figure 12 and Figure 15.

By using the application, information is provided by the patient that can be reused to (re-)activate the patient. E.g. one of the assignments is to write stories to support the positive self-esteem. The same positive stories can be presented to the user (by push notifications) to recall the positive experience on a later moment. Second example, in one assignment patients need to write down all positive qualities about oneself. The answers could be provided in a summary of the training; it will show a (potentially growing) list of positive qualities. Persons with low self-esteem are known to highlight one's bad qualities. The app could support the user by recalling one's earlier provided positive qualities. A sketch of the latter is shown in Figure 17.

The application will incorporate each element of COMET. Take music for example. The user can use music services to find and play music, for example by using Spotify and YouTube. This music will be integrated in other parts of the app. The user finds their music back in the summary. When required for the assignment, chosen music should

be easily accessible without having to switch applications for music. Music should be directly at their disposal, enabling them to focus solely on the assignment.

In the original setting (so without using any technology), patients need to remind themselves (or use a separate application) to work on assignments. The mobile application will provide a user with reminders based on their current progress. I.e.: if all homework of the last session is finished, a reminder is not needed. If this isn't the case, the application will provide a reminder a few days before the next session. The goal of the reminder is to motivate the patient to work on their assignments and to have these assignments completed a significant time before the session (instead of 5 minutes prior to the session). The notification might look as is presented in Figure 16.

As mentioned, a patient's earlier provided content can be re-used to facilitate features in the app. Taken a step further, all information can be summarized in an overview. Spend effort on the self-esteem will become clear and it shows the patient what is supportive and what isn't. The overview should provide the patient a better understanding of their self-esteem and actions to support it. The summary also provides contact information of professionals and relatives, to ask for help when struggling with low self-esteem. All information and tools are available from the application, preventing the user to have to switch between applications. Others can be easily contacted, though it won't be prominently presented as in the Connections-app, as described in Section 2.3. It is assumed that a relapse in self-esteem is of less influence than relapsing in case of a substance use disorder. A sketch of the latter is shown in Figure 17.

At last, the application will provide methods to monitor oneself. During COMET, the patient can be asked (depending on the mental health care organisation) to fill in a translated version of the Rosenberg Self-Esteem Scale (Franck et al., 2008). The latter can be used to measure one's self-esteem. To measure the influences of the training, the patient can be asked to fill in the same questionnaire at the end of the training. Possibly, the mobile application can ask the user, on a repetitive base, to indicate their self-esteem on a scale of 1 to 10. Although the protocol recommends professionals to use the Rosenberg Self-Esteem scale to measure and show effects of COMET (Korrelboom, 2011a), this will not be included in the prototype. As MHRQ5 states, the app is a personal tool of the patient. The content of the app should affiliate with the patient. Not all patients will be able to interpret the results of the scale to decide further steps; the scale is a tool for professionals. The application would become more difficult to understand and might evoke a clinical feel. Nevertheless, a monitor could be of value for the patient. It shows a simplistic view of one's self-esteem over time. Also without using a validated questionnaire, the results could be of interest to discuss with a mental health care professional. Questions could be asked like "What do you think has happened that your self-esteem scored lower in the last 4 months?". A step further could be taken; previously provided content could be shown when a low rating for self-esteem is registered. The application could suggest to contact somebody or to show a story of a positive moment. Although promising, for the first prototype this might be too specified and therefore the suggestions are not included. First the attitude towards the monitor has to be discovered. The assumption is that the monitor provides the patient with a more data-driven tool to show one's self-esteem. Progress on self-esteem can be shown, as well as fluctuations over time. By providing comments for monitor moments, a better understanding could be created of when a patient scores low on self-esteem. A sketch of the monitor is shown in Figure 18.

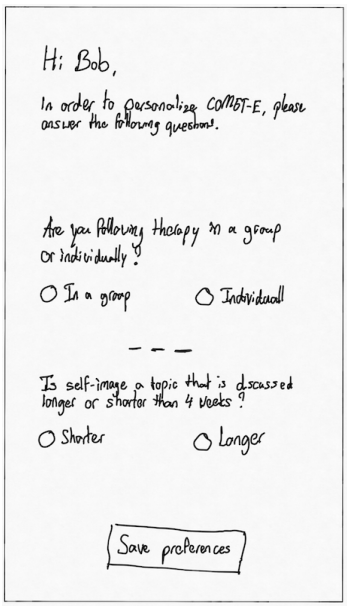

Figure 14: The app will be tailored by asking basic questions at first start

Figure 15: The user can include interactive media to enrich their content

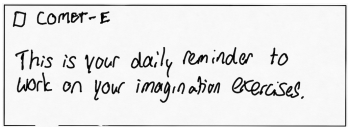

Figure 16: A push-notification to remind the user to work on exercises

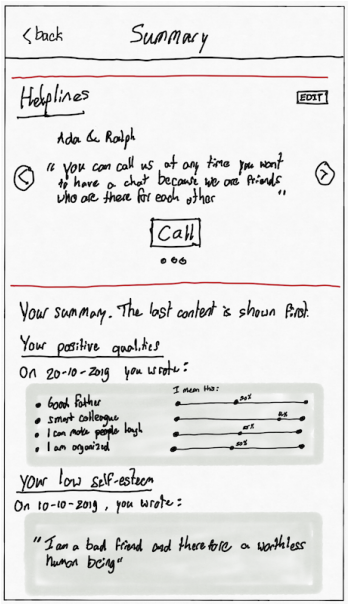

Figure 17: A tailored summary about the training, including helplines

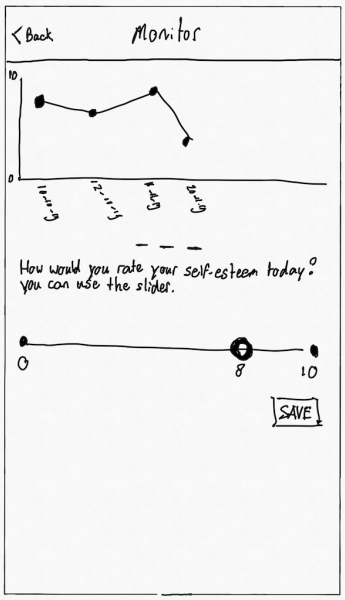

Figure 18: The user can monitor himself by answering a simple question

4.3.3 Included features and user stories

The latter sections describe the possible content and features of the application. In this section, the eventual included features of the application are listed. For every feature, user stories are written to ease development of the prototype. The list of features and their user stories are presented in Table 4.

Feature (code)	Content
F1	The original COMET-content is presented, expanded and extended to support the patient with working on the content. The same eight sessions or the same seven steps will be presented based on the chosen options in the introduction module (see F2). **User story #1**: As a user I want to view the sessions and relevant steps that I also know from the therapy I receive.
F2	Introductory screens are shown for tailoring the app to the therapy the patient follows (individually or in a group, original COMET or not). Based on answers on questions in this introduction, the format of the app changes. For the original COMET-training, users see the current progress and best possible next step. For other applications, this isn't the case. To support all implementations of COMET, all content is instantly available, without limitation of a predefined order. **User story #2**: As a user I want to view the sessions and relevant steps that relate to the type and length of the therapy I receive.
F3	Assignments are provided, explained and can be worked on in the app. The user can provide and edit answers on the assignments. The involved checklists will be included for every session or step of COMET. Once a part has been completed, this part will be checked off the list. **User story #3**: As a user I want to be able to see my required steps to be taken before the next session. **User story #4**: As a user I want to provide and store answers on assignments.
F4	Interactive media (sound, video, animations and games) is used to explain the content of COMET. Where video is used, also a transcript of the video is added to enable choosing the preferred method of receiving information. **User story #5**: As a user I want to be able to learn about the content through interactive media. **User story #6**: As a user I want to be able to read a transcript of a video that is included in the app.
F5	The app delivers (push) notifications with self-provided content (e.g. stories that reactivate the positive self-esteem) in order to reactivate what is learned before. **User story #7**: As a user I want to receive notifications of positive events and other content that might help me to maintain my positive self-esteem.
F6	In line with F4, the app enables searching for and including interactive media in provided answers. A user can look on Spotify and Youtube for music or include a self-made picture to a written story. Where possible, the same reports and its content will be used in other parts of the training (e.g. for assignments that include music, previously chosen music will be at direct disposal). **User story #8**: As a user I want to use interactive media (possibly from other services) to enrich and to use in the content I provide or have provided to the application.

F7	Reminders are provided to work on assignments. Assignments are more consistently worked on and completed a significant time before the next session (instead of last-minute). **User story #9**: As a user I want to be proactively reminded about required steps to take prior to the next session. Also during the week to keep me focused to work on my self-esteem.
F8	A summary is created by using the application. The summary includes earlier provided answers on assignments. The summary shows the made effort on self-esteem and enables to reflect on the progress, to better understand the low self-esteem and the counteracting steps. **User story #10**: As a user I want to reflect in a summary on what I have learned before.
F9	The app helps the user with monitoring self-esteem by regularly asking the user to score their self-esteem. Comments can be provided to emphasize on the provided score. New insights might be discovered. In the future, the monitor might provide suggestions to tackle a low score. **User story #11**: As a user I want to be able to regularly monitor myself by answering a simple question. I should be provided suggestions in case relevant.
F10	The app can store a (or multiple) phone number(s) to call in case of struggles related to self-esteem. **User story #12**: As a user I want to be able to call somebody for who I know is able to help me with my low self-esteem.

Table 4: Listing features and the supported user stories of the application

4.3.4 Mapping the features and content to the requirements

The described features are mapped to the requirements that are discussed in Section 3.7.1 and Section 3.7.2. Ideally, all (or at least most) of the features can be mapped to a requirement; in this case the upcoming prototype is more likely to meet the needs of the end users. Table 5 will show the mapping of features and requirements.

Feature (code)	**Requirement (code)**	**User story (code)**
F1	MHRQ1, MHRQ4, SHRQ3, SHRQ4, SHRQ5, WNHRQ1	US1
F2	MHRQ1, MHRQ4, SHRQ3, SHRQ6, SHRQ8, CHRQ1, CHRQ3, WNHRQ1	US2
F3	MHRQ1, MHRQ5, SHRQ1, SHRQ3, CHRQ3, CHRQ4	US3, US4
F4	MHRQ1, MHRQ4, SHRQ8, CHRQ3	US5, US6
F5	MHRQ3, MHRQ5, SHRQ1, SHRQ2, SHRQ9, CHRQ1, CHRQ3	US7
F6	MHRQ6, SHRQ1, CHRQ3	US8
F7	MHRQ2, CHRQ4	US9
F8	MHRQ3, MHRQ5, SHRQ1, SHRQ7, SHRQ9, CHRQ4	US10
F9	MHRQ5, SHRQ2, SHRQ7, SHRQ9	US11
F10	MHRQ6, SHRQ2, CHRQ2	US12

Table 5: Mapping the features to the requirements

As can be seen in the above table, all requirements are incorporated in the features.

4.4 Realisation of the prototype

The prototype[2] is realised by using Figma. Figma is an (online) collaborative interface design tool. This tool is chosen for its simplicity in use, while still providing the possibility to create and test user flows. The sketches from the previous sections are used as inspiration. Instead of creating a real functioning mobile application, the application is mocked by using a non-functional click-through prototype, with as reasons: 1) A tool as Figma enables to easily create and iterate over multiple designs and 2) Since this prototype is the first iteration in the user-centered design process, the user flows still have to be proven to the liking of the end user. Once with confidence can be said that this is the case, a real functioning application can be considered. Writing code is a time intensive activity, while there is no gain yet compared to a non-functional click-through prototype. Since the participants in the following user test are Dutch citizens, the used language in the prototype is Dutch.

Sketches from the previous sections are used as inspiration for this prototype. First sketches are used instead of further iterated sketches. This choice has two reasons, namely 1) due to the user-centered design approach, the product is susceptible to change. The goal of this current research is not to create a final product; the goal is to create and test if this concept could support the patients with COMET. In further iterations, the concept will have to become more sophisticated and complete. The first sketches are sufficient enough to create a prototype and test the concept. Additionally (and subsequent) 2) due to limitation of time, the choice is made to use the first sketches which are believed to be sufficient for the goal of the research.

The content of the application is based on and heavily inspired by the content from the COMET workbook for patients (Korrelboom, 2011b). To prevent copyright violation, text is interpreted and rewritten without changing the meaning of the text. Additionally two screenshots from a video from VGCt and Gedachten Uitpluizen are used (with permission), which is publicly available on YouTube (VGCt & Gedachten Uitpluizen, 2018).

4.4.1 An impression of the used prototype

An impression of the prototype is presented by Figure 19 to Figure 27. Each of the figures also shows the linked feature codes from Table 4. Each of the figures is shortly explained; similarities in text and design of Section 4.3.4 could be recognized since the text and sketches from the latter section are used as inspiration for the prototype.

Figure 19 shows one of the introductory screens that is used to alter the app to the situation of the user. The user chooses how the therapy is followed and its duration. Based on the choices, the app presents the content as sessions, equivalent to how the user is following the therapy; or as steps where the user can freely select topics to work on, if parts of COMET are integrated in a different therapy. Figure 20 shows the Start-page. This specific screen shows that a user currently has steps left that have to be completed prior to the following session. Figure 21 shows the content of a session; first the session is explained, followed by homework assignments. This prototype provides the options to view a video or read the content that is discussed in the video. The content can be explained by a method that is most preferred by the user. Assignments are listed; a distinction is visible between open and completed assignments. Figure 22 shows the Summary-page with helplines the user can call in case necessary. It presents all activity of the user within the app (e.g. it shows the response on the assignment of session 1) and tools that are found and stored during the therapy (e.g. a song that empowers the self-esteem of the user). Figure 23 shows the self-esteem monitor. By answering the question,

[2]The prototype is accessible via the following link: `https://tinyurl.com/qq9dafb`

the graph is updated. Optionally the user can provide a comment to a moment for later referencing. Figure 24 shows the Start-page when the user has completed the training. Only actions are shown that are relevant for this new situation. I.e. the user does not have to see if there are still homework assignments left for a certain session. Figure 25 shows the inclusion of interactive media. The song that empowers the self-esteem of the user can easily be played without having to search for it. Another interactive tool that is included are "concrete tegenvoorbeelden" which are stories that contradict the low self-esteem. Earlier written stories can be read and new stories can be written. In line with the latter, Figure 26 and Figure 27 present how the user is reminded on earlier written positive stories. Once clicked on the notification, the content will be presented. This content can include images (as in this example) but also other rich media (e.g. music and video) that make it easier to relive the moment.

Figure 19: Introductory questions to alter the app to the situation of the user
Feature codes: F2

Figure 20: Start-page showing the remaining steps of the current session
Feature codes: F1, F3, F7

Figure 21: Session-screen explaining the session and showing homework
Feature codes: F1, F3, F4

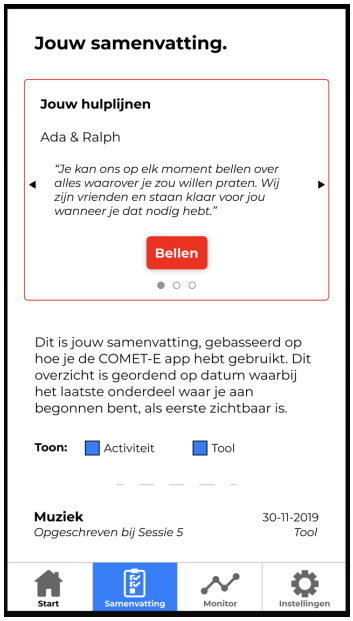

Figure 22: Summary-page showing helplines to be called when necessary
Feature codes: F8, F10

Figure 23: Monitor-page visualizing the current state of self-esteem
Feature codes: F9

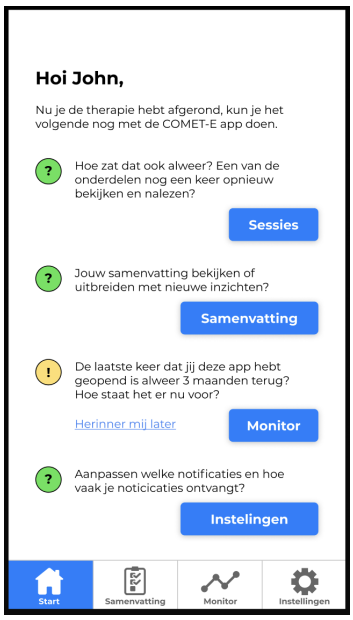

Figure 24: Start-page once finished with the training
Feature codes: F9

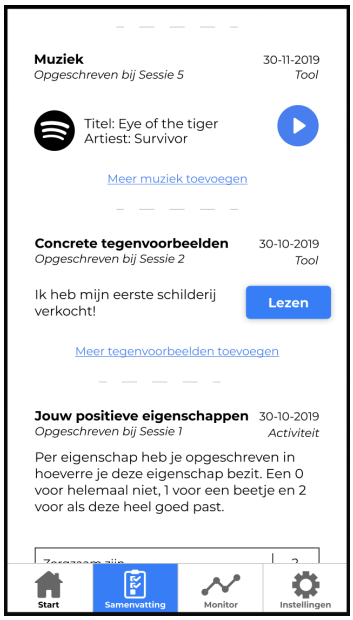

Figure 25: Interactive media from other apps like Spotify can be included
Feature codes: F6

Figure 26: Notification about positive stories to maintain self-esteem
Feature codes: F5

Figure 27: Recall positive moments to maintain self-esteem
Feature codes: F5

5 User test: testing with professionals and patients

This chapter discusses the design and results of an (individual) user test with both patients and professionals who are involved with (a derivative of) COMET. The results of this user test are used to further improve the prototype and eventually lead to the final design, as will be discussed in Chapter 6.

5.1 Goal

The goal of the user test is to discover how end users are experiencing the current prototype, to discover if the prototype fits the needs of the user and if it could provide support during therapy and could continue to provide support after their therapy. And at last, if they would intend to use a mobile application during and after their therapy, if it would become available. The feedback is used to improve the prototype to create the final iteration of this research. The improvements are described in Chapter 6.

5.2 Participants

The participants of this user test are those who belong to one of the two stakeholders, as described in Section 4.2): 1) the patient following a (derivative of) COMET and 2) the professional providing the (derivative of) COMET.

The first stakeholder-group, the patient who follows (a derivative of) COMET, is represented by patients from GGNet Doetinchem who follow either the original COMET-program or the Herstel 4-program. The original COMET-group follows COMET as is intended by Korrelboom. The Herstel 4-program, a program for patients with a personality disorder and other mental disorders, uses elements of the COMET-therapy but also focuses on other issues than self-esteem. Patients from both groups represent the potential end users of the application.

The same participants as from the interviews from Chapter 3, are asked to participate in this user test. They represent the second stakeholder-group, the professionals who provide (the derivative of) COMET. More elaborated on, this means that mental health care professionals (psychologists and social psychiatric nurses) who are involved with (a derivative of) COMET will be asked to participate. The involved professionals are employed at GGNet Doetinchem or at HSK Hengelo.

All participants are native Dutch speakers, all participants are voluntary joining this research and all participants can withdraw their participation during the user test up until three days after the user test. If participation is withdrawn, all gathered data of the participant will be destroyed.

5.3 Method

In this user test, participants test the prototype as described in Chapter 4. To discover how participants are experiencing the application, the participant performs a set of predefined tasks, will fill in the System Usability Scale (SUS)-questionnaire (Brooke et al., 1996) and Technology Acceptance Model (TAM)-questionnaire (Davis, 1985), and will be asked five questions during an evaluative interview.

With the performance of the predefined set of tasks, usability errors are searched for. E.g. the user is unable to find who to contact in case of an emergency. Users are observed during this performance. Furthermore, the think-aloud protocol is used (Lewis, 1982); the participant states made choices and their reasoning for these choices. The results from this performance of tasks, including provided reasons because of the think-aloud protocol, show the parts of the application that are not clear enough and

require more attention in the next iteration of the prototype. Each of the usability errors is registered and is to be solved in the next iteration. Performing these tasks also enables the participant to experience the prototype, in order to give their opinion about usability and their intention to use this application (in the future). The latter two are to be measured with the two questionnaires that will be discussed as follows.

With the SUS-questionnaire, a quick but reliable tool, the usability of the prototype can measured. Although the SUS is rather short and usability is not measured extensively, it enables to provide a quick result on how the participants experience the application on the topic of usability.

The TAM-questionnaire will be used to get an objective measure on the intention to use the application. Whereas the SUS-questionnaire measures how the application is experienced on the field of usability, the TAM-questionnaire measures how the user experiences the application on the fields of 1) perceived usefulness, 2) perceived ease of use, 3) the attitude towards using and 4) the intention to use this application.

