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Scenario-Based Evaluation of Self-Care with Monitoring and Coaching Technologies

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Scenario-Based Evaluation of Self-Care with Monitoring and Coaching Technologies

Master thesis for the master program Health Sciences at the University of Twente.

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Preface

After an informative, intensive and above all fun period, it is time to finish my thesis. During this period, I have broadened my knowledge about this relevant topic. Due to the pandemic I have learned to work from home, but also that I missed being at the University. Nevertheless, it was an experience that has changed the way I work, and I will not forget.

I would like to thank my study counselors, Roberto, and Saskia for the fine guidance. When I was lost you have given me the right directions, so that I have successfully completed my thesis.

I would also like to thank my family and friends, who I could also count on for some advice on the subject. We could talk about possible solutions, finding, but also talk about different things to get my mind off things.

Thank you very much!

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Abstract

When looking at the engagement of users with mobile health applications, not much is known about the relationship between the different dimensions of engagement (cognitive, behavioral, and emotional) and the self-care demands (preventive, rehabilitation, and chronic conditions). A clearer understanding of this relationship could help developers of mobile health applications create a higher form of engagement between the user and the application. When a higher form of engagement with an application is achieved by the users, this could lead to better health outcomes.

To explore the dimensions of engagement among different self-care demands, a semi-structured interview was carried out in which each participant used a specific mobile application for one week which matched with one of the three self-care demands. While using the application the participants needed to act as if they were in a specific hypothetical situation that was created to fit the specific self-care demand. In total every participant used three different mobile applications for a week, each corresponding with a different self-care demand. After each week of use, a semi-structured interview was conducted that were drawn up based on the literature research. These interviews consisted of two parts: the evaluation interview and the engagement scale. Both the evaluation interview and engagement scale elaborated on how the participants experience the three dimensions of engagement during their week of use.

Within the self-care for rehabilitation demand, 75% of the assigned quotes indicated that there was no motivation among the participants, while the other self-care demands scored much higher on motivation. Preventive self-care showed strong emotional engagement, while self-care for chronic conditions was found completely not enjoyable. The demands of preventive self-care and self-care for rehabilitation showed both routine and random users Whitin the behavioral dimension. However, the demand of self-care for chronic conditions only showed random users.

It can be concluded that every self-care demand has different strong- and weak points regarding the dimensions of engagement. It is important that these differences are taken into account when developing mobile health applications for specific self-care demands. This is important to ensure that elements are present within the applications to eliminate its weak points to offer a high form of engagement and ensure the best possible health outcomes.

Inhoudsopgave

1.Introduction

Today, over 318.000 mobile health apps are available on app stores worldwide. And this number keeps increasing with more than 200 apps being added per day [1]. A considerable number of adults with access to the internet make use of these applications, or some other form of digital technology to monitor their health. In the US alone there are over 30 million adult mHealth consumers [2]. These mobile health applications are used to support the individual's self-care. There are different types of self-care situations, therefore there are also different types of health applications that fit within those self-care situation [3]. The self-care process is unique for each individual and is based on their personal characteristics like health-related problems. Three important types of self-care demands are preventive self-care, self-care for chronic conditions and self-care for rehabilitation. These self-care demand can thus be supported by mobile health applications.

Some applications offer the ability to capture health data from parameters such as sleep, steps, exercise and other physiological states and behaviors, this is also known as ''self-monitoring'' [4, 5, 6]. Self-monitoring is an important feature within a lot of mobile health applications because it offers the potential for personalized feedback and self-management support, which can significantly improve individual's ability to manage and understand one's health [7]. Mobile phones can provide this support anywhere and at any time. Self-monitoring can thus be seen as a fundamental aspect of mHealth for self-care. Applications that offer self-monitoring can help users to get more involved in their own self-care process. Self-monitoring can consist of different actions among different self-care demands. It can include monitoring steps for disease prevention, monitoring symptoms for chronic conditions and monitoring health status for rehabilitation. This can help patients better understand their health and take appropriate actions [3].

Eventually the goal of every mobile health application is to keep its users engaged using different features, like self-monitoring. Some form of engagement with the application is assumed to have a positive effect on the user's health outcomes [8, 9]. On individual level this comes down to one's psychological characteristics and behavior. This can be broken down into three dimensions [10, 11]. First there is the cognitive dimensions, which entails the motivation of the user in using the intervention. The second dimension is the behavioral dimension, which is about the usage of the application, for example the amount of time the application is used per day. The last dimension is called the emotional dimension. This dimension is about the feelings of the user towards the intervention. These three dimensions all influence the engagement of the user with a certain eHealth intervention. It has been shown that users of technological interventions are often not fully engaged which lowers the effectiveness of that intervention [12, 13]. To ensure higher effectiveness and better health outcomes, it is important that these dimensions are optimized to ensure a high form of

engagement.

The relationships between the dimensions of engagement across the different self-care demands can differ. One study about self-care for rehabilitation has shown that fear of pain and depressed mood, which lies within the emotional domain, were the most dominant aspects within the engagement [14, 15]. While a study about self-care for chronic conditions indicated that knowledge and technical skills, which lies within the cognitive dimension, are the most dominant aspects in engagement [16].

When looking at the engagement of users with mobile health applications, not much is known about the relationship between the different dimensions of engagement and the different self-care demands. A clearer understanding of this relationship could help developers of mobile health applications create a higher form of engagement between the user and the application. This can be done by creating a better fit between the engagement dimensions of the users and the application itself. When a higher form of engagement with an application is achieved by the users, this could lead to better health outcomes. For example, if a person wants to maintain a healthy weight it could be that it is more important that the application raises the persons motivation to be active than to raise the persons enjoyment. In this case motivation could cause the person to work towards its long-term goals, while enjoyment could just be temporary and does not help as much.

2. Background

2.1 Self-care

Self-care is simply defined by Lipson and Steiger as ''activities performed by individuals or communities to achieve, maintain or promote maximum health'' [17]. However, self-care is not a simple concept, and this is just one of many definitions [18]. Self-care refers to the performance of activities or behaviors, aimed at improving one's health. These activities or behaviors are performed by individuals themselves, and sometimes assisted by health care professionals. These individuals can be patients with acute or chronic conditions, or nonpatients [19]. The types of activities that are carried out are dependent on the purpose of the self-care process. Examples of purposes could be disease prevention, symptom management and health maintenance. Consequences of self-care can include decreased risk for complications, decreased health services utilization and increased patient satisfaction [20].

