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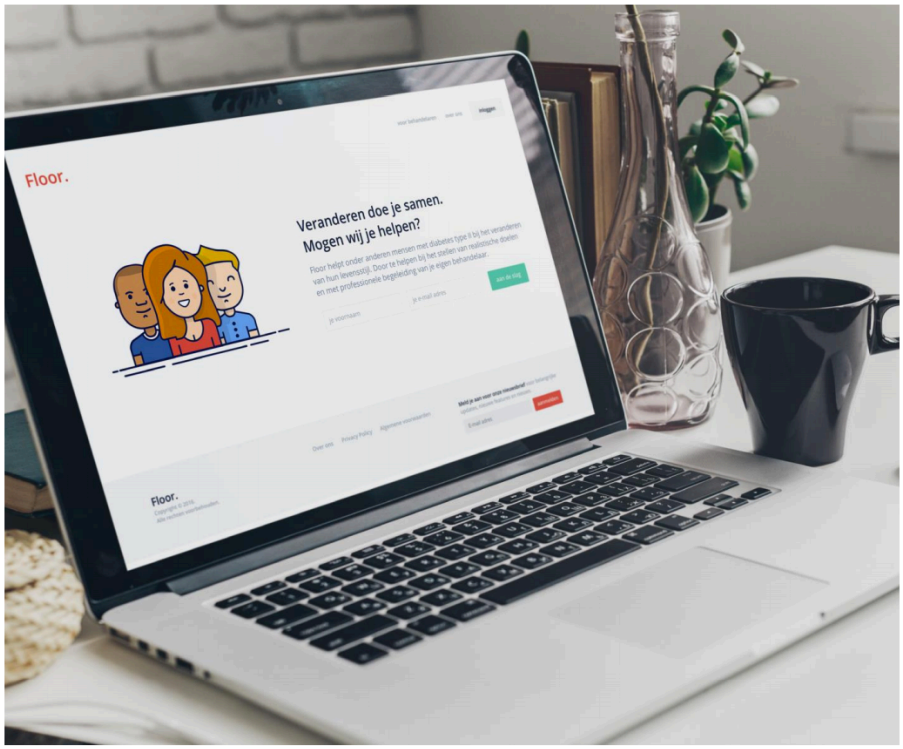

Master thesis Health Sciences

Research into the needs and barriers of diabetic type 2 patients concerning lifestyle monitoring and coaching, in order to improve a web based eHealth platform Floor.

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ABSTRACT

Background

Diabetes is a so-called metabolic disease. It affects the way the body processes glucose. Diabetes occurs when the pancreas does not produce (enough) insulin, or when the body cannot effectively use the insulin it produces [WHO, 2016]. Diabetes Mellitus is a fast-growing disease. According to the Dutch National Institute for Public Health and Environment (RIVM) the amount of patients will increase to 1.3 million in the year 2025. Diabetes is a chronic disease that requires continuous treatment. Diabetes treatment is mainly focused on preventing complications by keeping the glucose concentration of a patient within normal range. For diabetes patients, self-management and a change of lifestyle is important for the prevention or treatment of Diabetes. To improve self-management among diabetes type 2 patients, health coaching can be a great benefit (Huffman, 2007). Technology can play an important role in health coaching and helping patients develop competence for self- management and behavior change. Technology in the field of health is often called eHealth (Gemert-Pijnen, 2013). eHealth can play in important role in providing online support, coaching and monitoring. (Gemert-Pijnen, 2013). Many eHealth technologies are designed for diabetic patients. Most technologies aiming at lifestyle changes used mobile eHealth interventions, in which patients received feedback on for instance their blood glucose levels, medication or pedometer data. Yet none of these technologies seem to have led to long-term usage. It is known from previous research that long-term changes in nutrition and exercise are difficult to maintain for most diabetes type 2 patients (Klein et al., 2004). Adherence is very difficult to realize. According to van Gemert-Pijnen (2013) eHealth technologies should be persuasive to increase adherence. Technology should contain persuasive elements and triggers to stimulate users to persist and stick to their behaviour change programs and continue using this (Van Gemert-Pijnen, 2013).

Floor is an eHealth application that is designed for Diabetic Type 2 patients to help them change behaviour, to gain a healthier lifestyle. Floor is developed by Nedap Healthcare.

Objective

The aim of this research is to gain more insight in the needs and barriers of the patients in the current care and their experiences and expectations with online coaching. Furthermore, the persuasiveness of the eHealth application Floor will be assessed by using the Perceived Persuasiveness Questionnaire (PPQ). Lastly, the eHealth application Floor will be heuristically analyzed whether the elements of the Persuasive System Design (PSD) model are applied or not.

Method

To investigate the needs and barriers of patients (N=6), a qualitative semi-structured interview was held. The topics for the interview were based on lifestyle, experiences with the current care, the needs and barriers, support from family and friends and expectations from online coaching.

The interviews were inductive coded and analyzed in several steps. Eventually several themes were found. Another research method was the Perceived Persuasiveness Questionnaire (PPQ) which was completed by 5 users of Floor. This questionnaire has been used to analyze the persuasiveness of the current eHealth application Floor. The PPQ has been analyzed by calculating the mean for each item of the PPQ per respondent. This is calculated from the numbers that patients graded for each question on a 5-points Liker scale (1 for totally not agree and 5 for totally agree). Lastly, a heuristic evaluation of the eHealth application Floor is done by evaluating the Persuasive System Design principles of Oinas-Kukkonen & Harjumaa (2009). The main goal of heuristic evaluation is to identify any problems associated with the design of user interfaces. The simplicity of heuristic evaluation is beneficial at the early stages of design (Nielsen & Molich, 1990). These design principles in this evaluation are: primary task support, dialogue support, system credibility, and social support. For each principle the author has reviewed whether the given design principle is already implemented in Floor or not. And if the principle is not implemented in Floor yet, a short advice is given on how it could be implemented in Floor.

Results

The results of the interviews showed that the patients have need for clear advice on nutrition. Also they have the need for social support, mental support and professional support. The barriers that patients are facing currently are: difficulties in social pressure, difficulties in cooking healthy, traditional approach of dieticians that does not work and asking help from families is a barrier. The expectations of patients from online coaching: personal advice/guidelines on nutrition and exercise, "just in time care" (support on difficult times and 24/7 support). The barriers that were mentioned are: language barriers for patients that do not speak Dutch very well, patients that do not use internet. Lastly adherence was mentioned as a barrier: patients mentioned it is too much effort to use an app daily.

The persuasiveness of Floor was scored on average by the users, which is 2.8 (minimum score was 1 and maximum was 5). Lowest score was for the element perceived effort (2.4) and unobtrusiveness (2.5). None of the categories were scored high (>3.5). All other categories scored on average (2.5>3.5): primary task support, perceived credibility, perceived persuasiveness, dialogue support. The results of the heuristic evaluation can be found in the results section.

Conclusion

Patients need personal and just in time care. The current traditional approach does not work, which means that it does not help them to change their lifestyle. In their daily life they have need for support (social, mental and professional support). Therefore, they expect from online coaching that it is personal, available 24/7 and does not ask too much effort. Currently the persuasiveness of Floor has been scored on average by the patients. Patients scored the perceived effort as the lowest. This might be understandable since Floor expects that patients fill in their daily

satisfaction. To use an application daily could be experienced as much effort. Lastly according to heuristic evaluation, different elements of the PSD model are applied in Floor. The *primary task support* is clear for users; it is tunneled and tailored for only DM 2 patients. However the application is not much personalized and there is no option for self-monitoring. In *dialogue support* Floor can gain more. There are very less praise, rewards, reminders and suggestions. Patients only receive a daily SMS as a reminder to fill in their satisfaction in Floor. On *system credibility* Floor can reach more by other authorities, third party endorsements. However, the system already looks very professional and trustful. Lastly, on *social support* Floor tries to give support via buddy (friend/family that the user invites through the system). But there is no peer support, social learning or comparison, cooperation, competition or recognition of a user.

Key words: Diabetes type 2, lifestyle, motivation, self-management, eHealth, eCoaching, online coaching.

INTRODUCTION

1.1 Diabetes

Diabetes is a so-called metabolic disease. It affects the way the body processes glucose. Diabetes occurs when the pancreas does not produce (enough) insulin, or when the body cannot effectively use the insulin it produces [WHO, 2016]. Diabetes is a complex disease with multiple subtypes associated with different etiologies, diagnostic indicators, symptoms and clinical management strategies [American Diabetes Association, 2010].

There are different types of Diabetes Mellitus, however the majority of the patients have diabetes type 2 (90%). Diabetes type 2 usually occurs in adults when the body becomes resistant to insulin or does not make enough insulin. In the past three decades, the prevalence of type 2 diabetes has risen dramatically in countries of all income levels [WHO,2017]. Diabetes type 1, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself. For people living with diabetes, access to affordable treatment, including insulin, is critical to their survival [WHO,2017]. The third category, 'other specific types of diabetes', includes diabetes caused by a specific and identified underlying, such as genetic defects or diseases of the exocrine pancreas [WHO, 2017).

Diabetes of all types can lead to complications in many parts of the body and can increase the overall risk of dying prematurely. Diabetes is characterized by elevated levels of blood glucose, which leads over time to serious damage to the heart, blood vessels, eyes, kidneys, and nerves [WHO, 2017]. Some possible complications are heart attack, stroke, kidney failure, diabetic foot, vision loss and nerve damage. In pregnancy, it can increase the risk of fatal death and other serious complications. According to the registration of GP's, approximately in 40-56% percent of diabetic patients a complication occurs (Poortvliet, Scrhijvers & Baan, 2007).

1.2 Prevalence

Diabetes Mellitus is a fast-growing disease. In the Netherlands, there were approximately 196.000 diabetic patients in 1990. According to the Dutch National Institute for Public Health and Environment (RIVM) this amount will increase to 1.3 million in the year 2025. This amount consists 90% of Diabetes type 2 and 10% of type 1 (Baan & Schoenmaker, 2009). Diabetes is on the 8th place in the top 10 most expensive diseases in the Netherlands, which amounts approximately € 1.7 billion in the year 2011. Consequently, improving diabetes care can have large social and economic impact since it will affect a large number of people.

1.3 Treatment of diabetes

Diabetes is a chronic disease that requires continuous treatment. Diabetes treatment is mainly focused on preventing complications by keeping the glucose concentration of a patient within normal range. For patients with diabetes type 2, treatment initially focuses on reducing the insulin resistance. The first treatment step is to educate the patient about a healthy diet and lifestyle. Since insulin resistance is heavily correlated with obesity, overweight patients are encouraged to try and lose weight (Kahn, Hull & Utzschneider, 2006). Patients are also advised to exercise regularly. Exercise reduces the blood glucose concentration, since the muscles use glucose as energy (Goodyear, Laurie, Kahn & Barbara, 1998).