Whereas the questionnaires and the performance of predefined tasks will result in objective measures, a short interview will be held with as goal to also collect the subjective opinions of the participants. A set of predefined questions will be used and whereas the interviews from Chapter 3 are held semi-structured, the current short interview will be structured. The questions are predefined and the interviewer will not or only minimally defer from the predefined questions to maintain the 45-minute time-limit for this user test. Though, the subjective opinions on the prototype enable to say something on how the user is experiencing (specific parts of) the application. It enables to refer to how users are experiencing the features as are described in Chapter 4. The result of this last activity consists of a summary and quotes from the interview.

5.4 Materials

The following materials are required to perform this user test.

- Apple iPhone 6S
- Apple Lightning to USB-cable
- Apple MacBook Pro that is running the Figma Desktop-app
- Figma Mirror-app
- Figma prototype from Chapter 4
- A stable internet connection
- Zoom H1 - microphone
- Information letter
- Informed consent form
- List with tasks to be performed during this user test
- Interview template to be used during the final activity
- QuickTime Player to record the screen of the iPhone 6S and sound from the MacBook simultaneously
- Template for an intervention report
- SUS-questionnaire
- TAM-questionnaire

The use of the latter three items will be further emphasized on. The intervention report is used to register an intervention, a moment when a user requires help to continue the user test. The intervention report contains the following items:

- Problem description
- Severity: critical (task blocked), serious (task completed but high frustrations), minor (task completed and low frustrations)
- Screenshot of where this problem occurs
- Quote from the participant

With the SUS-questionnaire (Appendix I), the SUS-score is calculated. There is currently no official Dutch translation of the SUS. Since participants are mainly Dutch-speaking citizens and to ensure that the official questions are understood by the participant, the translation will be done by the researcher. The SUS-score ranges from 0 to 100. A higher SUS-score means that the prototype scores higher on usability.

For the TAM-questionnaire, the questions as are presented by Appendix J, are used. Three questions for each of the four topics will be asked. The questions for this questionnaire are based on questions from the original TAM-questionnaire (Davis, 1985) and from a research by Weng et al. (2018). All questions are translated to Dutch by the researcher, to ensure they are understood by the participant.

5.5 Procedure

The procedure of this user test will be explained, including how the participants are recruited and how the data is analysed.

5.5.1 Recruiting participants

As mentioned earlier, patients from GGNet Doetinchem are appraoched who either follow the traditional COMET-program or follow a derivative of COMET in the Herstel 4-group. Although the groups are different, the procedure is the same. The researcher will join one of the sessions to introduce himself and the research. The information letter of this research (see Appendix D) will be handed over. With those who are interested to join the user test, an appointment will be made. As mentioned above, the same professionals who joined the interviews from Chapter 3, will be asked to join this user test. Potentially these professionals will introduce new colleagues; new participants will not explicitly be searched for neither will they be excluded from this research. Each professional is contacted by email or in person to make an appointment. A week before the user test, the information letter, as can be found in Appendix F, will be send to their email address. The participant is requested to read through the document before the user test, to speed up signing the informed consent at the start of the user test.

5.5.2 Introduction and signing the informed consent form

In an introduction, the participant is informed on the activities of this test. In case the participant did not read the information letter yet, this time is now provided. Any questions from the participant about the information letter and the informed consent form, will be answered. After signing the informed consent form (Appendix E for informed consent form for patients and Appendix G respectively for professionals), the user test will commence.

5.5.3 Activity #1: Performance of a set of predefined tasks

The participant performs a prepared set of tasks (see Appendix H) with the Figma prototype. The Zoom H1-microphone will be used to record the session. The participant receives a mobile phone (iPhone 6S) that is running the Figma Mirror-app. The Figma Mirror-app enables the user to open and click through the prototype. The participant receives the document with the tasks that have to be performed. The participant is instructed to think-aloud. The participant is able to ask for intervention by the researcher, though this will be noted and reported. To be more specific, an intervention is performed only when the participants indicate that help is required; the initiative comes from the participant. To facilitate this first activity, QuickTime Player will be run in the background on the Apple MacBook Pro. QuickTime Player records the screen of the

connected iPhone 6S and combines this with sound from the microphone of the MacBook Pro. The recording contains the made choices of the participant because of the think-aloud protocol. To enable intervention and to change the starting screen for each of the tasks, the researcher uses the Figma desktop-app that is running on the Apple MacBook Pro with the same prototype. In the desktop-app he can click on (but not edit) one of the prototype-screens; the Figma Mirror-app of the participant will then show this screen and the participant can continue with the task. This first activity will take around 20 minutes.

5.5.4 Activity #2: Fill in two questionnaires

Two questionnaires will be filled in, the SUS-questionnaire and the TAM-questionnaire. Whereas the SUS-questionnaire has 10 questions and a 5-point Likert-scale, the TAM-questionnaire has 12 questions (three on each of its subjects) with a 7-point Likert-scale. Both questionnaires are included as Appendix. Appendix I for the SUS-questionnaire and Appendix J for the TAM-questionnaire. This activity will take around five minutes.

5.5.5 Activity #3: Evaluative interview

At last, a short evaluative interview will be held. This interview will consist of five prepared questions. The prepared questions are included as Appendix K. Whereas the interviews from Chapter 3 are semi-structured, this interview will be structured since time is limited. Though, still subjective information can be collected. This last activity will take around five minutes. For this and the previous two activities, 15 minutes (in total) is calculated as lead time.

5.5.6 Analyses of the data

The data will be analysed and presented as the results of this user test. By using the screen recording and audio recording from activity #1, the completion rate (has the user completed the task) and completion time for each task will be measured. Additionally, each error will be counted (e.g. the user pressed the wrong button) and each intervention (i.e. when a user needs help) will be reported by using an intervention report.

For the SUS-score, the min, max, mean and standard deviation will be calculated. To give more meaning to the found mean SUS-score, the adjective scale (Bangor et al., 2009) is used where a SUS-score will be assigned a meaning. These are the following (SUS-score - meaning from adjective scale):

- 25 - Worst imaginable
- 39 - Poor
- 52 - OK
- 73 - Good
- 85 - Excellent
- 100 - Best imaginable

For each question of the TAM-questionnaire, the min, max, mean and standard deviation will be calculated. Since in this questionnaire self-defined questions are used, also the reliability will be tested with Cronbach's alpha for each of the four topics of TAM. TAM offers the possibility for calculating a great number of statistics. Though it is believed that apart from the above mentioned, more statistics aren't needed to achieve the intended goal.

From the last activity, the short evaluative interview, a summary of the answers on each of the questions is given, including provided quotes. All results from the activities and their analyses are presented in Section 5.6 and will be further discussed in Section 5.7 to eventually lead to the conclusion of this user test in Section 5.8.

5.5.7 Unexpected change of method due to COVID-19 outbreak

Due to the outbreak of COVID-19 in the Netherlands (and the rest of the world), changes to the method had to be made to continue with this study online. It was not possible anymore to perform a user test in real life or to include real patients who are familiar with COMET. This to counter COVID-19 and to prevent additional load on mental health care. The changes to the user test are the following:

- Communication with the participant is done via Zoom[3], a video conferencing tool. With Zoom, the audio of the conversation is recorded and stored on the local device of the researcher.
- Instead of patients, interested people from the personal circle of the researcher are asked to join. They include students with different backgrounds and colleagues who are familiar with creating software for health care usage. The participant reads a scenario of a person with a low self-esteem as preparation to the user test. These participants are called proxy users.
- Users are asked to send the informed consent over email before the start of the user test. Any questions are answered via email. The informed consent file is send as an interactive PDF. An instruction video is made to instruct the participant on how to fill in the form.
- Small changes had to be made to the Figma-prototype in order to switch to the different start screens for each task of the task list. There are no functional changes, tasks are performed the same as if they would be performed during a real-life user test. The researcher can see and follow how the participant is using the prototype by using the Figma Desktop-app. A screen recording of the Figma Desktop-app is made on the local device of the researcher. This is done by using Quicktime Player, recording how the participant is using the prototype.
- Questionnaires are taken by using Google Forms, using a student account due to privacy considerations. Once processed in SPSS, the response of the participant is removed from Google Forms.
- A website[4] is created and used to provide the participant with all materials of the user test. This website provides a link to a scenario, a task list, a link to the prototype, a link to the SUS-questionnaire and a link to the TAM-questionnaire.

The study was already in progress when measurements by the government were announced to counter COVID-19. After the announcement of the government, all remaining user tests are preformed online. This means that a selection of the participants followed the original method, while others followed an online version of the method. This will be mentioned in the results.

5.5.8 Second unexpected change of method due to COVID-19 outbreak

Because of the COVID-19 outbreak, many companies and universities switched to using video conferencing tools to enable communication. This is also the case for the current research. As prior mentioned, communication with the participant is done via Zoom. On the 9th of April 2020, an update email about the coronavirus is sent to all students of the University of Twente[5]. This update includes the decision where Zoom was not allowed anymore for UT purposes because the terms of use of Zoom are not in line with the privacy regulations of the University of Twente.

[3]Zoom videoconferencing: `https://www.zoom.us`

[4]Can be accessed via: `http://www.onderzoek.bob-loos.com/`

[5]The sent email can be read via the following link: `https://tinyurl.com/qkl85sz`

To comply with the decision of the university, minimal changes are made to the used method. The changes to the user test are the following and are additional to the changes from Section 5.5.7:

- Communication is done with the participant via Google Meet[6], as advised by the University of Twente. As with Zoom, participants join a meeting by using a link.
- Whereas Zoom offered features to record the conversation to the local device of the researcher, these features were not offered by Google Meet. To enable the recording of the conversation, an audio recording is started by using QuickTime Player on the local device of the researcher.

Before the update email of the University of Twente was sent, seven participants already participated in an online version of the user test, including the changes from Section 5.5.7. All user tests after the 9th of April are performed by using Google Meet.

5.6 Results

In total 13 participants participated in the user test. Seven participants are proxy users, participants instructed with a scenario of a patient with a low self-esteem. Six other participants are professionals who use or are familiar with (a derivative of) COMET. They are professionals from two different mental health care organisation: GGNet and HSK. Three of the professionals are psychologists and three others are social psychiatric nurses. All participants are presented in Table 6. From all participants, four participants participated in a real-life user test. Those are respectively participants 1 to 4.

Type of participants	**Number of participants**
Proxy users, instructed with a scenario	7
Professionals using the original COMET method	1
Professionals using derivatives of COMET in group setting	3
Professionals using derivatives of COMET in personal setting	2

Table 6: Participants in the user test

5.6.1 Interventions, completion time and error count

In total 13 interventions are performed. An intervention is a moment where support is requested and provided to enable continuation of the task. These moments are recorded. A selection of the most significant intervention moments (for single participants), based on the intervention forms, are presented in Table 7. For all interventions the severity is marked as "minor" except for intervention #7 which is marked "critical". Appendix L lists all individual interventions and reasons for inclusion or exclusion as result.

Intervention #	**Task #**	**Reason for intervention**
1	6	The provided choice had to be confirmed. The user could not find the button to confirm the made choice. Not every choice or answer has to be confirmed. This is inconsistent.
4	2	The circles that indicate the status of the homework assignments are interpreted as action buttons to go to the next page.
7	3	The helplines could not be found.

Table 7: Interventions during the user test

[6]Google Meet: `https://meet.google.com`

For each of the performed tasks, the completion time is noted. The results are presented in Table 8. The last column, "Completed (%)", shows the percentage of the participants that succeeded in completing the task.

Participant Task	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Avg. time (s)**	**Completed (%)**
1	80	108	121	59	73	92	81	106	89	28	64	27	64	76.3	100
2	291	180	170	131	128	139	140	143	179	129	40	130	57	142.8	100
3	135	84	-	68	52	39	45	212	42	37	23	59	86	73.5	92.3
4	180	132	193	129	50	37	57	86	57	46	16	37	43	81.8	100
5	44	66	42	64	53	43	29	38	38	19	10	15	20	37.0	100
6	92	20	66	40	31	22	18	23	32	18	9	20	18	31.5	100
7	145	191	205	45	100	26	96	30	114	193	13	21	24	92.5	100
8	262	201	95	70	6	32	13	44	19	34	21	37	31	66.5	100

Table 8: Completion time of each task (in seconds) for each participant
Legend: A dash (-) is presented for non-completed tasks

For each of the performed tasks, errors (e.g. redundant actions) are counted manually by the researcher. The results are presented in Table 8. The column "Perfect (%)", shows the percentage of participants that completed the task without errors.

Participant Task	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Perfect (%)**	**Error rate (avg.)**
1	-	-	-	-	-	2	4	-	-	1	1	-	-	69.2	0.6
2	8	3	7	-	25	3	22	3	6	2	-	30	3	15.4	8.6
3	6	2	4	2	3	4	1	4	1	3	5	6	2	0.0	3.3
4	1	5	-	2	1	-	3	1	-	-	-	-	1	46.2	1.1
5	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0.0
6	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0.0
7	1	-	-	-	4	-	7	-	6	9	-	-	-	61.5	2.1
8	5	4	2	-	-	-	-	-	-	-	-	-	-	76.9	0.8

Table 9: Error count of each task for each participant
Legend: A dash (-) is presented for a task without errors

5.6.2 SUS-score and its meaning

Each of the individual SUS-scores is presented in Table 10. The SUS-score of participant 9 did not match the provided answers on the TAM and how the researcher experienced this participation. Elaboration is asked on the SUS-score. This participant mirrored the answers (positive = negative and vice versa); this participant was positive about the prototype; the score of 15.0 did not match this experience. Since the result is not trustworthy, it is excluded from the results presented in Table 10 and Table 11. The misunderstanding did not influence the other activities; therefore included as result.

Participant	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Average (avg.)**
SUS-score	50.0	62.5	17.5	65.0	47.5	90.0	72.5	80.0	-	65.0	62.50	90.0	82.5	65.4

Table 10: Individual SUS-scores
Legend: A dash (-) is presented for a non-included score

All SUS-scores combined gives Table 11 as result, including the meaning of the SUS-score by using the adjective scale.

(mean) SUS-score	Adjective scale	min	max	standard deviation
65.42	OK	17.50	90.00	20.53

Table 11: Combined SUS-score and adjective meaning for this prototype

5.6.3 TAM-scores

The results on each of the TAM questions are presented in Table 12. They are ordered by the topics this questionnaire addresses. Scores are measured on a scale from 1 - 7 with 1 being in strong disagreement and 7 being is strong agreement.

Topic - Question #	mean	min	max	standard deviation
Perceived usefulness - #1	5.31	2	7	1.32
Perceived usefulness - #5	5.92	2	7	1.66
Perceived usefulness - #9	5.54	1	7	1.71
Perceived ease of use - #2	5.46	2	7	1.27
Perceived ease of use - #6	5.00	2	7	1.68
Perceived ease of use - #10	4.77	1	6	1.42
Attitude towards using - #3	6.23	5	7	0.83
Attitude towards using - #7	6.25	3	7	1.29
Attitude towards using - #11	5.54	1	7	1.85
Intention to use - #4	5.92	3	7	1.26
Intention to use - #8	5.54	1	7	1.71
Intention to use - #12	5.62	1	7	1.90

Table 12: TAM-scores for each of the asked questions

Figure 28 shows the TAM-scores as a boxplot for each of the topics of TAM.

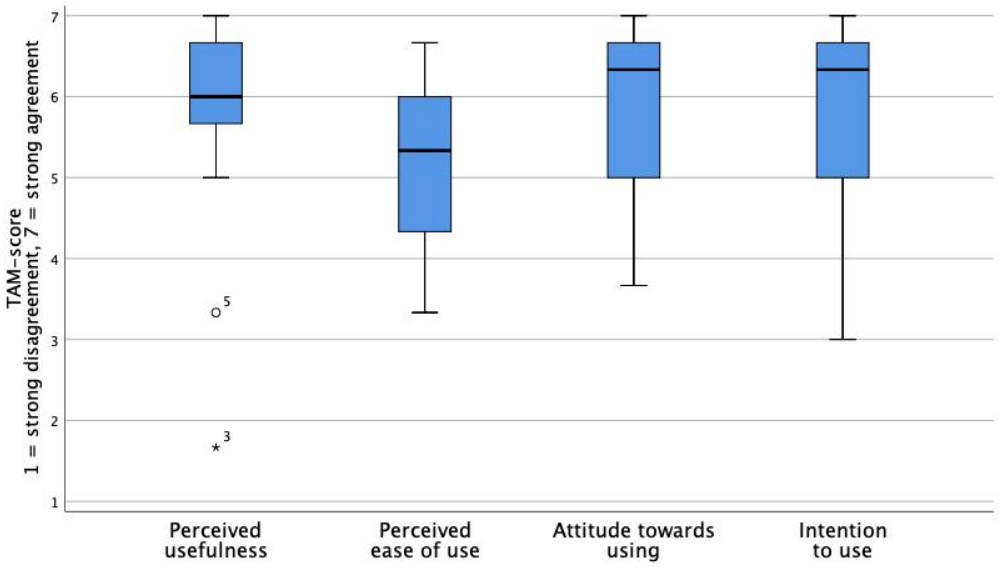

Figure 28: Boxplot of each of the topics of TAM

For each of the topics of TAM, the internal consistency of the questions is measured. Do the questions of each topic measure the same? The result, the Cronbach's alpha for each of the topics, is presented in Table 13.

Topic	**Cronbach's alpha**
Perceived usefulness	0.954
Perceived ease of use	0.500
Attitude towards using	0.914
Intention to use	0.809

Table 13: Cronbach's alpha on each of the topics of TAM

5.6.4 Interview

For each of the discussed topics, a summary is given. This summary is presented in the same chronological order as the topics (as questions) are discussed with the participant.

Experience with the prototype. Could this prototype be supportive for the user?:
The experience with the prototype is mostly positive. It could be experienced as being supportive for people who are alone and have less support from their environment. It could provide a clear overview of one's self-esteem and learned lessons. It could be supportive since it is hard to maintain new behaviour, the reminders could help with this since it triggers the user to focus (on working) on their self-esteem. A number of participants mention that the prototype is simple and easy to learn using. A few participants also mention that improvements need to be made; not for all participants the app is clear enough. An introduction to the app might be required.

Participant 4: "*New skills have been trained. But if you do not maintain them, they will slowly fade away. By having this application after such a therapy, you can keep practicing these skills. That's what makes it powerful.*"

Benefits of using the mobile application:
Benefits of the application: it allows to read back the content that has been discussed or has been provided earlier (e.g. positive qualities), the threshold to work on the training is lower since a phone is easier to use and often close by, it is an extension and addition that can be used in the home situation, it more easily enables to work on COMET on non-training days, it's harder to lose information that is stored on a phone and it is a tool that you can fallback on (also after training) in case of relapses. Some participants also mention that it depends on the user if the app is seen as beneficial; it could be counterintuitive (i.e. when a patient sees low values in the monitor, this will not improve the patient's state of mind). The quotes from participant 2 and 4 give two examples of how this application can be beneficial in comparison to the original training.

Participant 2: "*There are only 2 days of therapy whereas this you can use 7 days a week, for example to finish your day.*" (note: 2 days of therapy a week is the case for a training where a derivative of COMET is used)

Participant 4: "*You provide a supplement and extension that can be used in the home situation. In the group, something gets activated, but retaining this when you go home is difficult. Now you extend the moment.*"

Most useful, least useful, missing features?:
Features experienced as most useful: the summary since it provides an overview, having videos to explain sessions and assignments, notifications since they remind about homework, positive moments and trigger to reflect on yourself, being able to see a trend in the monitor (and that positive moments also exist), being able to retrieve earlier read information and having helplines that make the threshold for contact lower.

Features experienced as least useful: the monitor because it's currently too abstract and mainly shows snapshots (i.e. how the user feels can change with a day). The added value is not seen of showing previously answered questions in the settings.

Missing features: adding explanations or having filters in the monitor to find new insights (e.g. in the winter I feel less positive about myself), a support/help page for worse moments with tools to counteract these feelings, the app could be more lively, positive and encouraging, potentially contact with others for motivation. At last, the group phenomena should be maintained when the application is used in a group (e.g. showing something your colleague in the group has said about you).

Note: there is no agreement on the usefulness or lack of the features. Therefore they can be mentioned in all categories. A quote from participant 8 is presented.

Participant 8 about the helplines: "*It lowers the threshold to call somebody.*"

Attitude towards further development of the mobile application:
There is a positive attitude towards further development. Reasons are: it is an extra tool to get on the right track, it can support with maintaining positive self-esteem, it keeps confronting the patient with the goal to improve self-esteem, it can maintain attention on self-esteem also after the training, and it makes the patient less dependant on the training and professionals. The quote from participant 6 supports these statements. Only a small number of participants would require improvements to agree with the statement. The quote from participant 5 supports the latter.

Participant 5: "*In its current state, no. But if you are going to apply the adjustments we discussed, I can definitely imagine this app being used.*"

Participant 6: "*I think it is a good development. As patient you get an extra tool. The patients become just a little less dependent on the professionals and the sessions.*"

Additional comments:
Two additional comments are taken into account; others are discussed in earlier topics. The two comments: 1) first usage of the application during this test might differ from regular first usage, which might have influenced the results. This is illustrated by the quote from participant 8. And 2): tools like helplines should be more prominently displayed, perhaps by using a shortcut. This is illustrated by the quote from participant 11.