The types of self-care are dependent on one's health status and goals. Preventive self-care refers to the actions one takes to maintain a certain health status and prevent acute or chronic conditions. These actions can include following a healthy diet or exercise program to maintain a healthy weight [3]. Self-care for rehabilitation is performed by people that suffered from an event which lowered their health status and have yet to recover to a better health status. These people need to follow specific actions to be able to achieve their original health status. An example of this may be performing exercises to improve hand strength after a stroke.
Self-care for chronic conditions refers to actions performed by people with chronic conditions, which may last months or years. People with chronic conditions have an increased chance of certain health problems. For example, diabetes can cause nerve damage. To manage chronic conditions and avoid associated health problems, patients often must follow specific behaviors or routines. These behaviors can include combinations of strategies to slow progression or to manage the high-risk factors associated with chronic health conditions, like taking medication and self-monitoring [21, 22].

2.2 eHealth

Self-care can be supported using eHealth technologies. eHealth, short for ''electronic health'' refers to the use of technologies to support health, well-being, and healthcare [23]. eHealth can be used for monitoring and improving health, delivering information to the user, and establishing communication between the users and the healthcare professional. There is a large spectrum of different technologies used for supporting and promoting healthcare. Examples of these technologies are electronic health records, telemedicine services and mobile device -supported care [24, 25].

Health technologies can offer several advantages over conventional healthcare.
eHealth makes healthcare more easily accessible. eHealth makes is possible to access care at any place and at any time. It can also offer more people the possibility to access care by lowering certain thresholds, like stigmatization.
eHealth also offers the possibility for patients to take control over their own health and support self-care. Patients are able to educate themselves and make decisions regarding their own health process. This ''patient empowerment'' can improve the willingness of patients to make medical decisions and help them to stay committed to treatment which both contributes to improved health outcomes [26, 27, 28]. eHealth technologies can support all of the different self-care demands. For example, the use websites or mobile applications to gather information could be used to maintain a healthy weight (preventive self-care), deal with chronic pain (self-care of chronic conditions) or rehabilitate from a stroke (self-care for rehabilitation).
Finally, using eHealth technologies can result in higher efficiency by lowering the number of resources necessary which can save costs and time. It can also result in higher effectiveness by improving traditional interventions and treatments [29, 30].

Along with these advantages, however, eHealth technologies also bring certain risks. Several studies have found concerns about the quality of the information that is accessed via eHealth technologies. For example, a few studies pointed out that the increasing amount of health information that is available online did not correlate with a parallel increase of its quality [31, 32, 33]. Other studies pointed out that poor quality health information could mislead users and cause negative effects [34, 35, 36]. Another example is the fact that some online health information is not easily understandable for the users, or that the users find it difficult to evaluate if the information provided is adequate. Some studies have pointed out that a lot of health information that is accessed online is too technical and therefore not easily understandable for users [33, 37, 38]. However, these risks can be solved relatively easy. For example, by educating patients and verifying the information that is accessible online via eHealth interventions.

2.3 mHealth

Within mHealth, mobile applications are used to support health. This specific form of eHealth holds much promise for supporting the self-care of individuals. It is easily accessible via a smartphone. In recent years the number of these health-related mobile applications has increased with more than 165.000 available health apps for Apple and Android users in 2015 [39]. This means there are a lot of applications available for individuals' specific self-care needs. The adoption of mHealth can lead to positive changes in health, sleep and other physiological states and behaviors [40]. mHealth can be

seen as a good tool for improving health conditions. Mobile health applications are widely available to provide real-time monitoring of vital signs and help with the support of chronic conditions and healthier lifestyle choices for improving or maintaining health. Self-care across chronic as well as non-chronic patients often requires self-monitoring to achieve certain goals which help maintaining or improving one's health [41]. Self-monitoring can be seen as an important feature within mobile health applications that offers real-time information. This information can help the individual to adopt a specific behavior to in order to maintain or improve health.

For preventive self-care there are lots of apps available, these apps often help the individual maintaining one's health status and prevent chronic or acute illness. The most popular apps in terms of downloads are apps for counting calories, tracking exercise, and tracking menstrual cycle [42]. There are also apps available aimed at self-care for rehabilitation. For example: apps aimed at stroke-, musculoskeletal- and cardiac rehabilitation. These apps can involve, exercises, education related to self-care, tracking and monitoring features as well as goal settings [43].
Self-care of chronic conditions often requires self-monitoring to pursue daily decisions to maintain health and functionality [44] Also, mHealth systems for self-monitoring chronic conditions can possibly overcome difficulties that come with using traditional systems [45]. Still there is a lot of criticism against mHealth, mostly because of the lack of evidence for the general effectiveness of mHealth across all of the different self-care demands [46]. At the moment many systematic reviews have been performed which causes a growing amount of evidence. There has been found evidence for the effectiveness of mHealth in different self-care demands. For example, one study found positive results regarding the use of mHealth in cardiac rehabilitation [47]. While another study proved the effectiveness of mHealth in chronic diabetes patients [48]. While mHealth may not be effective within every self-care demand, it is clear that it has been proven to be effective in many self-care demands.

2.4 Engagement

mHealth offers the promise of more active engagement in patients' healthcare, and greater personalization by helping patients to self-monitor and encourage behavior change [49]. Engaged patients who are active and effective managers of their own health obtain more positive clinical outcomes than patients who are not engaged [4, 5]. There is evidence suggesting that mHealth can contribute to changing people's health behaviors, for example changes in physical activity and self-management of chronic conditions [50, 51]. This engagement with mHealth interventions is important because it can enhance health outcomes, both physical and psychological [7]. Some studies indicated that the engagement with mHealth is a psychological process related to the user´s

experience and perceptions [52, 53]. While there is more than one definition of what the engagement with mHealth entails, the following definition according to a recent systematic review is a relevant one:

"Engagement with DBCIs (Digital Behavioral Change Interventions) is the extent (e.g., amount, frequency, duration, depth) of usage and a subjective experience characterized by attention, interest and affect" [54, page 5]

This definition implies that engagement consist of several different components: the extent of usage, and a subjective experience characterized by attention, interest, and affect. These components are similar to the components of engagement mentioned by another study, which are behavior, emotion and cognition [55]. Therefore, it is assumed that engagement with eHealth technologies can be characterized by a total of three dimensions: a behavioral, cognitive, and emotional dimension.

First there is the behavioral dimension, this includes actions the patient takes through mHealth applications to face the disease. This mostly consists of usage. Usage can be defined as the amount of uses during a specific time period, or as the quality of usage. Quality of uses can include adherence, which indicates whether the application is used as intended by the developer [51]. Usage can be measured by tracking use patterns, including the number of logins and time spend using the application [56].

The cognitive dimension is mostly related to the achievement of goals. It can be broken down in motivation [57, 54, 29, 58]. When these aspects are not present, it will most likely negatively affect the engagement of the individual. When an individual is more motivated to reach a certain goal, the engagement of that individual will increase [59, 60].

Third there is the emotional dimension, this is connected to the psychological and emotional reactions that the individual experiences. Within the emotional dimension it is important how the users feel towards using a technology when working towards a certain goal. This can be measured by using the component ''enjoyment'' [61, 54].

