



## Development of an eCoaching module for type 2 diabetes patients to increase their physical activity

- Integrating theory, healthcare professionals' and patients' perspectives -

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## Preface

This thesis completes my master programme Health Sciences at the University of Twente, with the specialisation track “Personalised Monitoring and Coaching”. During the specialisation track I developed skills related to eHealth. I am very happy that I got to use those skills during my master thesis, which I performed at “ZiekenhuisGroep Twente (ZGT)”. During this thesis I further developed my skills in a practical setting.

I would like to thank my supervisors of the University of Twente, M.M.R. Vollenbroek-Hutten and M.G. Postel, for giving me the opportunity to perform this thesis and I am very thankful for their critical feedback, which helps me to improve my research and my skills.

Second, I would like to thank my supervisors from ZGT, Goos Laverman and Niala den Braber for their support and for allowing me to join the DIALECT study. It gave me the chance to saw the hospital care in a close view and have contact with the patients, my thesis aimed at. Thereby, I hope my thesis will help by developing the “Diameter” application for type 2 diabetes mellitus patients.

I would also like to thank the healthcare professionals and patients for their participation, time and effort. Without their participation this thesis could not have been completed.

Finally, I would like to thank my family and friends for their support. I would like to thank two of them in particular; my parents. I would like to thank them for their help, support and trust in me during my whole study period, without them I would not have been able to do this.

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## Abstract

**Background:** Type 2 Diabetes Mellitus (T2DM) is an increasing disease in the Western world. A healthy lifestyle is a key component in the management of T2DM. However, T2DM patients show insufficient Physical Activity (PA). eHealth interventions have great potential for increasing their PA. Although, earlier eHealth interventions showed diverse results; some interventions were successful others were not. The reasons for this success or failure are not fully clear yet. What is known, is that low treatment adherence is a problem for eHealth interventions and preferences of patients are important during the development to ensure the fit between technology and end-users. Additionally to this, systematic reviews came up with factors that have potential to contribute to the effectiveness of web-based interventions. These factors are intertwined with adherence to the interventions and preferences of patients.

**Objective:** This thesis aimed to systematically develop the content of a nine week evidence-based eCoaching module, where factors based on theory were combined with the perspectives of HealthCare Professionals (HCPs) and T2DM patients.

**Methods:** The first version of the content of the eCoaching module was developed based on literature and earlier research conducted at the ZGT. An updated version was made incorporating the results of the formative evaluation with HCPs of "ZiekenhuisGroepTwente" (ZGT). Subsequently, 9 T2DM patients from second-line care tested the updated version. Halfway and in the end telephone interviews took place about their experience, appreciation and feedback. The results of the formative evaluation with T2DM patients should lead to further improvements.

**Results:** The evidence-based content of the eCoaching module was developed, HCPs excluded and adapted relatively few messages. The T2DM patients were satisfied with the eCoaching module they received by SMS and email during the nine weeks, but a significant difference in PA level was not found for this group of 9 patients. Looking more in-depth in the individual analysis, it was shown that especially patients with a high self-efficacy and improper PA level at the start, improved their PA level.

**Conclusion:** An eCoaching module, with potential to increase PA of T2DM patients, was developed based on evidence and grounded in the experiences, views and preferences of patients with T2DM and their healthcare providers. An even more sophisticated personalization and tailoring and inclusion of more healthy lifestyle components is needed to further improve the eCoaching module.

The detailed description of the structure, content and evidence of the eCoaching module is a step taken in decreasing uncertainty of the active ingredients, effectiveness, and acceptability of eHealth interventions, which helps by identifying reasons for failure or success.

## List of abbreviations

BCTs	Behaviour Change Techniques
BMI	Body Mass Index
CeHReS	Center for eHealth Research
DELICATE	Diabetes and Lifestyle CoAching project TwEnte
DHI	Digital Health Intervention
DIALECT	DIAbetes and Lifestyle Cohort Twente
HAVO	Higher General Continued Education
HBO	Higher Vocational Education
HCPs	HealthCare Professionals
ICT	Information and Communications Technology
MBO	Intermediate Vocational Education
PA	Physical Activity
PIN	Patient Identification Number
PSD	Persuasive System Design
T2DM	Type 2 Diabetes Mellitus
UTAUT	Unified Theory of Acceptance and Use of Technology
VMBO	Lower Vocational Education
VWO	Pre-university Secondary Education
WHO	World Health Organisation
WO	University
ZGT	ZiekenhuisGroepTwente

## Contents

Preface.....	i
Abstract .....	ii
List of abbreviations .....	iii
1. Introduction.....	1
2. Theoretical framework.....	3
2.1 CeHRes roadmap .....	3
2.2 Participatory design.....	4
2.3 Unified Theory of Acceptance and Use of Technology (UTAUT).....	4
3. Method.....	5
3.1 Phase 1: From evidence to eCoaching .....	5
3.2 Phase 2: Optimization by formative evaluations .....	7
Healthcare professional .....	7
T2DM patients.....	9
4. Results .....	12
4.1 Phase 1: From evidence to eCoaching .....	12
Extensive use of theoretical framework.....	12
Use of additional methods for interacting with participants.....	13
Inclusion of educational components .....	13
Use of self-monitoring tool .....	13
Use of BCTs .....	14
Tailored content .....	14
Low treatment adherence.....	15
Preferences of patients .....	16
4.2 Phase 2: Optimization by formative evaluations .....	17
Healthcare professionals.....	17
T2DM patients.....	19
5. Discussion .....	24
5.1 Aim and research questions .....	24
5.2 Methodological considerations.....	25
5.3 Recommendations for the eCoaching module and its further research.....	26
6. Conclusion .....	28
7. References.....	29

8. Appendix.....	37
8.1 Test subjects information and Informed consent .....	37
8.2 Intake form, questionnaire and instructions for synchronization Fitbit .....	41
Intake form .....	41
Questionnaires .....	43
Instructions for synchronization Fitbit .....	44
8.3 Interview scheme .....	47
8.4 Code scheme .....	49
8.5 Supplementary information regarding the results of phase 1.....	50
The I-Change model.....	50
The PSD model .....	51
8.6 Found articles per factor .....	52
8.7 eCoaching module.....	59
8.8 Messages excluded by the HCPs .....	60
8.9 Coded fragments .....	61
General .....	61
Interactive elements.....	63
SMS.....	64
Email.....	66
Use of technology .....	69

## 1. Introduction

Diabetes mellitus is an increasing problem. In 2016 in the Netherlands more than 1.000.000 people were diagnosed with diabetes mellitus and it is expected that this number will rise to 1.300.000 in 2025 (1,2). Diabetes mellitus is a syndrome of chronic hyperglycaemia due to relative insulin deficiency, resistance or both (3). The majority of diabetes patients (90%) is diagnosed with Type 2 Diabetes Mellitus (T2DM) (1,4). Risk factors for T2DM are being overweight, insufficient physical activity (PA), unhealthy eating habits and smoking (5). The quality of life of these patients is reduced and when co-morbidities or complications start to develop the quality of life drops even more (6). The complications consist of macrovascular disease, leading to an increased prevalence of coronary artery disease, peripheral vascular disease and stroke, and microvascular disease leading to retinopathy, nephropathy and neuropathy (3). The life expectancy of diabetes patients is reduced and causes major health costs (7–9).

The treatment of T2DM is focused on achieving and maintaining optimal blood glucose, lipid and blood pressure levels to prevent or delay complications of diabetes. This can be reached by following a nutrition and exercise plan and losing weight. If this is not sufficient medication can be taken to lower the blood glucose level. When the diabetes is more severe, supplemental insulin is needed (10,11).

A healthy lifestyle improves the glycaemic control, decrease the risk of complications, and improve well-being for T2DM patients (12–16). Being physically active is one of the components of a healthy lifestyle. For adults, the Dutch Physical Activity Guideline recommends moderate or vigorous physical activity for at least 150 minutes every week, spread over several different days. Moreover, the guideline recommends to do activities that strengthen muscles and bones at least twice a week and avoid sedentary behaviour (17,18). However, most of the T2DM patients do not meet these recommendations (19,20). It is important to increase the PA of T2DM patients to improve their diabetes outcome.

Regular and sufficient PA remains very difficult to achieve for T2DM patients because of barriers like insufficient knowledge, lack of motivation, co-morbidities and limited economic resources due to low socioeconomic status (21). To overcome this, coaching can be helpful as there is evidence that coaching can be effective to support and better engage patients in managing their health (22). Health coaching has been described as “a practice of health education and health promotion within a coaching context, to enhance the well-being of individuals, and to facilitate the achievement of their health related goals” (23). Most of the health coaching, to improve the level of PA, is done by face-to-face contact and is time-, effort-, and cost intensive (24,25). Therefore, it is not very applicable for the long-term, which is not favourable for a chronic disease like T2DM (26).

Using Information and Communications Technology (ICT) to overcome these limitations looks promising (27). These technologies, in combination with health, are often referred to as eHealth interventions. The definition of eHealth according to the World Health Organisation (WHO) is “eHealth is the use of information and communication technologies for health” (28). eHealth could be a solution in making the health coaching less time-, effort-, and cost intensive. Additionally, it addresses the need for ongoing support in chronic disease management (29). An often used argument against eHealth is that most people have limited experience with technology, especially the elderly. This is an important issue in the case of diabetes, because the prevalence becomes higher with age (1). However, the next generation of elderly have a more positive attitude towards the use of technology which looks promising for the use and success of eHealth (30).

Previous studies on eHealth interventions for T2DM patients to improve lifestyle show variation in success (31,32). The reasons for failure or success are not fully clear yet. What is known so far, is that adherence and preferences of patients play an important role (33,34). When the adherence is low, the technology is not used as intended and, logically, the effectiveness is lower (35,36). That adherence is a challenge for eHealth applications is demonstrated by a systematic review to website-delivered PA intervention, which found an overall average attrition of 27% and a range of attrition of 7% to 69% (37).

Taken the preferences of patients into account during the development of Health is important to ensure the fit between technology and the end-users (34). Additional to this, systematic reviews identified factors that potentially contribute to the effectiveness of web-based interventions for behaviour change (38–40). These factors are intertwined with the adherence and preferences of patients.

The aim of this thesis is to systematically develop the content of a nine week evidence-based eCoaching module, where factors based on theory are combined with the perspectives of HealthCare Professionals (HCPs) and T2DM patients. First, methods to prevent low treatment adherence, preferences of patients and a number of the factors that potentially contribute to the effectiveness of web-based interventions, all found in literature or earlier research conducted at the ZGT, are integrated in the content of the eCoaching module. Second, the content is optimized by formative evaluations with HCPs followed by a formative evaluation with T2DM patients. It is not an attempt to ‘reinvent the wheel’ but it is an attempt to combine different evidence for an effective mHealth intervention for T2DM patients. A detailed description of the structure and content of the eCoaching module is given to decrease the uncertainty about the reasons for success or failure of eHealth interventions. If this intervention proved to be successful, similar interventions can be developed in the same way.

This thesis is part of the DIALECT (“DIAbetes and Lifestyle Cohort Twente”) study. DIALECT investigates the correlation of lifestyle and T2DM. The DELICATE (Diabetes and Lifestyle CoAching project TwEnte) project is an element of the DIALECT study. The DELICATE project aims to develop an application for T2DM patients; “the Diameter”. One of the components of the application is coaching to a healthy lifestyle. This thesis belongs to the development of the coaching to increase PA and builds on previous theses conducted at the “ZiekenhuisGroepTwente” ZGT, which have shown that T2DM patients have a positive attitude towards receiving daily informational and motivational SMS text messages and weekly emails, for two weeks (41,42). This current thesis will further develop the content to nine weeks, hereby focusing on the following research questions:

- *Which factors should be integrated in an eCoaching module for T2DM patients, based on literature and earlier research at ZGT?*
- *Are the SMS-messages of the eCoaching module positively valued by healthcare professionals and is the content positively experienced by T2DM patients?*

## 2. Theoretical framework

### 2.1 CeHRes roadmap

The CeHRes (Center for eHealth Research) roadmap, see Figure 1, can be used as a guideline to plan, coordinate and execute the participatory development process of eHealth (43,44). It consists of five phases; the contextual inquiry, value specification, design, operationalization and summative evaluation (43–45). After each phase, formative evaluation should take place to optimize the products created in that phase (43).

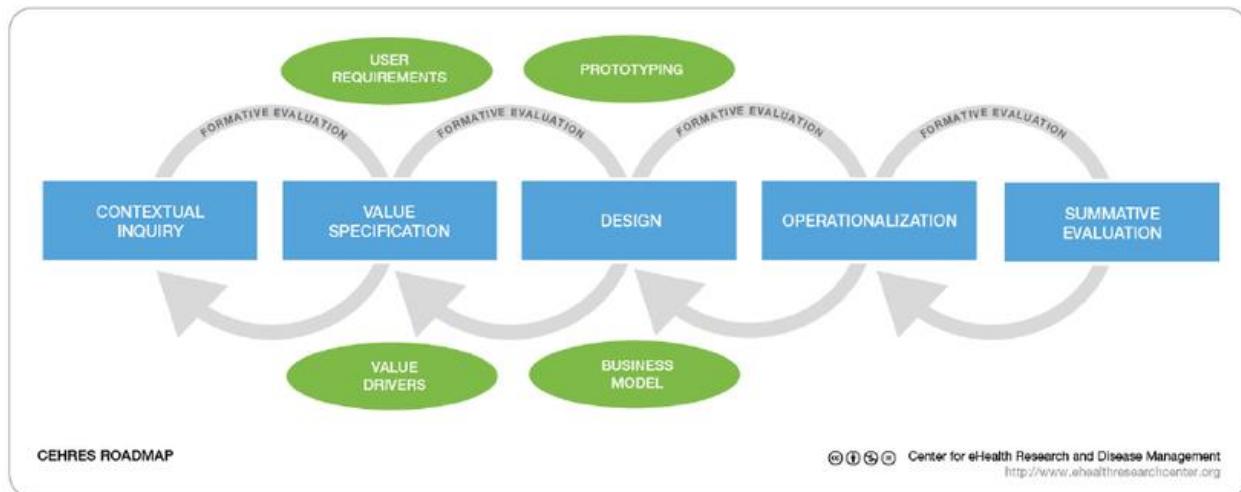


Figure 1: The CeHRes roadmap, consisting of five phases for the development process of eHealth (43)

The first phase, the contextual inquiry is an investigation of the context, to find out what the problems are, what the strong and weak points of the current care are, and how technology could contribute to a solution (43–46). The information, gathered in the contextual inquiry, is important to create a match between the new technology, end users and context (43). During the whole development phase the contextual inquiry should be used to check if the match is still present (43).

In the second phase, the value specification, the identified issues of the contextual inquiry should be narrowed down (43–46). It focuses on what kind of goals the technology should reach according to stakeholders and what should be done to reach these goals (43–46). In other words the added value of a technology. These should be translated to requirements (43–46).

After the first two phases the actual design process can start; the design phase. Multiple prototypes should be built and tested to make sure that a technology fits the needs and preferences of the users and other stakeholders (43,45). This is an iterative process, constant changes should be made to improve the product (43,45). The outcome of the design phase will actually be used in practice by the stakeholders (43).

The fourth phase, operationalization, is about the introduction, dissemination, adoption and internalization of the product into practice (43,45). In the fifth phase, summative evaluation, the impact and uptake of the technology is evaluated (43). The fourth and fifth phase will not be included in this thesis.

The CeHRes roadmap is used to guide this research track, it fits this research while it focuses on health and technology and it describes the development of eHealth by several steps. Every thesis can be classified within the steps of the roadmap. Additionally, the CeHRes roadmap states that participatory design, which is used in this thesis, is essential in eHealth technology development (43). Participatory design will be further explained in the next paragraph.

## 2.2 Participatory design

Acceptance problems of eHealth technologies can be caused by insufficiently meeting the needs of users (47). Stakeholder participation in the development process is important for preventing this problem, also known as participatory design (48). In this design, stakeholders are involved during the entire development and evaluation process, which is an iterative process, where design and evaluation alternate (43,49). Activities of stakeholders could be identifying their needs for the technology, improving the technology based on their input or identifying critical issues for implementation (43,49). It is developing ‘with’ instead of ‘for’ stakeholders.

In this thesis, participatory design will be used to ensure the fit between the eCoaching module and end-users. Different stakeholders are involved during the design process to identify critical issues and improve the eCoaching module. They will be involved in ‘informant’ design; they are asked for input and feedback, they provide suggestions but the designer makes the actual decision and design (43).

## 2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al. (50) integrated various theories into a new framework; the Unified Theory of Acceptance and Use of Technology (UTAUT), shown in Figure 2. UTAUT can be used to assess the likelihood of success of a new technology (50,51). It helps to evaluate and understand the drivers of acceptance and technology usage, which helps by the design of a technology (50,51).

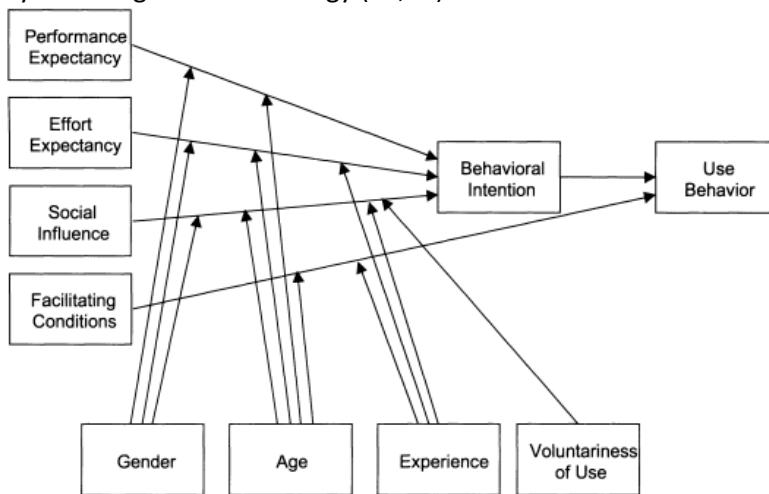


Figure 2: The Unified Theory of Acceptance and Use of Technology (UTAUT) (50)

The UTAUT has four essential factors: performance expectancy, effort expectancy, social influence and facilitating conditions. They defined performance expectancy as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance”. Effort expectancy is defined as “the degree of ease associated with the use of the system”. Social influence is defined as “the degree to which an individual perceives the important others believe he or she should use the new system”. Facilitating conditions is defined as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system”. Performance expectancy, effort expectancy and social influence will influence the behavioural intention and therefore indirectly influence the use behaviour. Facilitating conditions will directly influence use behaviour. In addition to these factors, the UTAUT has moderating factors; gender, age, experience and voluntariness of use. These factors will moderate the influence of the four essential factors. (50)

The UTAUT model will be used in this thesis to design part of the interview scheme for interviews with T2DM patients. Using the UTAUT model should give insight in the acceptance and use the technology, which helps by identifying points of improvements and optimizing the eCoaching module in order that the technology will be accepted and used by the end-users.

### 3. Method

This thesis was conducted at ZGT Almelo in the period of 05-02-2018 to 04-10-2018. It was divided into two phases; 1) Additional contextual inquiry and value specification, performed with literature and earlier research conducted at the ZGT, followed by integrating this into the content of the eCoaching module and 2) The optimization by formative evaluations with HCPs and T2DM patients. The method section and result section were divided into these two phases, the second phase built further on the first phase. This process is shown in Figure 3, which demonstrates that the development was an iterative process, where design and evaluation alternated.

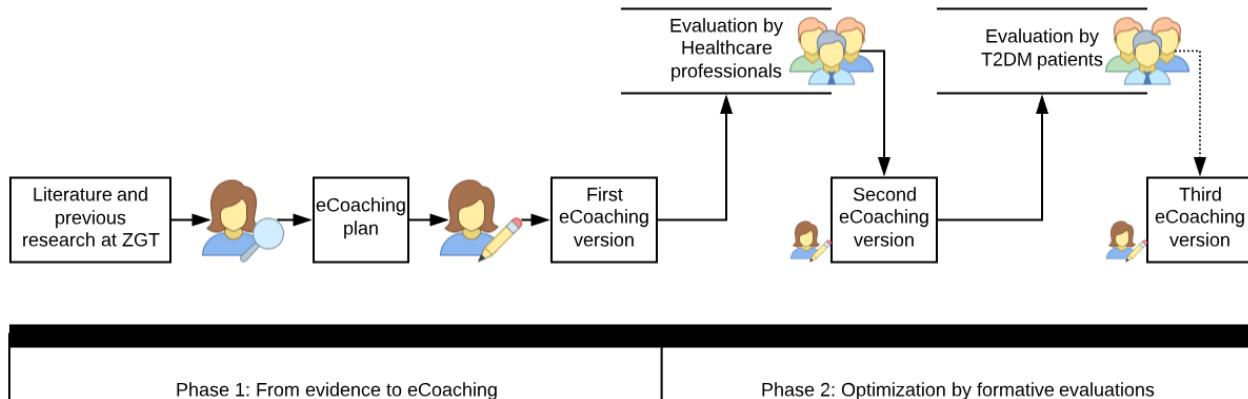


Figure 3: The steps taken in this study, divided in two phases, to develop the content of the eCoaching module

#### 3.1 Phase 1: From evidence to eCoaching

The aim of this phase was to combine literature and previous research results of the ZGT to determine what should be integrated in the content of the nine weeks eCoaching module, resulting in an evidence-based eCoaching module. The first research question is answered in this phase and based on this answer the first version of the eCoaching module was developed.

##### Procedure

The factors that have potential to contribute to the effectiveness found by systematic reviews, methods to prevent low treatment adherence and preferences of patients, were studied in more detail by the researcher by the use of literature and results of earlier research conducted at the ZGT.