Participant 8: "*Usually when I start using a new application, I would first click through all the possible screens. I was not able to do this, this time. ... It might have had a small effect on how I responded.*"

Participant 11: "*A call or music, should get a more prominent place. Especially if you're going through an episode... If you are panicking, it is not logical to find this back at the summary... Maybe add something to the screen "call a friend or play a song"... Like a shortcut... It feels like you have to perform additional steps to get help.*"

5.7 Discussion

The results are interpreted. What is learned from the results and what are the influences on the next iteration of the prototype? After this interpretation, required improvements on the prototype are discussed. At last, limitations of the results are highlighted.

5.7.1 Interpretation of the results

Three of 13 interventions are included as result. Reasons for exclusion are 1) being covered by other interventions, 2) they involve looking at the wrong screen of the prototype, 3) they involve (mis)reading the assignment or 4) are related to personal skills with apps (e.g. ability to scroll). The three interventions are included because of 1) experienced inconsistencies in the prototype, 2) the prototype being experienced as malfunctioning and 3) not being able to finish a task. The three interventions are discussed individually.

From intervention #1 can be learned that due to inconsistent behaviour on applying settings or providing answers, confusion is created for the specific participant. Though this reason is valid, this will not be treated further in the final prototype. All screens with input require the user to confirm provided choices and answers by pressing the button with the text "Opslaan" (translated: save) or "Toevoegen" (translated: add). With exceptions for the Settings-screen; a screen that has as only action "changing a setting". Since a single participant experienced issues, it has led to one intervention and no to minimal errors are counted, this issue will not be addressed in the next prototype.

From intervention #4 can be learned that the status circles are sometimes interpreted as action buttons. Users press the circles without a resulting action. Most users running into this issue, realise the buttons serve a different purpose. It has been noticed that the circle changes when completed an assignment. To overcome the created ambiguity, a change is required. This is supported by the counted errors for task #2. The error rate is relatively high. Though it is expected that ambiguity can be removed with the minimal change of introducing introductory dialogues explaining the circles.

Intervention #7 had to be performed since the user was not able to find the helplines. This is seen for multiple participants, potentially leading to not having any participant completing this task without errors. Participants did not expect the helplines to be found in the summary. The current location is seen as non-logical. A new location for the helplines needs to be searched for. Mentioned ideas are: adding a menu-item, having a help button on every screen or having a separate screen that combines all potential tools.

The completion time and error count, Table 8 and Table 9, show that task 2, 3, 4 and 7 require improvements. The error count for these tasks is relatively high. One note has to be made on the error count. It has been noticed that the participants started to "search" for the correct action once lost in the prototype. Repeatedly performing non-functional actions (i.e. clicking the same non-functional button repeatedly) is seen multiple times, increasing the error count. Incidentally, behaviour is seen were users used the prototype by searching for the functional buttons. Performing an additional, non-required, action has been counted as error. Nevertheless, the error count is of interest since it represents how users might use the application in real-life. Though one needs to consider the different styles to navigate through the application (i.e. by using a trial-and-error approach or repeatedly clicking the same non-functional actions). So the error count shows that especially task 2, 3, 4 and 7 could be improved. The completion time of these tasks confirms the latter. Although the completion time depends on the size of the task, it is noticeable that tasks with a relatively low error count, in this case task 1, 5, 6 and 8, are the tasks that are quickest resolved. The task might be easier to resolve, though one can also state the prototype supports the participant better in completing these tasks.

With a score of 65.42 (SD = 20.53) on the SUS, the prototype can be given the adjective meaning "OK". It suggests that improvements can be made, as is suggested by the completion time, the error-rate and the interventions. The results on SUS vary, as seen by the high differences in the min and max-values. The high standard deviation emphasizes this. It is assumed that performing the same user test with an improved prototype, will stabilize the scores. The mean SUS-score should become higher, the difference between min and max-values should be lowered, as for the standard deviation.

The TAM-scores show a similar, maybe even more promising result. The scores on each of the topics are relatively high; measured on a scale from 1 - 7 with 1 being in strong disagreement and 7 being is strong agreement. With as median, 6.00 (IQR = 5.67 - 6.67) for the perceived usefulness, 5.33 (IQR = 4.33 - 6.00) for perceived ease of use, 6.33 (IQR = 5.00 - 6.67) for attitude towards using and 6.33 (IQR = 5.00 - 6.67) for intention to use. Noticeably, the interquartile range (IQR) for the perceived usefulness is significantly smaller than for the other measures. The min and max is also less differing for these measures. This indicates that participants were more in agreement with the first topic compared to the remaining three topics. Based on the graph and the latter, the statement can be made that participants perceive the prototype as useful. The perceived ease of use shows a similar average result compared to the SUS, as can be expected since ease of use and usability are similar areas. The relatively high IQR for the perceived ease of use, attitude towards using and intention to use, as well as the spread min and max, shows that although the measures are positive, participants were not in agreement. As with the results on the SUS, it is assumed that more consistent scores are to be found with an improved prototype. The Cronbach's alpha on all topics, except ease of use, shows that the questions are consistently measuring the same. This is not the case for the perceived ease of use where the Cronbach's alpha is much lower than 0.7. Since the ease of use and the SUS show a similar result and measure similar topics, the result on perceived ease of use can still be seen as usable. The results show that the current concept is promising, though improvements are possible. The concept is perceived as useful, that people are relatively positive about using it and intent to use it when it would become available. An improved prototype might be able to show more consistent results, but for a first iteration the found results are very promising.

The interviews confirm the previous measures. Participants are mainly positive about the COMET-E application but improvement is possible. Concrete improvements will be discussed in the next section. Apart from improvements, the interviews also show the positive attitude towards the application. Both for during the training as well as for continuing providing support once the training is finished. Most participants were positive about the concept; it is seen as a good idea to develop further. This can be supported with the measures from TAM, "attitude towards using" and "intention to use", which are both relatively high. As was seen for the other measures, participants do not unanimously agree with each other. In the interviews, specific participants mention improvements need to be made to agree on further development of the application.

COMET-E is experienced as promising, especially since this is a first iteration. Nevertheless, improvements are possible as will be discussed in the next section.

5.7.2 Required improvements based on the results

There is a positive attitude towards COMET-E; the measures are relatively positive, especially for a first iteration. Based on the results and the discussion in the previous section, the following topics will have to be addressed for the next iteration. For each

topic, the main motivation of change (e.g. a high error rate or being mentioned during a task) is provided, based on the objective results and informal brainstorms during the interview.

- Displaying less text and removal or relocation of content to less prominent places in cases the content is of less importance.
  Motivation: the abundance of text is mentioned multiple times. Additionally, during the test and in the interview, the presence of redundant settings is noted.
- An introductory dialogue, video or tutorial to the COMET-E application.
  Motivation: the high error counts for people clicking circles in task #2 and the high error count because of not being able to find the helplines in task #3.
- Guiding a user when switching the state of the training from following the training to finished, and therefore changing the purpose of the application.
  Motivation: longer completion times (especially for the first four participants) and high error count during task #4, where this mode had to be changed.
- A new integration of the helplines.
  Motivation: mentions about the ambiguity on its location in interviews, the high error count for task #3 and the only case where a task could not be completed.
- A clarification of the monitor.
  Motivation: the mixed valuation of the monitor in the interviews whereas most often suggestions are mentioned to make the monitor more relevant or supporting.
- Earlier provided answers should more easily be found in both the summary and in the modules.
  Motivation: comments in the interviews about not being able to navigate from an answer in the summary to the content where the answer is initially provided.
- Improving navigation within the application.
  Motivation: based on the previous topic, but then applying the same improvement of navigation to other parts of the application.

The topics will be divided and further discussed in Chapter 6.

5.7.3 Limitation of the current results

First, the combination of professionals and end users as the participants of this user test. The real end users of the COMET-E-app are patients following or who have followed the COMET-program. Though, specifically also professionals are asked to join this research and eventually an almost equal division has been reached of the two groups. Both groups are asked to join since they are the stakeholders of this application, as discussed in Section 4.2. There are two reasons to include professionals. Reason #1: Due to their profession and extensive knowledge on COMET and mental health care, they can imagine how patients would experience this application. Since they have seen patients during the full trajectory of COMET (i.e. both first and last week), their participation extend the result. If only patients would be included, it would depend on their progress in the training how much they are able to tell if the application would be supportive. These gaps can be filled with experiences from the professionals. Reason #2: as discussed in Section 4.2, professionals are direct stakeholders and need to approve the application in order to recommend it to patients. By including them in the user test, their opinions can directly be taken into account.

Second point to discuss, the use of a Figma prototype instead of using a real functioning mobile application. As discussed in Section 4.4, in the current stage of the user-centered design process, there is not much to be gained by using a real working

application over a Figma prototype. Although certain interactions are not possible with the prototype (e.g. states can't be saved), the prototype was definitely sufficient enough to discover if (the features of) the application would be supportive for the patient.

Third point to discuss, 45 minutes to form an opinion is short, though sufficient. An opinion had to be formed on the prototype, based on the performed tasks. This opinion enabled answering the questionnaires and the interview questions. Comments are made that more time with the application would be required to substantiate the provided answer. Nevertheless are the initial responses of great value. This research is not focused on (clinical) effectiveness, where indeed a different setup and more time would be required; it is focused on discovering the assumed support for the patients. The (initial) responses support in discovering if features are understood correctly or need improvement. Clinical effectiveness is interesting, though for the final stages of the user-centered design process. Second, by asking the participant to perform a set of tasks without having prior knowledge of the application, the experience is mimicked of first time use. 45 minutes is sufficient for this purpose. Experienced issues with this prototype are likely to be also troublesome in the final prototype (if no adjustments are made). Third, both objective and subjective measures (e.g. completion time and interview responses) are of great value to decide on which screens need more attention in the next iteration. Again, the 45-minute time window is sufficient for this purpose. With the goal of this user-test in mind, 45 minutes is sufficient enough for this user test.

Fourth point to discuss is the switch from in-person user tests to online user tests. Due to unforeseen circumstances as discussed in Section 5.5.7 and Section 5.5.8, the method is changed twice where the first change was most impactful. The first change included switching from in-person to online user tests. Presented screens could not be switched by the researcher, as was possible in in-person user tests. To facilitate the later, the researcher would guide the participant to the correct screen. Small, non-functional, changes had to me made to the prototype. By guiding the user to an invisible button, the start screen for each task could be changed. Whether the user participated in an in-person or online user test, the same actions, apart form the above, are required to complete the tasks; minimal influence on the results are expected. A significant difference is the used "device". In the in-person user test, a user tests the prototype on an actual mobile device; this is not the case in the online user test. For the latter, a user tests the prototype in a browser window, on a PC or laptop instead of on a mobile phone. The screen ratio is the same as on a mobile device; the content will not be stretched. Two differences: 1) Due to a mistake, Figma did not show the case of a mobile phone; this had to be imagined. And 2) Buttons can be pressed by using a mouse, which is more precise compared to using fingers. Especially the last difference could be of, although minimal, influence on the results. During in-person user tests, notions are made about some buttons being small, making it difficult to e.g. go back to a previous screen. The first difference is assumed to have minimal influence, especially since the participant is informed to be testing a prototype of a mobile application. The second difference might have small influences on completion time, rating on ease-of-use for TAM and answers on SUS. Although otherwise intervention would have to be asked, the participant is actively supported with the problem with the "back"-button (and no intervention report is made). Due to this approach, the differences in the results are assumed to be minimal. For the questionnaires and interview, minimal to no differences are expected. Questionnaires could still be filled (although now online) and interaction between researcher and participant is assumed to be similar. So this fourth point in summary, no significant changes for the results are expected because of the unexpected changes in the method. The performance of tasks could still be done in almost the same manner as in an in-person user test, as well as for the other activities of this user test.

Fifth and last point to discuss: proxy users as participants instead of real patients.

Due to COVID-19, real patients could not participate. The use of proxy users have as advantage that results could still be collected. There are disadvantages: 1) proxy users are not real patients. Participants are not familiar with COMET, the presented content is new to them and proxy users might never use the intervention. 2) The proxy users are all people younger than 35 years old, familiar with mobile devices and applications. They, most probably, navigate more easily through the prototype compared to people who are e.g. 60 years old, who can also follow COMET. Difficulty might be experienced due to age difference. This is not taken further into account. All disadvantages can be negated. 1) COMET is provided to people with low self-esteem, most often, combined with other mental issues. This low self-esteem might not be evident for others. Also, patients are diverse (i.e. their demographics and (mental) issues differ). Anyone with a(n) (incorrect) low self-esteem could benefit from COMET. To enable proxy users to imagine having a low self-esteem, a scenario is used. Additionally, most participants are students with different backgrounds, therefore familiar with tools to learn new abilities. COMET-E can be seen as such a tool. Not knowing COMET should not have much influence on the results. 2) Users who are more experienced with mobile applications, most probably discover less issues. Though, any discovered issue is more problematic. I.e. if a more experienced participant is not able to perform a task, a less experienced participant most likely also won't be. Although the proxy users might not represent older patients, their participation is valuable. Main issues will be addressed. Specific issues due to age, can be solved in future iterations.

5.8 Conclusion

Based on the results, two sub research questions can be answered. Though, no actual patients but proxy users participated in this user test; this topic is discussed in depth in the latter discussion. Nevertheless they are well representatives of patients; the research questions can still be answered. They will be answered individually, starting with:

How do patients experience the proposed supportive smartphone application for the COMET-program, during a user test? ***(SRQ3)***

The prototype is received positively in general, though improvements can be made. This is to be expected in a user-centered design approach; the prototype is to be improved with each iteration. Nevertheless did the application score a 65.42 (SD = 20.53) on the SUS-scale which is equivalent to the meaning "OK". The application is seen as supportive for reasons including: it provides an overview of what a user is learning and has learned, reminders trigger the user to keep working on their self-esteem, it lowers the threshold to work on COMET (also on non-training days) and it provides tools against relapses. Improvements can be made, as is supported by the SUS and TAM-score. Though, for a first iteration, the results are very promising.

The following sub research question can also be answered:

How can the proposed supportive smartphone application for the COMET-program be further improved according to patients who are following this program? ***(SRQ4)***

Topics are identified which are to be addressed in the following iterations, including: a new integration of the helplines, including introductory dialogues, improving navigation in the application and a clarification of the monitor. Based on these findings, the final iteration of this research can be created.

6 Changes in the final prototype

Based on the findings from the user test, the final prototype for this research is created. Due to the user-centered design approach, the content will be similar to the content that is described in Chapter 4. The changes, differences and their reasons will be discussed.

This includes the following topics:

- Topic 1: changing the location of the helplines / introduction of the toolkit
- Topic 2: adding links to make content easier to find
- Topic 3: text is limited and provided optionally
- Topic 4: introduction and tips to the available content
- Topic 5: improvements of the monitor

Minor, though relevant, changes are discussed in Section 6.6. Appendix M lists all changes and highlights the differences between the first and final prototype. Section 6.7 shows an excerpt of what can be expected in Appendix M.

6.1 Topic 1: changing the location of the helplines / introduction of the toolkit

In the prototype from Chapter 4, helplines are difficult to find. Users do not expect to find them in the summary. To solve this, the helplines are relocated. Two possible flows are considered, each of them will be elaborated on. Flow #1: a separate page is created for the helplines and an additional menu item is added to the menu bar. This flow would be in line with the current layout of the app; every main feature gets its own menu item and page. By showing it as a menu item, the helplines should be easier to find without the introduction of any additional new flows. This first flow is represented by Figure 29 and Figure 30.

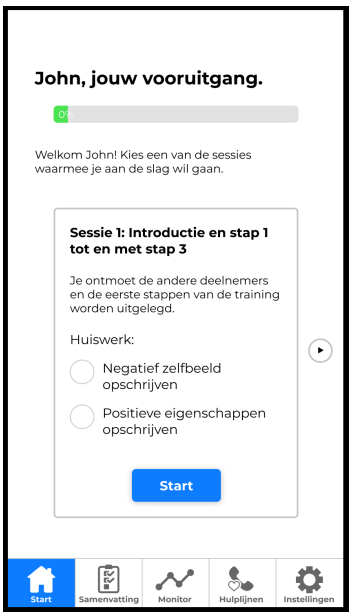

Figure 29: A new button is added in the menu bar: "hulplijnen"

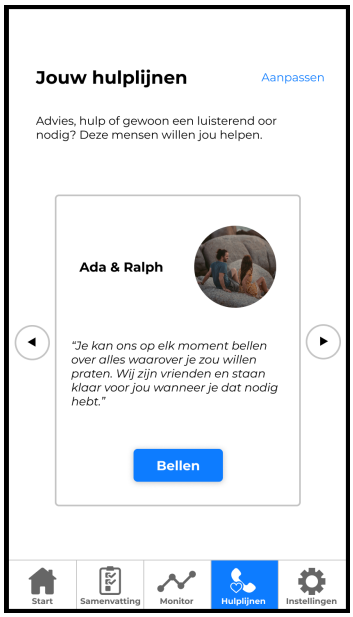

Figure 30: The helplines as a seperate menu item

A second possibility, flow #2: a separate page is created including helplines as well as other elements of COMET like music or written stories that empower the positive self-esteem. They can be seen as tools to maintain the positive self-esteem and are therefore easily accessible and usable. The tools differ from the regular pages (Start, Summary, Monitor and Settings). The latter pages are directly related to (following the) training and to monitoring oneself and therefore the effects of the training. They represent and collect information about one's self-esteem. These pages are more related to (maintaining effects of) the training. Tools, although they have their origin at the training, are resources that can pro-actively be used to support self-esteem and are less related to the training. Especially since the tools are also to be used in difficult times, they should be easily accessible for the user. A circle is added to the top right of each of the main pages of the application (i.e. Start, Summary, Monitor and Settings). Once pressed, the user gets redirected to a separate page listing the tools, including the helplines. This second flow is represented by Figure 31, Figure 32 and Figure 33. The overview of Figure 32 refers to pages where each of the individual tools can be accessed and altered. The "Hulplijnen" would refer to the page as presented in Figure 33. Respectively "Muziek" refers to Figure 48 where all music is listed; "Goede momenten" refers to Figure 49 where all positive moments are listed. The latter two figures are located at the end of this chapter. The user can freely add or remove music, moments or helplines. The interface is similar for each of the latter to increase ease of use. Each added item is also added to the Summary-page.

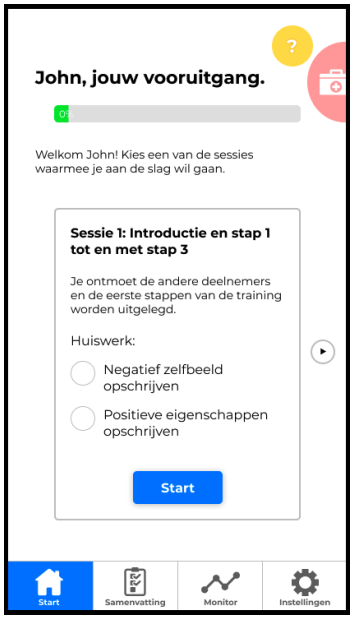

Figure 31: A soft red toolkit-button is shown on every main screen

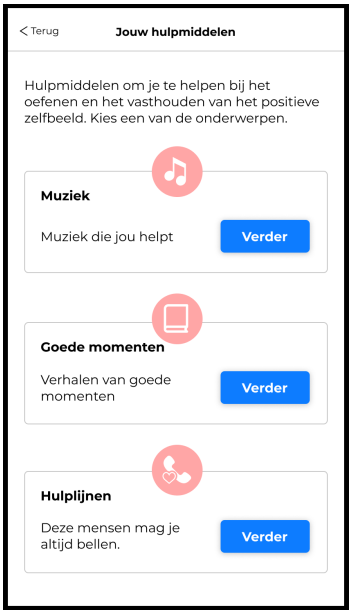

Figure 32: The toolkit provides the user a selection of tools

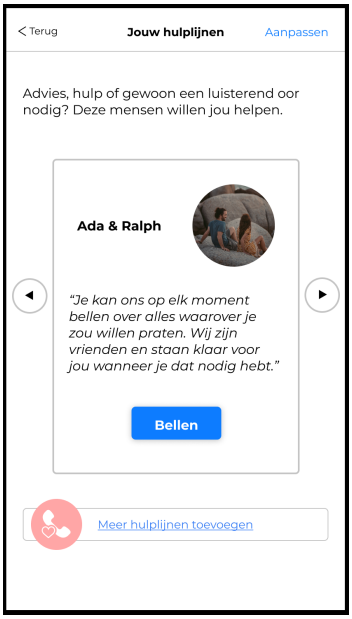

Figure 33: Calling a helpline is one of the tools from the toolkit

6.2 Topic 2: adding links to make content easier to find

Difficulty is experienced with finding earlier provided information. E.g. an answer to an assignment during session 1. The answer is presented in the summary. To see the content of session 1, the user would have to navigate via the Start-page to find the specific session. Those steps are redundant. Adding links in the summary lowers the amount of required steps and makes it easier to navigate through the application. The

links are represented by Figure 34.