2.5 Problem & Goal

It is plausible that the process of engagement with mHealth is consists of three dimensions: cognitive, emotional, and behavioral. Because people within different self-care demands have different goals, it is likely to assume they behave differently to achieve those goals. Therefore, it could be assumed that the relationship between these dimensions of engagement could be different among different self-care demands. These self-care demands can be divided in preventive self-care,

self-care for chronic conditions and self-care for rehabilitation. All these self-care demands can be supported by mobile health applications.

It is still unclear how the cognitive, behavioral, and emotional dimensions of engagement with mHealth are different when using mHealth to support self-care in different situations like preventive self-care, self-care for chronic conditions and self-care for rehabilitation. To understand the relationship between this engagement and different self-care demands better, the following research question is formulated:

What is the relationship between the different self-care demands and the cognitive, behavioral, and emotional dimensions of engagement with mobile health applications?

3. Method

A qualitative research design using semi-structured interviews as chosen to identify, explore and explain the engagement of the participants towards using mobile health applications across different self-care demands. Participants were asked to make use of three different mobile health applications, with each of the applications being used for a specific self-care demand. Each application was used for one week, they were not used simultaneously. The participants were given a fictional representation of a real-life situation for each of the applications. This was done to create a scenario which the participant needed to keep in mind while using the applications. The interviews were suitable for exploring the behaviors, thoughts, and attitudes towards the engagement of the participants in a flexible way by giving the participants the opportunity to respond and elaborate using their own words [62].

3.1 Study design

To explore these dimensions of engagement in different self-care demands a semi-structured interview was carried out in which each participant used a specific mobile application for one week which matched with one of the three self-care demands. While using the application the participant needed to act as if they were in the hypothetical situation that was described the vignette. Vignettes are short stories given to individuals to elicit a response, either from their own perspective or the perspective of a character in the story. Vignettes are used in social and health sciences to obtain information from individual when observation is not possible and are a valuable technique for exploring perceptions and beliefs about certain scenarios [63]. Before each of the participant started using the application, an introduction interview was conducted in which the participant was able to explore the application to get familiar with it. Functionalities that the participant did

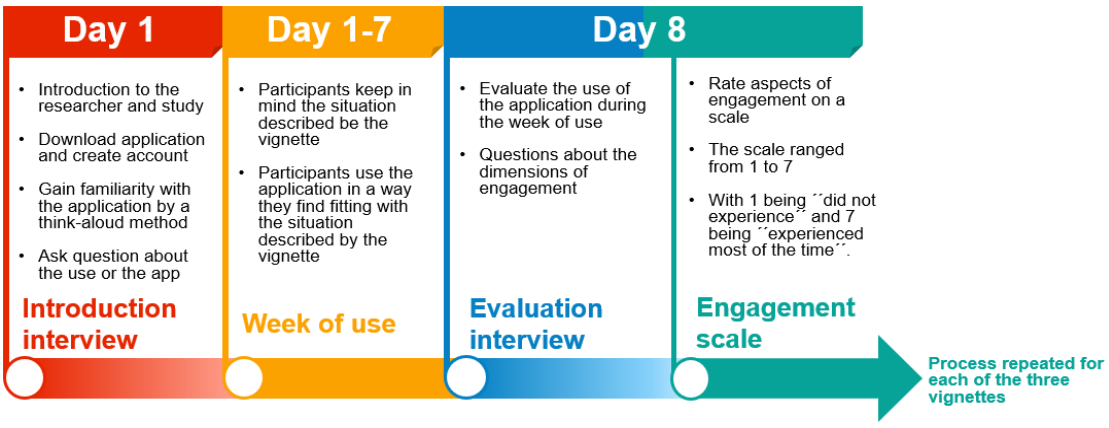

Figure 1: Design of this study

not understand were also explained by the researcher. In total every participant used three different mobile applications, each for one week. After each week of use, a semi-structured interview was

conducted that were drawn up based on the literature research. These interviews consisted of two parts: the evaluation interview and the engagement scale. Both the evaluation interview and engagement scale elaborated on how the participants experience the three dimensions of engagement during their week of use. In the end, each participant conducted three induction interviews, three evaluation interviews and three engagement scales. (For more information about the details of these interviews see Appendix 7.2).

The participants were contacted by phone for the planning of the first interview. Before the interviews were conducted all of the participants had to sign an informed consent form. Also, before the start of the interviews, this study approved by the BMS Ethics Committee (Requestnr: 210135). All of the interviews were conducted in person at the researcher´s home and were conducted in Dutch. After the researcher introduced himself, the study itself was explained including its goal and the handling of the participants data. If the participant had no further questions, permission was asked to start voice recording. The interview started with explaining of the first vignette. After the vignette was clear for the participant, the application should also be made clear to the participant before their actual use. It is important that the participants were familiar with the application to avoid that the participants used the application in a way that is not intended by the developers, which could influence their engagement. Also, it was important that all the participants had the same amount of knowledge about the applications and made use of the same functionalities within the applications to ensure the validity of this study. This was done by asking the participants a series of four questions about the application and letting them think about how the application can fit with their situation that was described by the vignette. After the introduction interview, the participants were asked to spend one week using the application while keeping the situation described by the vignette in mind. It was up to the participant to choose where and when to use the application, as long as they kept in mind the situation that they were in during the week which was described by the vignette. After this week an evaluation interview was conducted. With this evaluation interview the thoughts and behaviors of the participants regarding their engagement were further explored. This process was repeated three times, each time another vignette with another application was introduced to the participants.

3.2 Participants & Recruitment

A few criteria were established that had to be met by the participants. First, the participants had to be in the possession of a smartphone, either with an available Apple Play Store or Google Play Store. Because applications that they will be using must be download via either one of these stores. Secondly, they had to have experience in the use of smartphone and mobile applications, so that

they could quickly discover and understand the functionalities of the applications that they will be using. Preferably experience in the use of health applications, but any experience in using smartphones and mobile applications would suffice as well. And lastly, they must have a small amount of free time per day during the research period to make use of the application. Taking these criteria in consideration, students were chosen because of their smartphone use and amount of free time. A participant pool of ten participants was chosen to be sufficient considering the circumstances of this study. Although the sample size is small, the results should be able to give an indication on how the dimensions of engagement are different among the different self-care demands.

At first the SONA test subject pool was used to gather the participants. Within this system students from the BMS faculty of the University of Twente can participate in available studies of their choice. After a few weeks after the study had been registered in the SONA system, there were still not enough participants that registered to take part in this study. Because of this reason students from other schools and universities were asked to participate using the social network of the researcher. In the end ten male students from two different universities with an age between 19 and 23 took part in this study. Interviews were conducted between the 26th of April and the 26th of June 2021.