If adjustments in lifestyle no longer keep the glucose concentration within healthy range, oral medication can be added. Different types of medication exist; some of the medication heighten the amount of insulin the pancreas creates. Other medication lowers the amount of glucose the body absorbs from food. When oral medication is no longer effective, diabetes type 2 patients have also start injecting insulin, requires more education about how their daily habits influence their insulin needs (NHG-Standaard, 2013).

1.4 Disease management

For diabetes patients, it is important to learn how to manage their disease. They should learn to take responsibility for understanding how to take care of themselves. How to avoid potential problems and exacerbation, or worsening, of their disease. Several studies have shown effective diabetes education result in better blood glucose values (Tshiananga et al., 2013). Effective diabetes education also has been shown to have a positive effect on the patients' quality of life (Cochran & Conn, 2008) (Trento et al., 2004). Diabetes education is also important from a costs perspective. The costs of education are far lower than the costs of treating long-term complications and co- morbidities (Loveman et al., 2003). Better self-management skills also reduce the number of hospital admittances due to hypoglycaemia (dangerously low blood glucose levels). This happens mostly when a patient injects too much insulin. These hospital admittances form a significant part of the total healthcare costs associated with diabetes (Healy et al, 2013) (Duncan et al, 2011) (Robbins et al., 2008). More education can help a patient to understand diabetes better and develop knowledge, understanding and skills. Diabetes education is important in managing diabetes, because it constitutes a large part of treatment. The main focus is on teaching the patient effective self-management skills (NDF, 2014).

1.5 Self-management

The definition of self-management according to Barlow et al. (2002) is as follows: "Self-management refers to the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life style changes inherent in living with a chronic condition. Efficacious self-management encompasses ability to monitor one's condition and to affect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory quality of life. Thus, a dynamic and continuous process of self-regulation is established".

Another definition, according to the NDF self-management, is the individual ability of patients to address health problems wherever possible and in case health problems occur: dealing well with symptoms, treatment, physical, psychological and social consequences of the (chronic) disorder and related lifestyle adjustments. Patients are able to monitor their own health condition. Also, to show cognitive, behavioral and emotional responses that contribute to a patients' unique circumstances best achievable (health) outcomes and a satisfactory quality of life (NDF, 2014).

As mentioned before, Diabetes is a chronic disease that requires continuous treatment. Diabetes treatment is mainly focused on preventing complications. A change of lifestyle is important for the prevention or treatment of Diabetes. Patients should not only take their medication and adhere to general principles, but they are also responsible for measuring their weight and blood glucose level for example. This is important for caregivers to have more insight in the development of diabetes. Furthermore, patients should be more physically active and eat healthier. Diet and exercise are considered important components of the treatment strategy for adults with type 2 diabetes. Appropriate use of diet and exercise can improve insulin sensitivity and glycemic control and decrease the need for oral medications or insulin (Chandalia et al., 2000; Horton, 1988).

Overall, Barlow et al. (2002) stated that compared to no intervention, self-management approaches can potentially provide benefits for patients, mainly in terms of knowledge, behavior, self-efficacy and some aspects of health status. Self-management plays a significant role in treatment of diabetes (NIVEL, 2014). A meta-analysis of self-management education for adults with type-2 diabetes revealed improvement in glycemic control at immediate follow-up. However, the observed benefit declined one to three months after the intervention ceased, suggesting that continuing education is necessary (Williams, Freedman &Deci, 1998). A review of diabetes self-management education revealed that education is successful in lowering glycosylated hemoglobin levels (Norris et al., 2002).

Successful self-management could improve the quality of life for chronic patients and reduce their healthcare services use (National Voices, 2014). Effective self- management programs have been proven to reduce healthcare costs and improve quality of life in several

chronic conditions (Murray, 2012; UK Department of Health, 2005). However, self-management has also barriers.

Researchers claim that as much as 98% of diabetes related care is self-management (Mohebi & al., 2013). Self-management of a diabetes patient is linked to the patient's health-related goals and the actions patients undertake to reach these goals. These health-related goals mainly include: prevention of complications, maintain a good quality of life and achieve a certain sense of control over the diabetes (Mohebi & al., 2013).

As mentioned before a healthy lifestyle is very important for diabetes patients. To actually change the behavior to gain a healthier lifestyle current self-management is not enough. Patients that want to change their lifestyle habits are mostly referred by a GP to a dietician. However, a dietitian has only 3 consultation hours with a patient. During these consultations advice regarding nutrition and exercise is given to a patient. But when the patient returns home, it is hard to apply and maintain this advice. More support is needed to develop self-management competences to change behavior in diabetic patients.

1.6 Coaching for diabetes type 2 patients

To improve self-management among diabetes type 2 patients, health coaching can be a great benefit (Huffman, 2007). Health coaching is defined as: *the 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*" (Huffman, 2007).

Another definition of health coaching: *"a form of health education that …guides and prompts a patient to be an active participant in behavior change*" (Wilkie et al., 1995). Health coaching focuses on supporting people to reach new goals. It is different than didactic teaching, which typically emphasize imparting new knowledge. Health coaching is often compared with motivational interviewing; however, health coaches make use of motivational interviewing techniques. Motivational interviewing (MI) is the only health coaching technique to be fully described and consistently associated with positive behavioural outcomes (Butterrworth, Linden & McClay, 2007). MI is a directive (goal-oriented), client-centred counselling style for helping clients to explore and resolve ambivalence about behaviour change (Rollnick, Miller & Butler, 2008). The effect of MI was first demonstrated in the treatment of addictions, such as illegal drugs and alcoholism. Continued research showed that MI is effective in improving general health status, promoting physical activity, improving nutritional habits and managing chronic conditions such as obesity and diabetes (Addiction Technology Transfer Center, 1999).

For diabetes type 2 patients it is important to have the knowledge of the possible benefits of exercise and nutritional changes, in which health coaching can be important (Redekop et al., 2002). If patients know the possible benefits of these lifestyle changes, they can create awareness about their illness and be motivated to reach these benefits (Radekop et al., 2002). Awareness and

motivation are important elements to change behavior and gain a healthier lifestyle.

Research shows that health coaching has a positive effect on outcomes for diabetic patients: improvement in adherence to medications (Melko et al. ,2010), diet and exercise regimens (Whittemore et al., 2001; Sacco et al., 2009; Whittemore et al., 2004) and lower levels of depression (Sacco et al., 2009).

According to previous research health coaching can be effective if it is focused on self-efficacy and self-management skills of the patient (Wong & Rieger, 2013). Self-efficacy is an important factor in self-management. One definition of self-efficacy: patients coping with the conditions, management, and practical issues of their illness" (Mohebi et al., 2013).

1.7 eHealth technology

Technology can play an important role in supporting and developing these competences for self-management and behavior change. To promote self-care, interactive eHealth applications have been developed for self-monitoring and information exchange (Nijland, 2011). For example, "eVita", Personal Health Record (PHR) with Self-Management Support and Coaching, for Type 2 Diabetes Patients (Sieverink et al.,2016). PHRs support a patient centered approach by allowing patients to get more involved in their own disease management and decision-making process. It has been shown that a PHR could be beneficial for people with diabetes type 2 (Price et al., 2015). Another eHealth Technology is My Health Platform (MijnGezondheidsplatform) for chronic patients to let patients, in collaboration with their healthcare providers, have control over their own health, lifestyle and behaviour (Medicinfo, 2012). My Health Platform is also a Personal Health Record. Most recent technology which is very popular for diabetic patients is MySugr app. The introduction of the internet into clinical practice has brought many opportunities for self-care, as it can be used as a powerful medium for promoting healthy lifestyle and for increasing the understanding about the condition (Nijland, 2011). Self-management becomes easier with the use of technology and internet; it makes communication and care less dependent on a specific time of place. The use of information and communication technology (ICT) in the field of health is often called 'eHealth'. eHealth is defined by van Gemert-Pijnen (2013) as: *'the use of information and communication technologies, internet-technology in particular, to support or improve health and healthcare, without restrictions to a specific group of users or particular disease*' (van Gemert-Pijnen et al., 2013).

eHealth provides possibilities to meet the requirements of self-management by supporting patients in providing online information, education and diagnosis, support in treatment choices, monitoring their disease, for example by keeping track of readings (telemonitoring) and contact with peers (peer-to-peer support) (van Gemert-Pijnen et al., 2011).

eHealth can provide important online support for self-management skills for chronic patients by increasing information exchange between healthcare professionals and patients as well as by monitoring the performance of the disease management program (Sieverink et al., 2014).

eHealth can play an important role in disease management by offering opportunities to improve both Quality of Life of patients and increase efficiency in health care: the same or even better outcomes may be achieved with fewer resources (van Gemert-Pijnen, Peters & Ossebaard, 2013). But, the use of these technologies in the health care area is still in its early stages, and the possible high potential of e-care and tele-care programs is not reached yet (IJsselsteijn, de Kort, Midden, Eggen & van den Hoven, 2006)

The introduction of the internet into clinical practice has brought many opportunities for self-care, as it can be used as a powerful medium for promoting healthy lifestyle and for increasing the understanding about the condition (Nijland, 2011). However, to be effective in empowering patients' self-awareness and engagement, web applications should be designed to allow individuals to tailor the program to their own specific needs, because patients are increasingly demanding convenient access to a high level of personalized healthcare (Nijland, 2011). To promote self-care, interactive eHealth applications have been developed for self-monitoring and information exchange. One example of such an application is Floor, a web-based eHealth platform for diabetes type 2 patients, which is the subject of this study.

1.8 Persuasive technology

In the previous paragraph eHealth technology has been explained.. Many eHealth technologies are designed for diabetic patients. Most technologies aiming at lifestyle changes used mobile eHealth interventions, in which patients received feedback on for instance their blood glucose levels, medication or pedometer data. Yet none of these technologies seem to have led to long-term usage. It is known from previous research that long-term changes in nutrition and exercise are difficult to maintain for most diabetes type 2 patients (Klein et al., 2004). Adherence is very difficult to realize. According to van Gemert-Pijnen (2013) eHealth technologies should be persuasive to increase adherence. Technology should contain persuasive elements and triggers to stimulate users to persist and stick to their behaviour change programs and continue using this (Van Gemert-Pijnen, 2013)

Persuasive technology' offers insights about features that can be built into technology to make it more convincing without being coercive (Fogg, 2003). Oinas-Kukkonen and Harjuma (2009), describe persuasive technology as '*computerized software or information systems designed to change, shape or reinforce behaviours or attitudes or both without using deception or coercion'*.