The same strategy, having links to quickly navigate through the application, is used for other scenarios. Figure 35 shows how a link is presented on other pages than the Summary-page. On this page, a button is added that redirects the user to the Settings-page. A special occasion that needs to be explained, is the stack of links in Figure 36. An item called "Muziek", discussed in session 5, is shown in the summary. Multiple links are relevant, in this case: 1) a link to information from Session 5 and 2) a link to the complete list of music that a user would otherwise have to access via the toolkit.

Figure 34: Links in the Summary-page refer to earlier followed sessions

Figure 35: Links can be used across the app; not only in the summary

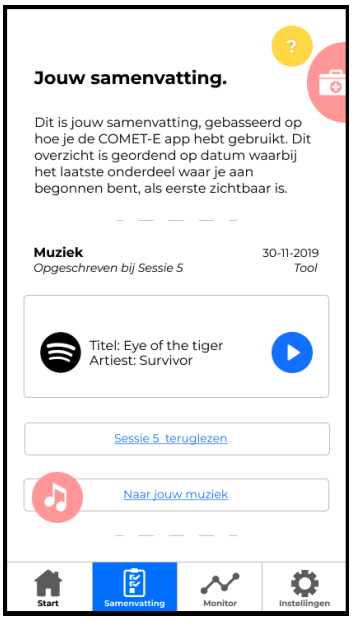

Figure 36: Links can be stacked if multiple screens are relevant

6.3 Topic 3: text is limited and provided optionally

Although the intention for the first prototype was to limit the amount of text, participants still made comments about the matter. To tackle this issue, two things are changed in this final prototype: 1) again text is limited and 2) text from the explanations of the assignments is moved to the "Als tekst lezen"-screen (translated: read as text), accessible via the button below the explaining video.

The first point is self-explanatory; any text that is not relevant or necessary, will be removed. The second point needs more elaboration. Originally, the button below the explanatory video is created to provide the user a transcript of the content of the video. For those users who do not prefer to view the video, the discussed text could be read. This feature will remain, but in addition, the small introductory text for each of the sessions will be added. The same screen could be used to provide additional information; information that is not necessary for the assignment but might be an addition for those who are interested. With this change, explanatory text for each session is limited while still providing the information to those who are interested.

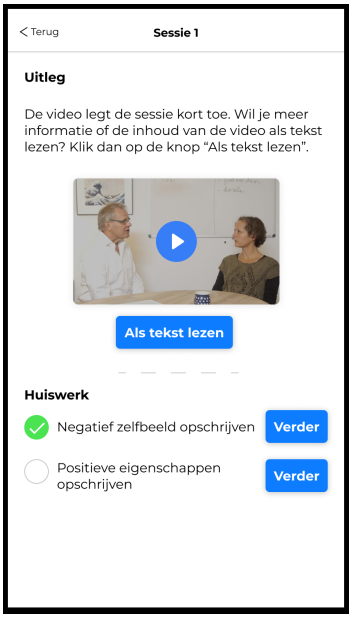

Figure 37: A video explains the session, additional information can be read

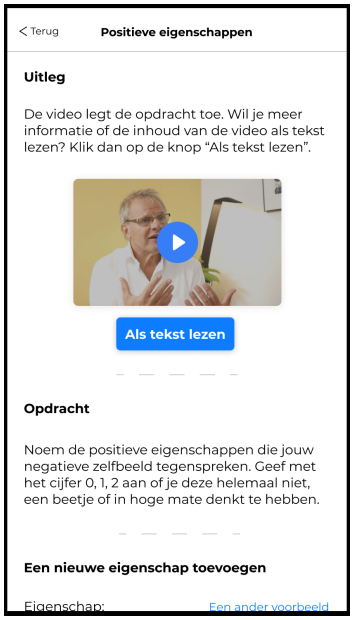

Figure 38: A video explains the assignment, extra information can be read

6.4 Topic 4: introduction and tips to the available content

In its current state, after finishing the introductory questions to tailor the application to the user, no further explanation is provided on its content and features. This has to be discovered by using the application with two possible consequences: 1) initially, users could have difficulties with finding content and 2) features might stay unused since the user is not aware of their existence. A button with a question mark is added to the top right corner of the main screens. In the introductory screens, the user is explained to press this button in case of need for tips. The latter is illustrated by Figure 39. The button is presented on each of the 4 main feature pages of the application (Start, Summary, Monitor, Settings), just as the toolkit-button. Due to the usage of bright yellow as background of the button, the button should be easy to find. The latter is illustrated by Figure 40. Once the user presses the button, a tip will be shown to the user as presented by Figure 41. The user can choose to show the next tip or to skip all remaining tips.

With the introduction of the tips, both the consequences are tackled. The above explains how the first consequence could be solved. The second consequence is solved by always finishing with having tips about the menu bar. Each of the menu items, the 4 main feature pages of the application, will briefly be mentioned. Although the application will not be explained in detail, the tips on these pages should give the user enough head start to use (and understand) the app. This approach is chosen instead of having a tip-button on each screen, to prevent cluttering of elements. The main screens are the screens where the user can take multiple actions in comparison with a screen that explains a single session. The latter is more specified to its content; it’s assumed that the user is less likely to get lost in this screen.

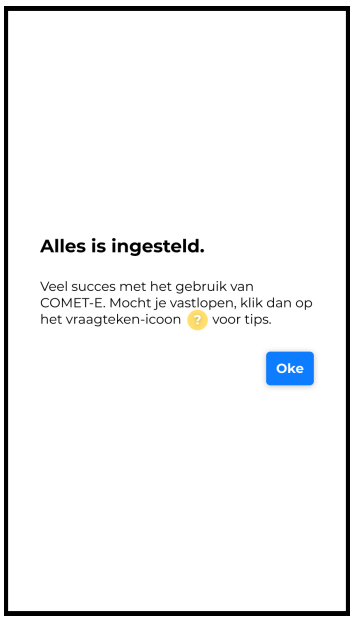

Figure 39: The final introductory screen informs the user about the tips

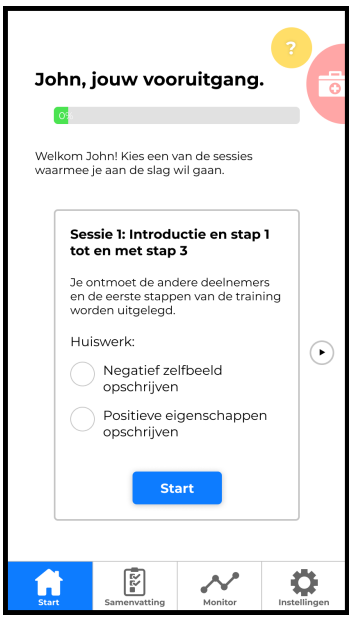

Figure 40: The tip-button is present on all main screens of the app

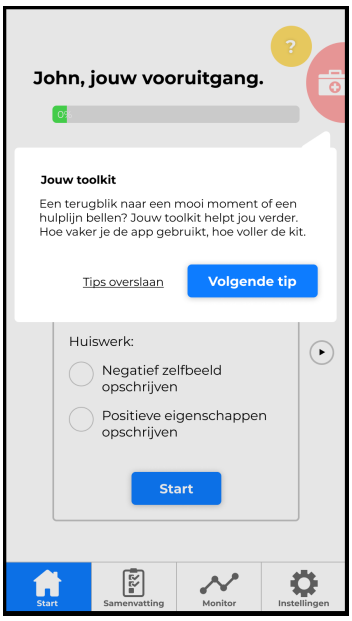

Figure 41: A short dialogue will be shown, providing the user with a tip

A similar approach is used when the user has finished the training. Once all sessions are completed, a tip is presented the next time the user visits the Start-page. The difference with this specific tip is that it's proactively shown instead of reactively. Other tips are only accessible by clicking on the tip-button, whereas this specific tip is proactively shown. This tip informs the user that the COMET-E app can also provide support now the training is finished. The tip is represented by Figure 42. Once having changed the state of the training to "afgerond" (translated: finished) on the Settings-page, the Start-page looks as represented in Figure 43. The latter screen got a small update to accentuate the existence of the different components that can be used.

Two other ideas could have been chosen to inform the user about switching modes in the app: 1) adding an additional module or session that helps the user to switch the app to "after-training"-mode, or 2) the app gets automatically configured to "after-training"-mode once all sessions have been completed. Option 1 has not been chosen since the modules only exists out of content from the original COMET-therapy; explanations on how to configure the application do not belong to this content. To prevent ambiguity, this new information should not be introduced in an additional module. Option 2 has not been chosen because of two reasons: 1) the app would suddenly change; screens that were previously visible, are now replaced by new screens. This could negatively affect the trustworthiness of the app. 2) This is not in line with SHRQ2 and SHRQ8 as represented in the table with requirements, Table 2. The app changes suddenly, without consent of the user (and thus violating SHRQ2). By automatically changing the app, you don't keep the patient responsible for their own behaviour and actions. Also, the user can't decide on the tempo of the training (and thus violating SHRQ8). Because of above reasons, the current approach has been used.

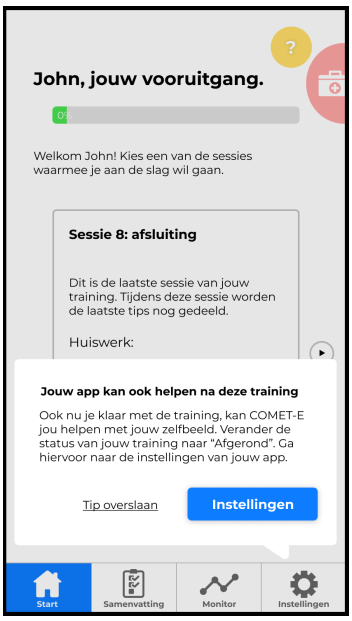

Figure 42: A tip to inform that the app is also able to support after COMET

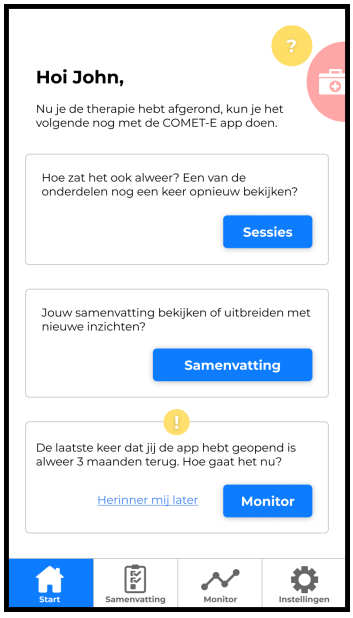

Figure 43: The (updated) start screen to provide support after COMET

6.5 Topic 5: improvements of the monitor

In the previous prototype, a basic implementation of the monitor is included. The comments that are made during the user test, enable to improve the monitor. Multiple improvements are involved; they will be discussed separately.

First improvement, automatically scrolling to the position of the screen where a new monitor moment can be added, after being redirected by a notification. A user had to scroll to add a new monitor moment; this is redundant. In the final prototype this is changed. After clicking the notification, the application automatically scrolls to the form to enter a new monitor moment. This is represented by Figure 44 and Figure 45; the first figure is shown when clicking the notification, the application will scroll automatically to the position of the second figure. This implementation is chosen since it shows the user recognizable elements: the title of the page and the graph.

Second improvement, more prominently is shown that a comment for a moment is provided and that these moments are clickable. A visual difference is made between moments including a comment and moments without. This visual difference might already trigger the user to discover the reason for the difference. Additionally, text below the graph explains that the circles with a white border, are moments with a comment. Although the change is minimal, it should be experienced as improvement of the monitor. Figure 44 represents this improvement.

Third improvement, users can directly add a comment to their provided mark by filling the additional text field below the slider. In the previous prototype, the user had to press a moment in the graph to add a comment. Participants of the user test emphasized the relevance of adding a comment to a monitor moment; the comment might enable to recognize patterns for low or high marks. Since the relevance is emphasized, a comment for a provided mark is more prominently asked for. Figure 45 shows this improvement.

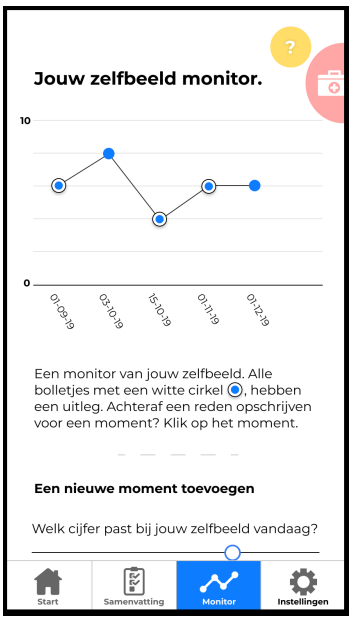

Figure 44: The monitor explicitly shows moments with an added explanation

Figure 45: When adding a new moment, optionally a reason can be given

6.6 Minor changes

Also minor changes are included in the final prototype. These changes are improvements, though they are not significant enough to dedicate a full section to. The following minor changes are made and will shortly be elaborated on:

- Settings from the Settings-page that are not of importance (e.g. earlier configured settings that are not likely to change) will be moved to a separate screen. They are still present in the application in case a user wants to correct a made mistake. Those settings are accessible via an additional button on the Settings-page, with the text "Geavanceerde instellingen" (translated: Advanced settings).
- On the Settings-page, the period can be configured of how often to be reminded to enter a new moment in the monitor. One of the professionals mentioned that the available time periods are too long. To learn new behaviour, these should be shorter. The time periods are changed from every month and every 2, 3 and 4 months to every week, every 2 weeks, every month and every 2 months.
- Content from the summary (e.g. answers on assignments) can also be found in the session where the answer is provided. Users should be able to find the content in the summary and on the places where they originally provided the content. *Note: This item is added to the minor changes since the intention to do this and the implementation in the prototype is already there, though not visible or clear enough. Due to difficulties to simulate this in a stateless prototype, this item probably has been mentioned a number of times by the participants.*
- Removal of the filters of the summary: the first prototype offered options to filter the presented content between tools (that can help the user) and activity (made progress) in the training. Since no comments are made, nor did anyone try to apply them, it is assumed that the filters are not experienced as an addition. Since the tools are moved to the toolkit, as discussed in Section 6.1, and since advantages are not recognized, the filters are removed from the summary.

6.7 Access to the final prototype

Just like the first prototype, this last prototype is created by using Figma[7]. Apart from Figure 29 and Figure 30, the displayed screens are also the screens that are used for the final prototype. The few screens that aren't displayed, are shown on the next page. For an easy comparison between the first prototype and this last prototype, see Appendix M. Figure 46 and Figure 47 show an excerpt of Appendix M. This excerpt shows how the Start-page has changed to provide the user with tools (including helplines) and tips that explain the application; topic #1 and topic #4 of this chapter.

First prototype - Final prototype

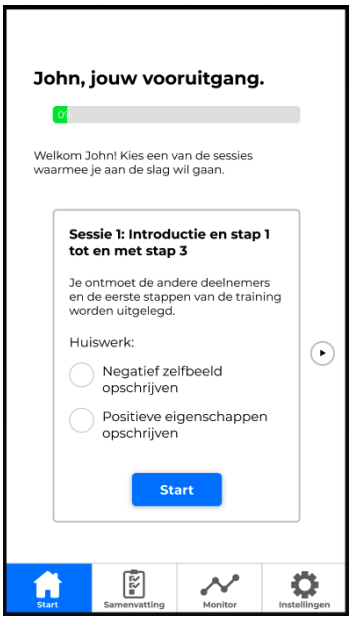

Figure 46: Start-page in the first prototype presents the modules that a patient can follow.

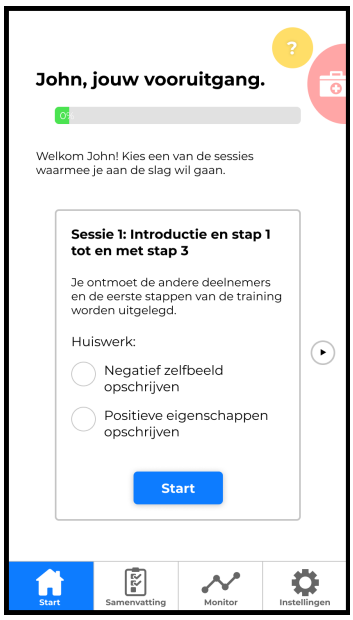

Figure 47: Start is extended with buttons for tools (red) and tips (yellow), presented on every main screen.

[7]The prototype is accessible via the following link: `https://tinyurl.com/ycuasp9b`

Figures that are included in the final prototype, though are not previously shown.

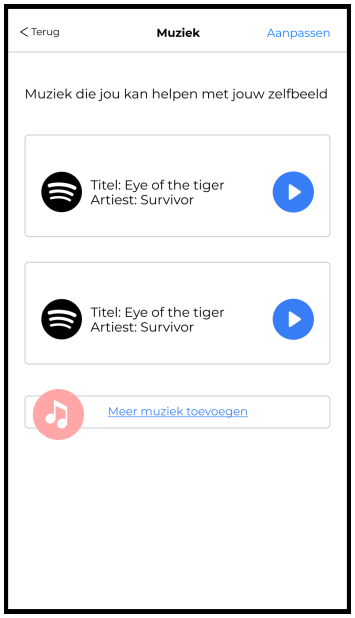

Figure 48: Supportive music, stored in the toolkit, is listed

Figure 49: Positive moments, stored in the toolkit, are listed

Figure 50: Advanced settings can be accessed via a link

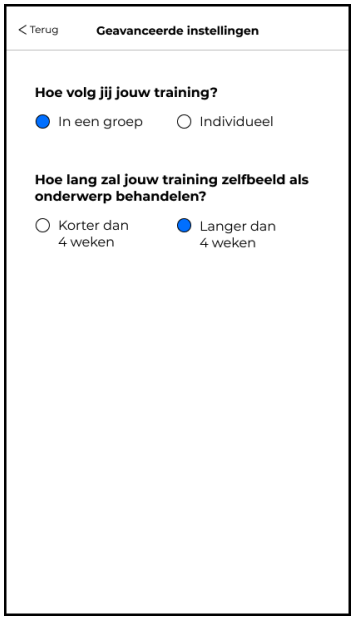

Figure 51: Advanced settings, settings that most likely do not change

7 (General) Discussion

Looking back to the overall research, two topics are to be discussed. First topic to discuss, none of the participants in this research are the end users of the application. Although intended, it was not possible to involve real end users. Due to the COVID-19 outbreak, as discussed in Section 5.5.7, proxy users have been asked to participate to represent the end users. Though, as discussed earlier in Section 5.7, proxy users are seen as a good replacement for this research. There are reasons to believe that similar results would have been collected with real end users. Additionally, the problems that proxy users ran into due to inconsistencies or ambiguities in the application, will also be the problems that real end users most probably would have ran into. Therefore, the results are still of great value. The assumption is that, although the participants did not suffer from (a diagnosed) low self-esteem, their participation was of a great support to create a prototype that fits the real end users. Further research is required to confirm the assumptions that similar results would have been collected with real patients.

Second and last topic to discuss, how the method in this research have led to an assumed supportive application for patients who are following or have followed COMET. As discussed above, no end users have been involved. Also, no real application is tested but mock-ups of an application. The chosen approach and its reasons will be elaborated on. This research intentionally started relatively broad with background information on COMET. The field of work had to be discovered for other related or similar research. From the features that have been discussed in the Related work (Section 2.3.3), some have been incorporated in the final prototype (a selection is provided): flexible modules, possibility to monitor oneself and an emergency feature. With new knowledge of the field of work and of similar applications, the interviews could start.

The interviews from Chapter 3 were required to discover the current experiences with COMET, and to discover if the found research on the after-therapy gap is also recognized in practice. With the interviews, requirements are defined which are incorporated in the definition of the first rough prototype of the COMET-E application, as discussed in Chapter 4. With this prototype, a user test could be done to find the flaws in the prototype and to register the experiences of the users with the application. With these results, a final prototype could be created where the flaws are solved and small errors are smoothed. This final prototype is described in Chapter 6.

All prototypes, including the final prototype, are mock-ups that are created by making use of Figma. In this iterative user-centered design process, the mock-ups are the perfect tool to discover how a concept should work and if the concept is adhering to the requirements of the users. It enables quick development of a prototype, whereas this would not have been possible with a real functioning application. Most technical difficulties (e.g. making the application support multiple operating systems or providing safe storage of sensitive data) could be surpassed. Though these are important matters, for the past phase of the development of the prototype, they are not of importance yet. After having done another user-test with the final prototype, a next step in the user-centered design process can be taken. This next step could include a real working mobile application, for which is known that the prior prototypes were well appreciated by the participants. With more certainty can be said that it's worth the effort to create this real working application, including all its technical difficulties. The effort it would require to create this real working application could be more easily supported. With more certainty can be said that the effort would adhere to the requirements of the end users. The chosen approach is seen as valuable, whereas relatively quickly a concept has been created and supported. Any overhead, due to development, has been limited and with more certainty can be said that it is worth the effort to spend time on the technological development of this application.