3.3 Procedure and materials

The interview that was conducted consisted of three parts, the introduction interview, the evaluation interview, and the engagement scale.

3.3.1 Introduction interview

The introduction interview consisted of four questions to make the participants get familiar with the applications. This introduction interview was in the form of a think-aloud method, which means that the participants had to verbalize their thought process [64]. The participants were asked about their impressions and expectations. This enabled the participants to think about what the application should do, and how this could fit with the situation of the vignette. To make the participants familiar with the layout and functionalities of the applications, the participants were asked to explore the application on their own. At the end of the participants exploration, there could still be functionalities, menus, or pages that the participant missed during the first exploration. For this reason, the functionalities, menus, or pages that were missed or not fully explored and understood by the participant were explained in further detail by the researcher. In this way every participant had approximately the same knowledge about the application´s functionalities and layout. At the end of the interview the participant was asked about the relevance of the application. Relevance refers to the fit between the technology, the individual, and their particular situation. The presence of personal relevance is associated with a positive influence on engagement [54]. The presence of relevance can confirm that a good fit was created between the hypothetical situations and the

corresponding applications. This whole process was repeated three times for each of the different vignettes the participants took part in

Question 1	*What is your first impression about the application?*
Question 2	*What are your expectations of this applications, what do you think it should do?*
Question 3	*Explore the application, and what are you looking for?*
Question 4	*Do you think the application is relevant for you and the situation that you are in? Why do you think this?*

Table 1: Questions of the introduction interview.

3.3.2 Evaluation interview

This evaluation interview consisted of a semi-structured interview including six open questions, to be able to explore the participants thoughts and behaviors. During this interview the participants were asked questions about their engagement with the application during the past week. This process was repeated three times for each of the different vignettes the participants took part in.

Question number	Engagement Dimension	Question
1	Cognitive	Did you feel motivated to reach your goal? Why?
2	Cognitive	Do you think the application was relevant to your personal situation? Why?
3	Behavioral	How many times on average have you used/opened the application during a day?
4	Behavioral	Did you have some type of routine involving the application?
5	Emotional	Did you enjoy using the application to reach your goal? Why?

Table 2: Question of the evaluation interview

3.3.3 Engagement Scale

At the end of the week the participants were asked to rate their own engagement regarding each of the three applications. This engagement scale used the same three dimensions to measure engagement and is based on the evaluation interview. It consists of three aspects: motivation, routinely use and enjoyment. The more these aspects are present during the participants use of one of the applications, the more engaged the participant is. Each of the three aspects had to be rated on

a 7-point scale, with 1 being ''not experienced at all'' and 7 being ''experienced all the time''. Inspiration for this scale came from the DBCI Engagement Scale [65]. This scale is used the acquire quantitative data about the engagement of the participants. This scale will be used to give a number to the amount of engagement of each participant based on the three dimensions of engagement.

	How strongly did you experience the following? (Measured on a 7-point scale)
1	Motivation
2	Routinely use
3	Enjoyment

Table 3: Engagement scale measured on a 7-pointlikertscale.

3.4 Vignettes

Within this study vignettes offer a valuable contribution. The use of vignettes makes it possible for individuals to imagine themselves in specific self-care situations. Three vignettes were used to describe situations of making use of mHealth within preventive self-care, self-care for rehabilitation and self-care of chronic conditions. The vignettes were developed in a way that a fit is created between the situation of the individual in the vignette and the mobile health application. To ensure that the vignettes were understandable for the average student, ten random students that did not take part in this study, were asked to read the vignettes. They were then asked about what parts they did and did not understand about the vignettes. If parts of the vignettes turned out to be hard to understand, they were revisited and rewritten. This process was repeated until all of the vignettes were understood by the ten students. To reduce the influences of the quality of the applications on the engagement of self-care, the applications were chosen based on positive reviews and the number of downloads.

3.4.1 Vignette A: Preventive self-care

Using the Fitbit application, the user is able to set certain health goals, for example the number of steps which can help the individual to maintain or improve their health. A fitness tracker can be connected to the Fitbit mobile application, where you can view your progress. This mobile application can also work as a standalone step counter and is rated in the Google Play store at almost 4 stars. For this vignette, the Fitbit mobile application will be used as a step counter. The vignette is formulated as follows:

Recently you visited your GP for a check-up. After some measurements, the GP concluded that you have put on quite a few pounds since the corona pandemic and that your BMI (Body Mass Index) is approaching an unhealthy number on the BMI scale. You explained to your doctor that you had to work from home since the beginning of the pandemic, which is why you put on weight. To prevent

health complications that go along with a high BMI, your GP is advising you to be more active throughout the day. You downloaded the Fitbit application to monitor your steps and activity.

3.4.2 Vignette B: Self-care for rehabilitation

Constant Therapy is a speech therapy app designed to help people cope with aphasia, dementia and other speech, language and cognitive disorder caused by stroke or traumatic brain injuries. There are more than 65 task categories, 100.000 exercised and 10 levels of difficulty available. It can help individuals improve their cognition, memory, speech, language, and comprehension skills. The app is developed by scientist at Boston University in Massachusetts and is recommended by neurologists, speech language pathologists and occupational therapists. It is rated in the Google Play store at almost 4 stars. The corresponding vignette is formulated below.

Because of an unknown factor you suffered from a stroke and ended up in the hospital. In the hospital it becomes clear that your brain is damaged due to lack of oxygen. It becomes apparent that you have trouble with your cognitive functions like remembering stories, conversations, and visual images, and you experience more problems with your short-term memory. Your doctor advised you to make use of the app ''Constant Therapy'' to help with your rehabilitation and monitor your progress. Your doctor advised you to do one session of therapy per day.

3.4.3 Vignette C: Self-care of chronic conditions

''Manage My Pain'' is a mobile application that helps people with chronic conditions like fibromyalgia or arthritis to better understand their symptoms and provide evidence of their pain to their doctors. Pain can be recorded quick and easy, in less than 30 seconds. The app can highlight patterns and trends and track how well medication is working. Pain can be described to your doctor. This app was created in partnership with industry-leading pain research. Daily reflections help people focus on their meaningful activities as opposed to the limitations created by their pain. This application is rated almost 5 stars in the Google Play store. The vignette is written down below.

You have been suffering from arthritis for a few years. This condition is causing pain and inflammation in your joints, especially your hands and knees. Recently your pain has become worse and more intermittent during the day, mostly during activities that require your hands or knees like cooking and walking. You take pain medication in the form of ibuprofen. You have been advised by your GP to make use of a mobile application to keep track of your pain and share it with your doctor if necessary. You downloaded the ''Manage My Pain'' application on your smartphone.