The factors that were studied in more detail are:

1. Extensive use of theory (40)
2. Use of additional methods for interacting with participants (40)
3. Inclusion of educational components (38,39)
4. Use of self-monitoring tool (39)
5. Use of Behaviour Change Techniques (BCTs) (40)
6. Tailored content (39)
7. Low treatment adherence (33)
8. Preferences of patients (34)

On beforehand, it was decided that two of the eight factors found by systematic reviews were not studied in more detail; “the inclusion of an exercise program” and “allowing communication with a healthcare provider or other patients” (39). The inclusion of an exercise program was not taken into account while this thesis was mostly focused on improving PA in daily life. Communication with a healthcare provider was not provided because the development was in an early stage, it would have been a high burden on the healthcare provider. Allowing communication with other patients was not taken into account because the eCoaching module was delivered by SMS and email, which makes communication with other patients

more difficult and in the first master thesis, nearly all patients rejected the idea of communication with other patients (41).

Literature was read to gather information on the first four factors (extensive use of theoretical framework, use of additional methods for interacting with participants, Inclusion of educational components, use of self-monitoring tool). The aim was to get more in-depth knowledge, in order to make substantiated design choices. The databases "Pubmed", "Scopus" and "Google Scholar" were used.

For the last four factors (use of BCTs, tailored content, non-usage attrition, preferences of patients) literature was searched to find out what was already proven to be suitable and/or effective for this target population to cause the behaviour change. This information should help by including suitable and/or effective content in the eCoaching module. The database "Scopus" was used. The search strings used for this are shown in Table 1. The found articles together with a short description and a summary about the relevance per article can be found in appendix 8.6.

**Table 1: Factors of the systematic review together with the used search strings and number of articles found**

Factor	Search string	Number of articles found
BCTs for increase of PA in the diabetes population or similar population	Behaviour change techniques: ("Behaviour change" OR "behaviour change") AND techni* Physical activity: "physical activity" OR "exercise"	7 (52–58)
Tailoring for in Physical activity behaviour change interventions	Tailor: "tailor**" Physical activity: "physical activity" OR "exercise" OR "health" Behaviour change: "behaviour change" OR "behavior change"	5 (59–63)
Design to prevent low treatment adherence in eHealth	non usage attrition: "non*usage attrition" OR "adherence" Design: "Design" eHealth: "eHealth" OR "technology" OR "web"	2 (64,65)
Preferences of T2DM patients to technology	Preferences: "preferences" OR "perspectives" T2DM patients: "diabetes type 2" OR "diabetes type II" OR "type 2 diabetes" Technology: "technology" OR "eHealth" OR "digital"	3 (66–68)

For BCTs, tailoring and adherence only systematic reviews were selected because these have more power and the aim was to find BCTs, tailor methods and methods to prevent low adherence that are already proven to be effective. No systematic reviews to the preferences of T2DM patients to technology could be found and therefore this criterion, of only systematic reviews, was not used for this factor.

All the information was summarized and these building blocks were translated to an eCoaching plan, which described the content that should be included, where the messages should target on and in which week this should be done.

The plan guided the writing and designing of the first version of the content of the eCoaching module, done by the researcher.

### **3.2 Phase 2: Optimization by formative evaluations**

The aim of this phase was to optimize the eCoaching module. Participatory design was used by involving different stakeholders in the design process during formative evaluations. The end product of this phase was an updated version of the eCoaching module and points of improvements for the future.

HCPs and T2DM patients were selected as stakeholders to involve. The HCPs were involved in the design process before patients were involved to lower the burden on the patients. The knowledge of the HCPs is of important value for bridging the gap between theory and practice. The aim of involving the HCPs was to optimize the messages. Patients were selected because they are the end-users of the eCoaching module. The aim of involving the patient was to get insights in how they experience the eCoaching module and what should be improved. The participatory design with the patients was less focused on the details but more on the overall value and experience of the eCoaching module. This phase answered the second research question.

#### **Healthcare professional**

HCPs were involved in the design process by analysing the messages during a focus group. Focus groups are suitable to link the knowledge of professionals to the development of a new and better method, in this case the eCoaching module (69). Furthermore, a focus group is a fast method to get a lot of information in a short time frame, the different perspectives can be directly confronted with each other and a discussion can be started to get more in-depth information (69–71).

The focus group had three aims; 1) to filter out messages that would not be valued positively by patients according to HCPs, 2) to optimize the messages 3) to validate if the used theory was actually translated to content.

#### **Sample size**

The minimum number of participants per focus group was four as it was expected that with four HCPs enough different perspectives were included. Additionally, with this minimal number of participants the exercises could be done in little groups, this seems ideal because during the exercise a bit of discussion could already take place.

#### **Participants**

One specialist of the ZGT was asked to identify the HCPs that work with T2DM patients. These HCPs were approached by email with a short explanation of the focus group and the question if they were willing to participate. During the first focus group, 5 HCPs (3 specialists, 2 diabetes nurse) were present. During the second focus group, 4 HCPs (2 specialist and 2 diabetes nurse) were present. Two of them were present during the first focus group as well.

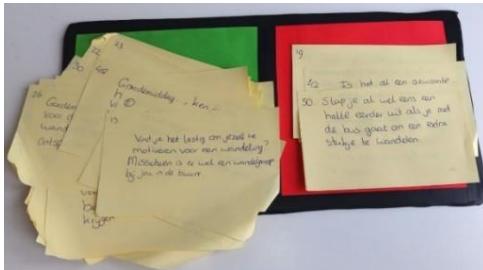
#### **Procedure**

Two focus groups were held instead of one big focus group, this was done to lower the burden on the HCPs and HCPs can come more easily to an appointment of one hour than of two hours.

Both focus groups started with an explanation of the thesis and the focus group. During the focus groups two types of exercises were used; the wrong/good exercise and the construct exercise. For both the exercises the messages were written down on sticky notes beforehand. During the wrong/good exercise, the HCPs had to stick the message to the red ("wrong") or green ("good") part of a board, shown in Figure 5. They had to focus on an aspect that was pointed to them. The "wrong" messages were discussed plenary and adapted together to a "good" message or excluded if no improvement could make the message "good". For the construct exercise, the HCPs got a board with four parts, shown in Figure 4, three parts belonged to a construct, the fourth part to "unclear". The HCPs had to stick the message to the construct they thought it belonged to or to "unclear". If they thought the message belonged to more than one of the constructs they had to write the message on another sticky note and stick it to both constructs. The definition of the used aspects and constructs can be found in Table 2.

**Table 2: The constructs and aspects together with their definitions, used for the wrong/good and construct exercises**

Construct/aspect	Definition
<b>Understanding</b>	Would the T2DM patient understand the message
<b>Intonation</b>	Is this the best way to address the T2DM patient
<b>Action planning</b>	Prompt detailed planning of performance of the behavior (72)
<b>Self-efficacy</b>	Beliefs in one's capability to organize and execute the courses of action required to manage prospective situations" (73).
<b>Social support</b>	Advise on, arrange, or provide practical help or emotional social support (e.g. from friends, relatives or colleagues) for performance of the behaviour (72).
<b>Motivation</b>	Does the message motivate the T2DM patient
<b>Leading to action</b>	Does the messages will actually lead to action of the patient



**Figure 5: The board with sticky notes as a result of the wrong/good exercise**



**Figure 4: The board with sticky notes as a result of the construct exercise**

In the first focus group, the messages of the awareness phase were tested with the wrong/good exercise. One group (a trio) categorized the messages focused on the aspect “understanding”, the other group (a couple) on “intonation”. Further, the construct exercise was done with the following constructs; action-planning, self-efficacy and social support. Only the messages that belonged to these constructs were used. The messages that were categorized to “unclear” were discussed plenary and adapted or excluded if needed.

In the second focus group, the wrong/good exercise was done with the messages of the motivation, action and maintenance phase. This time one couple categorized the messages focused on the aspect “motivation”, the other couple on “leading to action”. Further, the messages that were not categorized to the right construct, in the first focus group, were discussed to get more in-depth knowledge about the perspectives of the HCPs to these constructs and to these messages.

During both focus groups, it was mentioned explicitly that all the feedback was welcome, even if it did not relate to the constructs or aspects they had to focus one. These exercises were used to structure the focus group and make sure the HCPs looked critically at the most important aspects of the messages.

#### **Data access & privacy**

In the beginning of the focus group, permission was asked to record the interview. The records were stored in a private folder on the ZGT server, only the researcher had access to this. No names were recorded during the focus group and no names were used during the data analysis, only their function was used to describe them.

#### **Data analysis**

The feedback given for the “wrong” or excluded messages were transcribed per message, this should give inside in why the HCPs categorized the messages as wrong or excluded them. The other feedback they gave was summarized by the researcher because the exclusions and adaptations, together with the reasons of these, were seen as most important of the focus group.

## T2DM patients

Patients received the eCoaching module similar to how it will be put in practice, to test and give feedback, also known as field testing. In this way they would encounter all the problems, obstacles and advantages of the module (43).

### Sample size

The aim of the formative evaluation with T2DM patients was to discover points of improvement according to them, therefore, the aim was to include at least 5 patients.

### Participants

Patients who received treatment in the ZGT Almelo and participated in the DIALECT study were asked to test the eCoaching module. They were informed vocally by the researcher during the DIALECT study and received the information on paper as well, see appendix 8.1. During the next appointment, one week later, they were asked to participate. Due to the low response, patients who already participated in the DIALECT study in the past and had an appointment in the hospital were contacted by phone as well. They received the information by email and/or post. Additionally, one internist recruited patients during his regular outpatients' visits. The response rate of the DIALECT patients was 29%, 2 more patients were included with the help of the internist. In total 9 patients participated. The patients were included from the 4<sup>th</sup> of May 2018 until the 29<sup>th</sup> of June 2018. Not all patients started at the same time.

#### Inclusion criteria:

- Diagnosed with T2DM<sup>1</sup>
- Owning a smartphone and willing to download the Fitbit application
- Owning a laptop or computer and capable and willing to read a weekly email

#### Exclusion criteria:

- Age under 18 years<sup>1</sup>
- Insufficient command of the Dutch language<sup>1</sup>
- Insufficient intellectual capacity to understand informed consent<sup>1</sup>
- Undergoing haemodialysis treatment<sup>1</sup>
- Having a transplanted kidney<sup>1</sup>
- Physically unable to walk<sup>1</sup>

### Procedure

First, patients had to sign informed consent, after that they had to fill in two questionnaires and answer some additional questions, see appendix 8.2. Together with the researcher they set a goal. Hereafter, patients received the Fitbit and had to install the Fitbit application. This all was done during a face-to-face contact moment in the hospital. The patients who did not recently participated in the DIALECT study or the patients recruited by the internist did not know the number of steps they currently made, for hem it was difficult to set a goal (initial end goal). Therefore, the goals were checked after one week with the Fitbit data and if needed adapted (definitive end goal).

During the study period of nine weeks, patients had to wear the Fitbit, synchronize the data every Friday and they received two daily SMS-messages and a weekly email. They got written instructions for the synchronization of the Fitbit, see appendix 8.2. An overview of the devices used in the eCoaching module is shown in Figure 6. The questionnaires together with the data of the Fitbit were used to tailor the coaching. The researcher could see the Fitbit data on the computer, she tailored and sent the emails. In week 4 the patients had to fill in the same questionnaires again, this time online, the link for this was sent in the email of that week.

In week 5 the researcher contacted the patients by phone and interviews were held. Semi-constructed interviews were chosen to gather all the information, not forget any questions and have some room for interaction and input of the patients in order not to narrow down the view. Part of the interviews was qualitative and part was quantitative based on the UTAUT model. It consisted of 16 open questions, 15 statements they could agree or disagree with and three rating questions. The patients who had not

<sup>1</sup> Inclusion or exclusion criteria of the DIALECT study

filled in the questionnaires were reminded of this during the interview. The interview scheme can be found in appendix 8.3.

If patients had not filled in the questionnaire by week 6, they got a reminder in the email of that week.

After the nine weeks, the patients were contacted by phone again and the same questions were asked. Patients returned the Fitbit in a marked envelope, which they received at the start.

Due to warm weather, patients 4 till 9 got an additionally email in week 4. During the period these patients were testing the eCoaching module, a heat wave hit the Netherlands and the government announced a National Heat plan, which stated that people had to limit their PA during the day.

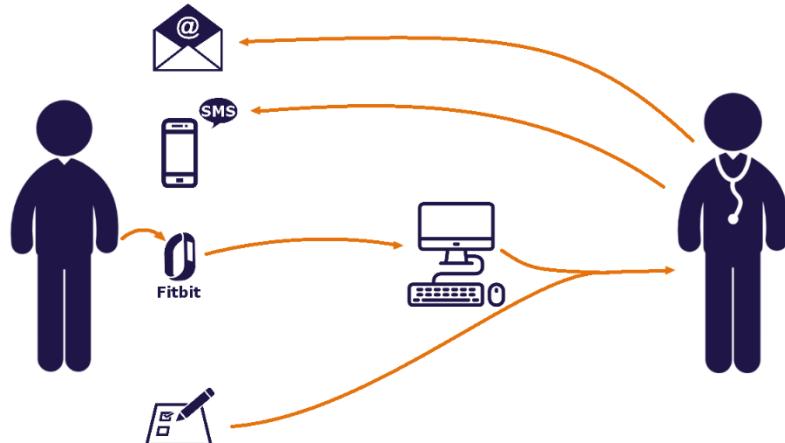


Figure 6: A schematic overview of the devices used during the testing of the eCoaching module. The computer is used by the researcher to read out the Fitbit data and tailor the emails.

### Materials

The patients received a Fitbit from the hospital and they needed to have a smartphone to install the Fitbit application. The Fitbit measured the number of steps and heart rate.

The questionnaires that patients had to fill in measured the self-efficacy level, stage of change and experience with mobile phone and email.

The self-efficacy level was needed for tailoring the coaching and is an outcome of the eCoaching module as well. The ESES questionnaire was used to measure the self-efficacy level, it is a validated questionnaire with high internal consistency and scale integrity and available in Dutch (74,75).

The experience with mobile phone and email was used to check for digital literacy, it was measured on a scale from 1 to 5, with 5 the highest experience.

The stage of change was measured because in the future this could be needed to tailor the coaching and it is an outcome as well. The following question was used to measure the Stage of Change: Are you at least 5 times per week physically active (walking, cycling, or doing sports) for more than 30 minutes each time?

Yes, I have been for more than 6 months.

Yes, I have been for less than 6 months.

No, but I intend to in the next 30 days.

No, but I intend to in the next 6 months.

No, and I do not intend to in the next 6 months

These phrases can be classified to the stage of change, respectively; maintenance, action, preparation, contemplation and pre-contemplation. This question was previously used in a similar project (SWELL) (76) and Reed et al. (77) found that either a 5-Choice or a true/false response format was effective in assessing behaviour stage. Not the number of steps was used to formulate the question because the assumption was made that patients would not have enough feeling with that.

### **Data access & privacy**

During the eCoaching module the same data storage of the DIALECT project was used, data from the Fitbit server was saved on the server of ZGT Almelo, using the patient identification number (PIN). For each Fitbit a separate anonymous Gmail address was used. All Fitbits were marked with a number, corresponding to the Gmail account used to obtain the data. Rights to access the database were only given to researchers involved in the DIALECT study. For analysing the Fitbit data, a research number was given to the data. A list of names corresponding to the research numbers was saved on the ZGT server and only accessible for the researcher.

For the interviews permission was asked to record. The records were stored in a private folder on the ZGT server, only the researcher had access to this.

### **Data analysis**

All the patients were asked about their diabetes medication, microvascular complications, weight, length, education and job. Their medical status was searched to check information.

#### *Interviews*

Only the halfway interviews were analysed in this thesis due to time restraints. The open questions were non-verbatim transcribed, meaning that the thinking noises, partial words, stuttering, "um", "ah" etcetera were left out. The transcripts were fragmented and deductively coded using the design choices. The code scheme was reviewed by the first and second supervisor of the University of Twente and can be found in appendix 8.4.

The coding of the interviews was done by the researcher and a second coder, a colleague student. They coded independently. First, the inter-coder reliability was checked with the percent agreement. The fragments were randomly listed in Excel and the first 10%, which is seen as sufficient according to Lombard et al. (78), was used to calculate the percent agreement. A percent agreement of 92% was found, which is above the acceptable 75% (79). Furthermore, they reached consensus about all the fragments. The coding was done in Atlas.ti and exported to Microsoft, sorted to the codes, to get a clear overview of all the quotes, which made analysing easier. The coded fragments, sorted per code can be found in appendix 8.9.

The 15 statements were quantitatively analysed by counting the how many patients agreed and how many disagreed to the statements. The rating questions were used to give the eCoaching module and each part of it an average grade and to check if this grade was satisfactory.

#### *Additional outcomes*

The number of steps per day was extracted from the Fitbit. When the number of steps was irregular compared to other days, it was checked if the Fitbit was worn by inspecting the heart rate measurements. The average number of steps per week per patient was calculated and was made visually by creating graphs. The difference between week 9 and 1 was calculated per patient and for the whole population. A percentage for this was calculated as well. A Wilcoxon signed rank test was performed to determine if the level of PA significantly differs between week 1, 5 and 9. This test was used because the distribution of the paired observation was not normal.

Self-efficacy was categorized as a continuous variable by adding the scores on the 10 items of the ESES questionnaire. Each item is scored on a four point Likert scale (1=not at all true, 2=rarely true, 3=moderately true, 4=always true). The minimum score is 10, the maximum score is 40, the higher the score the higher the self-efficacy level. The self-efficacy level at the start, in week 5 and at the end was calculated per patient.

The stage of change was categorized as a discrete variable from 1-5 (1. maintenance, 2. action, 3. preparation, 4. contemplation and 5. pre-contemplation). The stage of change at the start, in week 5 and at the end was calculated per patient and on average.

The additional outcomes were categorized to the tailoring mechanism of the eCoaching module and combined in one table together with the rating.

## 4. Results

The chapter starts with the eCoaching plan and an evidence-based explanation of this plan. Per factor, that has been pointed out as important for the development, a short overview of the literature and evidence is given together with its choices and integrations in the eCoaching plan. This answers the first research question. Based on this, the first version of the eCoaching module is developed. The chapter ends with the results of the optimization by formative evaluations with HCPs and T2DM patients.

### 4.1 Phase 1: From evidence to eCoaching

The eCoaching module has a duration of nine weeks, see Figure 7, because habit changes for a healthy lifestyle takes 66 days on average (80). Week 7 is crossed as in that week no coaching takes place, to find out if the patients are capable, at that point, of doing it on their own. Feedback on this can be given in week 8. Stopping the coaching for one week was based on the study of Wolves et al. (81).

The integration of the literature into the eCoaching plan, which is used to write and design the content of the eCoaching module by the researcher, resulted in an evidence-based eCoaching module, which can be found in appendix 8.7.

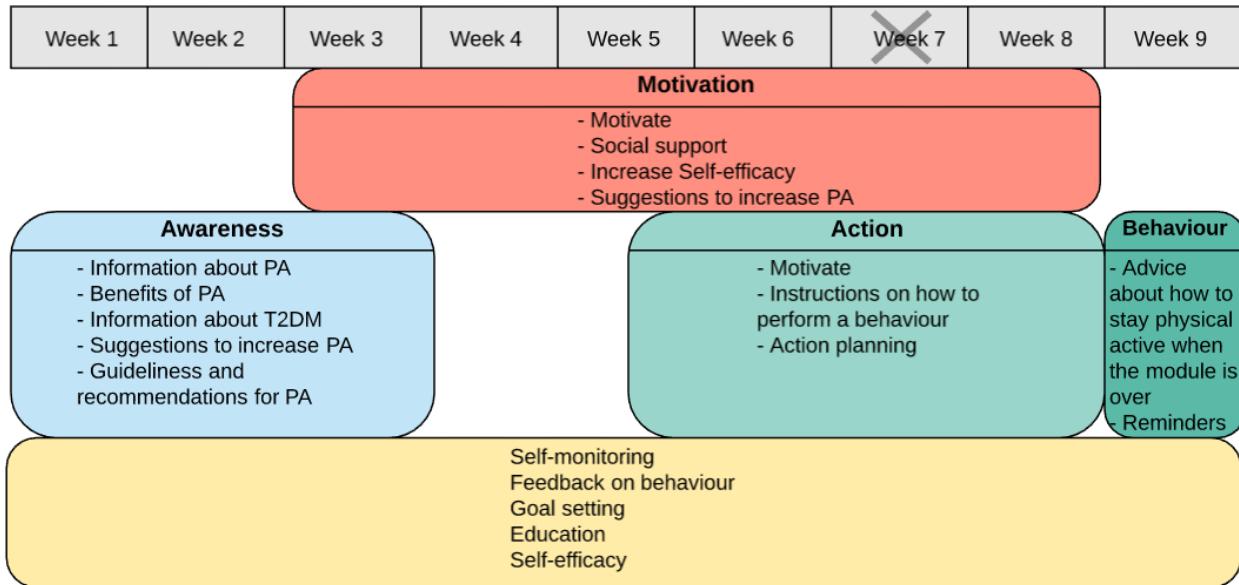


Figure 7: The evidence-based eCoaching plan

### Extensive use of theoretical framework

There are many different theories on behavioural change, which can be used for the intervention, e.g.; Theory of Planned Behavior, Transtheoretical Model, Health Action Process Approach, Fogg Behaviour Model, Health Belief Model and Social Cognitive Theory (82–87). These theories have a lot of overlap and many of them use similar constructs with different names. Several attempts are made by different researchers to integrate these theories, resulting in different integrated theories, e.g. the Integrated Theory of Health Behaviour change, the Behaviour Change wheel and the I-Change model (88–90).