8 (General) Conclusion

With all activities of this research, the main research question **(MRQ)** can be answered:

How to design a smartphone application for COMET in mental health care that can continue to provide support to the patients after having completed the program?

Each of the sub research questions is answered in their respective chapters. Each of the main activities will be summarized; the answers on the research questions are incorporated in this summary. The background information presents COMET, the training that will be supported by the smartphone application. This research focuses on COMET, although the results can be used as inspiration for supporting tools for other treatments and trainings. The after-therapy gap is discussed, the period of time after having finished COMET and when support from professionals is scaled down; the gap ought to be narrowed or overcome by the introduction of this smartphone application. Related work is presented, discussing interventions for COMET and a selection of disorders.

Interviews with mental health care professionals are held to discover current experienced issues with COMET that are noted by the professionals. Professionals mention issues with keeping patients involved on non-training days, the content not fitting all patients and tempo being maintained by the professional instead of the patient. The after-therapy gap is acknowledged and there is a positive attitude towards introducing a mobile application for during the training as well as when the training is finished. During the training, the application could guide and remind the patients with and on the content. After the training, the application could support with monitoring oneself and reactivating what has been learned or discussed earlier in training. From the interviews a total of 19 requirements for the development of a mobile application are derived, whereas 17 of these could be mapped to the PSD-model. An example of the requirements: *"Motivates to work on (homework assignments for) self-esteem (problems) during the full week instead of only during therapy sessions."*. With the requirements that are found in the interviews, a first iteration of an app for during and after COMET could be designed. The requirements are translated to features with user stories. With the latter, the first iteration of the COMET-E app could be created in Figma.

In a user test, this prototype is tested with stakeholders of this application: the professionals and most importantly the patients, the end users of this application. The patients are represented by participants that are instructed by using a scenario. The user test provides a promising result. The predominant part of the participants is positive about the COMET-E application, though improvements are definitely possible. This is seen in both the subjective measures (i.e. responses on an interview) as well as in the objective measures (i.e. the TAM and SUS-questionnaire, the error counts and the completion times of each of the executed tasks). Multiple topics are to be addressed to improve the prototype. A selection: a new integration of the helplines, inclusion of introductory dialogues and clarification of the monitor.

The results from the user test are used to create the final prototype of this research. This final prototype includes the latter topics. The changes to the final prototype are discussed, leading to the result of this research: a prototype of a mobile application that could support patients who are following or have followed COMET.

With the conclusions from all the prior chapters, the main research question can now be answered:

How to design a smartphone application for COMET in mental health care that can continue to provide support to the patients after having completed the program?

The user-centered design approach has proven to be very suitable for this research. Starting with gathering background information and interviews to understand the field of work, a first prototype could be developed and iterated on, to eventually reach a final prototype. The first prototype was already perceived as being "OK". Based on the feedback on this prototype, the next and final prototype is created that includes major improvements in comparison with its predecessor. If the same user test would be performed with this final prototype, better results and higher scores on the SUS and TAM are assumed to be achieved.

The main research question is therefore answered by the approach that is shown in this report. Whereas in this current research the focus is laid on supporting COMET, the same approach could also be well used for other trainings, therapies and mental disorders. The same accounts for the technology that's being used. The following chapter, Future work, will discuss this more in depth as well as how the current result could be further developed.

9 Future work

Following topics are discussed: 1) applying the same method for other trainings, therapies and mental disorders, 2) next steps in the (technical) development of COMET-E, 3) the process from prototype to final version, and at last 4) the validation of COMET-E. Written to inspire others who will be working on mobile applications for mental health care. May it be COMET-E or an application for a different target group.

9.1 Applying the same method for other trainings, therapies and mental disorders

The used method, can also be used for other trainings, therapies and mental disorders. This also accounts for the technology that's used. The learned lessons are interchangeable, whereas the following are most important:

- Both patients and professionals need to provide support for the application.
- It should support the patient without making them dependent on the application.
- It should be an extension to a training or therapy instead of a replacement.

These lessons are discussed earlier and will not be emphasized on. The method that is used in this research is suitable for its purpose and would definitely be a recommendation for the development of applications for a similar context. As discussed in Chapter 7, the used method enables to create and research deliberated concepts that could potentially be further evolved to working applications. Before any developmental party is involved, the concept could be thought trough by researchers, and those professionals and patients who have the most experience and practical knowledge. Once, with confidence, can be said that a mobile application would be beneficial for a patient and other involved parties, it can be decided to develop the application. A developmental party can be involved and the prototypes can be used to illustrate the goal of the application.

Whereas in the current research the focus is laid on mobile applications, the above as well as some requirements from Table 2, also apply when using other technology (e.g. VR, virtual reality). Extra caution is required since (vulnerable) patients with mental illnesses are involved; the use of technology should not worsen their situation. Therefore it's required to involve also mental health care professionals, with special preference to professionals that have the patient in treatment. Unless discouraged by the treating professional, suffering a mental illness is no reason to exclude a patient from participation to research. Taking VR as example, it might have much to offer; enhanced treatment outcomes by simulation of new realities are possible (Freeman et al., 2017). The use of virtual reality exposure therapy for combat-related PTSD has shown to be effective (Beidel et al., 2019). The above illustrates how the applied method can also be used for other trainings, therapies and mental disorders.

9.2 Next steps in the (technical) development of COMET-E

Although the technical development of the application has not been part of this research, ideas are shaped during the process and due to prior personal knowledge. Related to the content of the prototype, it is recommended to invest additional time to improve the monitor. The idea of the monitor has been successfully tested, though improvements can be made. By using the COMET-E application, a lot of data gets collected. Data that could be reused, as is done in parts of the application. E.g. answers provided during the assignments can be presented in the summary and in the toolkit. The current implementation of the monitor is passive. It provides means for the user to measure

self-esteem, though the provided information is not further used. The monitor could be made more valuable by adding features providing the user suggestions of possible actions. E.g. when a user scores low in the monitor, the user could be provided an earlier written success story or be suggested to call a helpline. The monitor becomes more active and responsive, suggesting follow-up actions to tackle the user's low score.

Second next step could be the creation of a visual design. In this research, the focus is laid on interaction design. This does not necessarily include the visual appeal to the user, but solely the comprehensibility of the application. The current design is acceptable but can be improved. The application could become more lively, making the application more useful, more appealing and more pleasant to use.

Last next step is the technique to be used for future development. An application as COMET-E should become available for all patients who are following or have followed the training. Currently, two operating systems for smartphones are widely used: iOS from Apple and Android from Google (StatCounter, 2020). Both operating systems should be supported. For the development of the application it's recommended to use a cross-platform development platform. This has as benefit that it can generate an application for both Android and iOS without having to create and maintain separate codebases; both apps can be generated by using the same source code. Compared to developing a separate iOS and Android application, this saves time. A second argument to use a cross-platform development platform is the simplicity of the intended application. The COMET-E app does not require platform specific or advanced APIs (e.g. for reading data from a smartwatch) and is therefore a great candidate for cross-platform development. Two platforms are recommended (based on personal preferences): React Native[8] and Flutter[9]. They originate respectively from Facebook and Google, but the code is open source, meaning that the code is available for all and maintained by all. Especially since an application is created for mental health care, transparency of the source code is of additional importance. These two platforms are also the most used platforms for cross-platform app development (JetBrains, 2019), therefore a great amount of community-support is available and the source code is likely to be maintained for a long time. As mentioned, the COMET-E app is relatively simple and has components that are used on multiple screens (e.g. music can be found back in the summary and in the toolkit). Both React Native and Flutter support the use of components, making them promising candidates for the technical development of COMET-E.

9.3 From prototype to final version

The first steps of the user-centered design process have been carried out. The performed user test should be repeated with the improved prototype. By comparing results with those from the current research, conclusions can be drawn on the experience of the improvements. It is recommendable to involve real patients. Large usability errors are expected to have been found by the proxy users. By having real patients participate in the next steps of the research, it's likely that more specific usability errors are found due to their experience with COMET. This process, altering the prototype and testing the prototype in a user test, should be repeated as long as new usability errors are found. Both patients who follow the original COMET-training and those who follow derivatives, can participate. This ensures that the COMET-E app suits all applications of COMET. This phase of the user-centered design process is still explorative with as goal to discover how the application can be supportive for any application of COMET. This is in line with MHRQ4 from Table 2. Changes are still easy to apply where this is not the case with a real working application.

[8]React Native: `https://reactnative.dev/`
[9]Flutter: `https://flutter.dev/`

Next step is to create the real working application, based on the latest prototype, with the recommendations from Section 9.2 in mind. This phase of the user-centered design process will be used find and solve (new) errors, experienced because of real use in a training, and will be used to prepare the application for validation of effects on COMET; this is described in Section 9.4. A stable target group is required. With derivatives of COMET, a selection of parts of COMET is used. This adds variables to the target group, this is not favourable a in validation study. Since the application is based on COMET, original COMET-groups are required. Original COMET-groups use all parts of the training, therefore limiting variables. A pilot with a COMET-group can start, where the application is included during training (and for after-care). Answers on the following two research questions should be searched for:

1. Is COMET-E experienced as supportive during the training?
2. Is COMET-E experienced as supportive after having completed the training?

The target group is a COMET-group starting from session #1; all patients are participating. Each patient uses the application on a personal device to prevent to have to carry multiple devices. Except for the application, no further tools (e.g. a workbook) are used. Halfway and at the end of the training, a semi-structured interview will be held to discover the experiences of the participants. As in the current research, the SUS and TAM will be answered. The semi-structured interview is also held with mental health care professionals. As discussed in Section 4.2, it's required that professionals approve the application. They are the promoters of the application (i.e. if a professional disapproves the application, it's less likely to be used during the training). With all results, the first research question can be answered.

Six months after COMET, a second semi-structured interview with patients is held and SUS and TAM will be answered. The measures are adjusted to measure if the application is being supportive for the patient, 6 months after COMET. With the results, the second question can be answered. The answers on the research questions can be used to improve the application. Since this research is a user-centered design process, the above has to be repeated until the results become stable (i.e. no (new) issues are experienced and the results become uniform). The SUS and TAM are objective measures for improvement; higher scores on these measures including positive experiences mentioned during the interview, can support if an iteration was an improvement. The eventual result, a final version of the application.

9.4 Validation of COMET-E

With the final version of COMET-E, clinical validation should be performed. This to ensure that the use of COMET-E does not negatively influence effects of COMET on self-esteem, that effects of COMET are maintained or perhaps being improved. Answers on the following two research questions should be searched for:

1. When used during COMET, does COMET-E support the effects of COMET on self-esteem?
2. When COMET is completed, does COMET-E support the effects of COMET on self-esteem?

Both questions can be answered by using an approach similar to and heavily inspired by approaches used to validate COMET for different disorders (Korrelboom et al., 2011, 2012). The Rosenberg Self Esteem Scale (RSES) (Franck et al., 2008) is the main instrument to measure a patient's self-esteem. Instead of validating effects of COMET

on self-esteem, the effects of the application on COMET are validated. Two groups in a randomized controlled trial (RCT) are required: 1) a control group: this group follows COMET as intended; also called treatment as usual (TAU), and 2) experimental group: this group follows COMET with the addition of the mobile application.

Before and after the training (after the last session of COMET), a RSES-measurement is taken. For the experimental group should be registered if the application is used at least once a week; once before every session. It's likely that the application is opened at least once a week if the application is actively being used. Without this requirement, it's not possible to draw conclusions on effects of COMET-E on COMET. If effects on self-esteem for both groups are similar, it suggests the app does not influence effects of COMET. Depending on conclusions from the research described by Section 9.3, COMET-E can be an addition to COMET. If the experimental group scores higher on self-esteem, it suggests the application increases effects of COMET. If the experimental group scores lower, it suggests the application negatively impacts COMET.

To answer the second question, the moment of RSES-measurements is the main change. One measurement is done right after the last COMET-session, the next measurement is taken a month later. As discussed in Section 2.2.2, a follow-up in the period of 30 days after hospitalization, lowers the readmission rate. Though patients who have followed COMET are not generally similar to the hospitalized patients, it can still be used as guide for the follow-up measurement. Combined with the two previous measures plus another measure 6 months after the last session, a trend might be spotted. If the experimental group scores higher on self-esteem compared to the control group, it suggests the application increases or maintains effects of COMET after completion of the training. If scores are similar, the app does not influence effects of COMET. Depending on the research described by Section 9.3, COMET-E can still be an addition for the patient. If the experimental group scores lower than the TAU-group, it suggests that the application negatively impacts the effects of COMET on self-esteem, after completion of the training. To draw conclusions, the application should be used regularly.

9.5 Final notes on future work

A user-centered design approach is used and the presented information is based on the first step of this approach. Many steps are remaining. This statement can be supported by the amount of topics that is discussed in this chapter. The first results are definitely promising, but additional steps have to be taken to be able to justifiable state that this application will effectively support the patients to work on their self-esteem during and after COMET. If COMET-E is found to be supporting effects of COMET, potentially the number of relapsing patients could be lowered; meaning less pressure on mental health care and therefore improving accessibility, less costs for insurance companies and improved quality of life for patients. If the taken approach and its result is supportive for people with low self-esteem, it's interesting to discover if the same applies for other treatments, therapies and trainings that are focused on other disorders.

This research is greatly supported with a lot of help from mental health care professionals and participants who were able to place oneself in the role of the patient who follows or has followed COMET. By repeating some of the completed steps, with the additions as discussed in this chapter, an eventual justified application can be created that will support patients both during and after having completed COMET.

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Appendices

A Questions for interviews with professionals

The file is printed on the next page. Since the interview is held in Dutch, the questions on the following page are also presented in Dutch.

Interview schema onderdeel 1: professionals over COMET

Algemene vragen

- Wat is jouw rol binnen de instelling waar je werkt?

Vragen gericht op COMET, tijdens de training.

- In hoeverre wordt COMET toegepast bij jouw organisatie?
- Welke ervaringen heb jij met COMET?
- Welke opdrachten, boekjes en materialen gebruik jij bij de training?
- Over welke aspecten ben jij positief over COMET?
- Over welke aspecten ben jij minder positief over COMET?
- Welke aspecten mis jij nu in de huidige toepassing van COMET?
- In het vorige onderzoek wat ik heb gedaan kwam COMET als een van de voorbeelden naar voren waar techniek mogelijk een aanvullende rol zou kunnen spelen? In dit onderzoek richt ik mij op hoe we een smartphone applicatie kunnen ontwerpen voor de ondersteuning van COMET. Hoe denk jij hierover?
- Waar / hoe zou een smartphone applicatie een rol kunnen spelen? Kun je dit toelichten?
- Voor welke onderdelen van COMET zou volgens jou een smartphone applicatie ingezet kunnen worden voor ondersteuning? Hoe ziet dat er volgens jou uit in een app?
- Waar / hoe zou een smartphone applicatie **geen** rol kunnen spelen en waarom **niet**?
- Wat zou een smartphone applicatie de patiënt **tijdens** de periode van COMET moeten bieden volgens jou? Waarom denk jij dat?

Vragen gericht op de periode na het voltooien van de training.

- Hoe eindigt de COMET-training? Wordt er nog persoonlijk advies gegeven aan het einde van de training? Hoe ziet zo'n advies eruit?
- In het vorige onderzoek werd de kloof tussen het volgen van een behandeling en het uit-behandeling zijn besproken. Waar je eerst feedback en ondersteuning krijgt, krijg je dat na de behandeling/training niet meer. **Herken jij dit?** Hoe zie jij dit bij COMET? Ken je situaties waarbij de patiënt na het volgen van de training, wel / of niet in staat is om het bijgeschaafde zelfbeeld vast te houden?
- Denk jij dat een smartphone applicatie een middel zou kunnen zijn om de effecten van de COMET training te verlengen en/of vast te houden? Hoe denk jij hierover? En hoe werk dat?
- Welke aspecten van wat de patiënt heeft geleerd tijdens COMET zou de smartphone applicatie naar voren moeten halen? Wat maakt deze aspecten extra belangrijk?
- Wat zou een smartphone applicatie de patiënt **na** COMET, moeten bieden volgens jou?
- Wat zou een smartphone applicatie **na** COMET, juist **niet** moeten doen?
- Vind jij het gebruik van een smartphone applicatie voor COMET nadat de patiënt de training heeft voltooid een goed idee? Waarom wel / waarom niet?

B Information letter for interviews with professionals

The file is printed on the next page(s). Since the interview is held in Dutch, the presented document is also written in Dutch.

Inleiding

Beste heer/mevrouw,

Wij vragen u om mee te doen aan een onderzoek naar uw ervaringen met (een variant van) het COMET-programma. Met uw bijdrage helpt u mee aan de ontwikkeling van een mobiele app ter ondersteuning van het COMET-programma en de periode nadat eerstgenoemde is afgerond. Mocht u na het lezen van de informatiebrief nog vragen hebben? Dan kunt u terecht bij de onderzoekers: Bob Loos, Randy Klaassen en Youri Derks. Onderaan bladzijde 2 vindt u de contactgegevens.

1. Wat is het doel van het onderzoek?

In dit onderzoek zijn wij op zoek naar hoe we een smartphone applicatie kunnen ontwerpen dat ondersteuning kan bieden aan patiënten tijdens het COMET-programma en nadat zij het programma hebben afgerond. Dit is samen te vatten in de volgende (vertaalde) onderzoeksvraag:

"Hoe ontwerpen we een smartphone applicatie voor het COMET-programma in de geestelijke gezondheidszorg, dat ondersteuning kan bieden aan patiënten tijdens het programma en nadat zij het programma hebben voltooid?".

U wordt gevraagd voor medewerking bij dit onderzoek vanwege uw (door ons vernomen) ervaring met COMET. Bij dit onderzoek ligt de focus op het definiëren van de eisen voor de eerstgenoemde smartphone applicatie. Dit doen wij door het inventariseren van de huidige ervaringen van behandelaren met het COMET-programma. Het resultaat hiervan wordt gebruikt voor de ontwikkeling van een prototype van een smartphone applicatie. In een vervolgonderzoek, wordt dit prototype getoetst door middel van gebruikerstesten om het prototype verder te ontwikkelen.

2. Hoe wordt het onderzoek uitgevoerd?

Als u ervoor kiest om deel te nemen aan dit onderzoek, dan plant Bob Loos (een van de onderzoekers en masterstudent aan de Universiteit van Twente) samen met u een interview in. Het interview is een open gesprek waarbij Bob een aantal vragen heeft voorbereid. Het interview kost ongeveer 30 minuten van uw tijd. Dit interview kan tevens in groepsverband afgenomen worden.

Uw antwoorden en de antwoorden van de andere deelnemende behandelaren worden samengevoegd om tot de resultaten te komen. Met deze resultaten kan er een definitie gedaan worden van de eisen voor een smartphone applicatie voor het COMET-programma.

3. Ontvang ik de resultaten na afloop van het onderzoek?

De resultaten zullen na afloop van dit eerste onderzoek, schriftelijk gepresenteerd worden aan de behandelaren die betrokken zijn met het COMET-programma. Indien wenselijk, kan deze presentatie ook gedaan worden door middel van een bijeenkomst.

4. Wat gebeurt er met mijn gegevens als ik deelneem?
Tijdens dit onderzoek worden uw ervaringen, die u heeft bij het uitvoeren van COMET, verzameld. Er worden geen persoonlijk medische gegevens verzameld. De verzamelde gegevens worden gecodeerd en zijn niet te herleiden naar u als persoon. Enkel de onderzoekers van deze studie zullen toegang hebben tot de coderingssleutel waarmee de interviewgegevens aan uw persoon kunnen worden gekoppeld. Dit zal uiteraard alleen gebruikt worden in geval dit noodzakelijk is voor de uitvoer van het onderzoek. Resultaten van het interview worden bewaard voor 5 jaar. Dit is om mogelijk verder onderzoek te kunnen doen, hierover te publiceren door onderzoekers van GGNet en de Universiteit van Twente of om de uitkomsten van het onderzoek te controleren.

5. Zijn er extra kosten/is er een vergoeding wanneer u besluit aan dit onderzoek mee te doen?
Er zijn geen extra kosten. U krijgt aan de andere kant ook niet betaald voor deelname.

6. Welke ethische toetsingscommissie heeft dit onderzoek goedgekeurd?
Dit onderzoek is voorgelegd aan de ethische commissie van de Universiteit Twente (faculteit EWI). Deze commissie heeft bepaald dat dit onderzoek uitgevoerd mag worden.