4. Results

The interviews were conducted in Dutch, and manually translated and transcribed into English using Microsoft Word. These documents were then exported and coded using ATLAS.ti 9. Quotes were seen as relevant when the quote could be assigned to one of the three main codes that arose from the literature research: behavioral, emotional, or cognitive. After all of the relevant quotes were assigned to one the main codes, the quotes within each of the main codes were read carefully to find similarities that could be split into different subcodes. During this process the code ''Behavioral Dimension'' was divided into ''Routine use'' and ''Random use''. ''Routine use'' entailed the participant using the application at fixed times during several days or using the application at fixed times around certain activities like before going to bed, or after work. While ''Random use'' entailed that the application was used at random times during the day. The code ''Emotional Dimension'' was divided into the subcodes ''fun'', ''challenging'' and ''no enjoyment''. The subcode ''fun'' focused on the feeling of happiness or satisfaction of the participants. The other subcode ''challenging'' entailed that participants enjoyed using the application because of challenging elements within the application, for example trying to beat your own score in the exercises. The main code ''Cognitive Dimension'' was first divided into the subcode ''Motivation''. Eventually this code was separated into three subcodes: ''Not motivated'', ''Internally motivated'' and ''Externally motivated''. The subcode ''not motivated'' only entailed quotes that stated to experience no motivation at all during their week of use. ''Internal motivation'' is mainly focused on participants that were motivated because of their own sake, for example participant that wanted to be or stay healthy. However, the subcode ''externally motivated'' is focused on participant that were motivated because of the application itself, or other external factors. The final coding structure, and the frequencies of quotes within the subcodes can be seen in Table 4.

Main code	Subcode	Vignette A	Vignette B	Vignette C
Cognitive dimension	Internally motivated	8	3	8
	Externally motivated	7	0	1
	Not motivated	2	9	2
Behavioral dimension	Routine use	4	6	0
	Random use	6	4	10
Emotional dimension	Fun	9	3	0
	Challenging	5	2	0
	No enjoyment	1	7	10

Tabel 4: Main codes and corresponding subcodes. Numbers indicate how many quotes were assigned to each subcode. It is possible for participants to have quotes in different subcodes of one main code.

4.1 Vignette A

This vignette represented a situation of preventive self-care using a Fitbit application. The Fitbit application was used to track the number of steps the participants took each day.

4.1.1 Emotional dimension

Participants reported to find the use of the application fun (90%, n = 9), challenging (50%, n = 5) and not enjoyable (10%, n = 1). In regard to ''fun'' the majority of the participants stated that they liked how they could get insight in their activity level by looking at the number of steps they took, as can be seen in the following quote:

> *''And at the end of a day I thought it was fun to see at what part of the day I was active and what part I was not. And when I reach my goal, I felt really satisfied which made it a fun experience.'' (P2)*

Some participants also described their enjoyment as ''challenging''. These participants enjoyed the competitive element of the application. This implies the opportunity for the participant to see the number of steps they took at a certain day, and to beat that number of steps the next day. The following quote was given by a participant to describe this:

> *''And when the app gives me a goal then I will definitely try to achieve that because I want to challenge myself in being really active.'' (P5)*

Only one participant did not experience any type of enjoyment. According to this participant this was due to time constraints.

> *''I did not really enjoy it. I just do not check my phone that much, and also the app. And when I did, I sometimes saw that I was far away from my step goal and there was not something I could do about it because of the time.'' (P9)*

4.1.2 Behavioral dimension

Participants reported they used the application randomly (60%, n = 6) or routinely (40%, n = 4). Different reasons were given for random use by participants, one reason being that the participant just quickly checked their progress towards their step goal at random times throughout the day or they would just randomly think about it.

''I did a lot of quick checks you know, just to see where I am at that point. But I did not really do it at given points during the day, I just did It when I thought about it.'' (P8)

At the other hand there were also participants that used the app in a certain routine. These participants used the app at the same times throughout the week, or before or after certain activities like sleeping or walking.

''A lot of times I would check it after I walked to see have many steps I gained. And at the end of the day look at the graph and look back on the day. You could call that a routine.'' (P4)

4.1.3 Cognitive dimension

The cognitive dimension is about motivation. Motivation is again separated into three subcodes: internally motivated, externally motivated, and not motivated. Internal motivation entails that the participant is motivated in using the application for their own sake. This can include using the application to become healthy or active. Externally motivated participants are motivated by external factors, for example messages from the app itself. There is also a possibility that the participants are not motivated at all, this is coded as ´´not motivated´´.

Participants were internally motivated (90%, n = 9), externally motivated (80%, n = 8) and not motivated (20%, n = 2). The group of participants that were internally motivated primarily stated that they wanted to become more active or healthy.

''I was motivated, I want to be healthy and stay healthy in the future. And just by simply taking steps I can help with doing that. My health is just really important to me, and I want to stay healthy and feel good.'' (P3).

The externally motivated participants were usually motivated by the app itself. They stated that they were being motivated by the messages they received from the application, or by the progress towards their step goal that the application displays. This can be seen in the following quote.

''The app helped to keep my motivation high by showing me how much or how little steps I need to take to reach the goal so it's kind of a tool that raised my motivation.'' (P8)

Two participants did not feel motivated during the use of the application. This was due to the application not fitting in a part of their actual lifestyle, which caused the application to have less impact.

''So I was not that motivated to take steps because I thought I had enough exercise for the day because I cycled.'' (P1)

4.2 Vignette B

This vignette represented the situation of self-care for rehabilitation using the Constant Therapy application.

4.2.1 Emotional dimension

Participants did find the use of the application fun (40%, n = 4) and challenging (20%, n = 2). But majority of the participant did not enjoy it (70%, n = 7). The group of participants that thought the use of the application was fun stated that they liked the exercises because they were in the form of a game.

''Some of the exercises were some kind of fun, like the one where you match pictures'' (P3)

Two participants said to find the exercises that are offered by the application challenging. Especially because of the fact that the exercises become more difficult after each therapy session.

''I mean some exercises were some sort of game where you match the pictures. So there is a little enjoyment in the fact that the games make it challenging for me.'' (P8)

Seven participants did not enjoy the use of the application. The most common reasons for this being that the exercises offered by the application were boring and therefore not fun.

''I did not enjoy it. Just like I said before, it becomes boring and you get fed up with it after some time.'' (P1)

4.2.2 Behavioral dimension

Participants used the application either routinely (60%, n = 6) or randomly (40%, n = 4). Most routine users had specific times at which they would complete the exercises.

''Usually I finished the exercises in the morning so I was done with it you know. When I woke up I know I had to do it so I thought I might as well just start with it so it's done.'' (P5)

The random users did not have specific times at which they would execute the exercises, most of the participants of this group would take on the exercises just randomly throughout the day whenever they had the time for it.