For this thesis, the I-Change model is chosen as behaviour change theory and functions as the basis for the eCoaching module. The I-Change model successfully integrated different theories to one model for understanding health behaviour change (89). More information about the I-Change model can be found in appendix 8.5. The I-Change model is most applicable for the eCoaching module because the different stages of change are central in this theory, making it possible to develop messages per stage of change. This is an advantage for tailoring on the stage of change in the future.

The nine weeks of the module are divided in the stages of behaviour change of the I-Change model, shown as the coloured boxes in Figure 7. The stages are not divided evenly over the nine weeks as these stages can overlap. Additionally, the eCoaching module does not focus on coaching after the behaviour change but focuses on the change. Therefore, the 'behaviour stage' is just one week and aims to empower the patient and provide them with the last tools to stay physically active after the eCoaching module.

The following division was used:

- Awareness: week 1-3
- Motivation: week 3-8
- Action: week 5 ½ - 8
- Behaviour: week 9

### **Use of additional methods for interacting with participants**

There are a lot of methods to interact with participants, e.g. phone calls and Skype. In a previous master thesis performed at the ZGT, SMS and emails were used, which was positively valued by T2DM patients (42). It is an inexpensive and well-accepted way to communicate with patients (91,92). It allows for tailoring and SMS allows instant delivery directly to individuals at any time, place or setting, which makes it a very suitable channel for health behaviour interventions (93). The disadvantages of email are that people read these messages mostly on a computer and less frequently than SMS. It can be used supplemental to the SMS while it is not limited to a number of characters and it allows for other ways of communication (e.g. videos).

Two daily SMS-messages and a weekly email are used to deliver the content of the eCoaching module to the patients. This frequency is based on a study of Wang et al. (94), which found that sending three SMS-messages per day was too much for obese patients, which is a similar target population, and two SMS-messages were found as a desirable frequency in the previous study conducted at the ZGT (42). The weekly emails give additional information to the SMS and contain, besides text, a quiz, a vlog and a graph of the made progress.

### **Inclusion of educational components**

The aim of the eCoaching module is to improve health. Therefore, as education form, health education is applicable. Health education is defined by the WHO as "any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes" (95).

The health education in the module starts in the awareness phase, shown in the blue box of Figure 7. 'Information about PA', 'benefits of PA', 'information about T2DM' and 'suggestions to increase PA' are included because of the preferences of the patients in earlier research (41,66). Additionally, education about guidelines and recommendations for PA is given because in the previous master thesis was found that the knowledge on the subject of exercise guidelines and recommendations is lacking in the T2DM population (41). The health education in the awareness phase is in line with the elements, cognizance, knowledge and risk perception, of the I-Change model (89).

Health education continues during the rest of the eCoaching module as well, as shown in the yellow box in Figure 7, but is more on the background.

### **Use of self-monitoring tool**

Self-monitoring can result in attempts to match behaviour to goals and it gives insight into your own performance, which is often lacking by T2DM patients (96,97). The eCoaching module focuses on an increase of PA, therefore PA is monitored. Quantitative methods, e.g. pedometers or accelerometers (the successor of pedometers), are less burdensome for the patient and they are less prone to recall error social and desirability bias than qualitative methods (98).

The Fitbit, a commercial accelerometer that measured the number of steps, was already available at the ZGT. Previous research suggested that a pedometer is an appropriate method to measure the level of PA of older adults and the majority of studies reported steps as their PA outcome metric (99,100). For these reasons, the Fitbit is used as self-monitoring tool for the eCoaching module.

The self-monitoring is done continuously during the eCoaching module, as shown in the yellow box in Figure 7 and is used for the feedback on behaviour.

### Use of BCTs

The National Institute for Health and Care Excellence described the term ‘behaviour change techniques’ as “the component of an intervention that has been designed to change behaviour” (101). BCTs are often described with different labels (72). The behaviour change technique taxonomy categorized the BCTs, to a list of 93 BCTs, to reach international consensus for reporting behaviour change interventions, which makes it possible to compare interventions with each other (72).

The following BCTs of this taxonomy are used for the eCoaching module: ‘Instructions on how to perform a behaviour’, ‘Feedback on behaviour’, ‘Self-monitoring’, ‘Social support’, ‘Action planning’, ‘Graded tasks’, ‘Goal setting’ and ‘Credible source’. These BCTs are associated with: clinically significant reduction in HbA1c and bodyweight, reductions in HbA1c but not clinically or statistically significant, successful interventions at long-term and/or has overlap with the I-Change model (55,56,89).

These BCTs are divided over the module, shown in Figure 7. The BCT ‘Instruction on how to perform a behaviour’ starts with giving suggestions in the awareness and motivation phase. In the action phase these suggestions are phrased as instructions. First, patients have to become aware of these possibilities, they have to get motivated to do it, and in the action phase they have to do it.

‘Self-monitoring’, ‘Feedback on behaviour’, ‘Goal setting’ and ‘Graded task’ are addressed together and continuously during the module as shown in the yellow bar in Figure 7. The feedback on behaviour is given to the monitored PA, and end goals together with sub-goals for every week are set.

‘Social support’ is addressed in the motivation phase and ‘Action planning’ during the action phase while these are important elements in that phase according to the I-Change model (89). ‘Social support’ is addressed by giving advice about how they can get social support from their environment. ‘Action planning’ starts with planning actions for patients, followed by instructions to plan PA and ends with advice about planning PA by themselves, in this way the T2DM patient develops the skill of action planning.

‘Credible source’ is addressed by using the ZGT logo in the email.

### Tailored content

Looking at the definition of tailored content of Kreuter et al. (102) and Hawkins et al. (103) it is clear that tailoring is a method to adapt messages in order to create messages that are relevant for the targeted person. In a review of Noar et al. (63) was found that non-mobile PA interventions tailored on attitudes, self-efficacy, stage of change, social support or processes of change showed significantly larger effect size than interventions without tailoring. Additionally, dynamic tailoring is associated with larger mean effect sizes than static tailoring (61). Not much research is done to tailoring in eHealth interventions for T2DM patients in order to increase their PA. Although, Achterkamp et al. (104) suggested that feedback, given by a technology to promote a healthy lifestyle, should be tailored on the level of self-efficacy and stage of change in combination with the baseline PA level.

The emails of the eCoaching module are dynamically tailored on self-efficacy in combination with the level of PA at the start. Stage of change is not used to tailor on and the SMS is not tailored yet because a larger database of SMS-messages and emails are needed for this. The messages are developed to the stages of the I-Change model, this made it easier to tailor on the stage of change in the future. For the first version the assumption is made that all patients start in the same stage of behaviour change of the I-Change model; the awareness stage and go further through the stages during the eCoaching module.

Self-efficacy is measured with the ESES-questionnaire. At the moment there is no established limit for what is considered low or high in the T2DM population. Despite that self-efficacy is very population specific, the cut-off values of Bay et al. (105) are used (categorized low as <29 and high as >29, for congenital heart disease patients), because of limited research.

The level of PA is measured by the Fitbit in steps/day. The cut-off value between proper and improper is based on the classification of Tudor-Locker for healthy adults (106). The third category, somewhat active (7500-9999), and everything above is classified as proper because this population has a lower PA level in general and they still get coaching to increase their PA (107).

Achterkamp et al. (76) developed a tailoring mechanism for self-efficacy, start level of PA and stage of change. The tailor mechanism of Achterkamp et al. (76) for the “no intention to change” stage together with the cut-off values described above, is shown in Table 3 and is used for the eCoaching module.

**Table 3: Used tailor mechanism for the eCoaching module**

	<b>Level of PA Improper &lt;7500</b>	<b>Level of PA Proper &gt;7500</b>
<b>Self-Efficacy</b> <b>Low &lt;29</b>	Make aware and increase self-efficacy	Increase self-efficacy
	Make subject aware and take action	Maintain situation

Increasing the self-efficacy is integrated according to the different strategies of Bandura; mastery experience, vicarious experience, verbal/social persuasion and psychological affective state (73,108). This is done during the whole eCoaching module by the feedback given in the emails. During the motivation phase the SMS-messages focus on increasing self-efficacy as well, because it is one of the important factors in that phase according to the I-Change model (89). Therefore, it is presented in two boxes in Figure 7.

Dynamic tailoring is reached by conducting the ESES questionnaire again in week 4 and adapting the feedback of the emails for the following weeks to the measured level of self-efficacy.

### Low treatment adherence

Adherence is mostly used as an outcome and contributes to the effectiveness of an intervention while non-optimal usage of an intervention undermined the possible effects of these interventions (35,36). Using features that improve the adherence helps in avoiding non-optimal usage and therefore probably enhance the effects of the intervention. Persuasiveness is an important factor in adherence and maintenance to interventions that promote behavioural change (109). Oinas Kukkonen developed a model that described software functionalities for persuasive systems, called the Persuasive System Design (PSD) model, more information about this model is given in appendix 8.5. The model helps by selecting effective persuasive features and design persuasive eHealth technologies (110).

Kelders et al. (65) found that using features of dialogue support of the PSD model predict better adherence. The features ‘suggestions’, ‘reminders’, and ‘social role’ of dialogue support are applicable for the eCoaching module in his current format.

‘Suggestions’ is integrated with the BCT ‘instructions on how to perform a behaviour’, this BCT is addressed by giving suggestions at the start. The suggestions are given in the awareness and motivation phase, as shown in the blue and red box in Figure 7. ‘Reminders’ are used in the maintenance phase to refresh the information of the previous phases. ‘Social role’ is addressed during the whole eCoaching module, as it should look like that they get the SMS and emails from their ‘coach’.

## Preferences of patients

Taking the preferences of patients into account should contribute to match the technology to the end-users (34). This was already acknowledged by the ZGT, a previous master thesis studied the preferences of T2DM to a coaching technology (41). Additionally, a qualitative study of Pal et al. (66) studied the preferences of T2DM to a Digital Health Intervention (DHI). These two studies were both focused on a general technology for T2DM and not specifically for a technology to improve their PA.

The preferences, applicable to the eCoaching module in its current format, are integrated. The preferences together with their integration are shown in Table 4.

**Table 4: The preferences that are addressed together with how they are integrated in the eCoaching module**

Preferences	Integration
Information about exercise (41)	The health education of the awareness phase includes these aspects, as shown in the blue box in Figure 7. The easy to do activities are mentioned in the suggestions to increase PA.
Benefits of exercise (66)	
Easy to do physical activities (66)	
Information about diabetes (41)	
Show calories burned by the performed exercise (41)	The eCoaching module does not show how many calories are burned after an exercise but it gives information in the SMS about how many calories are burned by performing a specific exercise, this is part of the health education and belongs to information about PA.
The language and tone should be accessible, encouraging and supportive (66)	This is taken into account when writing the messages.
Use medical terminology where needed, but provide definitions and explanations (66)	
Not shy away from difficult truths (66)	
Provide warning if patient does not exercise enough (41)	Patients are told when they do not exercise enough by the feedback on behaviour, but they are not specifically warned.
Linked to a step counter/ self-monitoring tools (41,66)	The eCoaching module includes a self-monitoring tool, the Fitbit.
Linked to a mobile phone, iPad, tablet or laptop (41)	The eCoaching module is delivered by SMS and email, which can be opened on a mobile phone, tablet or laptop.
Easy to use (41,66)	Receiving SMS and emails is not that difficult, synchronizing the Fitbit is less easy to use.
Provide warning if patient forget to measure (41)	The eCoaching module gives a reminder by SMS on Sunday when a patient forgets to synchronize the data on Friday.
Linked to the computer of the doctor (41)	The doctor sees the amount of PA on his computer when the patient synchronized the Fitbit.
Minimize scrolling (66)	The SMS-messages are not longer than the maximum number of characters. The emails are readable without scrolling when opened on a computer screen.
Use videos/Have interactive features, like quizzes (66)	A vlog, a knowledge quiz and a graph of the progress are included in the email.
Regular e mails (66)	The patient gets emails on a weekly basis.

## 4.2 Phase 2: Optimization by formative evaluations

This paragraph starts with the results of the formative evaluations with HCPs followed by the results of the formative evaluations with T2DM patients, this answers the second research question.

### Healthcare professionals

For the messages of the awareness phase, the HCPs categorized 10 messages as wrong and 29 as good when they focused on “intonation”. After discussion 1 of the messages categorized as wrong was excluded. When they focused on “understanding”, 8 messages were categorized as wrong and 31 as good. After discussion 3 of the messages categorized as wrong were excluded.

For the categorization of the three constructs (action-planning, self-efficacy and social support), 17 messages were categorized to the right construct, 2 messages to another construct, 4 messages to more than one construct and none of the messages to unclear. They advised to adapt the formulation of 2 messages. Both messages that were wrongly categorized to the constructs, belonged to action planning but were categorized to self-efficacy. The HCPs understood that it could belong to action planning but they thought it belonged to self-efficacy because it was self-assessment.

*“This one is about self-assessment, they have to think about the why, they have to think for themselves” (specialist)*

For the messages of the motivation, action and maintenance phase the HCPs categorized 2 messages as wrong and 48 as good when they focused on the “motivation” aspect. After discussion 1 of the messages categorized as wrong was excluded. When they focused on the “lead to action” aspect 15 messages were categorized as wrong and 35 as good. After discussion 3 of the messages categorized as wrong were excluded.

Although the HCPs did have different opinions about the categorisation of the messages, they reached consensus after a plenary discussion.

To summarize, 8 messages were excluded by the HCPs, for 26 messages the HCPs gave feedback and together the adaptations were made. In Figure 8, a schematic overview of the flow of the messages is given.

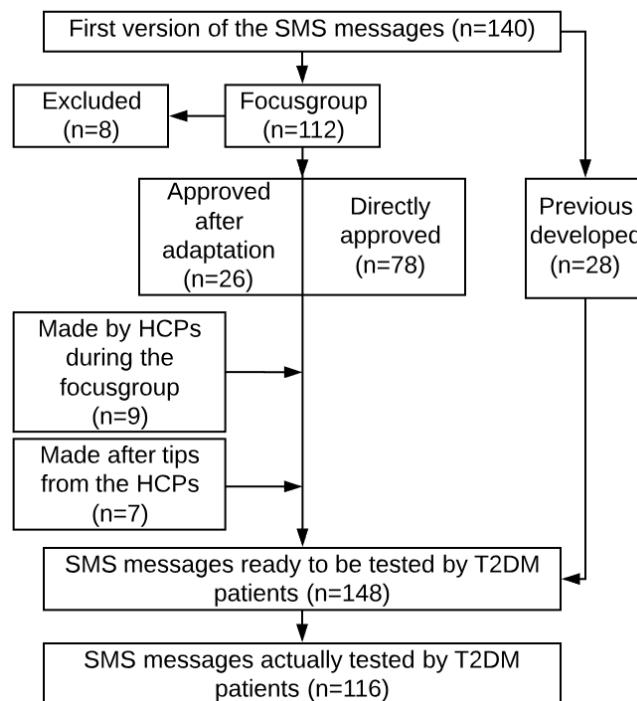


Figure 8: Schematic overview of the flow of the messages during the participatory design with the HCPs

### **Adapted messages**

In total 23 SMS-messages were adapted before they were approved by the HCPs. The main reasons for the adaptation of the messages were; formulation, not applicable for everyone, loss of context, or a pedantic tone.

Most of the adaptations were formulation adaptations. These were made in order that the messages would be clearer to the patients, some words the patient might not understand or might not have the right association with. One of the specialists mentioned that burning sugar is a formulation that patients see positively and they will associate it with lowering their glucose level.

*"I like to use the word "burning", then they burn it and people see the analogy with a motor and motor fuel. I have the illusion that it has a positive effect on people" (specialist). "I say that too" (diabetes nurse)*

Some messages were only applicable when the patient has a job, the HCPs mentioned that a big proportion of their population does not have a job. Adaptations were made to make the message more general and applicable to other situations as well.

Other messages lost the context. One of the diabetes nurses mentioned that you do not know the reason why somebody has not taken the elevator; maybe he is not able to do it, or the person has already done a lot that day. The messages were adapted in a way that the patient would see it as a good possibility to do it when he is able to perform the task.

A few messages were a bit pedantic according to the HPCs, together these were adapted.

### **Excluded messages**

In total 8 SMS-messages were excluded. The reasons for this were that it would raise unrealistic expectation by the patients, it was unrealistic that patients would actually perform what was advised, they thought it was part of daily living, the topic was too big for a short SMS-message, it was not related to any context or it was cumbersome and not motivational. The reasons together with the excluded messages and some quotes of the HCPs can be found in appendix 8.8.

### **General comments**

Additional to the feedback per message, they gave some general feedback for all the messages. They mentioned that starting the messages with "Hallo" will not be positively valued by most of the patients and some patients prefer to be addressed with the formal form of you instead of the informal form. ("u" and "je").

Furthermore, they thought that two daily SMS-messages would be too much and they advised to ask every week if patients experience the SMS-messages as too much. They thought that patients might get irritated by the frequency and it would be better to notice this before they get irritated. Additionally to this, they mentioned that there is a lot of repetition, the focus is mostly on walking and daily PA but people can also do some fitness, they mentioned "Nederland in beweging", a television programme as a good alternative for elderly instead of going to the gym. Another form of PA could be cycling; this was mentioned too little in the messages according to the HCPs.

They gave advice for the future as well; it would be good to personalize the SMS more on the personal situation. They advised to use a checklist for this at the intake.

According to the general feedback some additional messages were made, patients were asked to send an email when they thought the frequency of the SMS-messages was too high and a bit of personalization, with a short checklist, has been done for the SMS. This checklist included having a job, being able/willing to go to the fitness and the form of you.

## T2DM patients

Table 5 shows the characteristics of the 9 patients at the start of the study. As shown here the population consisted of relatively older people (66 [59-72] years) with a relatively long disease duration (10 [7-21] years). The average BMI was quite high (33 [32-43] kg/m<sup>2</sup>). The education level was relatively low, VMBO (56%), followed by MBO (33%) and VWO (11%), and 44% of the research population was employed. Around half of the patients (56%) experienced microvascular complications due to T2DM, 56% of the patients got drug treatment, 22% underwent insulin therapy and 22% got both as treatment for T2DM. One patient quitted after five days, the only reason he gave for quitting was that he did not understand the synchronization of the Fitbit, this frustrated him.

Taken into account that it is an obese T2DM population with a relatively low education level, these patients might most in need of coaching to adopt a healthier lifestyle and improve their diabetes outcomes, which is seen as the target population of the eCoaching module. However, the level of PA in week 1 (6103 [2836-7989]) was already quite high compared to earlier studies at ZGT, where a median of 4277 [2588-6407] steps/day and an average of 5916 ± 2628 steps/day was found (42,107).

**Table 5: Patient characteristics at the start of the study**

Patient characteristics	(n=9)
Age, years	66 [59-72]
Male, n (%)	5 (56%)
Duration of T2DM, years	10 [7-21]
Weight, kg	106 [97-110]
Height, cm	177 [164-180]
Body Mass Index (BMI), kg/m <sup>2</sup>	33 [32-43]
Complications, n (%)	5 (56%)
Retinopathy, n (%)	2 (22%)
Neuropathy, n (%)	1 (11%)
Nephropathy, n (%)	3 (33%)
Therapeutic regimens	
Drug treatment, n (%)	5 (56%)
Insulin therapy, n (%)	2 (22%)
Both, n (%)	2 (22%)
Highest completed educational level	
Primary school, n (%)	0 (0%)
Lower Vocational Education (VMBO), n (%)	5 (56%)
Intermediate Vocational Education (MBO), n (%)	3 (33%)
Higher General Continued Education (HAVO), n (%)	0 (0%)
Higher Vocational Education (HBO), n (%)	0 (0%)
Pre-university Secondary Education (VWO), n (%)	1 (11%)
University (WO), n (%)	0 (0%)
Employed, n (%)	4 (44%)
Experience mobile phone	3 [3-4]
Experience email	3 [3-5]
Level of PA week 1 <sup>1</sup> , steps/day	6103 [2836-7989]
Self-efficacy level start	30 [28-39]
Stage of change start	
1. Maintenance, n (%)	3 (33%)
2. Action, n (%)	0 (0%)
3. Preparation, n (%)	2 (22%)
4. Contemplation, n (%)	3 (33%)
5. Pre-contemplation, n (%)	1 (11%)

<sup>1</sup> n=8

### **Interviews**

The interviews were done with 8 patients. During the interviews it was notable that most of the patients were not very critical and their answers were short, sometimes it was difficult to get more information. The coded fragments of the interviews were sorted per code and can be found in appendix 8.9.

### **General**

In general, the patients were satisfied with the eCoaching module. They thought it was a good method to get people into action, it gave them a boost to get something done and following the eCoaching module did not take them a lot of extra time.

Six patients indicated that nine weeks was a good timeframe for the eCoaching module. Two patients experienced it as a bit long. One of them thought that all the information could be given in six weeks instead of nine weeks, without missing anything.

The main form of PA that was provided in the eCoaching module was walking, focused to build in in daily life. This form of PA was measured by the Fitbit. Most patients liked this form of PA, two of them mentioned that they would not have time for other forms. One patient strongly preferred other forms of PA, such as swimming, because he disliked walking. Biking was suggested by most (n=4) of them as an additional form of PA. Two of the patients pointed out that not everything was applicable to them because of physical limitations.

*"Well, I cannot walk a lot with my leg, I try to walk as much as possible" (P1)*

Only 4 out of 8 patients did the Quiz and 6 out of 8 patients watched the vlog. The patients, who experienced the interactive elements, thought that it was a good alternative for text because it was something different.