7. Wat moet u doen als u wilt deelnemen aan dit onderzoek?
Als u besluit om deel te nemen, laat dit dan via een e-mail bericht weten aan Bob Loos: b.loos@student.utwente.nl

8. Meer informatie?
Mocht u meer informatie willen over dit onderzoek, dan kunt u contact opnemen met een van de volgende drie onderzoekers:

- Bob Loos, masterstudent Human Media Interaction aan de Universiteit van Twente
  E-mail: b.loos@student.utwente.nl
- Randy Klaassen, onderzoeker bij de Human Media Interaction-groep aan de Universiteit Twente.
  (indien u niet verbonden bent aan GGNet)
  E-mail: r.klaassen@utwente.nl
  Telefoon: 053-489 3811
- Youri Derks, Gz-psycholoog en onderzoeker
  (indien collega bij GGNet)
  E-mail: y.derks@ggnet.nl.
  Telefoon: 088-933 5253 (bereikbaar op maandag en donderdag tussen 9 en 17 uur)

C Informed consent for interviews with professionals

The file is printed on the next page(s). Since the interview is held in Dutch, the presented document is also written in Dutch.

Toestemmingsformulier

Wij vragen u om toestemming of bevestiging voor de volgende punten. Geef voor elk van de volgende punten uw toestemming door een vinkje te zetten. Geeft u geen toestemming voor een van de onderwerpen, dan hoef u geen vinkje te zetten. Bij twijfel en vragen kunt u terecht bij de onderzoekers.

- ☐ Ik heb de informatiebrief gelezen. Ik kon aanvullende vragen stellen. Mijn vragen zijn beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.
- ☐ Ik weet dat meedoen helemaal vrijwillig is. Ik weet dat ik op ieder moment kan beslissen om toch niet mee te doen en op ieder moment kan stoppen. Daarvoor hoef ik geen reden te geven.
- ☐ Ik weet dat sommige mensen de door mij verstrekte gegevens kunnen zien. Die mensen staan vermeld in de informatiebrief. Gecodeerde gegevens kunnen gebruikt worden voor vervolgonderzoek. Al mijn gegevens worden geanonimiseerd en zijn niet terug ter herleiden naar mij als persoon.
- ☐ Ik geef toestemming aan de onderzoekers van dit onderzoek om mijn gegevens te gebruiken, voor de doelen die in de informatiebrief staan. Dit betreffen géén persoonlijke medische gegevens.
- ☐ Ik geef toestemming aan de onderzoekers van dit onderzoek om audio opnames te laten maken van het interview. Ik heb recht op het terugluisteren van het bestand dat wordt bewaard na het interview. Indien op een opname toch bepaalde persoonlijke gegevens terecht komen, dan weet ik dat deze zullen worden verwijderd.
- ☐ Ik ben ervan op de hoogte dat na de dag van mijn deelname, ik nog drie volledige dagen (alle dagen van de week gelden) heb om mijn deelname in te trekken. De onderzoeker moet in dit geval alle gegevens met betrekking tot mij en mijn deelname verwijderen.
- ☐ Ik ben ervan op de hoogte dat al mijn verzamelde geanonimiseerde gegevens (notities en transcript van het interview) voor 5 jaar worden bewaard. Dit is nodig om verder onderzoek te kunnen doen en hierover te publiceren door onderzoekers van GGNet en de Universiteit van Twente. Tevens is dit nodig om uitkomsten van dit huidige onderzoek te kunnen controleren.
- ☐ Ik wil meedoen aan dit onderzoek.

Naam deelnemer:

Handtekening: Datum : __ / __ / __

Ik verklaar hierbij dat ik deze deelnemer volledig heb geïnformeerd over het genoemde onderzoek.

Als er tijdens het onderzoek informatie bekend wordt die de toestemming van de deelnemer zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

Naam onderzoeker (of diens vertegenwoordiger):
Handtekening: Datum: __ / __ / __

Aanvullende informatie is gegeven door (indien van toepassing):
Naam:
Functie:
Handtekening: Datum: __ / __ / __

D Information letter for the user test with patients

The file is printed on the next page(s). Since the user test is held in Dutch, the presented document is also written in Dutch.

Beste heer/mevrouw,

Wij vragen je om mee te doen met een gebruikerstest met een prototype van een smartphone applicatie voor het COMET-programma. Mogelijk is dit bij jou beter bekend onder de noemer: zelfbeeld-module (of vergelijkbaar). Door deel te nemen, help je mee met de ontwikkeling van een mobiele applicatie die ondersteuning kan bieden tijdens het programma en nadat het programma is afgerond. Mocht je na het lezen van de informatiebrief nog vragen hebben? Dan kun je terecht bij de onderzoekers: Bob Loos, Randy Klaassen en Youri Derks. Bovenaan bladzijde 3 vind je de contactgegevens.

1. Wat is het doel van het onderzoek?

In dit onderzoek zijn wij op zoek naar hoe we een smartphone applicatie kunnen ontwerpen dat ondersteuning kan bieden bij het COMET-programma en de periode nadat het programma is afgerond. Dit is samen te vatten in de volgende (vertaalde) onderzoeksvraag:

"Hoe ontwerpen we een smartphone applicatie voor het COMET-programma in de geestelijke gezondheidszorg, dat ondersteuning kan bieden aan patiënten tijdens het programma en nadat zij het programma hebben voltooid?".

In eerder onderzoek hebben wij in kaart gebracht welke functies deze nieuwe smartphone applicatie moet bevatten. In dit huidige onderzoek willen wij een gebruikerstest uitvoeren met een eerste versie van deze applicatie. In deze gebruikerstest willen wij gaan kijken wat jij van deze applicatie vindt. Dit onderzoek wordt gedaan met zowel behandelaren als met patiënten die betrokken zijn met (een vorm van) COMET. De resultaten van dit onderzoek worden gebruik om het prototype van de smartphone applicatie te verbeteren.

2. Wat wordt er van je verwacht?

Deze gebruikerstest kost ongeveer 45 minuten van jouw tijd waarin jij een eerste versie test van een nieuwe smartphone applicatie voor COMET. Dit moment plant Bob (een van de onderzoekers) samen met jou in op een moment dat jou het beste uitkomt. Vooraf en na de gebruikerstest zijn er geen verwachtingen van je. Bob zorgt voor een telefoon met de smartphone applicatie. Je hebt jouw eigen telefoon dus niet nodig tijdens de gebruikerstest.

3. Hoe ziet de gebruikerstest eruit?

Tijdens de gebruikerstest zal Bob je vragen om een aantal taken uit te voeren met deze eerste versie van de smartphone applicatie. Een voorbeeld van zo'n taak: "Open de applicatie en bekijk welke oefeningen in de applicatie jij al hebt afgerond.". Hiermee kijken wij of de applicatie duidelijk genoeg is of dat wij deze nog kunnen verbeteren. Na de taken zal Bob jouw ervaringen met de applicatie bespreken. Als laatste zal hij jou vragen om een korte vragenlijst in te vullen over jouw ervaringen met de applicatie die je zojuist hebt getest.

4. Ontvang ik de resultaten na afloop van het onderzoek?

De resultaten zullen na afloop van dit onderzoek, (schriftelijk) gepresenteerd worden aan de behandelaren en patiënten van het betrokken behandelprogramma. Als er interesse voor is, kan deze presentatie ook in een bijeenkomst worden gedaan.

5. Wat zijn mogelijke voor- en nadelen van deelname aan dit onderzoek?
Door mee te doen aan dit onderzoek, help jij de onderzoekers uit te zoeken welke functies van de smartphone applicatie kunnen helpen tijdens de training en wanneer de training is afgerond. Ook helpt jouw deelname met het gebruiksvriendelijk maken van de applicatie. Met jouw deelname zorg jij er eigenlijk voor dat de smartphone applicatie alle functies heeft die de toekomstige gebruikers nodig hebben en dat zij met plezier hier gebruik van kunnen maken. Jij bent dus als het ware de eerste schakel naar een mogelijk nieuwe smartphone applicatie om mensen met een (te) negatief zelfbeeld te helpen.

Een mogelijk nadeel voor jou is dat het 45 minuten van jouw tijd kost.

6. Wat gebeurt er met mijn gegevens als ik deelneem?
Tijdens dit onderzoek worden jouw ervaringen verzameld die jij hebt bij het gebruik van de smartphone applicatie. Er worden geen persoonlijke medische gegevens verzameld. Alleen de onderzoeker die de gebruikerstest afneemt weet welke gegevens bij jou horen. Alle informatie die verzameld wordt, wordt gecodeerd (voorbeeld: ‘persoon 1’ en ‘persoon 2’) en is niet te herleiden naar jou als persoon. De verzamelde informatie wordt 5 jaar bewaard. Dit is om mogelijk verder onderzoek te kunnen doen, hierover te publiceren door onderzoekers van GGNet en de Universiteit van Twente of om de uitkomsten van het onderzoek te controleren.

7. Wat moet ik doen als ik wil deelnemen aan dit onderzoek?
Je kunt bij Bob aangeven dat je wilt deelnemen aan dit onderzoek (in persoon of via e-mail: b.loos@ggnet.nl). Dat kan ook bij een van de aanwezige behandelaren. In dit geval zullen zij dit aan Bob doorgeven. Bob zal vervolgens samen met jou op zoek gaan naar een moment dat jou het beste uitkomt.

Als je je daarna bedenkt of wanneer de datum en/of het tijdstip toch minder goed uitkomt, dan kun je met Bob contact opnemen via e-mail: b.loos@ggnet.nl.

8. Moet ik iets doen als ik niet (meer) wil deelnemen aan dit onderzoek?
Deelname aan dit onderzoek is volledig vrijwillig. Als je niet wilt deelnemen aan dit onderzoek dan hoef je verder niks te doen. Ook als je meedoet, kun je nog op ieder moment beslissen om toch niet meer mee te doen of om te stoppen me de gebruikerstest. Hiervoor hoef je geen reden op te geven. Wij respecteren jouw keuze en deze heeft verder geen gevolgen.

9. Zijn er extra kosten/is er een vergoeding wanneer u besluit aan dit onderzoek mee te doen?
Er zijn geen extra kosten. Je krijgt aan de andere kant ook niet betaald voor deelname.

10. Welke ethische toetsingscommissie heeft dit onderzoek goedgekeurd?
Dit onderzoek is voorgelegd aan de ethische commissie van de Universiteit Twente (faculteit EWI). Deze commissie heeft bepaald dat dit onderzoek uitgevoerd mag worden.

11. Meer informatie?

Mocht u meer informatie willen over dit onderzoek, dan kunt u contact opnemen met een van de volgende drie onderzoekers:

- Bob Loos, masterstudent Human Media Interaction aan de Universiteit van Twente
  E-mail: b.loos@ggnet.nl
- Randy Klaassen, onderzoeker bij de Human Media Interaction-groep aan de Universiteit Twente.
  (als je geen patiënt bent bij GGNet)
  E-mail: r.klaassen@utwente.nl
  Telefoon: 053-489 3811
- Youri Derks, Gz-psycholoog en onderzoeker
  (als je patiënt bent bij GGNet)
  E-mail: y.derks@ggnet.nl.
  Telefoon: 088-933 5253 (bereikbaar op maandag en donderdag tussen 9 en 17 uur)

Wil je een advies over het meedoen aan dit onderzoek van iemand die niet direct betrokken is bij het onderzoek? Bespreek het dan met je hoofdbehandelaar(s), vrienden, familie of andere goede bekenden. De hoofdbehandelaars zijn op de hoogte van het onderzoek, maar hebben geen eigen belang bij het onderzoek.

E Informed consent for the user test with patients

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Toestemmingsformulier

Wij vragen jou om toestemming voor of bevestiging van de volgende punten. Geef voor elk van de volgende punten toestemming door een vinkje te zetten. Geef jij geen toestemming voor een van de onderwerpen, dan hoef je bij dit onderwerp geen vinkje te zetten. Bij twijfel en vragen kun je terecht bij de onderzoeker of een aanwezige behandelaar.

☐ Ik heb de informatiebrief gelezen. Ik kon aanvullende vragen stellen. Mijn vragen zijn beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.

☐ Ik weet dat meedoen helemaal vrijwillig is. Ik weet dat ik op ieder moment kan beslissen om toch niet mee te doen en op ieder moment kan stoppen. Daarvoor hoef ik geen reden te geven.

☐ Ik weet dat sommige mensen de door mij verstrekte gegevens kunnen zien. Die mensen staan vermeld in de informatiebrief. Gegevens worden gecodeerd (bijvoorbeeld: ‘persoon 1’, ‘persoon 2’) en zijn daardoor niet te herleiden naar mij als persoon. Deze gegevens kunnen gebruikt worden voor vervolgonderzoek.

☐ Ik geef toestemming aan de onderzoekers om mijn gegevens te gebruiken, voor de doelen die in de informatiebrief staan. Dit betreffen géén persoonlijke medische gegevens.

☐ Ik geef toestemming aan de onderzoekers van dit onderzoek om audio opnames te laten maken van de gebruikerstest en om een video opname te maken van het door mij gebruikte scherm (beeldscherm van een computer of scherm van een mobiele telefoon) tijdens de gebruikerstest. Ik heb recht op het terugluisteren en het terugzien van de bestanden die worden bewaard na de gebruikerstest. Indien op een opname toch bepaalde persoonlijke gegevens terecht komen, dan weet ik dat deze zullen worden verwijderd.

☐ Ik ben ervan op de hoogte dat na de dag van mijn deelname, ik nog drie volledige dagen (alle dagen van de week gelden) heb om mijn deelname in te trekken. De onderzoeker moet in dit geval alle gegevens met betrekking tot mij en mijn deelname verwijderen.

☐ Ik ben ervan op de hoogte dat al mijn verzamelde geanonimiseerde gegevens (notities en opnames tijdens de gbruikerstest) voor 5 jaar worden bewaard. Dit is nodig om verder onderzoek te kunnen doen en hierover te publiceren door onderzoekers van GGNet en de Universiteit van Twente. Tevens is dit nodig om uitkomsten van dit huidige onderzoek te kunnen controleren.

☐ Ik wil meedoen aan dit onderzoek.

Naam deelnemer:

Handtekening: Datum : __ / __ / __

Ik verklaar hierbij dat ik deze deelnemer volledig heb geïnformeerd over het genoemde onderzoek.

Als er tijdens het onderzoek informatie bekend wordt die de toestemming van de deelnemer zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

Naam onderzoeker (of diens vertegenwoordiger):
Handtekening: Datum: __ / __ / __

Aanvullende informatie is gegeven door (indien van toepassing):
Naam:
Functie:
Handtekening: Datum: __ / __ / __

F Information letter for the user test with professionals

The file is printed on the next page(s). Since the user test is held in Dutch, the presented document is also written in Dutch.

Inleiding

Beste heer/mevrouw,

Wij vragen u om mee te doen met een gebruikerstest van een prototype van een smartphone applicatie ter ondersteuning van het COMET-programma. Met uw bijdrage helpt u mee aan de ontwikkeling van een mobiele app ter ondersteuning van het COMET-programma en de periode nadat eerstgenoemde is afgerond. Mocht u na het lezen van de informatiebrief nog vragen hebben? Dan kunt u terecht bij de onderzoekers: Bob Loos, Randy Klaassen en Youri Derks. Onderaan bladzijde 2 vindt u de contactgegevens.

1. Wat is het doel van het onderzoek?

In dit onderzoek zijn wij op zoek naar hoe we een smartphone applicatie kunnen ontwerpen dat ondersteuning kan bieden aan patiënten tijdens het COMET-programma en nadat zij het programma hebben afgerond. Dit is samen te vatten in de volgende (vertaalde) onderzoeksvraag:

"Hoe ontwerpen we een smartphone applicatie voor het COMET-programma in de geestelijke gezondheidszorg, dat ondersteuning kan bieden aan patiënten tijdens het programma en nadat zij het programma hebben voltooid?".

In eerder onderzoek zijn de eisen voor een smartphone applicatie gedefinieerd. Met deze eisen is er een prototype gemaakt van een smartphone applicatie voor COMET. Tijdens dit huidige onderzoek wordt er een gebruikerstest uitgevoerd met het prototype van deze smartphone applicatie. Dit wordt gedaan met zowel behandelaren die betrokken zijn met COMET als met patiënten die (een vorm van) COMET volgen. Het resultaat van dit onderzoek wordt gebruikt om het prototype van de applicatie verder te ontwikkelen.

2. Hoe wordt het onderzoek uitgevoerd?

Als u ervoor kiest om deel te nemen aan dit onderzoek, dan plant Bob Loos (een van de onderzoekers en masterstudent aan de Universiteit van Twente) samen met u een gebruikerstest in. Tijdens deze gebruikerstest zal Bob u vragen een aantal taken uit te voeren met het prototype van een smartphone applicatie voor COMET. Na het uitvoeren van deze taken zal Bob uw ervaring met u nabespreken. Als laatste zal hij u vragen om een korte vragenlijst in te vullen over het prototype dat u heeft getest.

De gebruikerstest kost ongeveer 45 minuten van uw tijd. Uw antwoorden en de antwoorden van de andere deelnemers worden samengevoegd om het prototype verder te ontwikkelen.

3. Ontvang ik de resultaten na afloop van het onderzoek?

De resultaten zullen na afloop van dit eerste onderzoek, schriftelijk gepresenteerd worden aan de behandelaren die betrokken zijn met het COMET-programma. Indien wenselijk, kan deze presentatie ook gedaan worden door middel van een bijeenkomst.

4. Wat gebeurt er met mijn gegevens als ik deelneem?
Tijdens dit onderzoek worden uw ervaringen met het prototype tijdens de gebruikerstest, verzameld. Er worden geen persoonlijk medische gegevens verzameld. De verzamelde gegevens worden gecodeerd en zijn niet te herleiden naar u als persoon. Enkel de onderzoekers van deze studie zullen toegang hebben tot de coderingssleutel waarmee de gegevens aan uw persoon kunnen worden gekoppeld. Dit zal uiteraard alleen gebruikt worden in geval dit noodzakelijk is voor de uitvoer van het onderzoek. Resultaten van het interview worden bewaard voor 5 jaar. Dit is om mogelijk verder onderzoek te kunnen doen, hierover te publiceren door onderzoekers van GGNet en de Universiteit van Twente of om de uitkomsten van het onderzoek te controleren.

5. Zijn er extra kosten/is er een vergoeding wanneer u besluit aan dit onderzoek mee te doen?
Er zijn geen extra kosten. U krijgt aan de andere kant ook niet betaald voor deelname.

6. Welke ethische toetsingscommissie heeft dit onderzoek goedgekeurd?
Dit onderzoek is voorgelegd aan de ethische commissie van de Universiteit Twente (faculteit EWI). Deze commissie heeft bepaald dat dit onderzoek uitgevoerd mag worden.

7. Wat moet u doen als u wilt deelnemen aan dit onderzoek?
Als u besluit om deel te nemen, laat dit dan via een e-mail bericht weten aan Bob Loos: b.loos@student.utwente.nl

8. Meer informatie?
Mocht u meer informatie willen over dit onderzoek, dan kunt u contact opnemen met een van de volgende drie onderzoekers:

- Bob Loos, masterstudent Human Media Interaction aan de Universiteit van Twente
  E-mail: b.loos@student.utwente.nl
- Randy Klaassen, onderzoeker bij de Human Media Interaction-groep aan de Universiteit Twente.
  (indien u niet verbonden bent aan GGNet)
  E-mail: r.klaassen@utwente.nl
  Telefoon: 053-489 3811
- Youri Derks, Gz-psycholoog en onderzoeker
  (indien collega bij GGNet)
  E-mail: y.derks@ggnet.nl.
  Telefoon: 088-933 5253 (bereikbaar op maandag en donderdag tussen 9 en 17 uur)

G Informed consent for the user test with professionals

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Toestemmingsformulier

Wij vragen u om toestemming of bevestiging voor de volgende punten. Geef voor elk van de volgende punten uw toestemming door een vinkje te zetten. Geeft u geen toestemming voor een van de onderwerpen, dan hoeft u geen vinkje te zetten. Bij twijfel en vragen kunt u terecht bij de onderzoekers.

☐ Ik heb de informatiebrief gelezen. Ik kon aanvullende vragen stellen. Mijn vragen zijn beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.

☐ Ik weet dat meedoen helemaal vrijwillig is. Ik weet dat ik op ieder moment kan beslissen om toch niet mee te doen en op ieder moment kan stoppen. Daarvoor hoef ik geen reden te geven.

☐ Ik weet dat sommige mensen de door mij verstrekte gegevens kunnen zien. Die mensen staan vermeld in de informatiebrief. Gecodeerde gegevens kunnen gebruikt worden voor vervolgonderzoek.

☐ Ik geef toestemming aan de onderzoekers van dit onderzoek om mijn gegevens te gebruiken, voor de doelen die in de informatiebrief staan. Dit betreffen géén persoonlijke medische gegevens. Al mijn gegevens worden geanonimiseerd en zijn niet terug ter herleiden naar mij als persoon.