''I did it just once in a day when I had nothing else to do so that could be during lunch or when I am done with school.'' (P7)

4.2.2 Cognitive dimension

Regarding motivation, most of the participant were not motivated (75%, n = 9), a few participants were internally motivated (25%, n = 3) and none were externally motivated. Participants that were not motivated found the exercises to be boring and they felt being forced to do them. Two participants said to not be motivated in using the application but were willing to use the app for the sake of their own health which made them internally motivated.

> *´´I really wanted to do them but the exercises aren't really motivation me. I think it are good exercises but they are boring and not motivating.´´ (P7)*

The participants that were internally motivated were motivated to take on the exercises because they wanted to become healthy again and train their memory back to a higher level.

> *´´But I do it for my own health and to get better so it's worth it.´´ (P4)*

4.3 Vignette C

This vignette represented a situation of self-care for rehabilitation using the application ''Manage my pain''.

4.3.1 Emotional dimension

Out of the ten participants, no one found the use of the application fun or challenging. All of the participant seemed to not enjoy their use (100%, n = 10). Most of the participants stated that the application is just about ''entering information'' which they did not enjoy doing.

> *''No, the app is doing what it is supposed to but it is definitely not enjoyable. It's just entering information and that not a thing you do because you like doing it.'' (P6)*

4.3.2 Behavioral dimension

All of the participants did use the application randomly (100%, n = 10). They primarily stated that their pain occurred randomly, and thus so did the registration of their pain.

> *''No because I only used the app when there was pain, and you don't know when that happens.'' (P8)*

4.3.2 Cognitive dimension

Regarding motivation, among all of the ten participants the majority experienced a form of internal motivation (50%, n = 5), however some did not experience motivation at all (30%, n = 3). Only one

participant was externally motivated (10%, n = 1). The internally motivated participants mainly stated that they were motivated to reduce their pain and thus better their own health state.

> *''Yes I think I was motivated. If I am in constant pain you want to know where its coming from and keep a diary of it. And if you skip registering it than it misses information that can help you to actually relieve the pain eventually.'' (P2)*

The only externally motivated participants said that the easiness of the application was motivating to use it more often.

> *''And it was really easy just registering the pain a few times a day, it does not take any time or effort so there is no reason not to do it.'' (P5)*

Three participants did not experience any motivation. These participants were unsure how to apply the information they acquired from the application. They did not see the application helping their situation which is why they were not motivated.

> *''But after a few days I was just entering kind of the same thing because my situation did not really change and then the information you get from it is also the same. So after a few day the motivation went away because it did not really help.''(P7)*

4.4 Engagement scale

In the engagement scale each participant rated their own engagement on a 7-pointlikertscale. The results are represented in Figure 2.

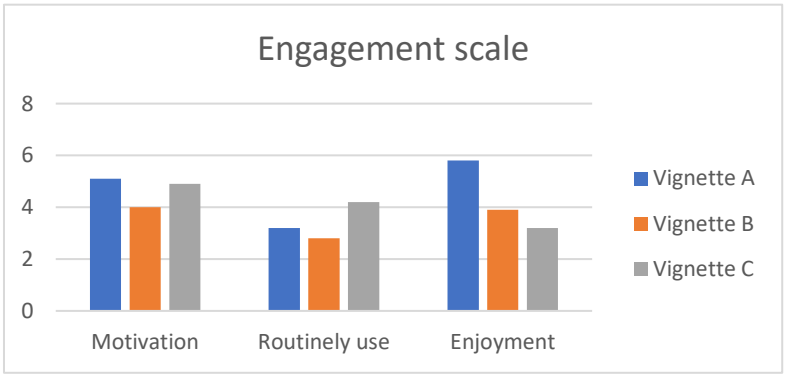

Figure 2: Results of the engagement scale.

According to the engagement scale, Vignette A received the highest score on motivation and enjoyment. Vignette B has the lowest scores on motivation and routinely use. Vignette C scores lowest on enjoyment, but the highest on routinely use. Assuming all of these dimensions are equally

important to the engagement, a score is calculated by averaging the score of each vignette. Vignette A received the highest engagement score (4,7), Vignette C is second (4,1) and Vignette B is third (3,6).

5.Discussion

This study was carried out to get insight into the different dimensions of engagement with mHealth among different self-care demands. Therefore, the following research question was asked: *What is the relationship between the different self-care demands and the cognitive, behavioral, and emotional dimensions of engagement with mobile health applications?*

After this study it can be concluded that the highest engagement with mHealth was found within the preventive self-care demand according to the participants themselves. Within the preventive self-care demand there were more random users than routinely users in terms of behavior. Also, there was a lot internal and external motivation, as well as the aspect of fun. While within the demand of self-care for chronic conditions, external and internal motivation was lacking. The aspect of enjoyment was present in the form of fun, although this was experienced by only a small portion of the participants. Looking at behavior, there were more routine users than random users. The demand of self-care for chronic conditions was exceptional because it was not enjoyed in any way by all of the participants. It also experienced the highest amount of random use. There was also a high amount of motivation, primarily internal motivation.

Results indicated that participants found using the Fitbit application in Vignette A the most enjoyable. Their use during vignette B was less enjoyable, and their use in vignette C was not enjoyable at all. The reason why most of the participants were experiencing fun when using the Fitbit application, could be due to the fact that reaching their step goal or visually seeing that they have been more active, is giving the participant a feeling of satisfaction or pleasure [66], although this was not explicitly stated by the participants. This could also be applied to the preventive self-care in general: users are preventing illness or conditions which could give the user a feeling of happiness or pleasure. Research has also shown that there is a positive relationship between physical activity and happiness [67]. There is a possibly that this feeling of happiness that occurs because of physical activity is then associated with the Fitbit app which makes their enjoyment even greater.

Participants were experiencing considerably less enjoyment during vignette B. Common reasons given by the participants are that the exercises became boring. This could be since some of the exercises were repeated by the application, which made the exercises more boring. The exercises of the ‘’Constant Therapy’’ application are developed to offer effectiveness for a quick recovery progress. It could be that ‘’enjoyment’’ was not a priority during the development of the exercises. This could make sense regarding the fact that rehabilitation is just temporary, in this case it could be that the developers preferred the effectiveness of the application over the enjoyment. Although according to literature, the enjoyment of users can be increased by a visually attractive design of the application [68].

It was remarkable that during the scenario of vignette C, there was not a single participant who enjoyed the application. Participants stated the app is just about entering pain information with no elements that made it an enjoyable experience. This could be due to the fact that applications for chronic conditions are developed to be used several times per day lasting years or even a lifetime. Because of this, the application should be easy and simple and should not take too much time to use. The app is therefore focused on easy and quick monitoring of symptoms and visualizing and sharing data to make the life of the user better and easier. Moreover, routine self-monitoring of chronic illness produces the best health outcomes [69]. The users should be internally motivated to acquire a better quality of life. This motivation is what leads the users to accepting the application and to actually use it [70]. It seems that the participants in this study did not find ´´enjoyment´´ to be a key aspect to experience engagement.