*"I thought it was nice to have something else than text" (P6)*

Patient experienced that they got enough personal attention. One mentioned that it was nice that she could ask questions if needed.

*"Yes, I had the feeling that I got enough personal attention and if I really wanted to know something else then I asked. I think this possibility should always be there" (P9)*

As external barriers for following the advice given by the eCoaching module, patients mentioned the weather(n=4), work (n=1) and illness(n=2).

*"Due to this hot weather your physical activity rhythm is not representative for what you normally would have performed" (P5)*

### **SMS**

Patients thought the content of the SMS was good, they thought the advice was useful and the tips were applicable. Points of criticism were that for one patient the content was not new and another got annoyed by the repetition of the content.

All patients had the feeling that the SMS-messages were general and that everybody got the same message, they did not think that the SMS-messages were very personal.

The frequency of the SMS-messages was experienced as desirable by most (n=7) of the patients. They mentioned that it reminded and motivated them to be physical active, especially at the beginning of the module.

*"It is not too much, especially not in the beginning. I really had to start up and then I needed these 2 SMS-messages, I thought it was really incentive" (P9)*

For one patient the frequency was too much, she would like to have a text message once in 2-3 days. Later in the interview, she told that the email without SMS-messages would be enough for her.

### **Email**

All patients were satisfied with the emails. They thought that the content was good and personal. Once a week was the perfect frequency according to all patients. It matched with the synchronization of the Fitbit and it was something to look forward too.

### **Use of technology**

All patients had a positive attitude towards this remote health care. When they were asked to choose, seven of them prefer this over face-to-face coaching. The main reason they gave was that it is not very time-consuming and they thought of it as an easily approachable method to increase their PA. However, it was also mentioned that meeting in person is favourable at the start.

*"You have to know what you are talking about, first a real meeting and then continue with this would be good" (P7)*

Patients thought that the Fitbit was a real stimulant. The most frequently mentioned disadvantage of the used technology was that the Fitbit could only measure walking.

*"I do not think that the bracelet is very reliable because it does not work when I cycle and it does not count when I swim, and that I do a lot" (P5)*

### **Acceptance and Use of Technology**

Table 6 shows how many patients agreed and disagreed with the statements. For every statement can be said that more patients agreed than disagreed. Most of the patients agreed with the performance expectancy (75%) and effort expectancy (93.8%). This suggests that the performance was sufficient and the effort was on a reasonable level. Looking at the social influence, the majority (75%) of the friends/family of the patients thought that it was a good idea that they participated in the eCoaching module and most of the patients (75%) would recommend it to other diabetes patients. The behavioural intention and use behaviour were sufficient for most of the patients (87.5% and 91.8%) as well. The patients who disagreed on the reliability of the eCoaching module mentioned the Fitbit as reason.

**Table 6: How many patients agreed and disagreed with the statements, based on the UTAUT**

Statement	Agree, n (%)	Disagree, n (%)
<b>Performance expectancy</b>		
The eCoaching module contributed to an improvement or maintenance of my physical activity	6 (75.0%)	2 (25%)
I became aware of my physical activity by using this eCoaching module	6 (75.0%)	2 (25.0%)
My health can be improved by the use of this eCoaching module	6 (75.0%)	2 (25.0%)
It was useful for my health to make use of this eCoaching module	5 (62.5%)	3 (37.5%)
<b>Effort expectancy</b>		
I think the use of the eCoaching module was easy to learn	7 (87.5%)	1 (12.5%)
I think the use of the eCoaching module was simple	8 (100.0%)	0 (0.0%)
<b>Social influence</b>		
My friends/family think that it is a good idea that I use this eCoaching module	6 (75.0%)	2 (25.0%)
I would recommend this eCoaching module to other diabetes patients	6 (75.0%)	2 (25.0%)
<b>Behavioural intention</b>		
I intend to continue using the eCoaching module for the remaining weeks	8 (100.0%)	0 (0.0%)
I think the use of the eCoaching module is a good idea	7 (87.5%)	1 (12.5%)
I think it is interesting to use the eCoaching module	7 (87.5%)	1 (12.5%)
I experience the eCoaching module as reliable	6 (75.0%)	2 (25.0%)
<b>Use behaviour</b>		
I read all the mails I received.	7.3 (91.8%)	0.7 (8.3%)
I read all the SMS-messages I received	8 (100.0%)	0 (0.0%)
I read the SMS-messages directly after receiving them	7 (87.5%)	1 (12.5%)

### **Rating**

The average grade the patients gave to the eCoaching module was a 7.8. They rated the SMS a bit less; a 7.3, and they rated the email with a 7.8, the Fitbit was not rated separately.

### **Additional outcomes**

The level of PA, self-efficacy and stage of change were measured during the eCoaching as well. These outcomes, together with the rating to the eCoaching module and categorized to the tailor mechanism, are shown in Table 7. In total 2 patients had a low self-efficacy level at the start, 6 patients had a high self-efficacy level, 5 patients had an improper level of PA and 3 patients a proper level of PA. This resulted in 1 patient in the first category of the tailor mechanism; low self-efficacy and improper level of PA, 1 patient in the second category; low self-efficacy and proper level of PA, 4 patients in the third category; high-self efficacy and improper level of PA, and 2 patients in the fourth category; high self-efficacy and proper level of PA.

It is shown in Table 7 that the level of PA was very diverse over the research population and all the patients scored the eCoaching relatively high, even if they did not improve their steps. In total 4 patients reached their initial goal, which was set during the intake, 2 patients almost reached their initial goal and 2 patients did not reach this goal. The two patients that did not reach their initial goal had already a proper level of PA at the start. Looking at the definitive goal, set after week 1 of the eCoaching module, only 2 patients reached this goal, 2 patients almost reached this goal and 4 patients did not reach this goal.

The median difference of the PA level between week 1 and 9 was 1024 [-1956-3279] steps/day. The PA level did not significantly differ after the first five weeks of the eCoaching module (6103 vs. 5871, p=0.889), neither did it after the whole eCoaching module (6103 vs 5768, p=0.575)

In Table 7 it can be seen that 5 of the 8 patients increased their PA level, 4 of these 5 patients are in the tailor group with a high self-efficacy level and improper level of PA. 1 patient improved his steps as well but was not in this category. If the cut-off value of improper level of PA was just a bit higher, this patient was also categorized in the third category.

In the third tailor group, a trend towards significance was found for the level of PA between week 1 and 5 and week 1 and 9 ((3163 [1708-6127] vs. 4482[2367-8300], p=0.068 and 3163 [1708-6127] vs. 5729[3795-8394], p=0.068), but it remains non-significant. These findings indicate that the eCoaching module has most effect on T2DM patients with an improper level of PA and a high self-efficacy level at the start.

Not much can be said about the difference of the self-efficacy level and stage of change, this data is incomplete. Not all patients filled in the questionnaires for a second and third time. The data can be compared individually for the patients who filled in the questionnaire. The self-efficacy of three patients, patient 1, 8 and 9, increased over time. At the start the self-efficacy was already high for patient 8 and 9, only patient 1 had a low self-efficacy level, which increased enough to be categorized as high at the end. The self-efficacy level of one patient, patient 5, remained the same, it was already categorized as high at the start. The self-efficacy level of one patient, patient 2, decreased over time, this level was at the maximum score at the start, at the end it would still be categorized as high. Looking at the stage of change, two patients, patient 1 and 9, moved further in the stage of change, one patient, patient 5, stayed in the same stage and two patients, patient 2 and 8, moved back.

**Table 7: The self-efficacy level, stage of change and physical activity in steps/day over the nine weeks, together with the difference in physical activity, goals and the rating, all categorized to the tailor mechanism**

Patient	Self-efficacy <sup>1</sup> :	Stage of Change <sup>1</sup> :	PA <sup>1</sup> , steps/day, :	ΔPA <sup>1</sup> , steps/day, (%)	Goal initial <sup>2</sup> , steps/day	Goal definitive <sup>2</sup> , steps/day	Rating:
	Start Week 5 End	Start Week 5 End	Week 1 Week 5 Week 9				
7	28 - -	Preparation - -	5315 2806 4563	-752 (-14%)	4000	7000	8 8 8
<b>1) Self-efficacy low and improper level of PA</b>							
1	27 28 31	Pre-contemplation Contemplation Contemplation	10204 7561 7847	-2357 (-23%)	10500	10500	7 4 8
<b>2) Self-efficacy low and proper level of PA</b>							
4	40 - -	Contemplation - -	1451 2002 3825	2374 (+164%)	4000	4000	7.5 7 8
5	30 30 -	Maintenance Maintenance -	2482 3463 3785	1303 (+53%)	4000	4000	8 9 8
8	29 31 -	Contemplation Pre-contemplation -	6889 9233 7634	745 (+11%)	7000	8500	8 7 7
9	33 31 37	Contemplation Maintenance Maintenance	3844 5501 8648	4804 (+125%)	4000	6000	8 7.5 9
<b>3) Self-efficacy high and improper level of PA</b>							
2	40 37 36	Maintenance Pre-contemplation Action	7551 11058 11132	3581 (+47%)	10000	10000	8 8 6
6	39 - -	Maintenance - -	8135 6989 5002	-3133 (-39%)	7000	10000	8 8 8
<b>Total population</b>							
	32 [28-40] 31 [29-34] <sup>3</sup> 36 [31-36] <sup>4</sup>		6103 [2836-7989] 5871 [3140-8787] 5768 [4009-7794]	1024 [-1956-3279] (+17%)	5500 [4000-9250]	7750 [4500-10000]	7.8 7.3 7.8

<sup>1</sup>green: improvement, red: decline, orange: no change;

<sup>2</sup>green: reached goal, red: goal not reached, orange: goal almost reached;

<sup>3</sup>n=5

<sup>4</sup>n=3

## 5. Discussion

This chapter starts with the aim and research question of this thesis, followed by the methodological considerations and it ends with recommendations for the eCoaching module.

### 5.1 Aim and research questions

The aim of this thesis was to systematically develop the content of a nine week evidence-based eCoaching module, where factors based on theory were combined with the perspectives of HealthCare Professionals (HCPs) and T2DM patients. The first part focused on the following research question:

1. *Which factors should be integrated in an eCoaching module for T2DM patients, based on literature and earlier research at ZGT?*

When designing an eHealth intervention, the following factors should be taken into account; Extensive use of theory, Use of additional methods for interacting with participants, Inclusion of educational components, use of self-monitoring tool, use of BCTs, tailored content, low treatment adherence and preferences of patients (33,34,38–40).

More in-depth investigation of these eight factors in literature to specify this for the T2DM population resulted in an eCoaching plan, where evidence of these factors was divided over the nine weeks according to the stages of change of the I-Change model. Some of the factors were continuously addressed and others only in one or two stages. The plan was used to design the content of the eCoaching module, which consisted of two daily SMS, a weekly email and the Fitbit.

Secondly, formative evaluations were conducted, focusing on the following research question:

2. *Are the SMS-messages of the eCoaching module positively valued by healthcare professionals and is the content positively experienced by T2DM patients?*

#### Healthcare professionals

The HCPs categorized most of the messages as good, which means that they positively valued the content.

Most of the improvements and exclusions of the messages that were made could only have been found by HCPs, this confirms that HCPs are needed to bridge the gap between theory and practice (111). However, it was expected that HCPs would have suggested more to improve. This might be caused by a lack of engagement and therefore a less critical view, this was the case in other research where it was found challenging to include and engage HCPs in participatory design (112). However, for this thesis a more plausible reason is that the researcher already bridged the gap; she carried out the measurements belonging to the visits of the DIALECT study. In this way, the researcher saw the hospital care in close view, experienced the way of communication with T2DM patients and knew for whom she was designing.

#### Patients

Most of the patients were satisfied with the eCoaching module and valued it positively; they gave it an average grade of a 7.8 and 7 of the 8 patients would choose this above face-to-face coaching.

The Fitbit was mentioned as the biggest disadvantage of the eCoaching module. The synchronization was difficult to learn for them, this could be because elderly in general have less digital literacy, and the research population had a median age of 66 years (113). Moreover, measuring PA in steps/day is not desirable according to T2DM patients. This contradicts what was found in literature, where a pedometer was found to be an appropriate method to measure the level of PA of older adults (100). The discrepancy could be explained by the research population being more complex than the general (older) adult population and more patients might have been limited in walking, therefore they performed more other forms of PA. Even though, the Fitbit was mentioned as a real stimulant.

The SMS was not personal according to the patients; they thought the SMS was very general and not always applicable to them. It confirmed the thought that the SMS should be personalized in the future.

It also explains that patients were more positive about the email, these were more personalized than the SMS. Although patients experienced in general that they got enough personal attention.

Looking at the agreements of the T2DM patients to the statements based on the UTAUT model, it can be said that the user acceptance and intention to use was already at a desirable level. Although during the interviews it became clear that the adherence to the quiz and vlog was not very high, this indicates that the actual use of the eCoaching module may not be sufficient. Objective measurements, such as log-data, can help by evaluating user behaviour and adherence in more detail (114).

The median difference in PA between week 1 and week 9 was 1024 steps/day, this was non-significant, suggesting that the eCoaching module is not effective. However, the median difference is higher than the mean difference of 775 steps/day, found for pedometer-based intervention in older adults (115). Additionally, 1024 steps/day is approximately an increase of PA of 10 minutes/day (assuming that this population walks a bit slower (4km/u) and one step is 70 cm). An increase of 10 minutes/day means an increase of 70 minutes per week, which is almost half of the norm (150min.). Although, no hard statements can be made with the small research population.

Further, the outcomes suggest that T2DM patients with an improper amount of steps and high self-efficacy at the start benefits most of the eCoaching module. An explanation for this is that their self-efficacy at baseline was sufficient to increase their PA but their awareness was not. To reach behavioural change, optimizing awareness is the first step and increasing self-efficacy the second step, according to the I-Change model (89). The eCoaching module increased the patients' awareness, resulting in an increase of PA, meaning that, the behavioural change did not happen to the stages of the I-Change model. It is not clear if increasing self-efficacy or increasing awareness is the first steps for behavioural change or that this should be done in parallel. In this thesis, the self-efficacy of the study population was relatively high, which could be caused by the fact that only patients who believed that they were able to increase their PA, participated.

The absence of a difference of the self-efficacy level between the start, week 5 and end could also be caused by the relatively high self-efficacy level at the start. Furthermore, it could be caused by the missing data and the relatively difficult questionnaire that was used, which might also have caused the absence of a difference of the stage of change, confirmed by the fact that some patients randomly jumped through the stages.

Looking at the difference in PA level and the grades the patients gave to the eCoaching module, it is remarkable that all patients graded it relatively high but not all patients increased their steps. It seems that there is a gap between being satisfied with the intervention and actually benefit from it. It could be possible that these patients increased their PA, but that this PA is not measurable in steps/day, we did not ask them if they had performed other forms of PA. Other possible reasons that these patients did not increase their steps is the heat-wave during the test period, illness or the information in the "proefpersoneninformatie", which did not ask for behavioural change because of ethical reasons.

## 5.2 Methodological considerations

This thesis had some strengths and limitations. To start with the strength of using the CeHRes roadmap, which gave guidance to the research track. It was used to categorize the previous research of the ZGT and to identify gaps in the gained information. These gaps were filled before the design of the module started and a sufficient amount of reliable information was available to create a fit with the end-users and be scientifically grounded.

Second, the involvement of stakeholders, which is one of the spear points in the CeHRes roadmap as well (116), was another strength of this thesis. It was made more valuable by the involvement of different stakeholders. The study of Beerlage-de Jong (117) demonstrated that although end-users are able to state their needs, likes, and dislikes about a to-be-developed eHealth technology, some

unrecognized needs can still exist. Moreover, she stated that experts can and should be involved to make sure their needs still fit clinical practice (117).

Third, the process was iterative, the eCoaching module was (partly) improved based on the feedback of the HCPs, this fits the CeHReS roadmap as well (34). However, during the patients' evaluation no adaptations were made. Directly improving, based on feedback of a patient results in improvements that followed each up more rapidly. Although, it is unsure if this iterative approach would end with all users being satisfied while improvements are based on the opinion of one patient and different patients have different opinions.

Lastly, using the UTAUT was a strength, it made it possible to systematically check for acceptance and use of the technology and specified this in a quantitative manner.

A limitation of this thesis was that the sample of the focus group was not very diverse; it only included two disciplines. This is related to the sampling method; snowball sampling. It is assumed that doing a stakeholder analysis and asking all the HCPs in the hospital who have contact with T2DM could have prevented this bias and a more diverse group probably finds more improvements. Additionally, in a focus group social processes could influence the outcomes; in a hospital a hierarchical system can be present (118). The focus group leader was aware of this but did not had the feeling that the hierarchical system was present, or affected the results.

Another limitation of this thesis was that the included patients might have had a more positive attitude towards the eCoaching module than the target population while they were asked to voluntarily participate. It is more likely that patients participate in a research that they are interested in, also known as self-selection bias (119). This could have been prevented by purposive sampling, with the purpose to get a heterogeneous population of patients with different attitudes towards eHealth (120).

Furthermore, the person who coached the patients also asked them for their feedback via a telephone interview. This feedback moment could have been interpreted by the patients as part of the eCoaching module and increased the perceived personal attention. Asking feedback by the same person could have caused that patients did not dare to express all their criticism, this might explain that the patients seemed not very critical. Using a telephone interview instead of an in-person interview, made it also impossible to react on non-verbal cues and more difficult to ask additional questions, important information could have been missed by this. It would have been better to hold the interviews in person after the nine weeks, conducted by an independent person.

### 5.3 Recommendations for the eCoaching module and its further research

Recommendations for the eCoaching module can be given based on the formative evaluations with the patients and partly on the formative evaluation with the HCPs.

Warm weather, physical limitations, illness and work held patients back from what was advised by the eCoaching module. Integration of the forecast and adaptation of the messages to this, e.g. when it is very hot; "go for a walk in the morning or evening when the temperature is more pleasant", helps patients with dealing with the weather condition. For temporary situations and when it is not desirable to continue the eCoaching module, like illness, a pause button should be included. Physical limitation and work are factors that are permanently present and should be dealt with in a different way. Personalization can be used for this, especially the SMS can be more personalized. The HCPs mentioned to use a checklist before the patient starts with the eCoaching module. Physical limitation and work can be included in the checklist. As a result of this checklist, the content should be more applicable to the patient and provided at a moment when it is most beneficial for the patient, it is likely that this improves the behaviour change (103,121). Adapting the time of coaching when it is most beneficial is called; just-in-time coaching, it takes data into account to determine the right moment and the right content (43). The Fitbit data can be used for this as well, e.g. to determine the frequency of the SMS; when the Fitbit registered a sufficient amount of steps/day, the frequency should decrease automatically, when the Fitbit registered a relapse, the

frequency should increase. Decreasing the frequency over time is also found to be more effective than keeping the SMS frequency constant overtime (122). Additionally, micro randomized trial design can be used to determine the moments when someone can be active, the critical decision points, and which moments are most effective for an individual (123).

As mentioned in result section one, tailoring should be done to the stage of change as well (104). For patients who are more ready to change, the content of previous stages might be useless or even annoying. The content is developed related to the stages of change of the I-Change model. Therefore, it is possible to skip or lessen the content of the passed stages.

This more sophisticated personalization and tailoring requires a larger database of SMS-messages and an algorithm. The algorithm picks the right content and moment for the patient, based on the checklist and Fitbit data, and it should send automatically. In this way no healthcare provider is needed. However, results of this thesis suggest that it is best to carry out the eCoaching module with a healthcare provider; patients prefer an intake and to have the possibility to communicate with a healthcare provider during the eCoaching module.

The low rate of patients that watched the vlog and did the quiz, indicated a low adherence rate. Not all the features of dialogue support of the PSD model were used yet, it is assumed that integrating the other features as well, which is possible when the module is delivered by the application, will increase the adherence (65). More interactive elements should be added in the application as well, while the vlog and quiz were seen as a good alternative for text by the patients.

Instead of the Fitbit, a system that combined different forms of PA would be more favourable. Another outcome metrics, then steps/day, is needed when the eCoaching wants to focus on different forms of PA as well. The MOX activity monitor might be a solution for this (124). The system can measure body movements during activities, these measurements can be transformed to meaningful information, e.g. if the person is walking or sitting (124). However, still some PA activities cannot be measured with the MOX, such as swimming. Another solution is that patients have to register the activities, that cannot be measured with the Fitbit, by themselves. Unfortunately, this increases the burden on the patient, for biking there is already a solution for this; the Fitbit app can be connected to the STRAVA app, which tracks your bike rides by using the GPS (125).

Sufficient PA is not the only component of a healthy lifestyle. Food intake is important as well, therefore additional content should be developed for food intake. One of the problems, related to coaching on food intake, is the registration of it (126). Sending reminders and tips for this registration can improve the quality. These reminders and tips could be part of the eCoaching. The percentage of coaching on PA and food intake should be free to choose, e.g. 80% food intake 20% PA, while the needs differ per patient. In this way, the eCoaching module is personalized and applicable to a broader aim, namely a healthy lifestyle.

After improving the eCoaching module to these recommendations, a large-scale evaluation and effectiveness study is needed to evaluate the new improvements and the effectiveness with a sufficient sample size. To get more knowledge about the effectiveness of the separate components and dynamics of the eCoaching module, micro randomized trial design can be used (123).

## **6. Conclusion**

An eCoaching module was developed based on evidence, and grounded in the experiences, views and preferences of patients with T2DM and their healthcare providers. It has potential to increase PA of T2DM patients, especially for the ones with a high self-efficacy level and improper level of PA at the start. A more sophisticated personalization and tailoring and addition of more healthy lifestyle components is needed to further improve the eCoaching module.

This thesis described the structure and content of the eCoaching module, together with its evidence where it is based on, in enough detail to allow replication or developing similar interventions. To our knowledge, this is not done in earlier research, which might have caused uncertainty about the active ingredients, effectiveness, and acceptability of eHealth interventions to increase PA in the T2DM population. This thesis made a step in decreasing this uncertainty and identifying the reasons for failure or success of the interventions.

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## **8. Appendix**

### **8.1 Test subjects information and Informed consent**

#### **Patiënteninformatie wetenschappelijk onderzoek:**

##### **Coaching via uw mobiel:**

##### **Evaluatie en doorontwikkeling van een eCoaching module voor het verhogen van fysieke activiteit van type 2 diabetes mellitus patiënten (ESCAPADE)**

Geachte heer/mevrouw,

Wij vragen u vriendelijk om mee te doen aan dit medisch wetenschappelijk onderzoek in het ZGT te Almelo. U beslist zelf of u mee wilt doen aan dit onderzoek. Voordat u deze beslissing neemt, is het belangrijk om goed geïnformeerd te zijn over het onderzoek. In dit informatie- en toestemmingsformulier staat wat het onderzoek precies inhoudt.

##### **Doel van het onderzoek**

Patiënten met Diabetes Mellitus type 2 hebben een grotere kans op het ontstaan van gezondheidsproblemen zoals schade aan het hart, de bloedvaten en de nieren. Een gezonde leefstijl is belangrijk om te voorkomen dat deze gezondheidsproblemen optreden. In dit onderzoek willen wij samen met patiënten tot geschikte berichten komen voor een eCoaching module gericht op lichaamsbeweging. Wij willen enkele patiënten gedurende een periode van minimaal 3 en maximaal 9 weken informatieberichten sturen per telefoon en vragen hoe zij dit ervaren. *Er zal niet van u worden gevraagd om u op een bepaalde manier te gedragen of om meer te bewegen.*

De resultaten van dit onderzoek zullen gebruikt worden om in de toekomst leefstijl- en coachingsadviezen nog beter op de individuele patiënten te kunnen afstemmen. Dit onderzoek heeft de grootste kans van slagen wanneer zo veel mogelijk patiënten met Diabetes Mellitus type 2 meedoelen. Het onderzoek is goedgekeurd door de Adviescommissie Lokale Uitvoerbaarheid (ALU) ZGT.

##### **Wie voert het onderzoek uit?**

Het onderzoek wordt uitgevoerd door internist-nefroloog x. De polikliniekbezoeken zullen worden gedaan door x, master student gezondheidswetenschappen.

### **Wie neemt deel aan het onderzoek?**

Alle patiënten met diabetes mellitus type 2 die onder controle zijn op de polikliniek interne geneeskunde komen in aanmerking voor deelname aan het onderzoek als zij geen fysieke klachten hebben die het lopen beperken.

### **Wat wordt er van u gevraagd?**

Wij vragen u om 3 vragenlijsten in te vullen: 1 vragenlijst over uw “zelfvertrouwen voor lichaamsbeweging”, 1 vragenlijst waarbij u aangeeft hoe goed u met de computer en mobiele telefoon kunt werken en 1 vragenlijst waarbij gevraagd wordt of u van plan bent de komende tijd uw fysieke activiteit te veranderen.

U zult gedurende 3 tot 9 weken maximaal 2 informatieberichten per dag ontvangen op uw telefoon en wekelijks 1 email. Hiervoor vragen wij u om uw mobiele telefoonnummer en emailadres. Daarnaast vragen we u om gedurende de periode dat u berichten krijgt (3 tot 9 weken) een stappenteller in de vorm van een polsband te dragen (Fitbit). Dit bandje lijkt op een horloge en kan lichamelijke beweging registreren. U kunt uw normale lichamelijke activiteiten voortzetten in deze periode. Na afloop kunt u deze stappenteller per post terugsturen naar het ZGT. Dit kunt u doen met de envelop die u meekrijgt met het adres van ZGT erop (een postzegel is niet nodig).

Tussentijds zal er tweemaal telefonisch contact met u worden opgenomen om te vragen naar uw mening over de tekstberichten.

### **Toestemmingsformulier**

Bijgevoegd vindt u een formulier waarmee u aan kunt geven toestemming te verlenen voor het gebruik van uw gegevens voor bovenstaand onderzoek.

### **Wat gebeurt er als u niet wenst deel te nemen aan dit onderzoek?**

U mag altijd zonder het opgeven van een reden en zonder gevolgen voor uw behandeling stoppen met uw deelname aan het onderzoek. Op aanvraag kunnen uw onderzoeksgegevens worden verwijderd. De gegevens die tot het moment van stoppen zijn verzameld zullen wel worden gebruikt in de verdere analyses van het onderzoek. Deelname aan deze studie geeft u geen recht op een snellere of andere voorkeursbehandeling. Voor uw deelname krijgt u niet betaald. Er zijn ook geen kosten voor u aan verbonden.

### **Risico's**

Aangezien u voor dit onderzoek geen extra opdrachten hoeft te doen, zijn er geen risico's aan verbonden. Dit onderzoek is goedgekeurd door de Raad van Bestuur van ZGT.

### **Privacy en anonimiteit**

De verzamelde gegevens uit de vragenlijsten, uw medisch dossier en de Fitbit gegevens zullen alleen gebruikt worden voor dit onderzoek en worden maximaal 15 jaar bewaard onder een unieke code, zodat verwisseling van gegevens wordt voorkomen. Uw persoonlijke gegevens, zoals uw naam, adres en andere persoonlijke gegevens die naar u als persoon kunnen worden herleid, blijven bewaard in ons ziekenhuis waarbij de hiervoor geldende wettelijke regels worden gevolgd.

Uw persoonlijke gegevens blijven uitsluitend bekend bij uw behandelend arts, hoofdonderzoeker (x), de uitvoerend onderzoekster (x) en de ziekenhuisadministratie.

Tijdens dit onderzoek wordt er gebruik gemaakt van de Fitbit. Fitbit slaat de verzamelde data, stappen per minuut en hartslag per minuut, op in Amerika. In Amerika gelden andere privacy richtlijnen dan in de EU. In de EU is de bescherming van persoonsgegevens een fundamenteel recht, waardoor derden niet bij de persoonsgegevens kunnen komen. In Amerika wordt data niet opgeslagen volgens een passend beschermingsniveau volgens de wet bescherming persoonsgegevens in de EU. Om te voorkomen dat er persoonsgegevens van u in Amerika worden opgeslagen is de Fitbit gekoppeld aan een emailadres die geen persoonlijke of persoonlijk herleidbare informatie bevat. Dit emailadres is aangemaakt door de onderzoeker in het ZGT en gekoppeld aan de Fitbit. De onderzoeker noteert welke Fitbit en emailadres voor u wordt gebruikt. Alleen de onderzoeker en het onderzoeksteam weten welk emailadres voor welke patiënt wordt gebruikt en kunnen de informatie herleiden. Op deze manier staan er geen persoonsgegevens van u in Amerika, enkel het aantal stappen dat u per minuut heeft gezet en de hartslag per minuut.

De resultaten van het onderzoek zullen worden gepubliceerd, bijvoorbeeld in wetenschappelijke tijdschriften. Uw persoonlijke gegevens zullen in publicaties niet terug te vinden zijn.

#### **Zijn er voordelen aan het onderzoek verbonden?**

U hebt persoonlijk niet direct baat bij deelname aan de studie. Het is mogelijk dat dit onderzoek nieuwe inzichten biedt over de relatie tussen persoonlijkheidskenmerken, lichaamsbeweging en coaching. Mochten er tijdens deze studie (nieuwe) bevindingen worden gedaan, dan wordt uw behandelende arts in het ZGT Almelo hiervan direct op de hoogte gesteld. Hij/zij zal deze met u bespreken.

#### **Vragen?**

Indien u vragen heeft voor, tijdens en na het onderzoek, of u denkt schade te hebben ondervonden door het onderzoek, mag u altijd contact opnemen met mw. A.S. ten Voorde. U behoudt altijd het recht op informatie.

#### **Contactgegevens onderzoeker**

xxxx

## TOESTEMMINGSVERKLARING

Voor deelname aan het wetenschappelijk onderzoek:

Coaching via uw mobiel:

Evaluatie en doorontwikkeling van een eCoaching module voor het verhogen van fysieke activiteit van type 2 diabetes mellitus patiënten

Naam:.....

Geboortedatum:.....

- Ik ben naar tevredenheid over het onderzoek geïnformeerd, schriftelijk en mondelijk. Mijn vragen zijn naar tevredenheid beantwoord. Ik heb goed over deelname aan het onderzoek kunnen nadenken.
- Ik stem ermee in dat de gegevens die door de stappenteller (Fitbit) worden verzameld, geanonimiseerd gebruikt zullen worden voor dit onderzoek.
- Ik weet dat sommige mensen mijn gegevens kunnen zien. Die mensen staan vermeld in de informatiebrief.
- Ik geef toestemming om mijn gegevens te gebruiken, voor de doelen die in de informatiebrief staan.
- Ik geef toestemming om gegevens nog maximaal 15 jaar na afloop van dit onderzoek te bewaren.
- Ik weet dat de gegevens van Fitbit, stappen en hartslag, worden opgeslagen in Amerika en dat de data alleen voor het onderzoeksteam in het ZGT te herleiden is.
- Ik heb het recht mijn toestemming op ieder moment weer in te trekken zonder dat ik daarvoor een reden hoef op te geven.
- Ik bevestig dat ik de stappenteller (Fitbit) en bijbehorende oplader na afloop van het onderzoek per post zal retourneren naar het ZGT te Almelo, in de antwoord envelop die ik gekregen heb.

Handtekening:

Datum:

Ondergetekende verklaart dat de hierboven genoemde persoon zowel schriftelijk als mondelijk over het bovenvermelde onderzoek geïnformeerd is. Hij verklaart tevens dat een voortijdige beëindiging van de deelname door bovengenoemde persoon van geen enkele invloed zal zijn op de zorg die hem of haar toekomt.

Naam:

Handtekening:

Datum:

## 8.2 Intake form, questionnaire and instructions for synchronization Fitbit

### Intake form

Naam	
Studienummer	
Fitbitnummer	
Emailadres	
06nummer	
Telefoonnummer voor belafspraak	
Belafspraak 1 (over 4 weken)	
Belafspraak 2 (over 9 weken)	

Gewicht .....

Lengte .....

Jaar van aanvang DM .....

Retinopathie Ja/Nee

Neuropathie Ja/Nee

Nefropathie Ja/Nee

Beroep: .....

Hoogst genoten opleiding: Geen/Basisonderwijs/VMBO/MBO/HAVO/HBO/VWO/WO/Post-WO

Dieetbegeleiding Ja/Nee

Aantal jaren dieetbegeleiding .....

Frequentie diëtistenbezoek .....

Medicatie voor diabetes

Hoeveel stappen per dag zou u over 9 weken willen zetten als we een doel willen stellen?

.....

Bent u bereid sportoefeningen te doen?	Ja/nee
Bent u lichamelijk in staat sportoefeningen te doen?	Ja/nee
Bent u in het verleden naar de sportschool geweest	Ja/nee
Gaat u momenteel naar de sportschool	Ja/nee
Wordt u liever met u of je aangesproken?	U/je

Check:

Patiënt weet hoe hij SMS berichten moet ontvangen	ja/nee
Patiënt weet hoe hij zijn mail moet openen	ja/nee
Installeer samen met de patiënt de Fitbit applicatie	gedaan ja/nee
Fitbit applicatie geïnstalleerd	ja/nee
Uitgelegd hoe de synchronisatie moet	ja/nee
Fitbitnummer op handleiding synchronisatie geschreven	ja/nee

Opmerkingen

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## Questionnaires

### SCI EXERCISE SELF-EFFICACY vragenlijst

Wij vragen u om aan te geven hoeveel vertrouwen u hebt in uw mogelijkheden om te bewegen. Onder bewegen wordt zowel alledaagse lichamelijke activiteit (bijvoorbeeld lopen, fietsen, rolstoelrijden of handbike om de hond uit te laten of boodschappen te doen) als sport (bijvoorbeeld fitness of zwemmen) verstaan.

(Gelieve maar 1 vakje per vraag aan te vinken)

Ik ben er van overtuigd:	Helemaal niet waar	Zelden waar	Soms waar	Altijd waar
Dat ik barrières en uitdaging met betrekking tot bewegen kan overwinnen als ik hard genoeg mijn best doe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik middelen en manieren kan vinden om te bewegen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik mijn doelen die ik stel voor bewegen kan bereiken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat wanneer ik geconfronteerd word met een barrière voor bewegen ik verschillende oplossing kan vinden om deze barrière te overwinnen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik kan bewegen zelfs wanneer ik moe ben	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik kan bewegen zelfs wanneer ik me depressief voel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik kan bewegen zelfs zonder de steun van mijn familie of vrienden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik kan bewegen zonder de hulp van een therapeut of trainer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik mezelf kan motiveren om opnieuw te beginnen met bewegen nadat ik een tijd gestopt ben	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dat ik kan bewegen zelfs wanneer ik geen toegang zou hebben tot een (medische) fitness of andere sportfaciliteit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Stage of Change

Gelieve het antwoord aan te kruisen dat op u van toepassing is. Niet meer dan één antwoord mogelijk.  
Bent u ten minste 5 dagen per week fysiek actief (wandelen, fietsen, of sporten) voor meer dan 30 minuten elke keer.

- Ja, en ik ben dat al langer dan 6 maanden
- Ja, maar ik ben daar pas in de afgelopen 6 maanden mee begonnen
- Nee, maar ik ben dat wel van plan in de komende 30 dagen
- Nee, maar ik ben dat wel van plan in de komende 6 maanden
- Nee, en ik ben dat ook niet van plan in de komende 6 maanden

### Ervaring met technologie

Op een schaal van 1 tot 5, hoeveel ervaring heeft u met het gebruiken van uw mobiele telefoon:

1      2      3      4      5

Op een schaal van 1 tot 5, hoeveel ervaring heeft u met het gebruiken van uw email:

1      2      3      4      5

## Instructions for synchronization Fitbit

### Fitbit synchroniseren met de applicatie op uw mobiel

Uw Fitbitnummer: ...

Wij verzoeken u elke week uw Fitbit te synchroniseren met de applicatie op uw mobiel. Bij voorkeur op vrijdag. Dit moet gedaan worden zodat uw activiteit opgeslagen wordt en uw coach ook weet hoeveel stappen u zet. Uw coach zal uw coaching berichten hier op aanpassen.

U kunt ervoor kiezen om elke week de synchronisatie handmatig te doen. Een andere optie is om de synchronisatie op continue in te stellen, u hoeft hem dan niet elke week te synchroniseren. U moet dan wel continue uw locatiegegevens en bluetooth aan hebben staan.

#### Eerste keer

1. Installeer de Fitbit applicatie op uw smartphone. Deze applicatie heeft het volgende logo:



Deze applicatie is te vinden in de “play store” voor een Android telefoon en in de “app store” voor een I-phone.

2. Na installatie opent u de applicatie en tikt u op “Log in”.

Uw inloggegevens zijn:

Email: zgtdelicate(nr)@gmail.com

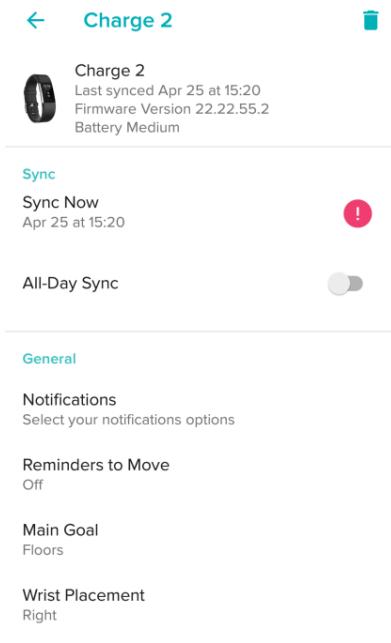
Password: zgtaelmelo(nr)

3. U ziet na het inloggen, als het goed is het volgende scherm:



### Synchronisatie handmatig

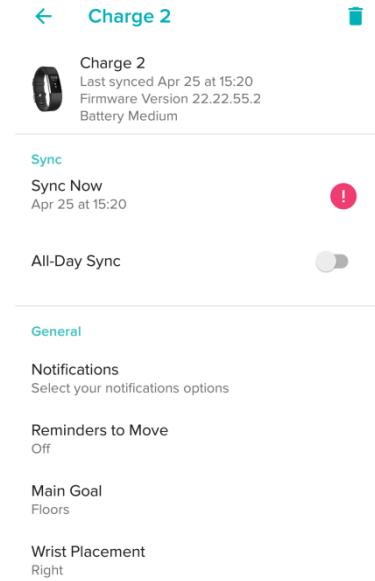
1. Zorg ervoor dat u uw locatiegegevens en bluetooth inschakelt voordat u aan de synchronisatie begint
2. Open de Fitbit applicatie
3. Tik rechts bovenin op de afbeelding van het armbandje. U ziet nu als het goed is het volgende scherm:



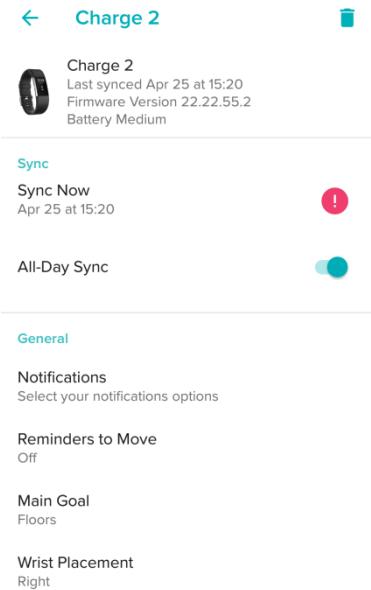
4. Tik vervolgens op "Sync Now"
5. Nu is de synchronisatie bezig. De synchronisatie is succesvol gelukt als onder "Sync Now" de datum en tijd van vandaag staan.

### Synchronisatie continue

1. Open de Fitbit applicatie
2. Tik rechts bovenin op de afbeelding van het armbandje. U ziet nu als het goed is het volgende scherm:



3. Tik vervolgens op "All-Day Sync", als het goed is schuift de schuiver nu naar rechts en kleurt die lichtblauw. Voorbeeld:



Nu zal de Fitbit armband automatisch met de applicatie op uw telefoon synchroniseren. Het is hierbij belangrijk dat uw locatiegegevens en bluetooth ingeschakeld zijn.

## 8.3 Interview scheme

### Aan de hand van design keuzes

#### Algemeen

- Wat vindt u van de coachings module?
- Vindt u dat de coachings module aansluit op uw behoeftes qua lichamelijke activiteit?
- Wat vindt u van de lengte van de coachingsmodule?
- Vindt u de vlog van toegevoegde waarde?
- Vindt u de quiz van toegevoegde waarde?
- (Wat vond u van het figuur in de mail van week 8)

#### SMS berichten

- Wat vindt u van de frequentie van de SMS-berichten
- Wat vindt u van de inhoud van de SMS-berichten

#### E-mailberichten

- Wat vindt u van de frequentie van de e-mail berichten
- Wat vindt u van de inhoud van de e-mail berichten
- Wat vindt u van de e-mailberichten als aanvulling op de SMS-berichten
- Vindt u de e-mail berichten persoonlijk?

#### Gebruik van technologie voor dit doeleinde

- Wat vindt u van deze manier van gezondheidszorg op afstand?
- Zou u dit contact op afstand willen in plaats van een afspraak in real life om uw fysieke activiteit te verbeteren?
- Had u het idee dat u hiermee persoonlijke aandacht kreeg?

### Waardering

- Wat voor cijfer zou u geven aan deze manier van gezondheidszorg op afstand? (1-10)
  - Overall
  - Sms:
  - Mail:

## Aan de hand van UTAUT

Performance expectancy	
De coachings module droeg bij aan het verbeteren of op peil houden van mijn fysieke activiteit	Eens/Oneens
Ik werd mij bewust van mijn fysieke activiteit door het gebruiken van deze coachings module	Eens/Oneens
Mijn gezondheid kan verbeteren door gebruik te maken van deze coachings module	Eens/Oneens
Het was nuttig voor mijn gezondheid nuttig om gebruik te maken van deze coachings module	Eens/Oneens
Effort expectancy	
Vond u het gebruiken van de coachings module makkelijk te leren?	Eens/Oneens
Vond u het gebruik van de coachings module eenvoudig?	Eens/Oneens
Social influence	
Mijn vrienden/familie vinden het een goed idee dat ik de coachings module gebruik?	Eens/Oneens
Ik zal deze coachings module aanraden aan andere diabetes patiënten?	Eens/Oneens
Behavioural intention	
Ik ben van plan de coachings module te blijven gebruiken voor de rest van de 4/5 weken	Eens/Oneens
Ik vind het gebruik van deze coachings module een goed idee	Eens/Oneens
Ik vind het interessant om deze coachings module te gebruiken	Eens/Oneens
Ik ervaar de eCoaching module als betrouwbaar	Eens/Oneens
Use behaviour	
Ik heb alle e-mails gelezen	Eens/Oneens
Ik heb alle SMS-berichten gelezen	Eens/Oneens
Ik las de SMS-berichten direct toen ik ze kreeg	Eens/Oneens

- (Indien questionnaire nog niet ingevuld hier aan herinneren)

## 8.4 Code scheme

Code	Subcode	Explanation	Variation
General	MatchingNeeds	Whether the different forms of PA (walking) match the needs of the patient	Match, No match, suggestions for other forms
	Perception	The overall perception of the coaching module	Positive perception, negative perception, Positive aspects, negative aspects, points for improvement
	Personal attention	Whether they have the feeling that they get enough personal attention by using this technology.	Yes, No, suggestions
	Length	Their opinion about the length (9weeks) of the coaching module	Good, too short, too long, suggestions
Interactive elements	Vlog	Their opinion about the Vlog	Positive opinion, negative opinion, did not watch it
	Quiz	Their opinion about the Quiz	Positive opinion, negative opinion, did not do it
SMS	Frequency	Their opinion about the frequency of the SMS-message	Good, too much, too little, Suggestions
	Content	Their opinion about the content of the SMS	Positive aspects, negative aspects, Suggestions
	Personalisation	Whether they have the feeling that the SMS is personal	Yes, No
Email	Frequency	Their opinion about the frequency of the email.	Good, too much, too little
	Content	Their opinion about the content of the emails	Positive opinion, negative opinion
	Personalisation	Whether they have the feeling that the email is personal	Yes, No
	Email relation to SMS	Their opinion about the email in relation with the SMS	Is connected, is not connected, email better than SMS, email worse than SMS, valuable addition to SMS, not a valuable addition to SMS
Use of technology	Remote health care	Their opinion about the use of technology for healthcare at distance	Good idea, bad idea, limitations, advantages, disadvantages
	Limitations	Limitations of the used technology	Limitations of Fitbit Limitations of email Limitations of SMS
	Replacement of usual care	Their opinion about the replacement of the usual care for technologies like this	Positive opinion, negative opinion, Not replacement but additional

## 8.5 Supplementary information regarding the results of phase 1

### The I-Change model

The I-Change model is derived from the Attitude Social influence self-Efficacy model (ASE-model). The model combined different theories and models; Azjen's Theory of Planned Behavior (TPB), Bandura's Social Cognitive Theory (SCT), Prochaska's Transtheoretical Model (TTM), the Health Belief model (HBM) and goal setting theories. (127)

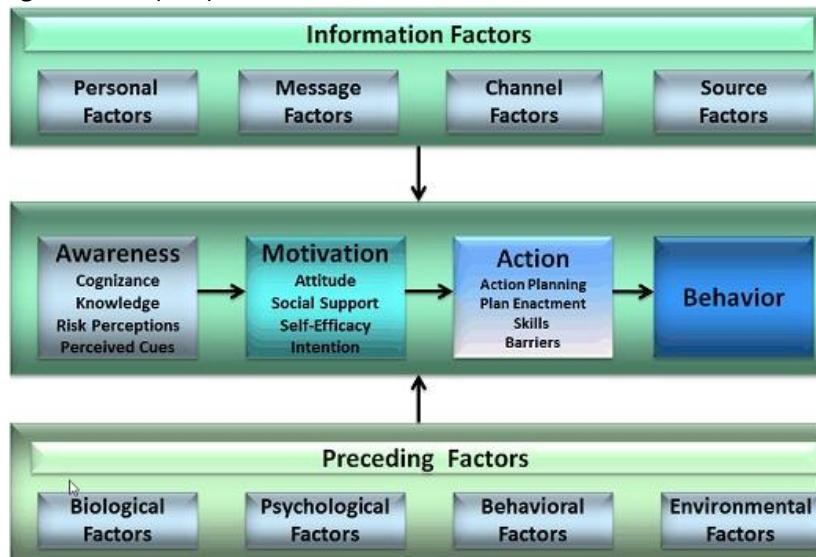


Figure 9: The I-Change model of de Vries et al. (89)

The I-Change model states that behaviour change consists of three phases before the change in behaviour takes place; awareness, motivation and action, also called pre motivational, motivational and post motivational phase. People can move back and forward from different stages (89). These phases can be linked to the different stages of the TTM; Precontemplation, Contemplation, Preparation, Action, Maintenance, Termination. (83)

The first phase of the I-Change model is awareness; a person has to be aware of his behaviour. Awareness is the result of cognizance, knowledge, risk perceptions and perceived cues. The awareness of someone has to be sufficient before moving on to the next phase (89).

The second phase is motivation; someone is aware of his behaviour but has to be motivated to change before he will take action. Motivation of an individual depends on his attitude, self-efficacy and social support this results in intentions, which can be linked to the TPB. TPB states that intention consists of attitude, subjective norm and perceived behavioural control. These elements are again influenced by other elements. TPB states that intention is the most important in behaviour change. (82)

After someone is motivated to change and convinced that he is capable to do it, he can move on to the next phase; Action. Having intentions to perform a certain behaviour does not directly mean that someone actual performs the behaviour. This is also known as the "intention-behaviour gap". (128–130) From literature it is known that action planning is effective in bridging this gap. (130) Action planning is the process of planning and executing specific, details plans that leads to the goal behaviour. The effect of action planning on behaviour is mediated by plan enactment. (128,129) Besides action planning and plan enactment, skills and barriers are also important in turning the intentions into action and performing the goal behaviour. (127)

Besides these elements inside the phases, the I-Change model states that preceding elements and information elements have influence on the phases. This report will focus less on these so they will not be discussed

## The PSD model

The Persuasive System Design (PSD) model, shown in Figure 10, developed by Oinas Kukkonen describes software functionalities for persuasive systems. The model helps by selecting effective persuasive features and is helpful in designing persuasive eHealth technologies (110).

### PSD-Model: Oinas-Kukkonen



Figure 10: Persuasive system design model of Oinas Kukkonen (110)

The categories for persuasive system principles suggested by the PSD model are; primary task support, dialogue support, credibility support and social support. The design principles of the primary task support should help the user by carrying out his primary task. The design principles of the dialogue support relate to the computer-human dialogue, which has the aim to help the users in moving towards his goal. The design principles of the credibility support should help by designing a system that is credible and therefore persuasive. The design principles of the last category; social support, should help by designing a system that motivates users through social influence. (110)

Only the persuasive features of the dialogue support were used in this thesis, an explanation per feature is given in Table 8.

Table 8: The persuasive design features of Dialogue support with explanation (110)

Persuasive design features	Explanation
Praise	A system could praise users via words, images, symbols, or sounds based on their behaviours.
Rewards	The system could reward the user for achieving goals.
Reminders	The system could remind the user of their target behaviour, users will more likely to achieve their goals if reminders are used.
Suggestion	The system could offer suggestions which help to reach the target behaviour.
Similarity	Systems that remind people of themselves in some meaningful way could be more persuasive.
Liking	A system that is visually attractive for its users is likely to be more persuasive.
Social role	It could be more persuasive when the system adopts a social role, this could be in the form as a coach, instructor or buddy.

## 8.6 Found articles per factor

Table 9: The title and description of the found articles and if it was applicable for the factor: Use of BCTs.

Title	Description	Applicable?
Physical activity self-management interventions for adults with spinal cord injury: Part 1–A systematic review of the use and effectiveness of behavior change techniques. (52)	<p>Objectives: To determine which behavior change techniques have been used within leisure time physical activity (LTPA) self-management interventions for persons with spinal cord injury, and which BCTs were effective for improving LTPA behavior and/or its antecedents.</p> <p>Relevant results: The most commonly used BCTs related to the core components of self-management (i.e., education, training/rehearsal of psychological strategies, and social support).</p>	No, other target population and there is nothing said of the effectiveness, only about the most commonly used BCTs.
Physiotherapists use a small number of behaviour change techniques when promoting physical activity: A systematic review comparing experimental and observational studies (53)	<p>Objectives: This study reviewed the BCTs physiotherapists use when promoting PA in experimental and observational studies</p> <p>Relevant results: Social support (unspecified) was the most frequently identified behaviour change technique.</p> <p>Conclusions: Physiotherapists use a small number of behaviour change techniques.</p>	No, they investigated which BCTs are used by physiotherapists and how many BCTs are used by physiotherapists.
Behavior change techniques in physical activity eHealth interventions for people with cardiovascular disease: Systematic review (54)	<p>Objective: assess the application of BCTs in eHealth interventions designed to increase PA in Cardio Vascular Disease populations.</p> <p>Relevant results: The top three most frequently used BCTs included information about health consequences (18/23), goal setting (behavior; 17/23), and joint third, self-monitoring of behavior and social support (practical) were included in 11 studies (11/23) each.</p>	No, other target population with less similarity and only investigated the amount of use, not the effectiveness.
Effective behaviour change techniques for physical activity and healthy eating in overweight and obese adults; systematic review and meta-regression analyses (55)	<p>Objective: explain the heterogeneity in results of interventions to promote PA and healthy eating for overweight and obese adults, by exploring the differential effects of (BCTs) and other intervention characteristics.</p> <p>Relevant results: The BCTs goal setting of behaviour and self-monitoring of behaviour were associated with positive intervention effect at both short and long term. Borderline significant evidence revealed that feedback on behaviour, feedback on outcome of behaviour, and demonstration of the behaviour were associated with successful interventions at short term.</p> <p>In addition to the BCTs goal setting and self-monitoring of behaviour, giving feedback on the outcome of behaviour, setting graded task, and adding objects to the environment, e.g. using a diet logbook, were associated with successful intervention reports at long term. The BCTs problem solving, review of behaviour goals, and receiving general social support, were borderline significantly associated with positive results.</p>	Yes, similar target population and they have looked to the effectiveness of the BCTs.

<p>Behaviour change techniques targeting both diet and physical activity in type 2 diabetes: A systematic review and meta-analysis (56)</p>	<p><b>Objective:</b> Identify BCTs and intervention features of dietary and PA interventions for patients with type 2 diabetes that are associated with changes in HbA1c and body weight.</p> <p><b>Relevant results:</b> Four of 46 BCTs identified were associated with &gt;0.3 % reduction in HbA1c: ‘instruction on how to perform a behaviour’, ‘behavioural practice/rehearsal’, ‘demonstration of the behaviour’ and ‘action planning’.</p>	<p>Yes, same target population and looked to the effectiveness of the BCTs.</p>
<p>What are the most effective behaviour change techniques to promote physical activity and/or reduce sedentary behaviour in inactive adults? A systematic review protocol (57)</p>	<p><b>Objective:</b> systematically identify and evaluate the effectiveness of the BCTs used in RCTs of interventions aimed at increasing PA and/or reducing sedentary behaviour in inactive adults with a 6-month follow-up measurement that considers all settings and modes of delivery.</p> <p><b>Relevant results:</b> None</p>	<p>No, because it is a protocol and they mentioned “Studies will be included if they assess interventions aimed at changing PA or sedentary behaviour levels in adults (over 18) who are inactive and do not suffer from chronic conditions.”</p>
<p>Do behaviour-change techniques contribute to the effectiveness of exercise therapy in patients with intermittent claudication? A systematic review (58)</p>	<p><b>Objective:</b> Identify and evaluate the efficacy of behaviour-change techniques explicitly aimed at walking in individuals with intermittent claudication.</p> <p><b>Relevant results:</b> Eleven BCTs were identified and several, in particular self-monitoring, feedback on performance and barrier identification with problem solving, could be easily combined with exercise prescription and walking advice in clinical practice. Future high-quality trials should explore these and other BCTs, and should evaluate changes in psychosocial variables that are targeted by specific techniques.</p>	<p>No, they only took 6 studies into account and claudication is not a similar target population.</p>

**Table 10: The title and description of the found articles and if it was applicable for the factor: Tailoring in Physical activity interventions.**

Article	Description	Applicable
How lay health workers tailor in effective health behaviour change interventions: A protocol for a systematic review (59)	<p>Objective: develop a better understanding of the effective implementation of tailoring in lay health worker interventions by appraising evidence and synthesising studies that report evaluations of tailored interventions.</p> <p>Relevant results: None</p>	No, it is a protocol.
A meta-analysis of web-delivered tailored health behavior change interventions (60)	<p>Objective: This meta-analysis compares the effects of tailored versus non-tailored, web-based interventions on health behaviors, and explores the influence of key moderators on treatment outcomes.</p> <p>Relevant results: Web-based tailored interventions effected significantly greater improvement in health outcomes as compared with control conditions both at posttesting.</p>	No, it does not mentioned methods of tailoring.
A meta-analysis of computer-tailored interventions for health behavior change (61)	<p>Objective: This study extends and builds upon the most comprehensive meta-analytic review to date by examining both print and computer-delivered interventions, by modeling weighted group variance for statistical tests, and by systematically examining publication bias and study quality.</p> <p>Relevant results: dynamically tailored interventions were found to have increased efficacy over time as compared with tailored interventions based on one assessment only. Dynamic tailoring (i.e. iterative assessments and feedback) was associated with larger mean effect sizes than static tailoring. Since some studies provided static feedback based on one baseline assessment at more than one time point, differences in mean effect size between numbers of contacts (1 vs. more than 1) of statically tailored materials were also assessed. Inclusion of more than one statically tailored communication was associated with larger effect sizes than use of only one contact.</p>	Yes, not to identify tailor factors but to take into account more than one assessment moment.
Computer-tailored physical activity behavior change interventions targeting adults: A systematic review (62)	<p>Objective: To provide a narrative systematic review describing the range of evidence on 'second' and 'third' generation computer-tailored primary prevention interventions for PA, to determine their effectiveness and key characteristics of success.</p> <p>Relevant results: The most commonly used methods of tailoring were providing feedback tailored to the participant's motivational stage of change followed by providing feedback that compared participant's behavior to current recommendations. The majority of studies tailored feedback in more than one way, however the combination of tailoring varied. Other</p>	Yes, it mentioned methods for tailoring but it mentioned the most commonly used methods, it does not say anything about the effectiveness.

	<p>ways of tailoring included providing feedback that compared the participant's behavior to previously set goals, the behavior of peers, participant's previous behavior, and feedback tailored to participant's self-efficacy their intentions and attitudes, and their perceived benefits and/or barriers to behavior.</p>	
Does Tailoring Matter? Meta-Analytic Review of Tailored Print Health Behavior Change Interventions (63)	<p><b>Objective:</b> The current study provides a meta-analytic review of this literature, with a primary focus on the effects of tailoring.</p> <p><b>Relevant results:</b> Results indicated that studies tailoring on attitudes (<math>Z = 2.38, p &lt; .003</math>), self-efficacy (<math>Z = 4.40, p &lt; .00001</math>), stage of change (<math>Z = 2.64, p &lt; .004</math>), social support (<math>Z = 9.88, p &lt; .00001</math>), and processes of change (<math>Z = 2.17, p &lt; .016</math>; marginally significant) had significantly larger effect sizes than those that did not tailor on these concepts. Studies tailoring on perceived susceptibility (<math>Z = 6.87, p &lt; .00001</math>) had significantly smaller effect sizes compared with those that did not. No other significant differences were found. In addition, the specific concepts most clearly associated with larger effect sizes included attitudes, self-efficacy, stage of change, processes of change, and social support (although the social support analysis was based on only four studies).</p>	Yes, although it is on tailored print communication, but it provides information about the method of tailoring.

**Table 11: The title and description of the found articles and if it was applicable for the factor: Preferences of T2DM patients to technology.**

Article	Description	Applicable
Digital health interventions for adults with type 2 diabetes: Qualitative study of patient perspectives on diabetes self-management education and support (66)	<p>Objective: explore patient perspectives on unmet needs for self-management and support and the role of DHI in adults living with type 2 diabetes.</p> <p>Relevant results: Summary of the range of content desired by participants in this study. *</p> <p>Design features desired by participants in this study. **</p>	<p>Yes, the lists "Summary of the range of content desired by participants in this study" and "Design features desired by participants" of this study provide preferences of T2DM to a digital intervention</p>
The influence of diabetes distress on digital interventions for diabetes management in vulnerable people with type 2 diabetes: A qualitative study of patient perspectives (67)	<p>Objective: explore the perspectives and needs of vulnerable people with T2DM to assess the potential for a tailored digital intervention for improving self-management of diabetes.</p> <p>Most relevant results: The main themes identified were: "Dealing with diabetes distress" characterized by psychological avoidance mechanisms; "Suffering informational confusion" dealing with inconsistent information; "Experiencing digital alienation" dealing with loss of freedom when technology invades the private sphere; and "Missing the human touch" preferring human interaction over digital contact.</p> <p>Vulnerable people with T2DM prefer personalized care including a designated caregiver and an allocated buddy, who could provide support and assist uptake of digital interventions to diabetes management.</p>	<p>No, they do not provide preferences, of patients to a digital intervention, in this article.</p>
Self-monitoring technologies for type 2 diabetes and the prevention of cardiovascular complications: Perspectives from end users (68)	<p>Objective: Explore facilitators and barriers to the adoption of self-monitoring devices in individuals with T2DM.</p> <p>Relevant results: None</p>	<p>No, mainly about self-monitoring, which is a part of the eCoaching module but it does not provide useful preferences.</p>

\* Summary of the range of content desired by participants

Medical information	Dietary advice	Physical activity	Alternative medicine
Medication	Controlling blood glucose	Benefits of exercise	Relaxation therapy and stress reduction
Side effects	Weight loss	Advice about weight loss	Complementary therapies
Hypoglycemia	Controlling cholesterol	Self-monitoring tools	
News and research	Understanding food	Easy-to-do physical activities	
	Recipe ideas	Resources for group activities	
Peer support	Pregnancy	Practical advice	Information about health services
Advice from peers	Safe conception	Travel	Services that patients should have access to
Emotional support	What to do if pregnant	Insurance	Local support groups
Social comparisons		Financial advice	Telephone support lines
Role models			
Not much enthusiasm for social media			

\*\* Design features desired by participants

Design and navigation	Language and tone	Trust
Easy to use	Accessible	Thorough proofreading
Clear, concise and consistent	Use medical terminology where needed, but provide definitions and explanations	No advertising
Minimize scrolling	Be encouraging and supportive	Working links to and from good websites
Use videos	Not shy away from difficult truths	Use trusted brands
Pages can be printed in black and white	Have a sense of humor	
Have interactive features like quizzes		
Provide self-monitoring tools		
Act as a central hub for all diabetes-related queries with links to other resources		
Avoid irritants	Keeping users engaged	
Poor design	Regularly adding new content	
Not relevant or localized	Articles about latest research findings	
Out of date	Regular emails	
Boring or static	Use video and interactive tools	
	Booking appointments	

**Table 12: The title and description of the found articles and if it was applicable for the factor: Design to prevent non-usage attrition in eHealth**

Article	Description	Included?
Informing patient self-management technology design using a patient adherence error classification (64)	NO ACCESS	No, it focused on error classification and no access to the full text.
Persuasive system design does matter: A systematic review of adherence to web-based interventions (65)	<p>Objective: review the literature on web-based health interventions to investigate whether intervention characteristics and persuasive design affect adherence to a web-based intervention.</p> <p>Relevant results: Regarding persuasive technology, we see that primary task support elements are most commonly employed. Dialogue support and social support are less commonly employed. In this model, a RCT study was opposed to an observational study, increased interaction with a counselor, more frequent intended usage, more frequent updates and more extensive employment of dialogue support significantly predicted better adherence.</p>	Yes, dialogue support can be used in the eCoaching module to have better adherence.

## **8.7 eCoaching module**

This part is confidential

## 8.8 Messages excluded by the HCPs

Table 13: The excluded messages together with the reasons and quotes of the HCPs

Reason	Quote	Message
Raise unrealistic expectations by patients	<i>"You cannot say that. People are going to expect that their kidney function will improve, I would exclude this one. I do not see how you can change this to say it different." (specialist)</i>	
Unrealistic that diabetes patients would actually perform what was advised	<i>"I think this is something that people think yes byeee. It is a bit too much and where do you walk too? The hallway up and down? You have to keep people motivated and with this message you may lose them" (diabetes nurse)</i> <i>"We thought it was too much" (diabetes nurse)</i> <i>"How realistic is this that people will do it?" (specialist)</i>	
Part of daily living, everyone has to do this.	<i>"This is something you cannot control, or you have a fixed day for it or you do it when the bag is full, you are not going to do it when the bag is half-full." (diabetes nurse)</i>	
Topic was too big for a short SMS-message	<i>"We thought the subject was not suitable for a short text message. I think this should be discussed during an appointment with the doctor or it may be mentioned in the email, so there could be said more about it, but not in a short text message. In terms of content it is correct." (specialist)</i>	
Not related to any context	<i>"It could be raining, or the person already has done a lot or is sick that day, the other messages were better" (diabetes nurse)</i>	
Cumbersome and not motivational	<i>"I think this one is too cumbersome, people has to searched for it, where can I do this. The idea behind it is funny but I would not be motivated by it." (diabetes nurse)</i> <i>"This one is really general, people can consider this but it is more something to tell them during an appointment, not something to send them by text to keep them motivated." (specialist)</i>	

## 8.9 Coded fragments

### General

#### Matching Needs

O: Sluit de coachingsmodule aan op uw behoefte qua lichamelijke activiteit?

P8: Ja, voor andere vormen heb ik niet echt de tijd voor. Ik ben een druk bezet baasje. Op zondag doe ik helemaal niks, dat is voor mij een rustdag.

O: En als we kijken naar de eCoaching module, u gaf eigenlijk al aan dat u andere bewegingsvormen prefereert boven het lopen dus kan ik dan stellen dat de eCoaching module niet aansluit op uw behoefte qua lichamelijke activiteit.

P5: Kijk, <naam> ik woon alleen, ik doe alles zelf, ik kook en ik was en ik strijk en ik poets het huis en ik doe de tuin. Dus ik heb wel veel beweging maar het is niet altijd lopen voor mij. Het is heel veel huishoudelijk werk, dat is ook wel veel beweging en dat telt dus ook.

P1: En ik krijg een beetje genoeg van de berichtjes. Het is bijna allemaal weer hetzelfde en bijvoorbeeld van: "ga boven naar de wc", we hebben helemaal geen wc boven. Dat soort dingetjes en dat heb ik allemaal al eens eerder gehad en daar krijg ik echt een beetje genoeg van. Van ga wandelen, nou ik kan met mijn been niet echt wandelen, ik probeer zoveel mogelijk te lopen en ik krijg er een beetje genoeg van. Van mij hoeft dat niet meer

O: Vindt u dat de coachingsmodule aansluit op uw behoefte qua lichamelijke activiteit?

P9: Hoe bedoelt u dat?

O: De beweegvormen die aangeboden worden, voornamelijk het wandelen, zou u behoefte hebben aan andere vormen van lichamelijke activiteit?

P9: Ja, ik zal fietsen erin wel leuk vinden.

O: Zijn er nog andere beweegvormen die u leuk zou vinden om erin terug te zien?

P9: Nee, maar eigenlijk fietsen en lopen is het enige wat ik doe.

P1: Nee, het was vaak dat ik dit niet kan wat er aangeraden werd. Omdat ik met die knie zit, het is niet zo dat ik niet wil lopen. Ik loop zo veel mogelijk maar ik kan niet een eind gaan wandelen. Dat krijg je dan wel steeds onder ogen.

O: In dat opzicht sloot het niet aan op uw behoefte?

P1: Nee

P5: Ja, en ik zit wel vaak op de fiets, dus toen heb ik ook gezegd; mag fietsen ook?

O: In de coachingsmodule worden verschillende vormen van lichamelijke activiteit aangeboden, zoals wandelen, vindt u dat de coachings module aansluit op uw behoefte qua lichamelijke activiteit?

P4: Niet alles.

O: Kunt u noemen wat er niet aansluit?

P4: Dan moet ik de berichtjes even nakijken. Voor fietsen bijvoorbeeld zou ik eerst een fiets moeten kopen.

O: Vindt u dat de coachings module aansluit op uw behoeftes qua lichamelijke activiteit?

P6: Kijk, dit meet alleen de stappen, ik had liever gezien dat die ook de activiteit had gemeten zoals fietsen of wat dan ook

O: Daar ben ik het met u mee eens, het is jammer dat die alleen de stappen meet.

P6: Ja precies, hij noteert maar één item.

O: Vindt u dan ook dat deze tips aansluiten op uw behoefte qua lichamelijke beweging?

P2: Voor mij niet, maar ik kan mij voorstellen dat iemand anders er wel wat aan heeft.

O: Vindt u dat de coachingsmodule aansluit op de behoeftes qua lichamelijk activiteit

P7: Vind ik wel, maar het moet allemaal wel kunnen mij beperkt mijn stoma mij nogal.

Vind het wel jammer dat fietsen niet mee telt, als ik heb gefietst zie ik geen extra activiteit helaas.

### Perception

P9: Ja maar ik vind het ook wel leuk, er is hier een hartstikke leuk park en dan loop ik toch 2,5km en dat vind ik hartstikke leuk. Ik heb het nooit gedaan, eigenlijk pas sinds ik dat armbandje om heb dat ik dat doe. Ik ben nooit in dat park geweest en wij wonen hier nu 15jaar en ik had het park nog nooit gezien, maar gewoon dat je nu ziet

van dat is hier ook. Mijn kleinzoon, oma wat leuk, ja die vindt dat ook weer super. Eigenlijk alleen maar lof om mensen op gang te krijgen met dat armbandje, dat is echt een stimulans.

O: Wat vond u van de coachings module?

P2: Ik vind het prima, ik moet eerlijk zeggen de tips die ik krijg via de SMS die wist ik eigenlijk wel.

O: dus het was voor u niet heel veel nieuws?

P2: nee

O: Wat vindt u van de coachings module tot nu toe?

P7: Hartstikke goed, maar ik heb niet zoveel energie om er aan mee te doen. Ik heb een blaasontsteking er tussendoor gehad en nog wat dingetjes. Maar eigenlijk krijg ik er wel een boost van, van kom op!

O: Wat vindt u van de coachingsmodule tot nu toe?

P8: Ik vind het wel prima, ik lees het wel maar als ik aan het werk ben kan ik er niks mee. Maar ik vind het wel mooi dat het er is. Ik lees het allemaal wel maar ja u weet niet waar ik dan mee bezig ben. Ik heb veel zittend werk en ik kan het dan wel lezen maar ja het is hartstikke mooi. En u denkt dan misschien die meneer <naam> doet geen flikker maar ik zit dan 2x 4,5 uur achter het stuur.

O: Had u ook het idee dat u hiermee voldoende persoonlijke aandacht krijgt?

P9: Ja, net wat ik zeg. Als ik echt iets wilde weten dan doe ik dat wel. Ik vind ook dat die mogelijkheid er wel moet zijn. Dat ik wel mijn vragen moet stellen en verder vind ik het zo hartstikke leuk. Het beurt ook op

O: Wat vindt u van de coachingsmodule?

P9: Helemaal geweldig, ik vind het heel leuk

O: Wat vindt u van de coachings module tot nu toe?

P6: Ja, het is mij wel goed bevallen hoor

O: Buiten het bandje om, wat vindt u van de coachings module?

P4: Wel goed

### Personal attention

O: Had u het idee dat u genoeg persoonlijke aandacht kreeg?

P7: Jawel

O: En had u het idee dat u hiermee genoeg persoonlijke aandacht krijgt?

P4: Ja, zekers

O: We hadden het net al even over de persoonlijke aandacht van de emailberichten, als we kijken naar het algemeen van de eCoaching module vind, u dan dat u genoeg persoonlijke aandacht krijgt?

P5: Ja, zeker wel.

O: Had u het idee dat u hiermee persoonlijke aandacht kreeg?

P2: Ja, maar die heb ik niet nodig.

O: Had u ook het idee dat u hiermee voldoende persoonlijke aandacht krijgt?

P9: Ja, net wat ik zeg. Als ik echt iets wilde weten dan doe ik dat wel. Ik vind ook dat die mogelijkheid er wel moet zijn. Dat ik wel mijn vragen moet stellen en verder vind ik het zo hartstikke leuk. Het beurt ook op

O: vindt u in het algemeen dat u genoeg persoonlijke aandacht krijgt gedurende deze module.

P6: Ik vind deze aandacht wel leuk.

### Length

O: En wat vindt u van de lengte van de coachingsmodule?

P4: Niet te lang, neuh,

O: Wat vindt u van de lengte van de coachingsmodule?

P8: Als u zegt, ik doe er 9 weken bij op dan vind ik het ook goed.

O: Vind u hem nu te kort?

P8: Ik vind hem zo goed

O: Wat vindt u van de lengte van de coachingsmodule? U ziet nu in week 5 en uiteindelijk duurt het 9 weken.

P2: Ja, maakt mij niet uit. of ik nou dit horloge om hebt of mijn eigen, daar zit weinig verschil in.

O: Maar ook het krijgen van de SMS berichten en de email berichten komt daar natuurlijk bij.

P2: Ja, nou daar kijk ik even snel naar en dan oja dat wist ik al

O: En wat vindt u van de lengte van de coachings module?
P6: Vrij lang, maar het is wel te doen hoor.
O: De coachings module duurt in totaal 9 weken, wat vindt u van deze lengte?
P9: Ja, goed, vooral de eerste 3-4 weken toen had ik van kalm aan nu ieder keer weer meer. Ik zit nu gemiddeld op de 6000 stappen per dag en dan van het weekend is het iets minder, dan heb je vaker visite enzo, dan is het iets minder. Verder vindt ik het helemaal geweldig, het is echt een stimulans
O: en wat vindt u van de lengte van de eCoaching module, de 9 weken in totaal?
P5: Daar heb ik geen probleem mee
O: Wat vindt u van de lengte van de coachingsmodule?
P7: Het is wel te doen hoor.
O: Nu bent u zes weken bezig en er komen nog drie weken. Wat vind je van die lengte.
P1: Ik vind het een beetje lang, 9 weken. Ook het armbandje, toen het echt heel heet was begon het mij te irriteren; rood plekje eronder. Dat is wel weer weggegaan. Ik vind 9 weken wel heel lang. Zes weken zou ik zelf eerder zeggen, dat is te overzien. Ik vind 9 weken wel heel lang. Maar goed, het kan wel, het is niet zo dat ik zeg ik houd er na 6 weken mee op. Ik heb wel een keertje op het punt gestaan, nou ik vind het goed geweest. Ook toen het begon te irriteren, rood plekje. Dat ik dacht, ik gooい dat ding straks af en ik schrijf er een berichtje over. Maar ik heb hem niet afgedaan maar toen heb ik mij er wel een beetje aan geërgerd. Dat was ongeveer 14 dagen geleden.

## Interactive elements

### VLOG

O: De video, die afgelopen maandag toegevoegd was in het emailbericht, wat vond u daarvan?
P8: Ja, het is wel spannend voor iemand die daar eigenlijk geen tijd voor heeft. Ik leef zoals ik anders ook leef, ik doe niks bijzonders
O: Ja snap ik
P8: Ja kijk, alles wat je stuurt dat klopt allemaal precies. Voor mijn kant dan ik heb er geen tijd voor.
O: Wat vond van het filmpje, dat deze week was bijgevoegd?
P5: Volgens mij was je extra naar de kapper geweest, haha. Ik vond dat wel leuk ja.
O: Heeft u het filmpje wat er vorige keer als bijlage van in de email was toegevoegd. Heeft u die bekeken?
P1: Ik heb hem bekeken
O: Wat vond u van het filmpje?
P1: Het is wel iets anders, de tekst komt maar steeds door. Dat is net wat ik zei; dat valt in herhaling. Ik vond dat je wel een goed praatje hield. Ik heb het een keer afgeluisterd, het is niet helemaal blijven hangen. Daarna werd ik ook ziek. Al met al was het een beetje een vervelende tijd.
O: En zoals deze week heeft u een filmpje gekregen, vond u dat van toegevoegde waarde?
P2: Neuh, voor mij niet.
O: Afgelopen maandag zat er bij de mail een video toegevoegd, wat vond u daarvan?
P7: O, die heb ik helemaal niet gezien
O: Afgelopen maandag zat er een video in de email toegevoegd, Wat vond u van deze video?
P6: Jawel, heel goed zelfs. Ik vond het prettig om iets anders te hebben dan tekst.
O: Afgelopen maandag zat er in het emailbericht een video toegevoegd, wat vond u daarvan.
P9: Leuk, ja dat vind ik echt leuk. Soms had ik het idee van ze heeft niet in de gaten dat ik COPD heb. Het zijn van die mailtjes die naar iedereen gaan en toen had ik ook wel van ik heb ook nog COPD, dat is gewoon dat opstarten en dat vind je in het begin heftig, het was wel moeilijk
O: Niet deze week maar vorige week maandag was een video toegevoegd, vond deze u deze email van toegevoegde waarde?
P4: Daar heb ik niet naar gekeken

### Quiz

O: In week 4 zat er in de mail een link om een quiz te doen, wat vond u daarvan?
P9: Dat vond ik ook wel leuk, ik vind van die dingen wel leuk te doen.

O: In week 4 kon u een link doen, heeft u die gedaan?
P7: ja
O: vond u deze quiz van toegevoegde waarde?
P7: Ja, dat hoort er bij hè? Het was even wat anders.
O: In week 4 zat er een link naar een quiz toegevoegd, heeft u deze quiz gedaan?
P6: Nee
O: En in de week daarvoor was er een kennisquizje toegevoegd, heeft u die gedaan?
P4: Nee
O: In week 4 zat er een quiz toegevoegd, heeft u die gedaan?
P8: Nee
O: De quiz die u in week 4 gekregen heeft, vond u die van toegevoegde waarde?
P2: Ja, ik had alles goed
O: En in week 4 heeft u een quiz ontvangen, wat vond u daarvan?
P5: Quiz? Die heb ik niet gedaan volgens mij
O: In de email berichten is ook een keer een link meegestuurd om een kennis quiz te doen. Heeft u die ook gedaan?
P1: Ik heb dat wel gedaan,
O: Wat vond van het kennis quizje?
P1: Ja, het is soms moeilijk om het in te vullen. Je zit er dan net tussen in en er zijn wel verschillende mogelijk.
O: Vind u het kennis quizje van toegevoegde waarde.
P1: Dat mag voor mij in plaats van die berichtjes. Dan kan ik er wel over nadenken, en dan kan ik ermee doen wat ik wil.

## SMS

### SMS frequency

O: Wat vindt u van de hoeveelheid van de SMS berichten?
P6: Prima hoor, het is genoeg. Ook de tips die je meegeeft zijn wel bruikbaar.
O: Vindt u het dan vervelend om 2x op een dag SMS-berichten te krijgen?
P8: Nee, ik vind dat niet vervelend.
O: Wat vindt u van de hoeveelheid van de SMS-berichten?
P9: Dat vind ik wel fijn, dat je nog weer even die aanmoediging hebt.
O: U vindt 2x op een dag niet te veel?
P9: Nee, vooral de eerste 2 maanden als zoiets begint, tenminste ik moet echt even opstarten en dan heb ik die 2 wel nodig. Ik vond het wel een stimulans
O: En heeft u alle SMS-berichten gelezen en wat vond u van de hoeveelheid van die SMS berichten?
P2: Ik vind de hoeveelheid prima.
O: U gaf aan dat u de hoeveelheid een beetje veel vindt?
P1: Ja, absoluut.
O: En wat vindt u van de hoeveelheid van de SMSberichtjes?
P4: Dat vind ik prima
O: Wat vond u van de hoeveelheid van de SMS-berichten?
P7: Dat kan mooi zo, ik heb er geen moeite mee
O: Wat vindt u van de hoeveelheid van de SMS-berichten, die 2x per dag komen?
P5: O dat vind ik prima, dat vind ik wel leuk.
O: Ik zal deze coachings module aanraden aan andere diabetespatiënten.
P1: Niet op de manier waarop, er moet eerst nog wat verbeterd worden. De hoeveelheid sms-berichten vind ik erg veel. Dat kan veel minder. 1x per week of 1x per 2/3 dagen dan vind ik dat eigenlijk al een herinnering voor een hele week. Voor mij is dat, maar dat is voor andere misschien niet.

## SMS content

O: En de inhoud van de SMS-berichten wat vindt u daarvan?
P7: Ja is goed, ik denk iedere keer dat jullie mij wel een zeurpiet zullen vinden dat ik niet meer stappen zet. Maar ik ervaar ze absoluut niet als vervelend of irritant.
O: Als we kijken naar de hoeveelheid van de sms-berichten, ze komen 2x per dag, wat vindt u daarvan?
P8: Kijk, wat u zegt klopt allemaal precies alleen ik kan ze allemaal niet uitvoeren. Ik zie mijzelf bijvoorbeeld niet met een hondje rondlopen. Mijn partner begon hard te lachen; jij met een hondje?
O: Wat vindt u van de inhoud van deze SMS-berichten?
P4: Ja wel goed
O: En zou ook zo kunnen vertellen wat u er goed aan vind?
P4: De dingen die er in staan, wat ik moet doen, lopend boodschappen halen, niet met de auto dat soort dingen.
P1: En ik krijg een beetje genoeg van de berichtjes. Het is bijna allemaal weer hetzelfde en bijvoorbeeld van: "ga boven naar de wc", we hebben helemaal geen wc boven. Dat soort dingetjes en dat heb ik allemaal al eens eerder gehad en daar krijg ik echt een beetje genoeg van. Van ga wandelen, nou ik kan met mijn been niet echt wandelen, ik probeer zoveel mogelijk te lopen en ik krijg er een beetje genoeg van. Van mij hoeft dat niet meer
O: Wat vindt u van de inhoud van de SMS-berichten?
P5: Ja ik denk dat jullie erg je best gedaan hebben om 9 weken elke dag 2 berichten, 126 berichtjes, om die leuk samen te stellen. Dat vind ik wel knap
O: Dat was een grote klus, daarom zijn we ook benieuwd of de inhoud een beetje gewaardeerd wordt of dat we nog meer moeten sleutelen.
P5: Ja, ik lees ze heel consequent en ik denk ik hoef niet elke keer erop te reageren natuurlijk. Ik vind ze wel grappig.
P5: en de dagelijkse berichtjes vind ik wel heel leuk. Ik moet er elke keer om lachen.
O: En de inhoud van de SMS-berichten wat vindt u daarvan?
P9: Ja goed. Net als wat ik zeg, in het begin dacht ik ze vergeet dat ik COPD heb en toen schoot er later ook wel in dat dat van die berichten waren die gewoon naar iedereen nog gaat, dan begrijp ik het. Maar in het begin had ik wel zoets van "he ik heb COPD", dat vergeet je toch niet.
O: Wat vond u van de coachings module?
P2: Ik vind het prima, ik moet eerlijk zeggen de tips die ik krijg via de SMS die wist ik eigenlijk wel.
O: dus het was voor u niet heel veel nieuws?
P2: nee
O: Wanneer begon het ergeren? Kunt u een tijdsindicatie geven wanneer u zich eraan begon te ergeren
P1: Nee, toen een beetje de herhaling kwamen, dat heb ik allemaal al een keer eerder gelezen dat weet ik dan nu wel. Dan hoef ik niet iedere keer die herhaalberichtjes weer. Wanneer dat is begonnen? Toen dat begon eigenlijk een beetje 14 dagen geleden. Ik begrijp ook wel dat je niet iedere dag nieuwe berichtjes kunt sturen. Je valt dan op een gegeven moment in herhaling, dat kan niet anders. Vanaf die tijd, dacht ik dat heb ik al eerder gelezen en ik kan er in principe niks mee.
O: Wat vindt u in eerste instantie van de inhoud?
P1: Het zijn in principe wel goede tips, maar ik kan niet overal wat mee. Als je heel goed kunt lopen, kun je er best wat mee doen. Maar voor mij zijn er soms dingen dat ik het wel vervelend vind.
P8: Ja kijk, alles wat je stuurt dat klopt allemaal precies. Voor mijn kant dan ik heb er geen tijd voor
O: Wat vindt u van de hoeveelheid van de SMS berichten?
P6: Prima hoor, het is genoeg. Ook de tips die je meegeeft zijn wel bruikbaar.
O: en de inhoud van de email berichten wat vindt u daarvan?
P9: Ja, ik vind het hartstikke leuk. Anderen zeggen ja <naam> is helemaal enthousiast, maar dat ben ik ook. Ik ben helemaal enthousiast hoe dat gaat, hoe jullie die berichten stuurt en de email, dat vind ik helemaal super. Het moedigt de mensen ook echt aan. Ik vind het helemaal geweldig, niks meer dan lof.
O: Ja en de inhoud, wat u al zei, het meeste weet u eigenlijk al, heeft u nog andere op- of aanmerkingen over de inhoud?
P2: Neuh, ik kan mij voorstellen dat het andere mensen wel helpt
P1: Dat doe maar, maar van mij hoeft het helemaal niet. Ik doe er in principe niks mee, ik ga mijn eigen gang. Als je iedere keer met je neus erop gedrukt wordt van: zoek eens een vriendin op om te gaan wandelen of probeer

dit of probeer dat eens.

O: Nee, dat snap ik.

P1: In het begin heb ik mij er niet zo aan geïrgerd. Maar de laatste tijd wel

P5: Dus ja, van stap een halte eerder uit is leuk. Ja, ik ga nooit met de bus.

## SMS personalisation

O: En de emailberichten als aanvulling op de SMS-berichten?

P5: Ik vind het persoonlijker dan de SMS-berichten. Daar wordt gezegd je hebt de afgelopen week zoveel stappen gedaan, je hebt zoveel dagen je doel gehaald. Het is moeilijk met elkaar te vergelijken. De SMS-berichten zijn in principe onpersoonlijk.

O: En vindt u de emailberichten persoonlijk?

P8: Ik vind ze wel persoonlijker dan de SMS-berichten

O: Maar los gezien van dit telefoongesprek; de smsberichten en de emailberichten. Vindt u dat u daar persoonlijk aandacht bij krijgt?

P1: De smsberichten vind ik niet persoonlijke aandacht. Het idee dat ik daarover heb is dat iedereen datzelfde krijgt. Voor de rest, email betreft dat vind ik wel persoonlijker.

O: En de inhoud van de SMS-berichten wat vindt u daarvan?

P9: Ja goed. Net als wat ik zeg, in het begin dacht ik ze vergeet dat ik COPD heb en toen schoot er later ook wel in dat dat van die berichten waren die gewoon naar iedereen nog gaan, dan begrijp ik het. Maar in het begin had ik wel zoets van "he ik heb COPD", dat vergeet je toch niet.

O: Ja klopt, de inhoud van de SMS-berichten zijn nu nog algemeen, het kan zijn dat deze berichten nog niet aansluiten op u als persoon.

P8: Ja dat weet ik ook, daar ga ik ook wel vanuit en tuurlijk er zijn een hoop dingen dat allemaal wel klopt, maar dan denk ik ja sorry dat gaat hem echt niet worden voor mij.

## Email

### Email frequency

O: Wat vindt u van de hoeveelheid van de emailberichten?

P7: Ik vind het goed zo.

O: En de emailberichten, wat vindt u daar van de hoeveelheid van?

P2: Ik vind 1x in de week inderdaad genoeg

O: Zou ik vak er zo'n email bericht willen ontvangen of is één keer per week voldoende?

P5: Eentje per week is voldoende niet vaker.

O: En wat vindt u van de hoeveelheid van de emailberichten?

P1: Dat vind ik wel goed, en dat is dan ook weer de aansluiting op het horloge. Dat vind ik wel prettig, van je hebt zoveel dagen wel het aantal stappen gehaald

O: Als we het hebben over de email berichten, die komen één keer in de week. Wat vindt u van die hoeveelheid?

P9: Vind ik ook leuk. Daar kijk ik echt naar uit op maandag, dat vind ik echt super leuk. Ik heb ze ook allemaal in een mapje gedaan dat ik straks niet terug gaan vallen als ik dat ding niet meer heb.

O: Zou u vaker een email bericht willen ontvangen of is één keer in de week voldoende?

P9: Nee, zoals maandag vind ik wel goed. Ja want nu kijk je er ook echt naar uit, hoeveel stappen heb ik nou gemiddeld gezet en hoe zit het met de doelen. Ja dat vind ik wel heel leuk.

O: En de hoeveelheid van de emailberichten, deze komen één keer in de week, wat vindt u van deze hoeveelheid?

P4: Ja wel goed

O: En wat vind u van de hoeveelheid van de emailberichten, die elke maandag komen?

P5: Ja, die vind ik uitstekend, prima. Die print ik ook allemaal uit, die bewaar ik netjes en netjes op volgorde liggen.

O: En de hoeveelheid van de emailberichten, wat vindt u van die hoeveelheid?

P6: Ja, meer dan genoeg. Want één keer in de week ga je ook de fitbit synchroniseren. Dan heb je ook genoeg informatie wat je moet doen.

O: Van de emailberichten, die komen 1x in de week. Wat vindt u van deze hoeveelheid?  
P8: Ja, dat mag van mij hoor, daar heb ik geen probleem mee.

O: Zou u juist vaker of juist minder vaak een emailbericht willen ontvangen?  
P8: Nou, doe maar zo als nu.

### Email content

O: en de inhoud van de email berichten wat vindt u daarvan?

P9: Ja, ik vind het hartstikke leuk. Anderen zeggen ja <naam> is helemaal enthousiast, maar dat ben ik ook. Ik ben helemaal enthousiast hoe dat gaat, hoe jullie die berichten stuurt en de email, dat vind ik helemaal super. Het moedigt de mensen ook echt aan. Ik vind het helemaal geweldig, niks meer dan lof.

O: En wat vindt u van de hoeveelheid van de emailberichten?

P1: Dat vind ik wel goed, en dat is dan ook weer de aansluiting op het horloge. Dat vind ik wel prettig, van je hebt zoveel dagen wel het aantal stappen gehaald

O: En wat vind u van de hoeveelheid van de emailberichten, die elke maandag komen?

P5: Ja, die vind ik uitstekend, prima. Die print ik ook allemaal uit, die bewaar ik netjes en netjes op volgorde liggen.

O: Als we het hebben over de email berichten, die komen één keer in de week. Wat vindt u van die hoeveelheid?

P9: Vind ik ook leuk. Daar kijk ik echt naar uit op maandag, dat vind ik echt super leuk. Ik heb ze ook allemaal in een mapje gedaan dat ik straks niet terug gaan vallen als ik dat ding niet meer heb.

O: Zou u vaker een email bericht willen ontvangen of is één keer in de week voldoende?

P9: Nee, zoals maandag vind ik wel goed. Ja want nu kijk je er ook echt naar uit, hoeveel stappen heb ik nou gemiddeld gezet en hoe zit het met de doelen. Ja dat vind ik wel heel leuk.

P8: Ja kijk, alles wat je stuurt dat klopt allemaal precies. Voor mijn kant dan ik heb er geen tijd voor

O: En wat vindt u van de inhoud van de emailberichten?

P1: Dat vind ik goed, niet verkeerd

O: en de inhoud van de emailberichten, wat vindt u daarvan?

P2: Het is wel wat ik verwacht.

O: En ook zeker de terugkoppeling naar uw aantal stappen, die kunt u zelf al zien, dus dat is even een kleine samenvatting.

P2: Ja, haha

O: En wat vindt u van de inhoud van deze emailberichten?

P6: Ja, ook goed

O: De inhoud van deze emailberichten, wat vindt u daarvan?

P7: Ja, hetzelfde ik vind ze goed

O: En de inhoud van deze emailberichten, wat vindt u daarvan?

P8: Het klopt allemaal precies wat u zegt en wat u stelt, zo moet je het eigenlijk zien.

O: En wat vindt u van deze inhoud van de emailberichten?

P4: Ook wel goed

O: Vindt u de emailberichten ook persoonlijk?

P7: Ja, ze klinken goed zijn leuke berichtjes.

O: Wat vindt u van de inhoud van die emailberichten?

P5: Nee, die vind ik heel goed.

### Email personalisation

O: Vindt u de emailberichten persoonlijk?

P4: Ja

O: De emailberichten zijn als aanvulling op de sms-berichten, ziet u dit ook echt als een aanvulling?

P9: Ja, echt, dat vind ik ook echt persoonlijk. Dat vindt ik hartstikke leuk

O: Vindt u de emailberichten ook persoonlijk?

P7: Ja, ze klinken goed zijn leuke berichtjes.

O: En vond u de emailberichten ook persoonlijk?
P1: Ik vind ze wel persoonlijk. Ik weet niet of jij naar iedereen hetzelfde stuurt, maar ik vond het wel persoonlijk.
O: En vindt u de emailberichten persoonlijk?
P8: Ik vind ze wel persoonlijker dan de SMS-berichten
O: En de emailberichten als aanvulling op de SMS-berichten?
P5: Ik vind het persoonlijker dan de SMS-berichten. Daar wordt gezegd je hebt de afgelopen week zoveel stappen gedaan, je hebt zoveel dagen je doel gehaald. Het is moeilijk met elkaar te vergelijken. De SMS-berichten zijn in principe onpersoonlijk.
O: Vindt u de emailberichten persoonlijk?
P6: Ja, die wel
O: Maar los gezien van dit telefoongesprek; de smsberichten en de emailberichten. Vindt u dat u daar persoonlijk aandacht bij krijgt?
P1: De smsberichten vind ik niet persoonlijke aandacht. Het idee dat ik daarover heb is dat iedereen datzelfde krijgt. Voor de rest, email betreft dat vind ik wel persoonlijker.
O: Afgelopen maandag zat er in het emailbericht een video toegevoegd, wat vindt u daarvan.
P9: Leuk, ja dat vind ik echt leuk. Soms had ik het idee van ze heeft niet in de gaten dat ik COPD heb. Het zijn van die mailtjes die naar iedereen gaan en toen had ik ook wel van ik heb ook nog COPD, dat is gewoon dat opstarten en dat vind je in het begin heftig, het was wel moeilijk
O: Vindt u de emailberichten persoonlijk?
P2: Jawel, je kunt wel zien dat het echt wel aan mij gericht is.
O: Ja, precies daarom is die extra mail ook verzonken, dat we toch de studie door willen zetten ondanks dat we ons bewust zijn van de warmte.
O: Ja, klopt de SMS-berichten zijn voor iedereen hetzelfde en de emailberichten wordt echt persoonlijk naar gekeken evenals de doelen die zijn op u afgesteld.
P9: Ja dat vind ik ook het leukst.

### Email relation to SMS

O: En de emailberichten als aanvulling op de SMS-berichten, wat vindt u daarvan?
P2: Ja, voor mij is het niet echt een aanvulling.
O: En vindt u de emailberichten ook van toegevoegde waarde
P4: Ja hoor
O: Wat vindt u van de emailberichten als aanvulling op de sms-berichten?
P1: Nouja, dan kom ik weer op het oude verhaaltje; zonder SMS-berichten waren die emailberichten voor mij genoeg. In die emailberichten stond er volgens mij ook wel eens aanvullingen; probeer dan nog eerst even wat meer te gaan lopen of dit. Daar ergerder ik mij niet zo aan als steeds die herhaling.
O: En de emailberichten als aanvulling op de SMS-berichten?
P5: Ik vind het persoonlijker dan de SMS-berichten. Daar wordt gezegd je hebt de afgelopen week zoveel stappen gedaan, je hebt zoveel dagen je doel gehaald. Het is moeilijk met elkaar te vergelijken. De SMS-berichten zijn in principe onpersoonlijk.
O: De emailberichten zijn als aanvulling op de sms-berichten, ziet u dit ook echt als een aanvulling?
P9: Ja, echt, dat vind ik ook echt persoonlijk. Dat vindt ik hartstikke leuk
O: Vindt u de emailberichten ook een aanvulling op de sms-berichten?
P8: O, ja dat denk ik wel. Ze zijn wel iets anders maar het komt op hetzelfde neer.
O: De emailberichten zijn bedoeld als aanvulling op de SMS-berichten, ervaart u dat ook zo? Vindt u het een aanvulling?
P7: Ja, dat is wel zo. Ik moet altijd eerst even zoeken van oja dat hoort daarbij. Ik vind het mooi zo.
O: En vindt u de emailberichten een aanvulling op de SMS berichten?
P6: Joa, dat wel.
O: Vindt u de emailberichten een aanvulling op de SMS-berichten?
P4: Niet opgelet

## Use of technology

### Remote Health Care

O: Wat vindt u van deze manier van gezondheidszorg op afstand?
P2: Ja ik vind het prima, anders deed ik niet mee
O: Deze manier van gezondheidszorg noemen we gezondheidszorg op afstand, wat vindt u van deze manier?`
P4: Ja ik vind prima manier, dat wel.
O: Wat vindt u van het gebruik van technologie voor deze gezondheidszorg op afstand?
P1: Ja, omdat het toch wel contact is vind ik het wel goed. Ik heb er verder geen moeite mee om niet elke week naar het ziekenhuis te moeten, dat vind ik wel prettig. Ik vind dit wel een goede manier om toch zo weer eens wat uit te testen. Ik kan niet zeggen dat ik dat vervelend vind.
O: Als u kon kiezen zou u dan liever deze manier van gezondheidszorg op afstand willen of iemand in real-life zien?
P6: Ja het is natuurlijk wel zo, er zit ook verschil in, dit is een module waarbij je zelf wat moet doen. Dan is het een perfecte manier. Maar als je lichamelijk wat mankeert dan is het wel zo dat de dokter aanwezig moet zijn.
O: Ja dus als we kijken naar het doel dat we nu hebben, om de fysieke activiteit wat te verhogen, zou u dan liever zo iets hebben of in real-life?
P6: Dan vind ik zo iets als dit wel prettig, deze manier is wel goed hoor.
O: Dit noemen we dan gezondheidszorg op afstand, wat vindt u van deze gezondheidszorg op afstand?
P9: Dat vindt ik leuk en als ik wat heb kan ik toch terugmailen of SMSen, dat heb ik ook 1-2 keer gedaan. Je kunt toch je vragen ook stellen en dat is toch ook belangrijk. Ik vind het heel leuk.
O: En vindt u dat u met zo iets genoeg persoonlijke aandacht krijgt?
P8: Ja, ik weet niet wat aandacht is. Ik vind zoals nu wat gunstiger. Maar met zo iets zit je mij niet in de weg dus voor mij is het een kwestie van goed lezen en dan heb ik geen problemen mee.
O: Deze manier noemen we gezondheidszorg op afstand. Wat vindt u van deze manier van gezondheidszorg op afstand?
P6: Ja helemaal goed, perfect geweldig.
O: Zoals deze coachingsmodule noemen wij gezondheidszorg op afstand? wat vindt u hiervan
P8: Ik vind het helemaal niet erg, ik vind het wel goed.
O: En wat vindt u er wel goed aan?
P8: Nou kijk, je houdt toch bij hoe iemand zich gedraagt en hoe het met diegene gaat en jullie kunnen daar iets over stellen qua gezondheid. Zijn allemaal wel belangrijke dingen vind ik.
O: Dit wordt gezien als gezondheidszorg op afstand. Wat vindt u van deze manier van gezondheidszorg op afstand?
P7: Ik vind het wel ideaal.
O: Als u zou kunnen kiezen om op deze manier de coachingsmodule te ontvangen of een face-to-face coaching om u fysieke activiteit te verbeteren.
P2: Dan heb ik liever dit, want dat kost veel minder tijd.

### Limitations

O: Wat vindt u van de coachingsmodule tot nu toe?
P8: Ik vind het wel prima, ik lees het wel maar als ik aan het werk ben kan ik er niks mee. Maar ik vind het wel mooi dat het er is. Ik lees het allemaal wel maar ja u weet niet waar ik dan mee bezig ben. Ik heb veel zittend werk en ik kan het dan wel lezen maar ja het is hartstikke mooi. En u denkt dan misschien die meneer <naam> doet geen flikker maar ik zit dan 2x 4,5 uur achter het stuur.
en dan met name het bandje niet:
Omdat die niet werkt als ik normaal fiets. En zwemmen telt die ook niet mee terwijl ik dat veel doe.
P9: Wat ik jammer vind is dat die de fitness niet opneemt, ik ga 2x per week naar de COPD arts en dat neemt die niet op.
P5: Ja, en ik zit wel vaak op de fiets, dus toen heb ik ook gezegd; mag fietsen ook? Dus ik zit wel elke dag met dat ding om mijn enkel en dan zit ik 10-15minuten op de hometrainer. Die staat in een redelijke koele ruimte, dan is die beweging wel vol te houden.

O: Ja en dan telt die ook wel stappen als u hem om u enkel heeft zitten.
P5: Ja dan telt die wel stappen ja
O: Ja want dat is inderdaad ook iets waar wij tegen aan lopen en ook zeker als verbeterpunt zien, is dat stappen niet de enige beweging is.
P5: Nee, maar dokter <naam> maakte toen tegen mij ook al een opmerking; "het ding werkt redelijk goed maar nog niet helemaal optimaal want bij fietsen hebben we een probleem" en dat heb ik ook gemerkt net als met de winkelwagen; je houdt je polsen stil, je loopt wel maar hij telt bijna niet.
P9: Ja, van de loopband neemt die niet op. En dan loop ik echt een halfuur en dan denk ik nu heb ik heel veel voetstappen en dan is het nul.
O: Vindt u dat de coachings module aansluit op uw behoeftes qua lichamelijke activiteit?
P6: Kijk, dit meet alleen de stappen, ik had liever gezien dat die ook de activiteit had gemeten zoals fietsen of wat dan ook
O: Daar ben ik het met u mee eens, het is jammer dat die alleen de stappen meet.
P6: Ja precies, hij noteert maar één item.
P5: de eerste twee weken had ik enorm probleem om de gegevens door te sturen vrijdag. Volgens mij was die gewoon nog niet goed ingesteld want ik kon ook op mijn telefoon het aantal stappen zien en de week daarna kon ik dat niet meer. Toen had ik alleen dat vierkantje met die puntjes op mijn telefoon. en ik hoef ik maar twee keer op het knopje te drukken en hij stuurt het door. Dan gaat het heel makkelijk
P7: Vind het wel jammer dat fietsen niet mee telt, als ik heb gefietst zie ik geen extra activiteit helaas.
O: Ja klopt, het bandje telt het aantal stappen dus het lopen.
O: Wat vindt u van de eCoaching module tot nu toe?
P5: Ja ik doe mijn best, daar hebben we ook al wat correspondentie over gehad. Met dit warme weer vind ik het niet helemaal representatief. Je werkelijke bewegingsritme en dat vind ik eigenlijk wel heel jammer.
O: Ja, dat ben ik met u eens, het weer is niet heel handig om dit te doen, zoals wij in de mail hebben uitgelegd, we vinden dit zelf ook heel jammer maar we hebben toch besloten om het door te laten gaan om te kijken van hoe worden de berichten nu ervaren.
P5: Ja, dat kan in principe voor jullie toch ook geen juist beeld geven
P5: Het is ook een uitzonderlijke situatie met de warmte, je moet het zelf ook een beetje aanpassen je kunt je nu niet 100% inspannen.
P7: Maar het warme weer werkt ook niet mee voor deze coachingsmodule. Als het niet zo warm was geweest had het prima gekund.
P7: andersom is het anders; ik had misschien eerder door moeten seinen dat ik blaasontsteking had, toen had ik geen zin om te bewegen, toen was ik veelte moe. Ik had alles in de war; de suiker de stoma alles.
P1: Van ga wandelen, nou ik kan met mijn been niet echt wandelen, ik probeer zoveel mogelijk te lopen en ik krijg er een beetje genoeg van.
P1: Maar goed ik heb nog geen weerstand dat voel ik wel, ik ben alleen op de fiets in beweging maar ik heb geen weerstand.
P8: Nouja dan lopen we wel en dan zo de laatste paar dagen loop ik ook veel, dat heeft u ook wel gezien denk ik. Ja deze dagen vandaag niet veel, daar is het veelte warm voor. Het weer werkt niet mee, laten we dat voorop stellen.
O: Het is meer dat het niet op uw leefwijze, vanwege werk, aansluit?
P8: Ja, precies, ik ben dan wel met pensioen maar ik ben niet iemand die stil kan zitten. Ik moet doorgaans wat te doen hebben. Daarom doe ik mijn oude werk ook weer, dat is voor mij nog altijd een hobby en ik voel mij daar zeer goed bij.
O: Wat vindt u van de coachings module tot nu toe?
P4: Hij valt iedere keer uit, dan moet ik iedere keer connecting.
O: Het bandje bedoelt u?
P4: Ja
O: Want dan kan die geen verbinding meer maken met uw mobiele telefoon?
P4: Ja ik moet dan elke keer opnieuw connecten
O: Ja elke vrijdag moet u opnieuw synchroniseren
P4: Ooohh, ik doe elke dag soms zelfs 3x per dag.

O: In principe hoeft u alleen op vrijdag te doen. Als het goed is worden dan alle gegevens goed opgeslagen want de gegevens kunnen eerst op het bandje opgeslagen worden en op vrijdag worden ze dan verstuurd.

P4: Ah sooo, op de telefoon krijg ik telkens zo'n tekentje en dan moet ik weer opnieuw connecten. Ja, misschien heeft dat met de instellingen te maken.

O: Ik zou eens naar de instellingen voor u kijken.

P4: Oké

O: Wat vindt u van de coachings module tot nu toe?

P7: Hartstikke goed, maar ik heb niet zoveel energie om er aan mee te doen. Ik heb een blaasontsteking er tussendoor gehad en nog wat dingetjes. Maar eigenlijk krijg ik er wel een boost van, van kom op!

Maar het warme weer werkt ook niet mee voor deze coachingsmodule. Als het niet zo warm was geweest had het prima gekund.

### Replacement of usual care

O: Als u zou mogen kiezen, om u fysieke activiteit te verbeteren, zou u dan voor deze manier kiezen of toch met iemand een afspraak maken om naar toe te gaan.

P4: Deze manier

O: En zou ik mogen vragen waarom u dan liever voor deze manier kiest?

P4: Ja, hoe moet ik dat uitleggen, ik vind dat fijner zo om uit te voeren wat er in de SMS gezegd wordt, die opdrachten uitvoeren dat is fijner.

O: Wat zou u liever willen dit of een afspraak met iemand?

P7: Dan moet je wel eerst weten waar je het dan over hebt, eerst een fysieke afspraak dan kan het wel zo. Dan kun je hiermee verder gaan.

O: Als u kon kiezen zou u dan liever deze manier van gezondheidszorg op afstand willen of iemand in real-life zien?

P6: Ja het is natuurlijk wel zo, er zit ook verschil in, dit is een module waarbij je zelf wat moet doen. Dan is het een perfecte manier. Maar als je lichamelijk wat mankeert dan is het wel zo dat de dokter aanwezig moet zijn.

O: Ja dus als we kijken naar het doel dat we nu hebben, om de fysieke activiteit wat te verhogen, zou u dan liever zoets hebben of in real-life?

P6: Dan vind ik zoets als dit wel prettig, deze manier is wel goed hoor.

O: Om u fysieke activiteit te verbeteren, zou u dan kiezen om iemand in real-life te zien of deze gezondheidszorg op afstand?

P9: Dit

O: En waarom zou u voor dit gaan dan?

P9: Ja, dat weet ik niet. Ik ben ook bij de diëtiste geweest, dat werkte gewoon niet. Maar nu als ik 's avonds een koek bij de koffie pak ja <naam> dan moet je voor deze 8 uur lopen. Ik vind dit leuker.

O: Zou u bijvoorbeeld dit contact op afstand willen in plaats van een afspraak in het echte leven om u fysieke activiteit te verbeteren? Wat prefereert u, als u fysieke activiteit wilt verbeteren, prefereert u dan een afspraak met iemand in het echt, of zou u dan zoets als dit wel leuk vinden?

P5: Nee ik vind dit een goede proef, ook voor mijzelf. Ik ben ook echt benieuwd na die 9 weken. Is er nou wat te zien aan mijn suikerwaardes? Dat die verbeterd zijn des te ja of te nee. Ik doe wel iets meer als normaal met dit warme weer. Normaal met dit warme weer zou ik echt mierstil zitten. Als mijn suikers verbeteren dan houd ik dit voor mijzelf bij.

O: Om uw fysieke activiteit te verbeteren, zou u dan liever deze module volgen of hiervoor met iemand een afspraak maken en in real-life afspreken?

P8: Dan zal ik zeggen, doe het maar op de manier hoe u het nu doet. Kijk ik lees alles wel dat is geen enkel probleem maar dan denk ik, even goede vrienden, maar zo loopt het allemaal niet.

O: Zou u dit contact op afstand willen in plaats van een afspraak bij de dokter of verpleegkundige jouw fysieke activiteit te verbeteren?

P1: Ik denk dat het contact met de verpleegkundige ook wel prettig vind, zo op zijn tijd. Niet elke maand maar zo op zijn tijd. Dat vind ik het wel prettig om even met haar te praten.