☐ Ik geef toestemming aan de onderzoekers van dit onderzoek om audio opnames te laten maken van de gebruikerstest en om een video opname te maken van het door mij gebruikte scherm (beeldscherm van een computer of scherm van een mobiele telefoon) tijdens de gebruikerstest. Ik heb recht op het terugluisteren en het terugzien van de bestanden die worden bewaard na de gebruikerstest. Indien op een opname toch bepaalde persoonlijke gegevens terecht komen, dan weet ik dat deze zullen worden verwijderd.

☐ Ik ben ervan op de hoogte dat na de dag van mijn deelname, ik nog drie volledige dagen (alle dagen van de week gelden) heb om mijn deelname in te trekken. De onderzoeker moet in dit geval alle gegevens met betrekking tot mij en mijn deelname verwijderen.

☐ Ik ben ervan op de hoogte dat al mijn verzamelde geanonimiseerde gegevens (notities en opnames tijdens de gbruikerstest) voor 5 jaar worden bewaard. Dit is nodig om verder onderzoek te kunnen doen en hierover te publiceren door onderzoekers van GGNet en de Universiteit van Twente. Tevens is dit nodig om uitkomsten van dit huidige onderzoek te kunnen controleren.

☐ Ik wil meedoen aan dit onderzoek.

Naam deelnemer:

Handtekening: Datum : __ / __ / __

Ik verklaar hierbij dat ik deze deelnemer volledig heb geïnformeerd over het genoemde onderzoek.

Als er tijdens het onderzoek informatie bekend wordt die de toestemming van de deelnemer zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

Naam onderzoeker (of diens vertegenwoordiger):
Handtekening: Datum: __ / __ / __

Aanvullende informatie is gegeven door (indien van toepassing):
Naam:
Functie:
Handtekening: Datum: __ / __ / __

H User test: prepared set of tasks

The file is printed on the next page(s). Since the user test is held in Dutch, the presented document is also written in Dutch.

Takenlijst gebruikerstest COMET-E

Je gaat een aantal taken uitvoeren met een prototype van de COMET-E app. Aangezien we hier werken met een prototype van een nieuwe applicatie, zijn problemen en onduidelijkheden onoverkomelijk. Deze test is juist bedoeld om de laatste twee te vinden. Als jij tegen zo'n probleem aanloopt dan betekend dat dat het prototype nog niet goed genoeg werkt. Er zal dan nog verder aan gewerkt moeten worden.

Spreek bij het uitvoeren van elke taak hardop jouw redenen voor een keuze uit.

Voeg de volgende 8 taken uit:

1. De COMET-E app is voor het eerst opgestart. Je gaat door een aantal introducerende schermen. Je wordt gevraagd voor informatie om deze app passend voor jou te maken.

   In deze situatie ben jij John. Je volgt een traditionele COMET-groepsbehandeling van 8 weken lang. Navigeer je door deze introducerende schermen.

   Je ontvangt graag notificaties om je te herinneren.

   Deze taak stopt als je op "Oke" hebt geklikt in het scherm met de koptekst "Alles is ingesteld".

2. Je hebt jouw eerste sessie vorige week gehad. Hierna heb je de app een paar dagen niet meer geopend. Je ontvang je een notificatie die jou eraan herinnert om te werken aan een van de huiswerk-onderdelen. Zo ben je straks klaar bent voor Sessie 2.

   Open de app met de notificatie en voltooi de huiswerkopdrachten van Sessie 1.

   Deze taak eindigt wanneer je hebt laten zien hoe je een nieuwe eigenschap toevoegt aan de lijst met positieve eigenschappen. Je hoeft deze niet daadwerkelijk toe te voegen.

3. Je bent onrustig. Je wil daarom in gesprek gaan met een van jouw hulplijnen. Deze hulplijnen heb jij eerder al in de COMET-E app gezet.

   Ga op zoek naar jouw hulplijnen en bel "Ada & Ralph".

   Deze taak stopt als je op "Bellen" hebt geklikt om "Ada & Ralph" te bellen.

4. Je hebt vandaag jouw laatste bijeenkomst gehad. Jouw app hoeft je nu niet meer te helpen met het volgen van de training. Deze zal jou nu moeten gaan herinneren aan wat je eerder hebt geleerd en jouw helpen met jouw zelfbeeld te monitoren.

   Wijzig de status van jouw behandeling naar "Afgerond".

   Stel een reminder in die jou elke 2 maanden herinnert om de monitor in te vullen.

   De taak eindigt wanneer je de reminder hebt ingesteld.

5. Je ontvangt een notificatie over een van jouw success momenten. Het moment: "Ik heb mijn eerste schilderij verkocht!".

   Open het verhaal wat hierbij hoort.

   Lees het verhaal en keer terug naar het "Start" scherm in de app.

   De taak stopt als je terug bent gekeerd naar het "Start"-scherm.

6. Je ontvangt een notificatie: Het is alweer twee maanden geleden dat je de monitor hebt ingevuld.

   Jouw taak is om een monitor moment toe te voegen. Je geeft dit moment het cijfer 7.

   Deze taak stopt wanneer je een nieuw moment hebt toegevoegd.

7. Je bent klaar met de training. Drie maanden na de laatste sessie zou je graag hetgeen willen nalezen dat in sessie 3 is besproken. Sessie 3 ging over “Voelbaar maken van de concrete voorbeelden".

   Deze taak is klaar wanneer je de informatie over deze sessie hebt geopend.

8. Je bent klaar met de training.

   Toon het negatieve zelfbeeld waar je tijdens jouw training aan hebt gewerkt.

   Deze taak stop wanneer je het negatieve zelfbeeld hebt getoond.

I User test: SUS-questionnaire

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Deelnemer #

System Usability Scale - vragenlijst (vertaald in het Nederlands)

Instructie: markeer bij elk van de 10 vragen enkel maar 1 ovaal

1. Ik denk dat ik dit systeem graag regelmatig wil gebruiken

	1	2	3	4	5	
Sterk mee oneens	◯	◯	◯	◯	◯	Sterk mee eens

2. Ik vond het systeem onnodig complex

	1	2	3	4	5	
Sterk mee oneens	◯	◯	◯	◯	◯	Sterk mee eens

3. Ik vond het systeem makkelijk te gebruiken

	1	2	3	4	5	
Sterk mee oneens	◯	◯	◯	◯	◯	Sterk mee eens

4. Ik denk dat ik de ondersteuning nodig heb van een technisch persoon om dit systeem te kunnen gebruiken

	1	2	3	4	5	
Sterk mee oneens	◯	◯	◯	◯	◯	Sterk mee eens

5. Ik vond dat de verschillende functies in dit systeem erg goed geïntegreerd zijn

	1	2	3	4	5	
Sterk mee oneens	◯	◯	◯	◯	◯	Sterk mee eens

Deelnemer #

6. Ik vond dat er teveel tegenstrijdigheden in het systeem zaten

	1	2	3	4	5	
Sterk mee oneens	○	○	○	○	○	**Sterk mee eens**

7. Ik kan mij voorstellen dat de meeste mensen zeer snel leren om dit systeem te gebruiken

	1	2	3	4	5	
Sterk mee oneens	○	○	○	○	○	**Sterk mee eens**

8. Ik vond het system erg omslachtig in gebruik

	1	2	3	4	5	
Sterk mee oneens	○	○	○	○	○	**Sterk mee eens**

9. Ik voelde me vertrouwd met het systeem

	1	2	3	4	5	
Sterk mee oneens	○	○	○	○	○	**Sterk mee eens**

10. Ik moest erg veel leren voordat ik aan de slag kon gaan met dit systeem

	1	2	3	4	5	
Sterk mee oneens	○	○	○	○	○	**Sterk mee eens**

Als je alle vragen hebt beantwoord kun je de vragenijst nu inleveren

J User test: TAM-questionnaire

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Deelnemer #

TAM - vragenlijst (vertaald in het Nederlands)

Instructie: markeer bij elk van de 12 vragen enkel maar 1 ovaal

1. De COMET-E app ondersteund mij met de belangrijkste onderdelen van mijn therapie

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

2. Het gebruik van de COMET-E app is vaak frustrerend

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

3. Het gebruik van de COMET-E app voor zelfbeeld gerelateerde therapie is een goede ontwikkeling

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

4. Ik zou graag gebruik maken van de COMET-E app voor mijn zelfbeeld gerelateerde therapie

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

5. De COMET-E app maakt het makkelijker om mijn therapie te volgen

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

6. Het is met de COMET-E app makkelijk om te doen wat ik wil doen

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

Deelnemer #

7. Ik denk dat het waardevol is om de COMET-E app te gebruiken voor zelfbeeld gerelateerde therapie en de daarop volgende periode

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

8. Ik zou anderen aanraden om gebruik te maken van de COMET-E app voor zelfbeeld gerelateerde therapie

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

9. Over het algemeen vind ik de COMET-E app nuttig voor mijn therapie en de periode die daarop volgt

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

10. Over het algemeen vind ik de COMET-E app makkelijk in gebruik

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

11. Het gebruik van de COMET-E app zou een positieve invloed kunnen hebben op mijn therapie en de periode na mijn therapie.

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

12. Als deze app beschikbaar komt voor ondersteuning van zelfbeeld gerelateerde therapie, zou ik deze graag gebruiken

	1	2	3	4	5	6	7	
Sterk mee oneens	◯	◯	◯	◯	◯	◯	◯	**Sterk mee eens**

Als je alle vragen hebt beantwoord kun je de vragenlijst nu inleveren

K User test: interview questions

The file is printed on the next page(s). Since the user test is held in Dutch, the presented document is also written in Dutch.

Deelnemer #

Interview vragen
(max 5)

Vraag 1: Hoe heb je het prototype ervaren? Zou het een ondersteunend middel voor jou kunnen zijn? Graag toelichten.

_____

_____

_____

Vraag 2: Wat zou de COMET-E toevoegen ten opzichte van de therapie die je nu krijgt?

_____

_____

_____

Vraag 3: Wat vond je de meest nuttige functie van het prototype wat je vandaag hebt gezien? En wat was de minst nuttige functie volgens jou? Mis je nog iets?

_____

_____

_____

Vraag 4: Vind je dat het prototype ontwikkeld zou moeten worden tot een werkende app?

_____

_____

_____

Vraag 5: Heb je verder nog op of aanmerkingen?

_____

_____

L User test: all performed interventions

Table 14 lists all interventions, performed during the user test. An intervention is only performed when support is explicitly asked for by the participant. An intervention report is written, as discussed in Section 5.4. The table includes the intervention and task number, the reason for the intervention, if it's included in the results and the reason for the latter. Intervention #7 is marked critical, other interventions are marked as minor. Four reasons not to include the intervention as result: 1) they are covered by other interventions, 2) they involve looking at the wrong screen, 3) they involve (mis)reading the assignment and 4) they involve basic interactions for mobile applications.

Interv. #	**Task #**	**Reason for intervention**	**Included as result (Yes / No)**	**Reason for inclusion / exclusion**
1	6	The provided choice had to be confirmed. The user could not find the button to confirm the made choice. Not every choice or answer has to be confirmed. This is inconsistent.	Yes	Inconsistency in the use of action buttons is recognized.
2	8	Could not find the low self-esteem. Was looking on the wrong screen, the screen with sessions. A tip is provided.	No	The user was looking on the wrong screen.
3	8	Could not find the low self-esteem. Was looking on the wrong screen, the screen with sessions. A tip is provided.	No	The user was looking on the wrong screen.
4	2	The circles indicating the status of homework are interpreted as action buttons for a next page. They are experienced as malfunctioning.	Yes	The user thought the prototype was malfunctioning. Similar struggles (e.g. repeatedly clicking the circles) are seen for other participants.
5	3	Was looking on the wrong screen. The button with "Verder" on the main screen, is interpreted as the only available step. User is made aware of the menu buttons.	No	The user was looking on the wrong screen.
6	3	Could not find the screen. User had to be made aware of the menu buttons.	No	The user was looking on the wrong screens.
7	3	The helplines could not be found.	Yes	The user could not complete the task; the only intervention marked as critical.
8	7	It was not clear how to navigate between the sessions. A tip is provided on the navigation arrows.	No	Is seen as basic interaction for mobile applications.
9	8	The user could not find the information. A hint is provided on the ability to scroll in the window.	No	Is seen as basic interaction for mobile applications.
10	3	Chose a wrong screen, asked for a reset.	No	The user chose a wrong screen.
11	6	Chose a wrong screen, asked for a reset.	No	The user chose a wrong screen.
12	1	Was not aware the information was to be found in the task list.	No	Although shown on the task list, the information was skipped.
13	3	Could not find the helplines. A hint is provided to check the summary.	No	The user was looking on the wrong screen.

Table 14: All performed interventions during the user test

M Comparing the first and the final prototype

Two prototypes are created for this research. The improvements that are made on the first prototype are discussed in Chapter 6. In this Appendix, differences will be highlighted in screens of the first and the final prototype. First the completely new features will be displayed, followed by a comparison on earlier introduced features between the screens of the first prototype and the final prototype.

New features

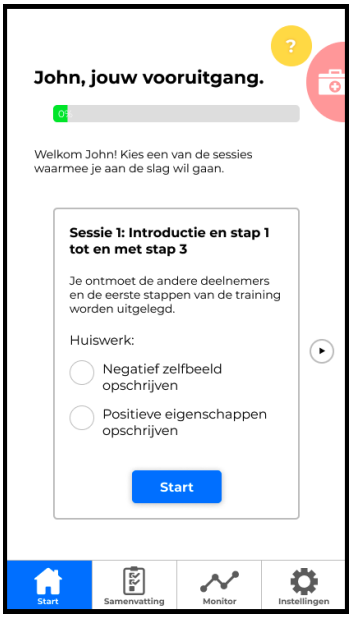

Figure 52: Toolbox: tools to actively work on the self-esteem. The red button is reachable from every main screen

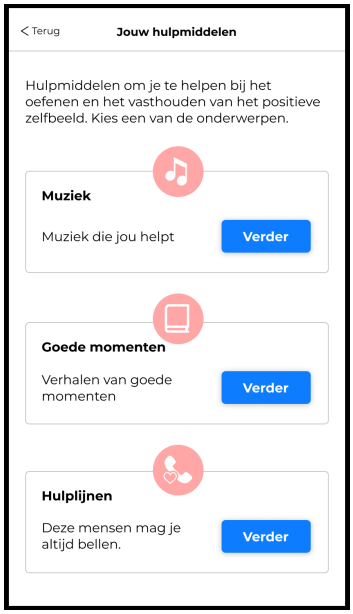

Figure 53: The content of the toolbox consists out of music, earlier written positive stories and the helplines

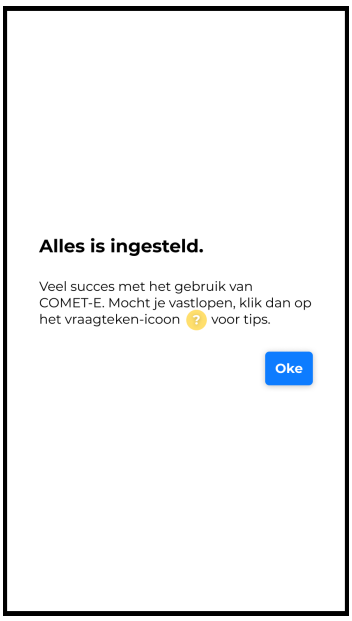

Figure 54: Introduction of the tool tips: the final introductory screen introduces the tool tips to the user

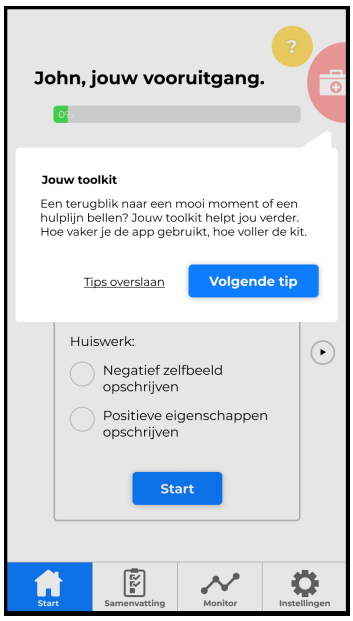

Figure 55: As the toolkit, the tips are accessible from the main screens. They introduce features of the app

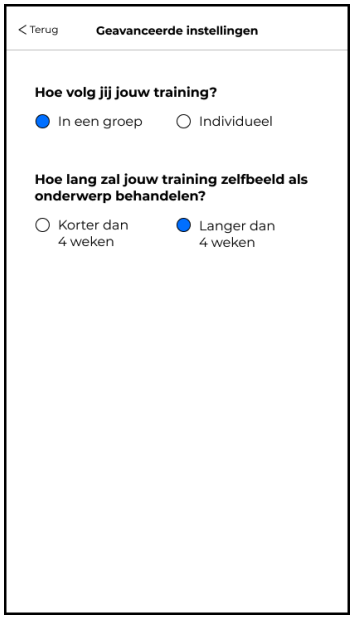

Figure 56: A selection of settings are moved to a separate screen to save space for more frequently changed settings

From this page on, features are shown that are present in both prototypes. The left figure always represents the first prototype. The right figure always represents the final prototype.

First prototype - Final prototype

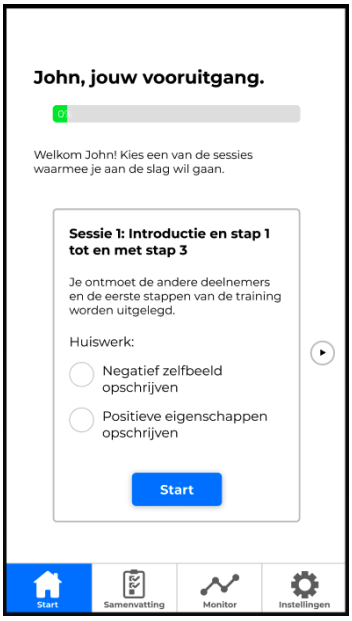

Figure 57: The Start-page in the first prototype presents the modules that a patient can follow

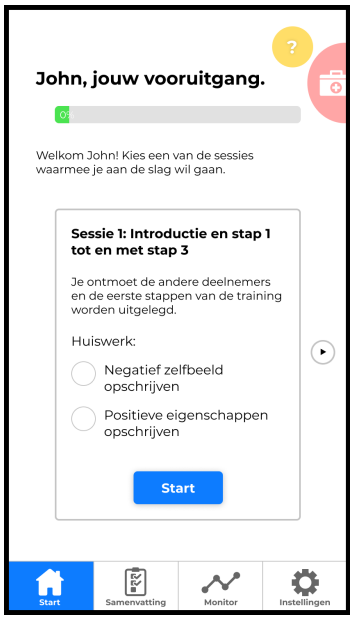

Figure 58: Start is extended with buttons for tools (red) and tips (yellow), they are presented on every main screen

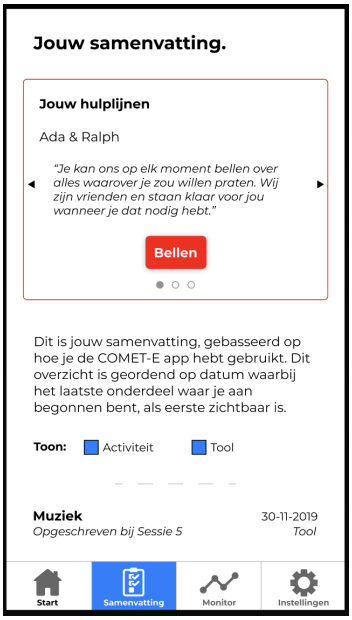

Figure 59: The helplines were positioned in the summary

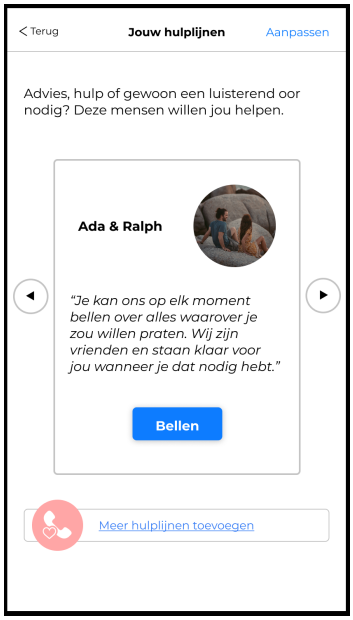

Figure 60: The helplines on a dedicated screen, accessible via the toolkit

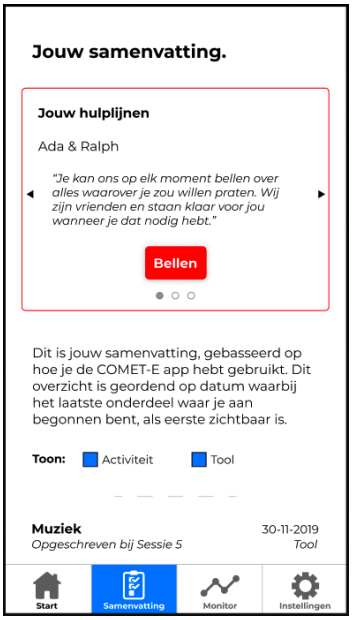

Figure 61: The summary contains helplines, completed assignments and tools like music and positive moments