The overall motivation of participants within vignette A was very high, with only one out of the ten participant not being motivated. The external motivation that was present among most participants can be caused by motivational elements that are integrated inside the Fitbit application. Examples of these elements are motivational messages, reminders, and badges that the users can obtain. This was also a common reason given by the externally motivated participant. It appeared that seeing the progress towards the step goal, and getting reminders were the most mentioned motivational elements by the participants. Several studies about persuasive design confirm these reasons for the participants to be externally motivated [71, 72]. The internal motivation is mostly caused by the willingness of the participants to stay healthy and active to prevent negative health conditions in the future.

The lack of motivation that was present within the Vignette B can be caused by a lack of motivational elements that are offered within the ''Constant Therapy'' application. Most of the participants that were not motivated admitted in wanting to do the exercises but were not motivated because the exercises were repetitive and boring. Another study confirms that patients within self-care demand of rehabilitation often experience low motivation and interest [73].

The lack of external motivation within Vignette C could be caused by a lack of motivation elements. The application ''Manage my pain'' is mainly focused on registering pain and symptoms, with little to non-motivational elements to keep the users engaged. However, the severity and duration of chronic pain in combination with the easiness of the ''manage my pain'' application could be the reason why a lot of participants were still internally motivated. Moreover, literature identifies motivation as a key construct and mediating factor for self-care of chronic conditions [74]. This can explain the high internal motivation within this self-care domain.

Looking at the behavioral dimension, it became clear that there were differences in the amount of routinely users. Within Vignette A most participant used the application randomly, while in Vignette B most participant were routine users. Within Vignette C there were only random users. This makes sense because the app must be used when the user experiences pain, which can be at different times and moments during the day. Self-care for chronic conditions like arthritis happen spontaneously and cannot be planned.

Now that there is more insight in the dimensions of engagement with health application across the self-care demands, these insights can be used to increases the engagement of patients and users. For example, within the preventive self-care demand the lack of routine use can be solved by adding reminders to the application at fixed times. These reminders will remind the user to check the application at fixed times and thus creating a routine. A solution for the lack of motivation in the self-care demand for rehabilitation, could be to add motivational element to the application. Gamification is often used to make mobile application more motivating [75]. The ''Constant Therapy'' application already consists of some gamification in the form of some exercises. This could be taken to a higher level by adding more elements in line with gamification that increase motivation, for example a progress bar, leaderboard, and score system [76].
Within vignette C it was remarkable that none of the participants experienced enjoyment in any form. Enjoyment could be increased in several ways. For example, by offering a well-designed user interface with visually appealing features [77].

5.1 Limitations & future work

When explaining the vignettes to the participants, it became clear that some participants had difficulty with imagining themselves in the situation described by the vignette. Furthermore, there is a difference between healthy participants that imagine themselves in a self-care scenario, and participants there are actually living with a specific health condition matching a specific self-care scenario. Participants without those health conditions may experience the use of the applications differently than participants actually living with those health conditions. This could influence their engagement. It could be the case that participant living with those health conditions take the use of the applications more seriously. However, this would need to be studied further. Either way, the results of this study give a good indication of what engagement with mHealth could look like in different self-care demands. To increase validity during a follow-up study, participants with health conditions matching the self-care demands could be used.

6.Conclusion

In this study the relationship between the three dimensions of engagement was studied across different self-care demands using mobile health applications for self-monitoring.

From this study it can be concluded that within the self-care demand of preventive self-care, the engagement of the participants was high in the emotional as well as cognitive dimension, while in the behavioral dimension engagement was lacking. The engagement within self-care demand of self-care for rehabilitation was low in the cognitive dimension, looking at the lack of motivation. The same can be said about the emotional dimension because of the lack of any form of enjoyment. There was however some engagement within the behavioral dimension because of the relative high routine usage. Finally, the engagement of the self-care demand of self-care for chronic conditions was lacking in the behavioral as well as emotional dimension, regarding the high amount of routinely use and lack of enjoyment. Some engagement was found in the form of the cognitive dimension, with some participants being internally motivated. It can be seen that every self-care demand has different strong- and weak points regarding the dimensions of engagement. It is important that these differences are taken into account when developing mobile health applications for specific self-care demands. This is important to ensure that elements are present within the applications to eliminate its weak points to offer a high form of engagement.

7. References

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8. Appendix

7.1 Interview (English version)

1. Introduction to the study

First, let me briefly introduce myself. My name is Maikel Nijboer and I have been studying the master of Health Science at the University of Twente for more than one year now. I have chosen this study because of my interest in technology as well as health. These two concepts come together in mobile applications. There are thousands of applications that can monitor certain aspects of your health, like your heart rate or the number of steps that you took during the day. There are different apps for people with different health conditions. Someone with obesity could track the number of calories that they burned during the day, while someone else is trying to increase their activity during the day by tracking their steps. However, today's knowledge in quite limited regarding the fact why some users are engaged with health apps, and others are not. Especially while looking at people with different health conditions, and thus using different health application.

In the study in which you are about to participate is all about these mobile health applications. There are three different scenarios written for you. In each scenario you will experience some kind of health-related issue, while making use of a corresponding mobile health application that is developed to help you with that issue. You will spend one week using one of the three health applications, this will carry on for three weeks until you have used each of the three mobile health application for one week. During each week you will have to imagine yourself in the persona that is described by the scenario (vignette), while making use the corresponding health application which will be downloaded on your smartphone. At the end of the week, an evaluation interview will take place. During this interview you will be asked questions about your engagement with the app during the week of use. Do you have any question about what I just explained?

Lastly, I would like to inform you that everything you say during this interview will stay confidential. The data will be processed in a way in which this cannot be linked to you. If everything is clear to you and there are no further questions, I would like to ask you to take you time to read and sign the following document (informed consent). Then now I would like to ask you if I can start recording this interview.

2. Introduction interview

1. *What is your first impression about the application?*
2. *What are your expectations of this applications, what do you think it should do?*

3. *Explore the app, what are you looking for?*
4. *Do you think the app is relevant for you and the situation that you are in, why do you think this?*

3. Evaluation interview

Cognitive dimension

1. *Did you feel motivated to reach you goal? Why?*
2. *Do you think the app was relevant to your personal situation? Why?*

Behavioral dimension

3. *How many times on average have you opened the app during a day?*
4. *Did you have some type of routine involving the app?*

Emotional dimension

5. *Did you enjoy using the application to reach your goal? Why did you or did you not?*

4. Engagement scale

How strongly did you experience the following (measured on a 7-point scale)

Cognitive dimension

1. Motivation

Behavioral dimension

3. Routinely use

Emotional dimension

4. Enjoyment

7.2 Informed consent form

Informatieblad voor onderzoek 'Scenario-Based Evaluation of Self-Care with Monitoring and Coaching Technologies'

Doel van het onderzoek

Dit onderzoek wordt geleid door Maikel Nijboer.