Persuasive technology focuses on how technology can be designed to empower and motivate users to realize their goals (Van Gemert-Pijnen, 2013). When developing eHealth technology, it is important to use persuasive design techniques to modify the format and content of the technology while taking the users motivation, persuasion styles and ability to use the technology into account (Chatterjee & Price, 2009; Fogg, 2009). This ensures using the right triggers in the right format and at the right moment and consequently leads to an increase in adherence to the system (Van Gemert-Pijnen & Kelders, 2013). Oinas-Kukkonen and Harjuma (2009), propose various design principles for persuasive system content and functionality. These principles will be described in the next paragraph.

Persuasive elements are important to make the technology more attractive. An attractive technology will help patients to use it more regularly, because it is more challenging. Especially for diabetes patients change of lifestyle is important. To realize this change, patients should adhere to the rules needed for change. Persuasive elements are friendlier and can help patients to adhere more to the lifestyle rules.

1.8.1 Persuasive System Design Model

A framework for designing persuasive systems and that will be used within this study, concerns the Persuasive Systems Design (PSD) model from Oinas-Kukkonen and Harjumaa (2009) (Figure 1). This concerns a useful model that provides ideas and tools for designing technological interventions that are well described and persuasive (Oinas-Kukkonen & Harjumaa, 2009).

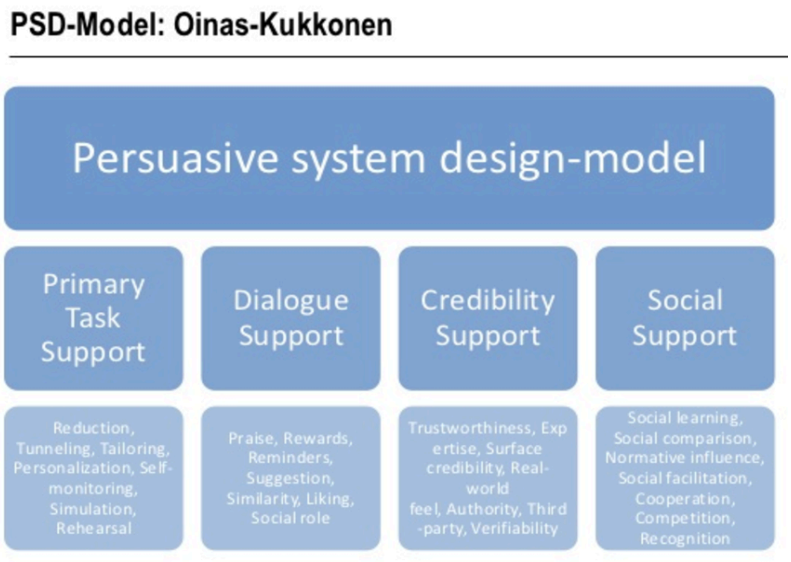

Figure 1: PSD Model

The model describes persuasive features (design principles) in the categories of primary task support, dialogue support, system credibility support and social support. The category 'primary task support' contains design principles, which support the performance of the user's primary tasks and activities. Principles within the category 'dialogue support' refer to the human-computer dialogue and are techniques to achieve the aims set for using the technology (Van Gemert-Pijnen & Kelders, 2013; Oinas-Kukkonen & Harjumaa, 2013). The design principles from

the category 'system credibility' relate to the trustworthiness of the system and the believability of the design. Lastly, the principles in the 'social support' category indicate how to design a system in order to motivate users by leveraging social influence (Van Gemert-Pijnen & Kelders, 2013; Oinas-Kukkonen & Harjumaa, 2009).

1.8 eHealth application Floor for Diabetic Type 2 patients

Nedap Healthcare is an innovative software company that developed a new online eHealth application for diabetes type 2 patients (www.floorhelpt.nl). Floor has been created after research of Stefan Vermaas. According to interviews with patients, nurse practitioners and general practitioners it showed that patients are hardly supervised in managing their own disease (Vermaas, 2015). This is also confirmed by the health care inspection, it concludes that patients receive little support in self-management, and patients are not always central in the care they receive (Health Care Inspectorate, 2012). More intensive guidance is necessary to increase the success of lifestyle change, and to prevent the complications of diabetes. More intensive (personal) support is labor-intensive and involves high costs. Taking into account the increase in number of patients with type 2 diabetes are technological innovations needed to improve the care of diabetes type 2 (Baan & Schoemaker, 2009). EHealth is a promising solution to support people with diabetes lifestyle changes related to diabetes.

Nedap Healthcare created an online eHealth application Floor to help improving the quality of life of diabetic type 2 patients. Floor wants to help maintain patients their disease, by helping them change their lifestyle. From market research and collaborations with psychologists, dieticians, GPs it showed that behavioral change is an important aspect in maintaining diabetes type 2. This leaded to creating Floor. Floor contains a buddy (friend or family member) and a mentor/coach whom helps DM2 patients to gain a healthier lifestyle. To further develop the product, Nedap Healthcare wants to further investigate how diabetes type 2 patients can be supported in adopting a healthy lifestyle.

Floor has several functionalities for patients to help them change their lifestyle. The main functionalities for DM2 patients are:

1. *Building and monitoring own goals related to lifestyle and exercise:*

DM2 patients can set up their own goals and divide them in small steps. For example: a patients goal can be: I want to lose weight, my goal is 20 kg. To reach this goal the patient needs to set up some small steps: I will not eat candies or chocolate in the evening, instead I will eat crackers with some cheese or one fruit. Or I'm going to exercise 30 minutes every day. By working on those small steps the patient can reach his "big goal". The mentor (online coach) can help the patient with setting up a goal and steps.

2. *Working with online mentors*

Patients can ask questions etc. to online mentors. Those mentors are specialized in the field of nutrition and exercise. They give personal advice to patients by looking on their personal circumstances. They do not work with a one size fits all mentality, because each patient is different and has different needs.

3. *Exchanging satisfaction with healthcare providers, but only data about daily satisfaction and SRHI (Self-report Habit Index)*

The daily satisfaction is measured by a 5-Points Likert Scale, this scale consists of smileys as shown in figure 2. The patients need to fill in his daily satisfaction by clicking on a smiley. The smileys are arranged from most (left) not satisfied at all, to most right which is totally satisfied. This satisfaction that is monitored is about the small steps that the patient tries to reach.

Another monitoring tool is the Self report Habit Index (SRHI). The SRHI consists of four questions that shows how ordinary a behavior feels for the patient. In other words, to measure to what extend the new behavior feels as an habit for the patients. Both of those data can be seen by the caregivers such as the GP, Nurse Practitioner or the dietician.

4. *Contact with a buddy whom can help motivating the patient when needed*

A buddy is someone from the patient's own network such as a friend or family member. The patient invites this person via Floor by adding an e-mailadress. The buddy receives an email with an invitation to log in on Floor. Via Floor the buddy and the patient can have contact. The buddy does not see any data of the patient.

Floor currently does not have many functionalities. To give a quick overview the main functionalities are presented in table 1.

FUNCTIONALITY	GOALS	WHO
Online coach/chat	Via online chat or videocalling the coach can help the patient with their questions	Coach - patient
Daily satisfaction	Patients' needs to fill in (daily) about their satisfaction	Patient
Goal and steps	Patients need to create a goal and make small steps out of this	Patient together with coach
Results	Shows graphs about satisfaction of the goal of the patient and one graph about SRBHI. SRBHI shows if a behavior has really become a habit.	The caregiver and coach can see those graphs and contact the patient
Wist je dat? / Did you know this?	This functionality is not ready yet. But in future this will show educational videos and e-learnings about Diabetes Type 2, nutrition, exercise, physical activity and behavior change etc.	Patient

Table 1: overview of functionalities in Floor

Figure 2: Dashboard Floor

1.9 Research objective

The purpose of this study is to gain insight in the needs and barriers of DM2 patients concerning lifestyle monitoring and coaching. Furthermore, a heuristic evaluation of the eHealth application Floor will be done by looking at each individual element of the Persuasive System Design Model. Since Floor was not developed based on this model. By analyzing these experiences, eventually recommendations can be given for Nedap Healthcare to improve Floor. This research is conducted on behalf of Nedap Healthcare and The University of Twente.

1.10 Research Question

To achieve the research objective of this study the following research question is defined:

What are the needs and barriers of DM2 patients concerning lifestyle monitoring and coaching, and to what extend is the eHealth application Floor for DM2 patients persuasive?

The following sub questions are formulated to answer the research question:

1. *What are the needs and barriers of Diabetes Mellitus Type 2 patients in current care?*
2. *What are the expectations/experiences of DM2 patients with online coaching?*
3. *How do users of the eHealth application Floor assess its persuasiveness?*
4. *Which elements of the Persuasive System Design model are applied in the current system Floor?*

METHOD

2.1 Design

To answer the research questions a qualitative research method is used within this study. Semi-structured in depth with diabetic patients and caregivers was conducted. The participants in this study are approached by the researchers' own network and from a physiotherapy practice in Almelo. The Ethics Committee of the faculty of Behavioral, Management and Social Sciences (BMS) at the University of Twente has approved this study. See table 2 for an overview of different methods that have been used within this study.

Research Question	Method
1. What are the experiences of DM2 patients with the current care?	Semi-structured interviews (N=6)
2. What are the expectations/experiences of DM2 patients with online coaching?	Semi-structured interviews
3. How do users of the eHealth application Floor assess its persuasiveness?	Perceived Persuasiveness Questionnaire (N=5)
4. Which elements of the Persuasive System Design model are applied in the current system Floor?	Heuristic evaluation of the PSD model

Table 2: Research Questions and Methods

2.2 Study populations

Participants of the interviews

The study participants were invited to participate through a written invitation (Appendix A) Through this invitation the participants were informed about the study's purpose, mode of participation and confidentiality. The participants were asked to fill in an informed consent form in the case they would like to participate in this study. Some patients were selected from the researchers own network and some of them were recruited via a physiotherapy practice in Almelo. Patients from the researchers own network were called and information was given from the phone. When needed, extra information was sent by e-mail. The physiotherapy practice is also called and they sent out the information to Diabetes type 2 patients, to ask them to participate this study.

Six DM2 patients wanted to participate in this study. The gender distribution of these six patients are summarized in table 3. Four patients were female and two patients were male.
Also 2 dieticians were interviewed, both female.

Gender	N=6
Female	4
Male	2

Table 3: Gender distribution of the participating patients in the interviews

Participants of the Survey Perceived Persuasiveness Questionnaire (PPQ)

Another group participants was for the PPQ. For this online survey only 5 users participated. This survey was held among the users of Floor. In total there were 13 users at the moment this survey was held. The PPQ was sent out online via Google Forms to all the users of Floor.

2.3 Analysis

2.3.1 Interviews

The interviews are recorded and afterwards literally transcribed in Microsoft Word for the analysis. A specific approach is highly recommended to facilitate the analysis of a lot of qualitative data. The interviews are inductive coded. The process of inductive coding has several steps (Thomas,2006). Those steps are: 1) Reading of the raw data: the transcripts were re-read. 2) interesting statements in the data were selected and related to objectives. 3) statements in the text were labelled to create categories. 4) Overlap and redundancy among the codes is reduced. 5) Most important categories were selected and within each category we searched for different points of view and new insights. Moreover, appropriate quotations that convey the core theme or essence of a category were selected and used in the results section. All answers of the patients were imported in Excel, this was without all the unnecessary information. Only necessary information which was relative. Each sentence was checked and labelled with a code and made a large table with all codes. After that this table in excel was analyzed again to see whether there was a relation between the codes, and whether some of the codes could be recoded in an overarching theme. Eventually several themes were found.

The grounded theory has been used for theoretical saturation of the interviews. This means that the data that was collected from the patients no longer contributes anything new on the previous data.

2.3.2 The Perceived Persuasiveness Questionnaire

The PPQ has been analyzed by calculating the mean for each item of the PPQ per respondent. This is calculated from the numbers that patients graded for each question on a 5-points Liker scale. This scale is from 1 (totally not agree) to 5 (totally agree). In the questionnaire, some items needed to be rescaled because these items were negatively formulated. When a respondent gave a negative formulated item a 4 this was seen as a 2. If the respondent gave a 5, this was seen as 1. Moreover, if a patient graded an item for 2 this was seen as 4, and if the patient graded 1 this was seen as 5. The respondents are *positive (satisfied)* if the item was scored *high on average (4-5),* and *negative* if the score was *1-2.*

2.3.3 Heuristic evaluation

The heuristic evaluation of the eHealth application Floor is done by evaluating the Persuasive System Design principles of Oinas-Kukkonen & Harjumaa (2009). The main goal of heuristic evaluation is to identify any problems associated with the design of user interfaces. The simplicity of heuristic evaluation is beneficial at the early stages of design (Nielsen & Molich, 1990).

These design principles in this evaluation are: primary task support, dialogue support, system credibility, and social support. In this paragraph Floor is been evaluated for each design principle of the PSD model. For example, Primary Task Support has 7 different principles, such as: reduction, tunneling, tailoring. For each principle the author has looked whether the given design principle is already implemented in Floor or not. And if the principle is not implemented in Floor yet, a short recommendation is given on how it could be implemented in Floor.

RESULTS

3.1 Needs and barriers of DM2 patient in current care

Through the interviews the (healthcare) needs and barriers of the patients were investigated in the current care for DM 2 patients. In this paragraph the needs and barriers will be presented. The social and demographic characteristics of the patients are summarized in table 4. Four patients were female and two patients were male. The mean age of the participants is 62 years.

	N1	N2	N3	N4	N5	N6
Age (Mean=62)	37	64	70	68	62	68
Gender	Female	Female	Female	Female	Male	Male
Educational Level	HBO	Primary	MBO	MBO	MBO	MBO
Social status	Married	Married	Widow	Married	Married	Widow
Children	Yes	Yes	Yes	Yes	Yes	Yes
Years of DM2	10	5	4	15	9	8
Medication use	Tablet + insulin	Tablet	Tablet	Tablet+ insulin	Tablet	Tablet + insulin
Technology use (Tablet/laptop/smart phone)	Yes	Yes	No	Yes	Yes	Yes

Table 4:General information of participants

Needs of the patients

Patients mentioned that they need more clear advice about nutrition and more guidelines. Also social support and peer support was mentioned as a need. Most patients mentioned that they need *social support* from their friends and family, however there were also patients that refused to ask help from their family or friends. They believed that they should do it by themselves, and mostly they do not want to bother other people. *Mental support* was also mentioned by some patients, since diabetes had a lot of impact on their (mental) health, daily life and quality of life. Mostly they do not feel understood by others. Also *peer support* was mentioned by patients. To have contact with other DM2 patients, especially because they have the need to be understood and believe that peers can understand and support each other. Especially to motivate and give each other tips. Third, almost all patients mentioned they need motivation. Motivation to change their lifestyle to become healthy. Currently they do not have the feeling they get motivation from somewhere, not from a dietician or somewhere else. See table 5 for an overview of the needs with the quotes of patients.

> *"I think if I ask for help I would get help. But I think this is something that I've to do by myself. It starts with yourself, you have to do it for yourself. Nobody can change you!" (N1).*

Label	Quote
Clear Advice on Nutrition	*"I did eat less carbs a while ago. My glucose levels were okay, but I did not lose any weight. The one says you need to eat this, the other one says no you should not eat this. I'm very bothered with this. I really want to know, what should I do now?" (N1)*
Social support	*Sometimes you want to share that with someone. Someone who can understand you. Sometimes I really have the feeling that I am not understood. I could use some tips on how I can deal with this. It makes me quite unhappy sometimes (N2).*
Social support (peer support)	*Yes, I would really appreciate all the help I can get. Especially from people who also have diabetes and run into the same things. If there are several people who want to lose weight, maybe we can do something together. Motivate each other's and give tips. At the moment I do not know anyone in my area with diabetes. Then I also think that they often do not understand me, but they judge quickly. It may seem easy for them. (N = 6)*
Mental support to motivate a healthy lifestyle	*..not necessarily only about my diet, but physically as well as mentally. Just talk about what is on your mind. In my head I often know that I'm doing wrong, sometimes I ignore that I have diabetes and live like a normal person. I think I eat unhealthier than a normal person .. I am often tired .. Then I do not feel like walking or eating healthy. How can I motivate myself? I would like to talk to someone. (N2).*
Professional support	*Unfortunately I don't feel so motivated. I find it difficult to do it alone. I need more guidance. I have now been referred to a dietitian perhaps that will help (N6).* *"… my motivation goes away. When I come back after such a meeting, I am super motivated, and then it drops again.. "(N1)*

Table 5: Needs of DM2 patients in current care

Barriers of the patients

Several barriers were mentioned by the patients in the current care: Difficult to reject food, difficult to cook healthy, cooking healthy takes too much time, traditional approach of dieticians does not work, asking help from family/friends is a barrier, help of family causes irritation.

Patients find it hard to reject food, i.e. to say no when they are in company of others (for example at a party). Some patients mentioned that they find it difficult to cook healthy at home, because their partner (husband) does not want to eat healthy food and she is not motivated to cook for herself (because she needs to cook twice then). Also patients grab for ready to eat meals because it is easier and they think that healthy cooking takes a lot of time to prepare.

Traditional approach of dieticians in the current care is also a barrier. Patients think that this approach of the dietician is not effective because it is not personal. They think their body works different because they have diabetes. Also in the current care they have only few consults with the

dietician (mainly 4 consults in a year), after a consult the motivation drops again very fast. So adherence on a lifestyle advice is low.

Social support is also a barrier for patients. Especially asking help/support from family or friends is a barrier for patients because of several reasons. Mostly mentioned reason is that patients does not want to bother others with their disease (problem). Also some patients do not want help because they feel irritation. See table 6 for an overview of the barriers in the current care.

Label	Quote
Social pressure/ difficult to reject food	*Yes I am often tired, stressed sometimes shaky, especially when I don't eat much.. So eating little is nothing for me. I really have to eat regularly. But also when I am visiting or getting a visit. Then I always eat goodies I can never say no. Not against someone else, but not against myself. (N2)*
Difficult to cook healthy	*..my husband doesn't want to eat healthy because of me. He himself has nothing else. I would have to cook two times. Once for them and something for myself with less salt and fat. I find that very difficult. I do not have the motivation to do that. (N 2)*
Cooking healthy takes too much time	*…I try to follow advice from the Nurse Practitioner, but I find it very difficult. I have to cook healthy and move more. But I often eat ready meals. That is much easier for me. I think it takes a lot of time when you want to cook healthy. I do not have time for that.*
Traditional approach of dieticians does not work	*"….A traditional approach does not work for me. This approach is not personal. Just such a standard way that could also apply to you for example... I now realize my body works and reacts different than someone who does not have diabetes…" (N1).* *"… my motivation goes away. When I come back after such a meeting, I am super motivated, and then it drops again.. "(N1)*
Asking help from family/friends is a barrier	*I do not really get help from my relatives because I do not want that myself. I mean if I want to lose weight my husband can try to help so much but if I'm not open for it, it doesn't help. Look if it comes from you, even though my husband is sitting with a bag of chips in front of me. Then you just do not eat that. It really has to come from inside of you. (N1)*
Help of family causes irritation sometimes	*Yes, I would like support from my family. But it should not be just that my daughter says: mama you should not eat this. So more than that. I want to be understood and not always corrected by her. Because that makes me tired. I think family and friends are important in this process (N2).*

Table 6: Barriers of DM2 patients in the current care

3.2 Expectations of DM2 patients from online coaching

Patients were showed the current eHealth application Floor and asked if they would use such a system in future and what would they expect from an online coach. The following table shows several expectations of patients divided in needs and barriers (Table 7).

Patients mentioned that they would like to receive personal coaching about nutrition and exercise. Also they mentioned that they want just in time coaching, especially on moments when they felt hard to keep up or they felt the need to talk with someone.

The barriers that were found according to online coaching was that some patients would not be able to use the technology due to language barriers or because they do not use internet or smartphone/tablet. Another barrier is adherence, some patients have problems to keep using the app. After a while their motivation decreases and they stop using online health apps.

Needs

Label	Quote
Personal advice-guidelines- nutrition and exercise	*I would like some guidelines/practical tips from a coach. That she can help me lose weight and give me a personal advice. Also advice in the field of exercise. Because I also suffer from my knees so I cannot do everything.*
Support on difficult times	*I can rely on at difficult times. But also with all those questions that go around in my head. Because everyone says something else. I would just like to have guidelines that I can use and not something standard (N1)* *At times when I feel bad or unmotivated. I sometimes feel very stressed than I could use it. I want to be able to talk to someone at those moments. (N2)*
24/7 support	*But I would prefer, in the evenings because I work during the day.*

Barriers

Labels	Quote
Language barrier	*"…I would find it useful, but due to language barrier I would not be able to use it. But if I could, I would use it." (N2)*
No internet	*"… because I only have a cell phone with which I can call. I never go on the internet." (N3)*
Too much effort to keep using the app (adherence)	*… I download all kinds of apps about diabetes. About glucose and stuff. But I find it difficult to keep up with it on a daily basis. For example apps where you need to fill in what you eat daily. It is too much work. That does not work in practice. Is just very tricky. You really need discipline if you want to keep track of that daily (N 1).*

Table 7: Expectations of patients according to online coaching divided in needs and barriers

3.3 Persuasiveness of Floor

From the respondents 1 was male and 4 female. See table 8 for age and gender distribution.

Gender	N	Age	N
Female	4	18-30 years	1
Male	1	31-45 years	2
		>45 years	2

Table 8: Gender and age distribution of the respondents of PPQ (N=5)

The users of the eHealth application Floor scored the overall persuasiveness on average (2.8). There is scored low (2.4) on one element, which is the perceived effort. This is understandable, because the effort users need to undertake is relatively high. It is asked from them to fill in their daily satisfaction. Also, currently users need to log in from a web portal and they do not receive any notification. Low scores are scores below <2.5).
Another low score (2.5) is given for unobtrusiveness. Unobtrusiveness is one of the key postulates behind persuasive systems design according to Oinas-Kukkonen and Harjumaa (2009). The key to successful implementation and continued use may depend on whether users have the opportunity to use the system as a seamless part of their daily routines. Unobtrusiveness, i.e. they should avoid disturbing users while they are performing their primary tasks with the aid of the system (Oinas-Kukkonen & Harjumaa, 2009). The users did not score high on any item. High scores are scores above 3.5.
Users scored on average for all the other categories (scores between 2.5 and 3.5). Users find that Floor gives sufficient support while performing primary tasks (Primary task support). The information in the system is reliable (Perceived credibility). Floor provides reinforcement, change and distortion of the behaviour (Perceived persuasiveness). Floor gives relevant feedback to the users to reach their goal (Dialogue support). Use continuance scored also on average, but a bit on the lowest side (2.6), which means that the users are not very positive on using Floor in future. See table 9 for an overview of the results.

Number patient	Primary task support	Dialogue support	Perceived credibility	Social support	Unob-trusiveness	Perceived persuasiveness	Perceived effort	Perceived effectiveness	Use continuance
1	3.1	3.2	3.4	3.2	3.5	2.8	2.6	2.4	2.4
2	2.8	2.7	3.2	3.0	3.1	3.1	2.4	2.8	2.5
3	2.2	2.7	2.8	3.1	3.2	3.0	2.5	2.6	2.4
4	3.2	3.0	3.4	3.4	3.5	3.2	2.4	2.7	2.8
5	3.0	2.8	3.2	3.4	3.3	2.9	2.1	3.0	2.9
Mean	2.8	2.9	3.2	3.2	2.5	3.0	2.4	2.7	2.6
Total mean	2.8								

Table 9: Results Perceived Persuasiveness Questionnaire (N=5)

3.4 Heuristic evaluation of Floor

In this paragraph the results of the heuristic evaluation will be presented. This evaluation was based on the Persuasive System Design model, in total there are 4 categories: primary task support, dialogue support, system credibility and social support. Each category has different design principles. In the following table the principles will be presented and whether this principle is already implemented in Floor or not, and if not, how it can be implemented.

The design principles in the primary task category support the carrying out of the user's primary task. The design principles in this category are reduction, tunnelling, tailoring, personalization, self-monitoring, simulation, and rehearsal. See Table 6 primary task support principles, example requirements and implementation in Floor.

Interactive systems should provide some feedback to its users, via verbal information or other kinds of summaries. There are several design principles related to computer-human support in a manner that helps users moving to their goal. These principles include: praise, rewards, reminders, suggestions, similarity, liking and social role. See table 7 for the dialogue support principles, example requirement and implementation in Floor.

The design principles in the system credibility category describe how to design a system so that it is more credible and thus more persuasive. The category of system credibility consists of trustworthiness, expertise, surface credibility, real-world feel, authority, third-party endorsements, and verifiability. See Table 8 for the system credibility support principles, example requirement and implementation in Floor.

The design principles in the social support category describe how to design the system so that it motivates users by leveraging social influence. The design principles in this category are social facilitation, social comparison, normative influence, social learning, cooperation, competition, and recognition.

According to heuristic evaluation, different elements of the PSD model are applied in Floor. The *primary task support* is clear for users; it is tunnelled and tailored for only DM 2 patients. However the application is not much personalized and there is no option for self-monitoring. In *dialogue support* Floor can gain more. There are very less praise, rewards, reminders and suggestions. Patients only receive a daily SMS as a reminder to fill in their satisfaction in Floor. On *system credibility* Floor can reach more by other authorities, third party endorsements. However, the system already looks very professional and trustful. Lastly, on *social support* Floor tries to give support via buddy (friend/family that the user invites through the system). But looking at the table 13 none of the social support elements of the PSD model has been is implemented in Floor. For more detail for each item see table 10 until 13.

Principle	Example requirement	Features are applied in Floor (yes or no)	How it can be implemented
Reduction A system that reduces complex behavior into simple tasks helps users perform the target behavior, and it may increase the benefit/cost ratio of a behavior.	System should reduce effort that users expend with regard to performing their target behavior.	In Floor patients can divide their main goal in small steps. There is a target behavior and by dividing this it helps patients to work on the small tasks. The benefit/cost ratio is that eventually someone can have less medication by changing their lifestyle.	There should be more focus on the benefit cost/ratio, this needs to be mentioned in Floor.
Tunnelling Using the system to guide users through a process or experience provides opportunities to persuade along the way.	System should guide users in the attitude change process by providing means for action that brings them closer to the target behavior.	Floor tunnels patients by setting small targets together with the mentor.	Floor should be more interactive and let them think about their targeted behaviour. An interactive test/assessment can be taken from patients: about what problems the patients are facing, about quality of life. In which parts, he/she would develop herself. This would provide info for the mentor.
Tailoring Information provided by the system will be more persuasive if it is tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group.	System should provide tailored information for its user groups.	In Floor not many personal needs interested are collected. Only gender and age. This information is only gathered by the mentors by talking to the patients.	Information that is given in Floor for example "did you know" should be more tailored. Especially patients that just been diagnosed with diabetes could have more need for information than someone that already has diabetes for 10 years. Also by gathering more patient data in Floor, more social groups can be formed in future. So, patients can support each other.
Personalization A system that offers personalized content or services has a greater capability for persuasion.	System should offer personalized content and services for its users.	Currently there is personal contact between the mentor and the patient. The dashboard shows the name of the user and also the e-mails and everything the user receives are with personal name.	It would be nice to let users make their own personal dashboards, to choose which information and services they want to see. And showing them information which they are interested in.
Self-monitoring A system that keeps track of one's own performance or status supports the user in achieving goals.	System should provide means for users to track their performance or status.	In Floor, there is no measurement except users own input.	In Floor other applications could be integrated such as the Health app of a smartphone. Those apps measure how many steps someone walked a day. This might be a nice feature because it shows real data if a user walks more (if that was a goal).
Simulation Systems that provide simulations can persuade by enabling users to observe immediately the link between cause and effect.	System should provide means for observing the link between the cause and effect with regard to users' behavior.	There is no feature in Floor that provides the link between cause and effect of the users' behaviour.	There could be before-and-after stories or pictures or videos of people who have lost weight or reached another goal presented in Floor.
Rehearsal *A system providing means with which to rehearse a behavior can enable people to change their attitudes or behavior in the real world.*	System should provide means for rehearsing a target behavior.	In Floor, users work on one step until they feel satisfied about their step. After that they work on another step. By doing this the aim is to repeat the target behavior constantly until it becomes a habit. Also patients receive a test to fill in, the SRHI, which measures how ordinary a behaviour feels for a patient.	Is already implemented.

Table 10: Primary task support

Principle	Example requirement	Features are applied in in Floor (yes or no)	How it can be implemented
Praise By offering praise, a system can make users more open to persuasion.	System should use praise via words, images, symbols, or sounds as a way to provide user feedback information based on his/her behaviors.	Currently mentors in Floor are giving praises or compliments when the user is satisfied, or reached his/her step.	The app can also send the user praises by sending automated text messages for reaching individual goals.
Rewards Systems that reward target behaviors may have great persuasive powers.	System should provide virtual rewards for users in order to give credit for performing the target behavior.	In Floor, there are no rewards. When someone is satisfied you see a celebration confetti. Therefore, a reward element could be integrated into the system.	According to the users' performance the app can give rewards, such as trophies. In gamification for example a person can get something for his/her avatar such as extra clothes accessories.
Reminders If a system reminds users of their target behavior, the users will more likely achieve their goals.	System should remind users of their target behavior during the use of the system.	Floor sends automatic text messages to remind the patients about their goal but this is a very general message. Such as: do not forget to work on your goal.	An automated text does not say anything about the individual goals of the patients. It should be more personalized and motivating. Such as do not forget to walk 10 minutes today, the weather is beautiful (thanks to the weather app this message could be send).
Suggestion Systems offering fitting suggestions will have greater persuasive powers.	System should suggest that users carry out behaviors during the system use process.	Currently mentors in Floor give fitting suggestions for the patients.	Floor can suggest healthy eating habits for example when you really want to eat some snacks (candy) because you feel your body needs "sugar", Floor can suggest what to eat instead of candy. For example, eat a date or dried fruit. This can be automated. For example, the patients first fill in a survey about what he/she likes and does not like and based on that he/she receives personal recipes.
Similarity People are more readily persuaded through systems that remind them of themselves in some meaningful way.	System should imitate its users in some specific way.	This is not implemented in Floor.	This is hard to realize. It needs more research to find out how a patient can be reminded of themselves. Some suggestion for Floor could be by looking at the interest of a patient, does he/she have a pet, grandchildren, hobby's? And showing him things about this. For example, if someone has a dog or grandchildren go to the park with them. Take a ball and try to play and exercise in a fun way. This can be shown to the patient to see similarities.
Liking A system that is visually attractive for its users is likely to be more persuasive.	System should have a look and feel that appeals to its users.	Floor is already attractive in the new design. They made use of avatars, colours and smileys for example. It is easy to use. There is not too much text.	Floor should keep continue his clear look and feel. Not too much info and text. But it should not be boring. It should add more videos, interactive things etc. This appeals more to users.
Social role If a system adopts a social role, users will more likely use it for persuasive purposes.	System should adopt a social role.	Floor has already a social role because it supports communication between patient, buddy and mentor.	In Floor you miss the social support from peers. There is no peer to peer contact. In future this could be implemented in Floor, such as a forum where people can chat, and like each other.

Table 11: Dialogue Support

Principle	Example requirement	Features are applied in Floor (yes or no)	How it can be implemented
Trustworthiness A system that is viewed as trustworthy will have increased powers of persuasion.	System should provide information that is truthful, fair and unbiased.	Floor provides information based on theories and studies. It watches out for biased advertising or commercializing. This is important because otherwise the trustworthiness will be questioned.	In future patients who did use Floor could be ambassadors and tell about their own experiences. This can also increase trustworthiness.
Expertise A system that is viewed as incorporating expertise will have increased powers of persuasion.	System should provide information showing knowledge, experience, and competence.	Currently this is not implemented in Floor.	In future it is important that Floor is updated and information on the page is not out dated. It has to make sure that everything what is on the page is also working.
Surface credibility People make initial assessments of the system credibility based on a firsthand inspection.	System should have competent look and feel.	Floor already looks very competent, there are no advertisements etc. When people look at the system first, they see professionality. It is clean and well designed.	In future there should be more content because now there is less content in Floor because it is in the pilot phase. It is important to continue the competent look and feel.
Real-world feel A system that highlights people or organization behind its content or services will have more credibility.	System should provide information of the organization and/or actual people behind its content and services.	On the website of Floor provides possibilities to contact the support department. The users can fill in a form and Floor will get in touch with them. Nedap Healthcare is highlighted as the organization behind the content and service.	In future the persons behind the information can be highlighted more. Such as the team Floor who's working daily on the product Floor. Also a video or picture biography of the mentors who are working for Floor.
Authority A system that leverages roles of authority will have enhanced powers of persuasion.	System should refer to people in the role of authority.	Floor has been posted on the website of DVN (Dutch Diabetes association), however this is not shown on the webpage of Floor it selves.	In future, more people organizations who have authority can be posted on the webpage. Also users who have good experiences can be quoted on the website.
Third-party endorsements Third-party endorsements, especially from well-known and respected sources, boost perceptions on system credibility.	System should provide endorsements from respected sources.	Is not applied in Floor.	In future some respected sources such as the Dutch Diabetes Association can be shown or a GP that mentions the effectiveness of Floor. This would create more trust among users and give Floor a boost on system credibility.
Verifiability *Credibility perceptions will be enhanced if a system makes it easy to verify the accuracy of site content via outside sources.*	System should provide means to verify the accuracy of site content via outside sources.	Is not applied in Floor.	If it is important and needed in future. Floor can provide information for users to verify the accuracy of the site content etc.

Table 12: System credibility support

Principle	Example requirement	Features are applied in Floor (yes or no)	Implementation in Floor
Social learning A person will be more motivated to perform a target behavior if (s)he can use a system to observe others performing the behavior.	System should provide means to observe other users who are performing their target behaviors and to see the outcomes of their behavior.	Not implemented in Floor.	Floor might give users an option such as a forum, where users can share tips and gain insight how others try to reach their behavior.
Social comparison System users will have a greater motivation to perform the target behavior if they can compare their performance with the performance of others.	System should provide means for comparing performance with the performance of other users.	Not implemented in Floor.	Floor could implement a platform where users can share their performance to motivate each other. For example, there might be groups with people who have the same goal, which is losing weight by doing more exercise. They might share their physical activity data with each other.
Normative influence A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behavior.	System should provide means for gathering together people who have the same goal and make them feel norms.	Not implemented in Floor.	Here the same idea of a forum can be used. People with the same goals can discuss things with peers and receive peer support. Normative influence can be hard to realize.
Social facilitation System users are more likely to perform target behavior if they discern via the system that others are performing the behavior along with them.	System should provide means for discerning other users who are performing the behavior.	Not implemented in Floor.	For example, Floor could show users how many people are working at the same goal as them. Or even for example by showing which users are walking right now. So, the user has the feeling that he/she is not doing this alone. This could even lead to a "walking group" if these users live in the same area. In this case Floor can realize the social facilitation for its users.
Cooperation A system can motivate users to adopt a target attitude or behavior by leveraging human beings' natural drive to co-operate.	System should provide means for co-operation.	Not implemented in Floor.	The behavioral patterns of users could be studied by collecting data, and be analyzed in group level and individual level in more detail. So, these users can be connected to each other through Floor.
Competition A system can motivate users to adopt a target attitude or behavior by leveraging human beings' natural drive to compete.	System should provide means for competing with other users.	Not implemented in Floor.	In Floor, there could be social competitions, such as reach your goal/step and win a prize. This can trigger users by external motivation. Each month there could be a prize winner.
Recognition By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behavior.	System should provide public recognition for users who perform their target behavior.	Not implemented in Floor.	In Floor names or usernames of the awarded people such as: "reached his goal this month" can be published on the website. Or personal stories of people who succeeded in their goal are published in Floor.

Table 13: Social Support

DISCUSSION

It can be concluded from the results that patients with DM2 need more clear advice on nutrition. Also they need social (peer) support, mental support and professional support. The barriers that patients are facing are: social pressure, difficulties in cooking healthy, the traditional approach of dieticians that does not work and asking help from friends and family is a barrier. The expectations of patients from online coaching: personal advice/guidelines on nutrition and exercise, "just in time care" (support on difficult times and 24/7 support). The barriers that were mentioned are: language barriers for patients that do not speak Dutch very well, patients that do not use internet. Furthermore, adherence was mentioned as a barrier: patients mentioned that it is too much effort to use an app daily. The persuasiveness of Floor was scored on average by the users, the users for the Perceived Persuasiveness questionnaire were a different group of patients than the interviewed group. The users that mentioned here, are the users of Floor. Especially perceived effort was scored very low. This means that patients currently think that they need to do much effort to use the app. This is understandable since Floor wants patients to fill in their daily satisfaction. Using an app daily might be a lot of effort for patients. Lastly, according to the heuristic evaluation of Floor. The primary task support is clear for the users, but it is not much personalized and there are no options for self-monitoring. On Dialogue support there is less praise, rewards, reminders and suggestion. Patients only receive sms and e-mail reminders. On System credibility, Floor looks already professional and trustful. However, there can be done more with third party endorsement, such as Dutch Diabetes Association. By mentioning more authorities on the website, it can give a more trustful image to potential users. Lastly, on social support Floor gives this support via a buddy and coach. But there is no peer support, therefore there is not any competition, corporation, recognition or social comparison.

Needs and barriers of DM2 patient

Patients seem to find it difficult to say no too food, especially when they in company of others such as parties. They feel social pressure. Social pressure is very human, there are several factors that makes people more likely to be influenced by others. Especially people are more likely to say no when they come from families where there is little support, strongly identify with only one ethnic group, are afraid of not belonging or fitting in (Human Diseases & Conditions, n.d.). In this study some Turkish patients were interviewed, these patients probably feel strongly identified with their own Turkish ethnicity. Therefore they experience more peer pressure. A case for example is rejecting food during a special occasion, which is very hard for DM2 patients, because rejecting food might give patients a guilty feeling. There has been put a lot of effort to prepare the food and they do not want to reject and disappoint the people that invited them. Current traditional care for DM2 patients is totally inadequate, it is not personal and not on time, which means patients cannot get help at the moments that they need it the most. They only receive care only few times

in a year. However, technology such as Floor can help solve this problem. A technological application can for example: sent patients reminders, triggers and help them at difficult times.

Patients with DM2 that were interviewed did not use Floor yet. However they mentioned that they need *social- and mental support,* which is very important for patients with chronical diseases. Therefore it is a good idea to build in more social support in Floor, this can improve the adherence. According to Kelders et al. (2012) social support features are rarely used in current eHealth technologies. This is remarkable, because it is proven that social support has a lot of positive influence on the quality of life of patients. Social support can be useful in different areas. In people with HIV, social support seems to have a big positive influence. One study indicated that HIV patients with a lot of social support more often sought help with first-line care (Ramaswamy et al., 2013) and other researchers added that social support can increase health-related quality of life directly or indirectly by reducing depressive symptoms of patients (Bekele et al., 2013). In cancer patients with a good social network a higher quality of life was registered and also a lower level of fatigue than less socially supported patients (Soares et al., 2013).

Also patients with DM2 mentioned that most of them have a lack of motivation to change their behaviour. According to Fogg's Behaviour Model(2008) three elements must converge at the same moment for a behavior to occur: Motivation, Ability, and Trigger. When a behavior does not occur, at least one of those three elements is missing. To increase the motivation of patients some triggers could be given such as rewards or reminders but also patients need to have ability to change their behaviour. In the current care there is a traditional approach which does not work for patients. Behavior change is a whole process that takes time and effort. According to the Trans theoretical model (TTM) developed by Prochaska and Carlo (1980) TTM supposes that in any given time, a person is in one of five stages of change: precontemplation, contemplation, preparation, action, or maintenance. Each stage is a preparation for the following stage, so patients must not hurry trough or skip stages. In the current traditional care, dieticians have only 3 consultation hours a year for patients. This is not enough to help patients change their behavior. To go through all those stages needs more time than 3 hours in a year. Changing behaviour is a constant process. Technology could help in this process because it is always accessible.
By designing Floor Fogg's Behaviour change model has been used. However the usage of Floor among users is low. The reason for this might be that some of the elements as: Motivation, Ability or Trigger is missing in Floor.

Perceived Persuasiveness Questionnaire

It is remarkable is that users assessed perceived effort and unobtrusiveness very low. A low score means in this case, they are negative about these items. Users think the effort they need to do is very high to use the application, which is understandable. They are asked to fill in their daily satisfaction, however it is just clicking on a smiley. So it does not take that much time to do it. The problem can be the fact, that there is not an application and patient need to go to the web address (and log in if they do not have automatic log in on) to fill in their satisfaction. Effort expectancy is the degree of ease associated with consumers' use of technology' (Venkatesh et al. 2012). Floor needs to be ease in use. Another low scored item is the unobtrusiveness. Users think that Floor is obtrusive. Currently, patients receive a daily SMS (which they cannot answer) that reminds them to fill in their daily satisfaction. They also receive e-mails with reminders, and asking them how well they are doing. Obtrusiveness and perceived effort seems to have a link. If you think you need to do a lot of effort using the technology, it is logical that it is obtrusive in your daily life.

Heuristic evaluation of Floor

In Floor the primary task support is well implemented so far. However it can be more personalized and there should be a self-monitoring option. From the interviews patients also mentioned that they would like to receive more personalized care, they believed that the current traditional care is not personalized. Therefore Floor should try to be more personal. According to the research of Nijland & van Gemert-Pijnen (2011) personalized feedback appeared to be one of the most promising features for long-term usage. The mentors in Floor that whom are coaching the patients try to give personal care. Each patient has different goals, or different problems. But otherwise Floor is the same for everyone. Moreover, there is no self-monitoring. According to Fry & Neff (2009), use of personalized feedback from a real person is more persuasive than automated tailored feedback. Self-monitoring is also important, because it gives more objective data. For example, if a patient's goal is to walk 2 km every day, a pedometer that measures the daily steps can be useful. The patient and the coach can monitor the data.

On dialogue support, Floor does not have any praise or rewards or reminders for the users. Dialogue support is a key future in more commercial fitness and sport apps such as Nike+ or Runkeeper (Deterding, 2012). Users can achieve high score and get rewards (such as badges, trophies), receive praise (motivational messages) and reminders. These are so called gamification techniques, which are currently used in many apps, but lacking in many health apps (Sailer et al, 2014). Floor could benefit from implementing rewards and praise.

On system credibility support, Floor should make use more of expertise, authority and third-party endorsements. This would increase the trustworthiness of Floor. According to Fogg (2003) the Key Dimensions of credibility is: Perceived Trusthwortiness & Perceived Expertise.

The look and feel of Floor shows professionality, this is also shown in the results of the Perceived Persuasiveness Questionnaire. Users scored high on Perceived Credibility.

Lastly, on social support Floor tries to give support via a mentor and buddy. But as shown in table 13 in fact, principles of this category were completely lacking. As mentioned before, according to Kelders et al. (2012) social support is very important. Most sport apps such as Nike+ and Runkeeper make use of social support techniques, they allow users to share their results on social media for example. Many theories and research show, that principles from social psychology may be effective in long term. For example, relatedness, has been linked to intrinsic motivation (Deci & Ryan, 1985), normative beliefs are very important for planned behavior change (Ajzen, 1985), and so on. Floor could benefit more by implementing different principles of the social support techniques. Also, DM2 patients mentioned during the interviews that they need social support from friends and peers. Floor can make more us of this and implement a platform where users of Floor can meet and support each other. Currently, Floor has a mentor and buddy for social support., but the added value of the buddy is not clear yet.

Limitations

First limitation is the small number of participants, in this study only six patients were interviewed. The research method that was used is the grounded theory of theoretical saturation. After six interviews there was not many new data anymore. With this data we could give an overview of the needs and barriers of DM 2 patients. However, the six patients are not representative for all patients with DM2 in the Netherlands. The participants in this study, are only a select group. Most of the participants were from Turkish origin. However, the statistics show that the prevalence of DM 2 among Turkish patients (9,9%) is higher than among Dutch patients (4,8%). To have a more representative study and more generalizability, quantitative research can be done in future if needed. Another limitation is that there was not a second expert review while analysing the codes to reach an agreement. Therefore, abstraction level not all the iterations of the coding has been completed.

There are also limitations in the Perceived Persuasiveness Questionnaire (PPQ) that was conducted among users of Floor. Since Floor did not have many users, the response on this questionnaire was only five. This is a very low response, which means that we were not able to test if there is any significance. So, no powerful conclusion can be drawn of this results. We can only say that for now the users scored Floor on average. To draw powerful conclusion, we need at least a response of 150 users in future. But for now this was impossible, since Floor had approximately 20 active users. Another limitation of the PPQ is that it has not been validated yet. This questionnaire has been developed at the University of Twente by Beerlage- de Jong et al.

(2015). The PPQ was scored on average by the users (2,8 out of 5). However, we cannot say for sure if the elements in the questionnaire are correct, because it has not been validated yet.

Strengths

First strength of this study is the use of face-to-face interviews in which the needs and barriers of patients could be identified and also their expectations from online coaching. This is also called the contextual inquiry phase (Van Gemert-Pijnen et al., 2011). Contextual inquiry is aimed at finding out what the problems in the current healthcare are, what the contribution of technology can be, and who might benefit from the technology. In this phase we tried to understand the prospective users of Floor and their context, and analyze the strong and weak points of the current provision of care for diabetes patients (related to lifestyle coaching). This phase is a valuable input for further development of Floor.

However we cannot draw powerful conclusions from the Perceived Persuasiveness Questionnaire (PPQ). The PPQ gives an indication how Floor is perceived by the users. On one item they scored very low, which is the perceived effort. This is understandable because currently patients need to fill in their daily satisfaction, which can be experienced as much effort for patients. The strength of this study is, that the developers of Floor can use this insights and already think about other solutions to decrease this amount of effort.

Recommendations for future research

In future research other stakeholders should be interviewed and included in the study. According to the CehRes roadmap (Gemer-Pijnen et al., 2013) which consists of five different phases, can be used to help development process of eHealth (see figure 3). Basically, it consist out of: contextual inquiry: in this phase the prospective users need to be understand, and the current provision of care should be analysed. Second phase, is the value specification: in this phases the values of different stakeholders must be determined. These values and users' needs need to be translated into user requirements. In this current study phase 1 is determined and phase 2 is not fully determined. Namely, not all stakeholders have been taken into account. In future research different stakeholders as: dieticians, GP's, Nurse practitioners, Health Insurance companies should be interviewed. After those two phases the research should be continued with the design, operationalization and summative evaluation phase. Furthermore, the eHealth technology created in each phase should be the subject of formative evaluation. Formative evaluation is

performed between each phase of the roadmap. It is aimed at evaluating each step of the process. Its goals is to provide ongoing information on how to improve the process and eHealth technology.

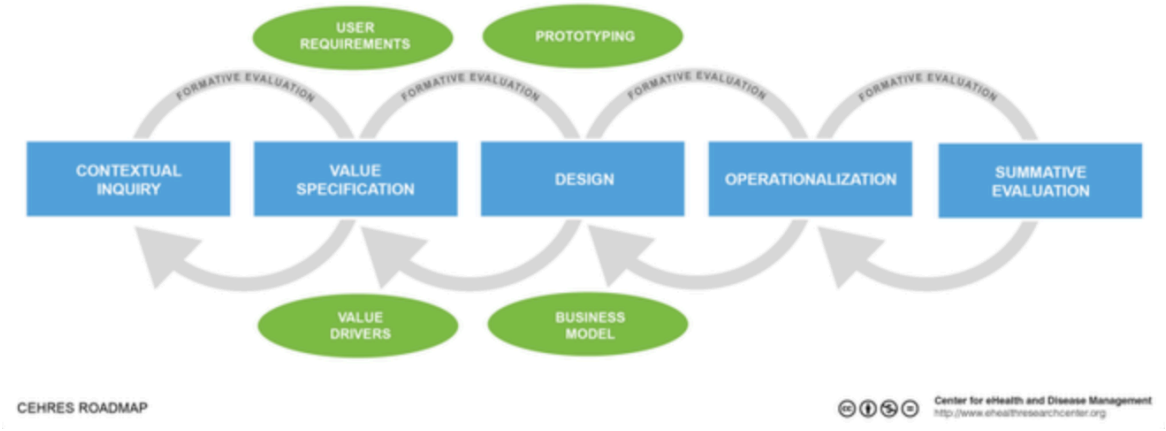

Figure 3: CehRes Roadmap

Another suggestion for future research is to interview more patients with different gender, ages and different ethnic groups to increase the reliability and the validity of outcomes of the needs and barriers.

Implications and recommendations for practice

With the information that is retrieved from the interviews there has been gained more insights into the needs and barriers of patients in the current care also there is more insight in the expectations that they have from online coaching. Nedap Healthcare could use this information to improve the eHealth system Floor. Furthermore, Persuasiveness is an important aspect which can be applied into Floor with the results that has been retrieved from this research. The elements of the PSD model have been analysed and advice for implementation has been given.

The added value of the technology needs to be clear. According to research users will only use a technology when for example the advantage of the technology is clear for them. According to Cain & Mittman(2002) there are 10 critical dynamics of innovation diffusion. In this paragraph only the relevant dynamics will be discussed. The Relative advantage of the technology should be clear which means that in this case the patients need to see the value and benefit of Floor the more they wil adapt it. Also trialability is an important factor, which means the ability to try out an innovation without total commitment and with minimal investment. This helps adopting a new technology. In this case is Floor free for DM2 patients and also they are not bounded to a subscription. Floor might benefit from the dynamics of Cain&Mittman (2002) which is: opinion leaders and communication channels. They are both related with each other. Communications channels are the paths through which opinion leaders and others communicate about an

innovation. This can affect the speed of diffusion. Floor should find some opinion leaders and communications channels through which they can communicate to the potential users, the DM

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APPENDIX

Appendix A: Written invitation

Uitleg onderzoek Floor

Beste heer/mevrouw,

Mijn naam is Tugba Kocabiyik en ik ben student Gezondheidswetenschappen aan de Universiteit Twente. Binnen mijn afstudeeropdracht bij Nedap Healthcare ben ik bezig met een onderzoek naar het gebruik van Floor, een gezondheidsapplicatie voor diabetespatiënten die helpt bij leefstijl verandering. De onderzoeksvraag luidt als volgt: Wat zijn de behoeften en barrières van diabetes type 2 patiënten met betrekking tot monitoring en coaching van hun leefstijl, en wat vinden ze van een coaching applicatie genaamd Floor?

Wat is Floor?
Floor is een persoonlijke gezondheidsapplicatie die u helpt om uw leefstijl gedrag te veranderen. U stelt een doel op samen met uw behandelaar en een buddy, vervolgens deelt u uw doel in kleine stappen waardoor het haalbaar wordt. Een buddy is iemand uit uw familie of vriendenkring. Het doel is om u te motiveren om uw stappen te halen. U gebruikt Floor om te communiceren met uw behandelaar en uw buddy en door te geven hoe tevreden u bent met uw stappen.

Wat is het doel van dit onderzoek?
Het doel van dit onderzoek is om inzicht te krijgen in de zorg rondom diabetespatiënten en vast te stellen hoe Floor hierin van toegevoegde waarde kan zijn. We vinden het belangrijk om naar de wensen en behoeften van potentiele gebruikers te luisteren. Met die informatie kunnen we Floor verbeteren. Daarom vragen we u om ons mee te helpen met dit onderzoek.

Hoe ziet het onderzoek eruit?
Het onderzoek bestaat uit een interview van ongeveer 30 minuten. In het interview krijgt u vragen over uw zorgproces. We vragen daarbij ook naar uw mening over Floor. We zijn ook geïnteresseerd in eventuele tekortkomingen en verbeterpunten van Floor. Als u er geen bezwaar tegen hebt willen we graag het interview met u opnemen. Op die manier kunnen we de analyses zo goed mogelijk doen. De gegevens worden alleen voor dit onderzoek gebruikt, bovendien zullen alle gegevens vertrouwelijk en anoniem behandeld worden.

Vergoeding
Voor uw deelname aan het onderzoek ontvangt u een vergoeding van €10,- in de vorm van een VVV-bon. Deze zal direct na het interview aan u gegeven worden.

Meedoen?
Als u mee wilt werken aan dit onderzoek, dan kunt u contact met mij opnemen via onderstaande gegevens. We maken dan een afspraak voor het interview. U kunt ook uw praktijkondersteuner vragen om uw e-mailadres door te sturen naar de onderzoeker. Vervolgens wordt er via e-mail contact met u opgenomen voor het maken van een afspraak.

Wij hopen dat wij u voldoende geïnformeerd hebben over het onderzoek. Mocht u toch nog vragen hebben, dan kunt u mij bereiken via onderstaand telefoonnummer of e-mailadres.
Bij voorbaat hartelijk dank voor uw medewerking!

Met vriendelijke groet,

Tugba Kocabiyik
Student, Universiteit Twente, in opdracht van Nedap Healthcare
E-mail: tugba.kocabiyik@nedap.com

Appendix B: Interview protocol

Algemeen

Ik wil graag beginnen met een aantal algemene vragen:

1	Geslacht (M/V)
2	Wat is uw leeftijd?
3	Wat is uw opleidingsniveau? LBO MBO HBO WO
4	Wat is uw woonsituatie? Met/zonder partner, met/zonder kinderen
5	Gebruikt u weleens een computer of tablet? Zo ja, waarvoor?

Zorgproces gerelateerde vragen

6	Hoe lang geleden kreeg u de diagnose Diabetes? _ jaar
7	Bent u momenteel bezig met uw leefstijl ivm diabetes: dwz let u op uw voeding en beweging?
8	Wat voor ondersteuning krijgt u momenteel als patiënt? (mbt tot voeding en beweging)?
8b	Door wie wordt u ondersteund?
9	Wat vindt u van de hulp die u krijgt van naasten? Waarom vindt u dat?
10	Wat doet u momenteel als u vragen heeft over uw gezondheid?
11	In hoeverre kunt u uw diabetes momenteel zelf managen? Dwz zelfzorg. (Zelf-zorg, ook wel zelf-management genoemd, gaat over het omgaan met de dagelijkse bijkomstigheden van de diabetes, bijvoorbeeld: medicatie, glucosemetingen, insuline spuiten, bijwerkingen, etc.)
12	Wat heeft u nodig op gebied van ondersteuning bij het zelf managen van uw diabetes?
13	Zijn er nog andere dingen waar u tegenaan loopt momenteel?

Leefstijl gerichte vragen

14	Wat zou er volgens u kunnen veranderen aan uw diabetes als u uw voeding en beweging (leefstijl gaat veranderen?)
14b	In hoeverre lukt het u momenteel om actie te ondernemen waardoor uw situatie zou kunnen verbeteren?
14 c	In hoeverre voelt u zich gemotiveerd om deze acties te ondernemen?
14 d	Zou u begeleiding (coaching) door uw medepatiënten prettig vinden om u te motiveren?
15	Heeft u behoefte aan ondersteuning van familie en vrienden bij het veranderen van uw leefstijl?
15 b	Waarom zou u wel of niet geholpen willen worden?
15 c	Door wie zou u specifiek geholpen willen worden?
15 d	Wanneer zou u dit soort hulp het beste willen gebruiken?
16	Zijn er weleens lastige situaties voor u?
16b	Wat doet u wanneer er een lastige situatie zich voordoet?
16 c	Waarom vindt u zo'n situatie lastig/moeilijk?

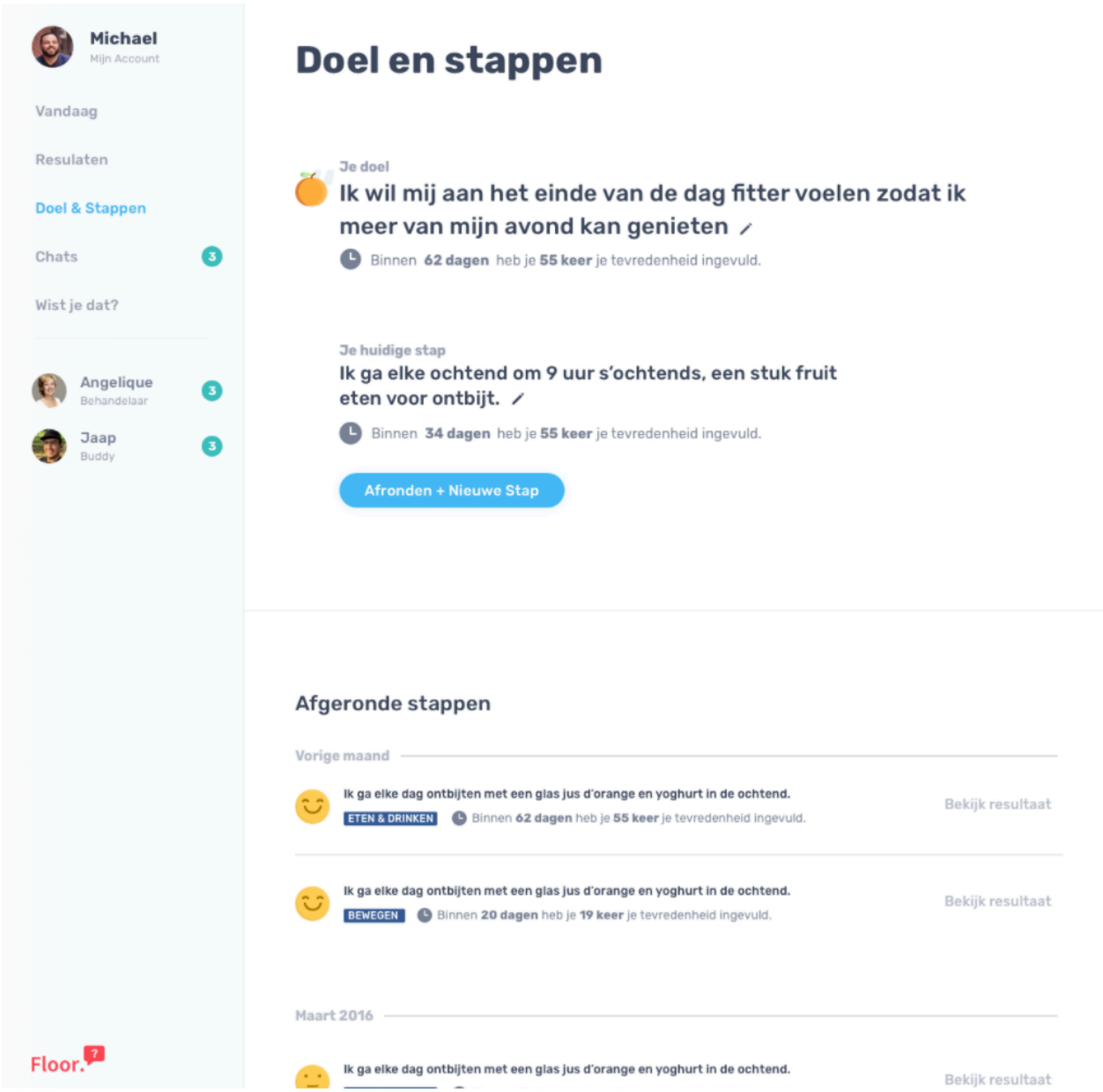
Vragen over eCoaching en Floor

Momenteel is er een systeem ontwikkeld genaamd Floor. Floor helpt diabetespatiënten met hun voeding en leefstijl door doelen te stellen. Door je doel in kleinere stapjes te verdelen, probeer je samen stap voor stap naar je doel te werken. Ik zal zo meteen een paar schermpjes van dit nieuwe systeem laten zien met bijbehorend een aantal vragen. Ik ben alleen benieuwd naar uw mening. Er zijn dus geen goede of foute antwoorden.

eCoaching is online coaching. Een coach helpt u om een gezondere leefstijl te krijgen. Een coach is vaak een diëtist die gespecialiseerd is om diabetespatiënten te ondersteunen met dingen waarmee ze moeite hebben mbt voeding en dieet, maar ook beweging. Via een live chat kunt u vragen stellen aan een coach.

17	Wat zou u vinden van een online coach voor uw voeding en beweging?
17a	Hoe zou u ondersteund willen worden door uw coach?
17b	Waar zou u ondersteuning willen?
17c	Wanneer zou u extra ondersteuning kunnen gebruiken en willen?
18	Zou u uw coach zelf willen kiezen?
18a	Wat is belangrijk voor u bij het kiezen?
18b	Zou u uw coach willen zien?
18c	Waarop zou u uw keuze voor een coach baseren?
19	Op welke momenten zou u hulp van uw coach willen?
19a	Wat voor tips zou u willen krijgen van uw coach?
19b	Wanneer zou u tips willen krijgen van uw coach?
20	Welke benaming zou u fijner vinden voor een coach: coach of mentor

Beginnen specifiek over Floor: 1e scherm dashboard van Floor: hier staat uw doel en uw stappen om het doel te behalen.



1	Wat is het eerste indruk als u naar dit scherm kijkt?
2	Hoe zou u uw doelen en stappen willen opstellen?
2a	Alleen of met hulp van iemand anders?
2b	Als u hulp wil van iemand, zou u een professional willen of iemand van uw omgeving?
2c	Waarmee kan diegene u verder helpen?

Schermpje laten zien tevredenheid met de smileys:

Bijbehorende uitleg:

Binnen het systeem Floor is het de bedoeling dat u dagelijks uw tevredenheid over uw stappen doorgeeft aan uw coach en/of behandelaar. Hij/zij kan zien hoe tevreden u was in de afgelopen tijd, en als u niet tevreden bent kan hij/zij u vragen waarom. Samen kan er naar een oplossing worden gezocht. Uw coach of behandelaar kan u tips geven en of motiveren om uw stappen te kunnen behalen.

3	Wat is het eerste indruk als u naar dit scherm kijkt?
4	Wat vindt u van het idee om dagelijks uw tevredenheid door te geven?
4b	Zou u dit willen doen? Waarom wel/niet?
4c	Denkt u dat het helpt bij het behalen van uw doelen?

Vraag over buddy's:

Buddy: familie of vriend die u kan helpen bij het behalen van uw doelen. Hij of zij ziet momenteel geen gegevens in van u. Alleen als u niet uw tevredenheid doorgeeft krijg hij/zij een melding. Daarin staat dat u een x aantal dagen niet heeft ingelogd. Uw buddy kan u vragen waarom u niet heeft ingelogd en eventueel helpen en motiveren.

5	Zou u deze gegevens ook willen delen met uw buddy?
5b	Waarom zou u het wel/niet willen delen?
6	Zou u hulp willen van een buddy?
6a	Waarom wel/niet?
6b	Waarmee zou de buddy u kunnen helpen?

Specifiek over Floor:

7	Zou u dit systeem willen gebruiken?
7a	Waarom wel/niet?
8	Wat zou u nog meer willen kunnen in dit systeem?
8 a	Waarom zou u dit willen?
9	Wat zou u nog meer kunnen helpen bij het veranderen van uw gedrag?
10	Zijn er nog andere dingen die belangrijk zijn voor u, maar wat nog niet is besproken?