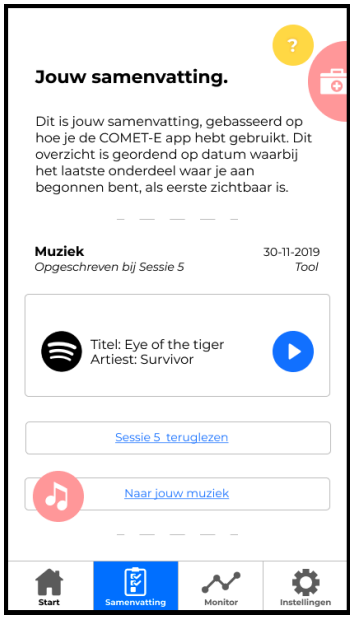

Figure 62: Due to moving the helplines, the summary is more dense. Links to modules are added to ease navigation

Figure 63: The monitor that enables the user to enter a new moment to the graph for later reference

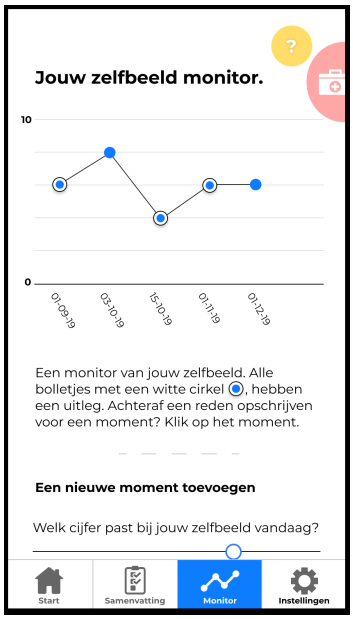

Figure 64: Monitor moments with notes are more clearly presented and an elaborating text can more easily be provided

Figure 65: On the Settings-page, the user can change all available settings for this application

Figure 66: The Settings-page has become more dense, only showing the settings that might change more frequently

First prototype - Final prototype

Figure 67: The introductory text explains the session. The text summarizes the session and introduces the video

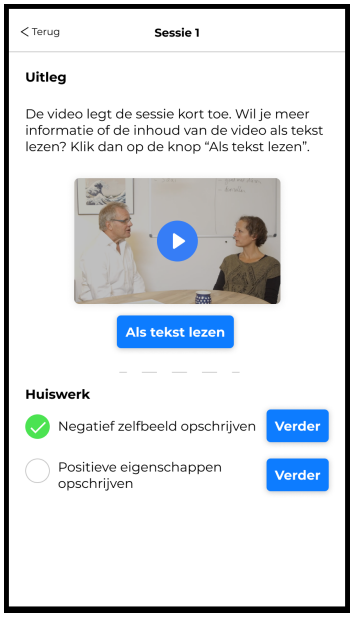

Figure 68: Where possible, text has been removed to keep the session information dense

Both the first and the final prototype are available on Figma.
The first prototype is accessible via: `https://tinyurl.com/qq9dafb`
The second prototype is available via: `https://tinyurl.com/ycuasp9b`

N Interviews – open coding – coding scheme

The file is printed on the next page(s).

Coding scheme - Open Coding

- Requirements for an app
  - Uniting differnt elemens that help
  - Picture to integrate the solution in the self-image
  - Example of how 113 could help
  - Benefits compared to online portal
    - HSK online - InTherapy
    - App could make it more playful, challenging and therefore attractive
      - Needed because behavioural change is dificult, not only for mental problems
    - App could explain something ones again
    - App couuld provide video material and animations
    - App could provide reminders
  - If people keep using the app has some dependants
    - People only have a temporal focused timespan
    - Should technically work out of the box
    - Is it attractive
    - Do people want to use it
  - App enables to easly / quickly report on something
  - If people are digitally capable, this might be a nice addition to a current training
  - App's text
    - App should not contain too much text
    - Text in app should be encouraging
    - App's text should be simple
    - Apps's text should be neutral or be rathter real/negative
    - Apps' text should be motivational
    - Apps's text should acknowledge the situation of the user
    - App should not suggest that you are weak because of a relapse
    - App's text should not suggest that their situation are simple things
    - App's text should not suggest things that would do good for the user
    - App should be use before critical moments
  - An app might ...
    - An app would only be a small tool, no replacement of
      - Perhaps for people with less prominent complaints, only the app might also work.
    - App might help recalling positive moments icm with pictures
    - App might give the patient an idea of next steps during relapse
    - Using an app after treatment might suport keeping the effects of the treatment because of repetition
    - An app might help because if remembers of what you've learned earlier
  - An app could / should ...
    - App enables the patient to independently set the tempo
    - (Content of the) App should be verified and substantiated
      - Example how not to do it
    - App should repeat positive points
    - How an app could help
      - Easily get music that give you a good feeling
    - App could add mobility, make it easier to recall those positive feelings
    - App could record and save positive moments
    - App could support in finding help easily
    - App could integrate music that is used
    - App should motivate to repeatedly perform bahaviour that helps
    - App could mirror how the user is behaving
    - App should motivate the patient to do things, note things that they really believe
    - App could be used to collect positive moments to look back to
    - App after treatment can be a reminder of what's learned earlier
    - App could be supportive when for working of self-esteem at home
    - App could contain input that is gathered during treatment and that will be used later

App could provide more flexibility to the user of where they can work on their self-esteem
App should be a personal tool (no technical sharing with practitioners)
How the app could support during the training
    Give a summary of oneself
    Guiding through assignments
    Keeping effects
    Keep showing the positive self-esteem
    Switch negative self-esteem to positive self-esteem
    Diary with positive moments
    Finding evidence for the positive self-esteem
    Quotes and assignments
    Remind your to do something
    Monitoring yourself
    Apply what's learned during the sessions in real life
How an app could help after training
    Easy recalling what has been done
    Motivate people to keep practicing
    Generating/having a summary of yourself
    Monitoring yourself
        Should always mention that if they need help, they just have to ask for it
        And provide options for different scores
    Relapse-prevention
    Will NOT replace fellow sufferers
    Reactivating was is learned before
        That might have helped most before
App could be personified (being only of that single client)
    Recalling something ealier
    Elements from the training come back in the app
    To easily remember you about your positive moments
    Example: Apple emojicon
The app could be used during the training but once finished
    When being finished you always have the app to fall back to
App could motivate to perform certain assignments
    Progression is visible
    Assignments are split in smaller steps
    Especially when things get visual
App could provide reminders
    Reminders stimulate people to do assignments during the week
    Reminders for assignments
App could remind you to keep working the issue (past treatment)
    Should be manually configurable
    Fits with how COMET works
    Example: Duolingo
    Could be used as check-ups
    Without it is easier to peform the same behaviour as before.
App could show the patient what effort they put into the therapy
    Could be like a prestation
    Over time people forget what effor they have put into therapy
    Proves that somebody did put a lot of effort in it
App could be used as prevention plan
App should be easy to get started with
    Example: people easily think that they are not able to do something
App could help with assignments
    Writing reports with the positive self-image
        Having a template can help patients
    Defining the positive self-image
        Long list with positive qualities

- An app shound't / can't ...
  - An app will not change big coping mechanisms
  - App should not be used in most critical moments
    - Although: success story
  - Would not use an app at the peak moment of suicidal thoughts
  - App should not be too positive, just real
  - An app should not (after training)
    - Example: Evy (how not to do it)
    - Not too pushy
  - App should not be extremely positive
  - App should not
  - App should not replace a training
  - People should not be taken away their own responsbility (once the training is done)
  - App should not give the user a bad feeling about theirselves
- Involvement of others
  - How much support that patients require might depend on the group
  - Professionals
    - Patients need support from therapist to set the first steps
      - Easily be seen as too theoretical without help from professionals
    - Somethings have to be done together with a professional or family member
    - Without feedback from professionals, people are less motivated
  - Having family and friends involved
    - Should not be only with your app
    - Is a problem when the family disapproves
  - Having fellow sufferers seems to be very important
    - Also has downsides
      - When somebody is really pushy
    - Might be a privacy issue
    - Having people to talk to who understand
    - Not being alone
    - They are not on their own
  - Feedback from others
- After a training
  - Being on your own after treatment is the case for all treatments
  - Finishing training feels like a rough transition
    - By decreasing the intensity of the therapy sessions it already become better
    - Having a short line to help already gives some peace
    - Sometimes patient find other topics that have to be worked on
    - Counteracting loneliness
    - Losing fellow sufferers
  - No gap when finished with training
    - A prevention plan is made before leaving
    - Slowly decreasing intensity of therapy
    - Depending on how severe the problems are
    - Follow-up session (after 3 months)
  - Relapse is most often later than earlier after treatment
    - The more severe your negative self-esteem, the more you have to keep practicing
    - People forget what they have learned
- Behavioural change
  - Looking back at used workbook, might help some patients
  - Self-esteem
    - Create positive self-esteem (counteracting the negative)
      - Finding evidence for the positive self-esteem
      - Searching for positive words
      - Don't believing/trusting that people mean the positive things they say
    - Negative self-esteem
      - Holding on to the positive things is difficult
      - Scared to be let down when being honest

- People think that I am a difficult person
- Can be a part of the problem
- Repetition of fitting self-esteem
- Mindfullness can help to handle difficult situations
- Mental wall can be a survival mechanism
- Sometimes you need to accept the pain to endure it
- Switch of attitude of the client
- Stimulating people is better that schooling
- That they can grow and unlock new things
- Perhaps with gamification
- A visible change can be noted once the patient finishes the training
- Create awarenss / insight in own behaviour
- Confronting with their behaviour (mirroring)
- Questioning thoughts (patient - practitioner)
- Gain positive experience when asking for something
- Having / seeing fellow sufferers, people who have the same issues, you're not alone

Missing in COMET

- Looking for more learn-by-doing activities
- A shortened version
- Some parts should be more concrete
- Providing template examples
- Have to be practiced during therapy session
- By practicing during session, patients become less anxious to also perform the assignment at home
- Instructions have to be repeated
- Opinions of others about you
- Others are asked for example to prove the positive parts
- Makes it easier for the patients to believe their positive parts
- Though, people have to trust theirselves
- Worksheets
- You'll always have to read, also when you have to close your eyes for an assignment
- Worksheets are old-fashioned
- Can help the patient with working on assignments
- Being able to hand over some tangible to the client
- Patient could look back to the assignment
- Easily having access to those tools that quickly help

Opinion about COMET

- Negative about COMET
- Also damaging experiences are not really discussed during therapy
- No shortened original version of COMET
- Not all elements are applying to each patient
- Lookings for alternatives when this occurs
- Original book is though and dry
- Can pose problems due to pshycological issues
- It does not altered to the target group (MBO vs WO)
- Not intensive enough for more complex issues
- Positive about COMET
- Positive about app for COMET
- First during COMET
- Example of using all elements
- Imagination can have a lot to offer
- Not only for COMET but also for other treatments
- It makes the negative less prominent
- Focusing on what are the good qualities of a person
- Making people experience the opposite of their self-image by making things feelable
- Stepped (stapsgewijs)
- Experiental way of learning

Challenges during training

- It can be difficult to keep all parts clear for a patient
- In a group
  - Geting used to the group
  - You need to adjust to the group

About COMET

- Combining other elements in live with the positive self-image
- During training, talks and performing exercises
- Once finished the training, patients get some basic (regular) advice
  - Creating a preventionplan
  - People are advised to make their prevention plan as personal as possible
  - A little token might be searched for that easily let them remind about what they have learend
  - Sometimes with cards where compliments will be written on
- Stepped care
- Usage of materials
  - Homework notebook
  - Module in client portal
    - Different module can be chosen to create a fitting program
    - Enables the client to contact a professional
    - Is used as a reminder
    - Assignments can be performed in the online portal
    - Usable for studying and referencing
    - Not usable during group training
  - Youtube movies
  - Original book as base
    - COMET book has a nice style of telling
    - Parts of the book are provided to the client
  - Examples of positive self-image
- Currently used assignments (home-work)
  - Summary of yourself
  - Home-work assignments are always discussed in the sessions
    - To be able to direct people to beter examples
    - Because people put effort in their assignments
  - Practice with summoning the positive self-esteem
  - Writing donw positive qualities about yourself including examples
  - Writing down moment where they felt the positive self-esteem
- Content of COMET
  - Integrating those things around your self-image
    - Music
      - Music does not have to be happy, it should only make you feel good
    - Linking pose to positive self-esteem
  - Writing down of success stories
    - Highligh positive events, moments, part of self-image
  - Combining self-esteem with music
    - Humming music in case of not having a music device
  - Steps of COMET are followed
- Non-COMET appliances
  - EMDR vs COMET plus research
  - Meer dimensionaal evalueren
    - Asking the environmnent for positive qualities
- Diferences in appliances of COMET.
  - COMET in part time group
    - The whole group has to do all parts for feeling of safety
    - Patients do not easily practice something at home
    - Refering to original COMET group
      - Example
    - Map with information
      - Examples of positive self-image

- Usage of time
- Example of patient 2
- Example of patient
- Experiental
- Taking a vulnerable position
- COMET as designed by Kees Korrelboom
  - There are different types of clients
    - Combining these different types of people might make it harder fo the client to idenitfy with each other
  - In the beginning, people need to get used to each other
  - Intake is done
  - Can be followed in a group or individually
- COMET as (additional) individual treatment
  - COMET mainly used for milder forms of lower self-esteem
  - Most often applied as addition to a treatment
  - Sometimes own implementation of certain assignments
  - Part of treatment
  - Client should be capable to do an extra intervention
  - Length

profession (role)

- BAS
  - Course of being a patient at BAS
    - "Crisisdienst"
    - SGGZ
    - Basis ggz (BAS)
    - POH
  - Different trajectories
    - "Chronisch"
    - "Curatief"
- Herstel 1
- Transition of Herstel programs
- Herstel 4
- Herstel 3

O Interviews – axial coding – coding scheme

The file is printed on the next page(s).

Coding scheme - Axial Coding

- Requirements for an app
  - How an app could help after training
    - Easy recalling what has been done
    - Motivate people to keep practicing
    - Generating/having a summary of yourself
    - Monitoring yourself
      - Should always mention that if they need help, they just have to ask for it
      - And provide options for different scores
    - Relapse-prevention
    - Reactivating was is learned before
    - Will NOT replace fellow sufferers
  - How the app could support during the training
    - Give a summary of oneself
    - (Guiding through) assignments
    - Keep showing the positive self-esteem
    - Diary with positive moments and finding evidence for positive self-esteem
    - Remind your to do something
    - Monitoring yourself
    - Apply what's learned during the sessions in real life
    - Taking notes
  - Example of how 113 could help
  - Benefits compared to online portal
    - App could make it more playful, challenging and therefore attractive
  - If people keep using the app has some dependants
  - App's text
    - Should not be too pushy
    - should be motivational
    - should be simple and short
    - should be neutral or be rathter real/negative
    - should acknowledge the situation of the user
  - An app might ...
    - would only be a small tool, no replacement of
    - might give the patient an idea of next steps during relapse
    - (after treatment) might support keeping the effects of the treatment because of repetition
  - An app could / should ...
    - could enable the patient to independently set the tempo
    - should be used before critical moments occur
    - (Content of the app) should be verified and substantiated
    - could be used to collect and repeat positive moments and feelings to look back to
    - should motivate to repeatedly perform bahaviour that helps
    - Should be able to play (and find) (used) music
    - should support in finding help easily
    - should motivate the patient to do things, note things that they really believe
    - could mirror how the user is behaving
    - could provide more flexibility to the user of where they can work on their self-esteem
    - could contain input that is gathered during treatment and that will be used later
    - should be a personal tool (no technical sharing with practitioners)
    - could be personified (being only of that single client)
    - could help and motivate to work on assignments
    - could provide reminders about
    - could remind you to keep working the issue (past treatment)
      - Should be manually configurable
      - Could be used as check-ups
      - Without it is easier to peform the same behaviour as before.

- should be easy to get started with
- An app shound't / can't ...
  - An app will not change big coping mechanisms
  - App should not be used / will not work in most critical moments of suicidal thoughts
  - App should not replace a training
  - People should not be taken away their own responsbility (once the training is done)
- Involvement of others
  - How much support that patients require might depend on the group
  - Professionals
    - Patients need support from therapist to set the first steps. Also to keep them motivated
    - Somethings have to be done together with a professional or family member
  - Having family and friends involved van be both benefical as well as troublesome
  - Having fellow sufferers seems to be very important
    - Also has downsides
    - Not being alone
  - Feedback from others
- After a training
  - Finishing training feels like a rough transition
    - By decreasing the intensity of the therapy sessions it already become better
    - Having a short line to help already gives some peace
    - Sometimes patient find other topics that have to be worked on
    - Losing fellow sufferers
  - No gap when finished with training
    - A prevention plan is made before leaving
    - Slowly decreasing intensity of therapy
    - Depending on how severe the problems are
    - Follow-up session (after 3 months)
  - Relapse is most often later than earlier after treatment
- Behavioural change
  - Looking back at used workbook, might help some patients
  - Self-esteem
    - Create positive self-esteem (counteracting the negative)
      - Finding evidence for the positive self-esteem and searching for positive words
      - Don't believing/trusting that people mean the positive things they say
    - Negative self-esteem
      - Holding on to the positive things is difficult
      - Scared to be let down when being honest
      - People think that I am a difficult person
      - Can be a part of an other problem
    - Repetition of fitting self-esteem
  - Mindfullness can help to handle difficult situations
  - Mental wall can be a survival mechanism
  - Sometimes you need to accept the pain to endure it
  - Stimulating people is better that schooling
  - A visible change can be noted once the patient finishes the training
  - Create awarenss / insight in own behaviour
  - Gain positive experience when asking for something
  - Having / seeing fellow sufferers, people who have the same issues, you're not alone
- Missing in COMET
  - Looking for more learn-by-doing activities
  - A shortened version
  - Some parts should be more concrete
    - Providing template examples
    - Have to be practiced during therapy session
    - Instructions have to be repeated
  - Opinions of others about you
  - Worksheets
    - You'll always have to read, also when you have to close your eyes for an assignment

- Being able to hand over some tangible to the client
- Easily having access to those tools that quickly help

Opinion about COMET

- Negative about COMET
  - Damaging experiences are not really discussed during therapy
  - No shortened original version of COMET
  - Not all elements are applying to each patient
  - Original book is though and dry
  - Not intensive enough for more complex issues
- Positive about COMET
  - Positive about potential app for COMET
  - Imagination can have a lot to offer
  - Focusing on what are the good qualities of a person
  - Making people experience the opposite of their self-image by making things feelable
  - Stepped (stapsgewijs)
  - Experiental way of learning
- Challenges during training
  - It can be difficult to keep all parts clear for a patient
  - You've to adjust to the group

About COMET

- Once finished the training, patients get some basic (regular) advice
  - Creating a (personal) prevention plan
  - A little token might be searched for that easily let them remind about what they have learend
  - Sometimes with cards where compliments will be written on
- Usage of materials
  - Homework notebook
  - Module in client portal
    - Different module can be chosen to create a fitting program with fitting assignments that can be performed
    - Usable for studying and referencing but not for during group training
    - Enables the client to contact a professional
    - Is used as a reminder
  - Original book as base
- Currently used assignments (home-work)
  - Summary of yourself
  - Home-work assignments are always discussed in the sessions
  - Practice with summoning the positive self-esteem
  - Defining the positive self-image
  - Writing down moment where they felt the positive self-esteem
- Content of COMET
  - Integrating those things around your self-image
    - Combining self-esteem with music
      - Music does not have to be happy, it should only make you feel good
      - Humming music in case of not having a music device
    - Linking pose to positive self-esteem
  - Highligh positive events, moments, part of self-image
- Non-COMET appliances
  - EMDR vs COMET plus research
  - The environment is asked for positive qualities
- Diferences in appliances of COMET.
  - COMET in part time group
    - The whole group has to do all parts for feeling of safety
    - Patients do not easily practice something at home
    - Refering to original COMET group
    - Map with information
    - Experiental
    - Taking a vulnerable position

- COMET as designed by Kees Korrelboom
  - There are different types of clients/Combining these different types of people might make it harder fo the client to idenitfy with each other
  - Intake is done
  - Can be followed in a group or individually
- COMET as (additional) individual treatment
  - Steps of COMET are followed
  - Most often applied as addition to a treatment and for milder forms of low self-esteem
  - Sometimes own implementation of certain assignments
  - Part of treatment
  - Client should be capable to do an extra intervention

profession (role)

- BAS
  - Course of being a patient at BAS
  - Different trajectories
- Herstel 4/Herstel 3/Herstel 1/Transition of Herstel programs