Het doel van dit onderzoek is om inzicht te krijgen in de ''engagement'' van individuen in bepaalde gezondheidsapp 's die gekoppeld zijn aan specifieke gezondheidsscenario's. Er wordt gekeken naar verschillen of verbanden in de engagement op het gebied van motivatie, relevantie, gebruik en plezier van de individuen en hoe deze verklaart kan worden vanuit de literatuur.

Hoe gaan we te werk?

U neemt deel aan een onderzoek waarbij we informatie zullen vergaren door:

- U te interviewen en uw antwoorden te noteren/op te nemen via een audio-opname/video-opname. Er zal ook een transcript worden uitgewerkt van het interview.
-

Potentiële risico's en ongemakken

- Er zijn geen fysieke, juridische of economische risico's verbonden aan uw deelname aan deze studie. U hoeft geen vragen te beantwoorden die u niet wilt beantwoorden. Uw deelname is vrijwillig en u kunt uw deelname op elk gewenst moment stoppen.

Vergoeding

U ontvangt voor deelname aan dit onderzoek geen vergoeding .

Vertrouwelijkheid van gegevens

Wij doen er alles aan uw privacy zo goed mogelijk te beschermen. Er wordt op geen enkele wijze vertrouwelijke informatie of persoonsgegevens van of over u naar buiten gebracht, waardoor iemand u zal kunnen herkennen.

Voordat onze onderzoeksgegevens naar buiten gebracht worden, worden uw gegevens zoveel mogelijk geanonimiseerd, tenzij u in ons toestemmingsformulier expliciet toestemming heeft gegeven voor het vermelden van uw naam, bijvoorbeeld bij een quote.

In een publicatie zullen anonieme gegevens of pseudoniemen worden gebruikt. De audio-opnamen, formulieren en andere documenten die in het kader van deze studie worden gemaakt of verzameld, worden opgeslagen op een beveiligde locatie bij de Universiteit Twente en op de beveiligde (versleutelde) gegevensdragers van de onderzoekers.

De onderzoeksgegevens worden bewaard tot het onderzoek klaar is.

De onderzoeksgegevens worden indien nodig (bijvoorbeeld voor een controle op wetenschappelijke integriteit) en alleen in anonieme vorm ter beschikking gesteld aan personen buiten de onderzoeksgroep.

Tot slot is dit onderzoek beoordeeld en goedgekeurd door de ethische commissie van de faculteit BMS.

Vrijwilligheid

Deelname aan dit onderzoek is geheel vrijwillig. U kunt als deelnemer uw medewerking aan het onderzoek te allen tijde stoppen, of weigeren dat uw gegevens voor het onderzoek mogen worden gebruikt, zonder opgaaf

van redenen. Het stopzetten van deelname heeft geen nadelige gevolgen voor u of de eventueel reeds ontvangen vergoeding.

Als u tijdens het onderzoek besluit om uw medewerking te staken, zullen de gegevens die u reeds hebt verstrekt tot het moment van intrekking van de toestemming in het onderzoek gebruikt worden.

Wilt u stoppen met het onderzoek, of heeft u vragen en/of klachten? Neem dan contact op met de onderzoeksleider.

Naam: Maikel Nijboer

Emailadres: m.h.j.e.nijboer@student.utwente.nl

Telefoonnummer: 31643287765

Adres: Drilscholtenstraat 11 te Hengelo

Voor bezwaren met betrekking tot de opzet en of uitvoering van het onderzoek kunt u zich ook wenden tot de Secretaris van de Ethische Commissie van de faculteit Behavioural, Management and Social Sciences op de Universiteit Twente via ethicscommittee-bms@utwente.nl. Dit onderzoek wordt uitgevoerd vanuit de Universiteit Twente, faculteit Behavioural, Management and Social Sciences. Indien u specifieke vragen hebt over de omgang met persoonsgegevens kun u deze ook richten aan de Functionaris Gegevensbescherming van de UT door een mail te sturen naar dpo@utwente.nl.

Tot slot heeft u het recht een verzoek tot inzage, wijziging, verwijdering of aanpassing van uw gegevens te doen bij de Onderzoeksleider.

Door dit toestemmingsformulier te ondertekenen erken ik het volgende:

1. Ik ben voldoende geïnformeerd over het onderzoek door middel van een separaat informatieblad. Ik heb het informatieblad gelezen en heb daarna de mogelijkheid gehad vragen te kunnen stellen. Deze vragen zijn voldoende beantwoord.

2. Ik neem vrijwillig deel aan dit onderzoek. Er is geen expliciete of impliciete dwang voor mij om aan dit onderzoek deel te nemen. Het is mij duidelijk dat ik deelname aan het onder- zoek op elk moment, zonder opgaaf van reden, kan beëindigen. Ik hoef een vraag niet te beantwoorden als ik dat niet wil.

Naast het bovenstaande is het hieronder mogelijk voor verschillende onderdelen van het onderzoek specifiek toestemming te geven. U kunt er per onderdeel voor kiezen wel of geen toestemming te geven. Indien u voor alles toestemming wil geven, is dat mogelijk via de aanvinkbox onderaan de stellingen.

3. Ik geef toestemming om de gegevens die gedurende het onderzoek bij mij worden verzameld te verwerken zoals is opgenomen in het bijgevoegde informatieblad. Deze toestemming ziet dus ook op het verwerken van gegevens betreffende mijn gezondheid/ras/etnische afkomst/politieke opvattingen/religieuze en of levensbeschouwelijke overtuigingen/lidmaatschap van vakbond/seksueel gedrag/seksuele gerichtheid en/of over mijn genetische gegevens/biometrische gegevens.	JA ☐	NEE ☐
4. Ik geef toestemming om tijdens het interview opnames (geluid / beeld) te maken en mijn antwoorden uit te werken in een transcript.	☐	☐
6. Ik geef toestemming om mijn antwoorden te gebruiken voor quotes in de onderzoekspublicaties.	☐	☐
7. Ik geef toestemming om mijn echte naam te vermelden bij de hierboven bedoelde quotes.	☐	☐
8. Ik geef toestemming om de bij mij verzamelde onderzoeksdata te bewaren en te gebruiken voor toekomstig onderzoek en voor onderwijsdoeleinden.	☐	☐
Ik geef toestemming voor alles dat hierboven beschreven staat.	☐	

Naam Deelnemer:

Handtekening:

Datum:

Naam Onderzoeker:

Handtekening:

Datum: