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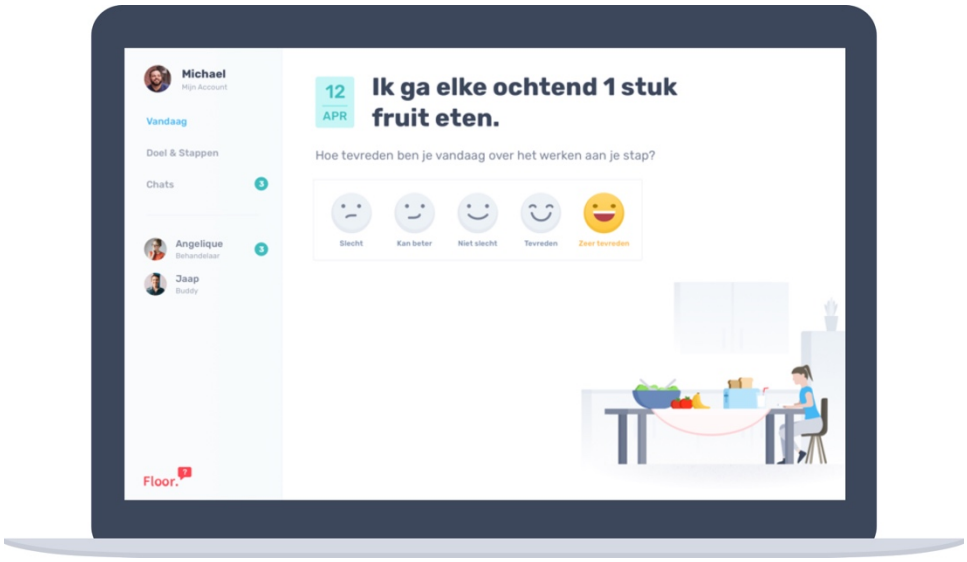
Evaluation of a web-based platform for diabetes type 2 patients

Investigating the uptake, use and effects of *Floor* with a mixed-methods approach



Master Thesis Health Sciences

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Abstract

Background:

Type 2 Diabetes Mellitus (T2DM) is a chronic condition with an increasing prevalence worldwide. eHealth is an option for new ways of prevention and treatment and to improve the patient's self-management.

Problem:

There is a knowledge gap in how a combination of conceptual behavioural change models and digital encounters with nutritionists in web-based platform is used among T2DM patients and in how far it can contribute to support healthy lifestyles.

Aim of the study:

The aim is to investigate the platform's *uptake, use* and *effects* to estimate the platform's role and chance to improve the current way of practice.

Methods:

The platform *Floor* was analysed by performing an explanatory sequential mixed method. The *uptake, use* and *effects* were investigated by combining quantitative data of a log data analysis with 233 users and qualitative data of semi-structured interviews with five users and three mentors to identify the current way of use and possible points of improvements and recommendations.

Results:

The *uptake* was comparable to other platforms with 101 users enrolled in the platform in a period of almost 11 months. According to the users of the platform, the biggest barriers hereby were a missing vision of the platform and an unclear presentation of costs. The *use* of components was low, and the platform was not used as intended by the developers. The interaction among users and mentors were highlighted by the interviewees. However, the components that are based on behavioural change theories were less used and appreciated. There were small *effects* found in the users' reduction of their Body Mass Index (BMI), but no effect was found in behavioural changes.

Conclusion:

All in all, it can be said that the platform *Floor* shows small indications to improve the current way of supporting people with T2DM. Most importantly, it not only the choice of underlying behavioural change theories that contributes to a platform's *uptake* and *use.* Rather, the way how these theories are implemented in the platform are crucial for further development.

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1 Introduction

More than ever, the increasing number of people suffering from Type 2 Diabetes Mellitus (T2DM) emphasizes the need for new ways of prevention and treatment. As one of the most frequent chronic diseases with 1.1 million patients in the Netherlands [1] and 422 million patients worldwide [2], T2DM is omnipresent. In this context, T2DM is not just a condition that has an impact on the patients' Quality of Life (QoL). With 1.6 billion euro in the Netherlands in 2016 [3], the health-related costs are tremendous.

In the following, it will be looked at the background of T2DM in terms of a short description of the condition and its current way of support and treatment. Subsequentially, eHealth technologies and their anticipated role in supporting people with T2DM will be shown. In the end of the introduction, it will be looked in how far a combination of the current way of treatment and an eHealth platform could meet the need for new ways of prevention and treatment and how such combination will be evaluated in this study.

1.1 Background

T2DM is a so-called metabolic, chronic condition caused by the body's ineffective use of the insulin produced. It results in an increased glucose level that has a destructive impact on blood vessels and nerves [2]. Furthermore, T2DM is *not* congenital and most of the times a daily administration of insulin is not inevitable. Moreover, the condition is mainly caused by personal and lifestyle-related factors [2] like obesity, unhealthy eating patterns, physical inactivity and smoking [4-6].

By looking at the positive effects of changing lifestyle-related factors (i.e. reducing dietary energy intake and increasing physical activity), it can be said that self-management is the cornerstone of diabetes care and individuals suffering from T2DM are responsible for the daily decisions and actions to manage their disease [7]. Recent studies showed that improved self-management and lifestyle-related changes have a positive impact on maintaining an acceptable QoL, improving the patients' control of their chronic disease [8-10], optimizing their blood glucose level [11] and even more decreasing mortality and preventing long-term complications [12, 13]. There is even evidence that T2DM is a reversible disease. Moreover, it is also interesting to look at the financial aspects of self-management in T2DM.

Improved self-management is also important to decrease the costs in healthcare. Hereby, the costs of such interventions are lower than the treatment costs of long-term complications and comorbidities [14]. Despite all the facts and benefits, there are a lot of challenges.

The current health care of lifestyle-related diseases mainly focuses on controlling the disease instead of striving to reverse the cause. In recently published research, Van Ommen et al. emphasized the focus on three factors to cure this condition: using lifestyle as medicine, behavioural change and socioeconomic changes [15].

By looking at the current self-management support of T2DM patients – consisting of one-on-one sessions with healthcare professionals, like nutritionists, lifestyle coaches, physicians or diabetes nurses in the Netherlands [16] – the costs are not the only weak point in health care. The needed change of lifestyle is not easily adopted by most of the T2DM patients [17] and the number of new incidents is rising [1]. Particularly, the most significant barrier of effective self-management is the autonomous motivation of the patients itself. According to Shigaki et al., higher levels of autonomous motivation reported higher frequencies for maintaining diet and testing blood glucose – but by looking at T2DM patients, the autonomous motivation is low [18, 19]. Even more, a lasting change in T2DM needs a sustained behaviour change. Rothman et al suggested four phases of behaviour change: behavioural initiation, continuation, maintenance and habit [20]. The need for an improved way of current care and the pursuit of sustained behaviour changes leads to the search for new ways in health care [21].

1.2 eHealth and its anticipated role in T2DM

In search of new ways, eHealth technologies are promoted worldwide and their number is growing rapidly [22, 23]. To understand the role of eHealth, it can be defined by "the use of (information and communication) technologies to improve health, well-being and healthcare" [24].

Several types of research indicated a positive impact of eHealth interventions on changing health behaviours in general populations [25-27] – even more, by applying a theoretical framework (i.e. various behavioural change models) [28, 29] and behavioural change strategies [29, 30] to these. Moreover, guided eHealth interventions seemed to be as effective as face-to-face treatment and have been shown as cost-effective [31].

Nevertheless, a high (cost-)effectiveness of an intervention does not automatically result in a high uptake in terms of the number of users and frequency of use. In fact, several researches showed that most eHealth interventions do not tap the full potential because of a limited number of users and high dropout rates. Eventually, resulting in slow dissemination in T2DM-related healthcare [32-36].

Moreover, a phenomenon what is known as "Black Box" [37] can be found in large parts of recent studies [24]. It implies that a Randomised Controlled Trial (RCT) cannot explore how, why and which components of the technology had an effect on the user. Particularly explaining why and how outcomes occurred, can give the chance to promote, change or discharge the components of eHealth technologies. To open the "Black Box" it is important to analyse how and to what extent components of a platform are used and what are the reasons for (non-) use [37].

To develop and implement an eHealth technology that does have the potential of improving the situation of patients and health care professionals, it is important to open the "Black Box". Hence, it should be looked at 1) the platform's *uptake*, *use* and *effects* and 2) at the '*whys'* and *'hows'* of these factors. Although *uptake* is often defined as "the adoption or use of the technology by predetermined users and implementation, and use within the intended context" [38], it is chosen to distinguish between *uptake* and *use* in this research. According to the Cambridge Dictionary, the term *uptake* is defined as "the rate or act of accepting something" [39]. Applied to this research, the *uptake* describes the number of patients who are interested in a platform's use, the rate of people

who actually enrol in it and the frequency of use. The term *use* describes the way how the patients use the platform and if it is used as intended. The term *effects*, however, specifies whether and in how far the intended effects in clinical and behavioural terms have been reached [40].

1.3 Casus: a web-based platform for patients with T2DM *Floor*

To the author's best knowledge, there is nothing known about the role of a web-based platform in improving the care and life of patients with T2DM that combines behavioural change models and digital encounters with nutritionists. In this research, the web-based platform *Floor* will be used as a case to investigate and to cause the technology's *uptake, use* and *effects.*

Floor is a recently developed platform by Nedap Healthcare to change lifestyle-related habits of T2DM patients by step-by-step goal achievements and by combining digital face-to-face consultations with an eHealth platform. The intervention is based on the Theory of Planned Behaviour [41], the Habit-Goal Interface by Wood & Neal [42] and the Self-report Behavioral Automaticity Index (SRBAI) [43] – theoretical models that may engage T2DM patients in finding and maintaining a healthy lifestyle with the support of nutritionists. After giving an overview of the study's objectives, the intervention itself will be described in detail in chapter 2.1.

1.4 Objectives

This study aims to evaluate the current state of a web-based platform for patients with T2DM which is based on behavioural change models and digital encounters with nutritionists in the Netherlands. To open the above described 'Black Box' [37], this study will investigate the platform's *uptake, use* and *effects* by performing an explanatory sequential mixed-methods design. It is a type of design in which quantitative and qualitative data are collected in sequential order, analysed separately, and then merged. To evaluate the web-based platform for patients with T2DM, the following parts will be investigated:

(1) The first aim of this study is to get insight into the platform's *uptake.* It will be looked at the people who were interested in the platform and at the users who actually enrolled in it. Additionally, the number of log ins will be analysed. Furthermore, it is aimed to explore the reasons, experiences and barriers to start using the platform.

(2) The second aim of this study is to investigate the platform's *use* by the users. Being more precisely, it is looked if the platform was used as intended, which components of the platforms were used frequently and why certain usage patterns occurred.

(3) The third aim of this study is to find *effects* on clinical and behavioural outcomes of the users and if the use of the platform contributed to those effects and why.
After combining the three aims of the study, the following overall research question arises:

To what extent can a web-based platform – based on behavioural change models and digital encounters with nutritionists – contribute to the improvement of the current way of supporting people with T2DM?

To respond to the research question accurately, the following five sub-questions will be investigated:

1. *What is the platform´s uptake?*
2. *What are reasons for (non)-starting to use of the platform?*

3. *To what extent was the platform and its components used?*
4. *What are the reasons for (in-) frequent use of the platform?*

5. *What is the platform's impact on clinical and behavioural outcomes and which components of the platform contribute to it?*

2 Methods

Because this study used *Floor* as a case, an overview of the platform is presented in the following. Hereby it is made use of the CONSORT-EHEALTH checklist by Gunther Eysenbach [44]. Subsequentially, the study design is described. Because of its complexity, the remaining method section was split up into two different parts: Part A and Part B. These parts refer to the two designs of this research. Finally, the synthesis of the two parts is described. But first of all, it is helpful to get an idea of the case used.

2.1 Description of the web-based platform *Floor*

Initiated with the research of Stefan Vermaas in 2015, the Dutch company Nedap Healthcare (Groenlo, Netherlands) saw the need to develop an intervention that supports T2DM patients in a more intensive and personal way [45]. In 2016, a small team of software developers, designers and ethologists started to develop *Floor* (www.floorhelpt.nl) intending to support T2DM patients in finding and maintaining a healthy lifestyle by changing lifestyle-related habits with step-by-step goal achievements with the assistance of a nutritionist.

Until the end of this research, *Floor* was provided free of charge to supplement regular care. In future, the developers intend that *Floor* can be used as blended care for T2DM patients to increase the quality of care. To get access to the intervention, the prospective user had to pass a screening test. The test consisted of medical screening to check if the prospective users belonged to the group of T2DM patients or if they had the risk of suffering from T2DM (so-called prediabetic). Furthermore, the TransTheoretical Model (TTM) was used in Floor to determine in which stage of change a new participant entered the program. This information can help the nutritionist – in the platform called mentor – to choose the right approach for this participant and to check if the participant was eligible for the platform [46]. For further consistency of this paper, the term user represents the patients with T2DM who used the platform and the term mentor represents the nutritionists in the platform. After the registration process was finished, the platform was built like presented in Figure 2. To get a better understanding of the platform and its functions, a global overview of all components is visualized in the following paragraph. Besides, a structural setup can be found in Appendix 1.

Figure 1 Screenshot of Floor

2.2 Components within Floor

The starting page of the website was the component ***Today (1)***. It represented the platform's core: the users' sub-goals which are based on the *Habit-Goal Interface* by Wood & Neal [42]. On a five-point-Likert scale – going from "not good" to "super satisfied", the users were stimulated to fill in their daily satisfaction regarding their intended behaviour. Those steps (s. Appendix 2) represented a partial building block of the Main Goal.

The ***Main goal (2)*** was intended to be related to lifestyle-related changes, like increasing physical activity or improving eating habits. To make the *Main goal* as personalised as possible, the user can visualize it by linking the goal with a motivational image (s. appendix 2). Furthermore, the goal can be changed over time. Next to setting the *Main Goal* and *Sub-goals*, the users can fill in their *Bodyweight* as a quantitative way of tracking their progress. Furthermore, the users' progression in making a habit out of an intention was also visualized in the form of the Self-*report Behavioral Automaticity Index (SRBAI).* According to Gardner et al., the SRBAI is a reliable and sensitive sub-test of the Self-Report Habit Index to test the habit-behaviour correlation [43]. The SRBAI and even the satisfaction scores are derived from the *Theory of Planned Behaviour* [47]. Together with a buddy (see point 4), it is aimed to trigger the users' perceived behavioural control and subjective norms.

The ***chat (3)*** with mentors was aimed to support the users in reaching their goals. More precisely, chatting with their mentors can support the users in defining their *Main goal* and *Sub-goals* (s. Appendix 3) and even more in changing their intended behaviour into a habit. The mentors can monitor the users' trend in *Bodyweight, SRBAI* and *satisfaction* and had access to the users' *Main goals and Intermediate steps.*

After being invited, a ***buddy (4)*** received information about T2DM (s. Appendix 4 and 5) and how to motivate the users in changing their lifestyle, but there was no access given to the users' data.

The users had the option to fill in and to change personal information and their password in the ***settings (5)***. Furthermore, the platform mad use of reminders in the form of emails to the users, the healthcare professional or the buddy. In *Settings,* the notifications can even be switched off.

The users could not get special training to use *Floor* properly. The only way of getting help was by contacting the ***support (6)*** (i.e. helpdesk) team of the platform. Hereby, questions regarding the use of the platform can be answered.

All in all, the aim of the developers was that the platform was used regularly. With the possibility to add the satisfaction of the sub-goals two days back, the idea was that the user should use the platform at least three times a week. Furthermore, the users' bodyweight and the SRBAI should have been filled in at least one time per week. In the case of fulfilling those requirements, the user can be called *adherent.*

2.3 Study design

This research was designed as an explanatory sequential mixed-methods [48]. A quantitative analysis on its own can investigate the platform's *uptake*, *use* and *effects* on patients with T2DM, but it cannot give insight into why the platform was used and what the users experienced hereby [49]. The study was conducted in a sequential order 1) to investigate *uptake, use and effects* of the platform and 2) to explain the found patterns and effects to get a complete picture of the platform among patients with T2DM [48].

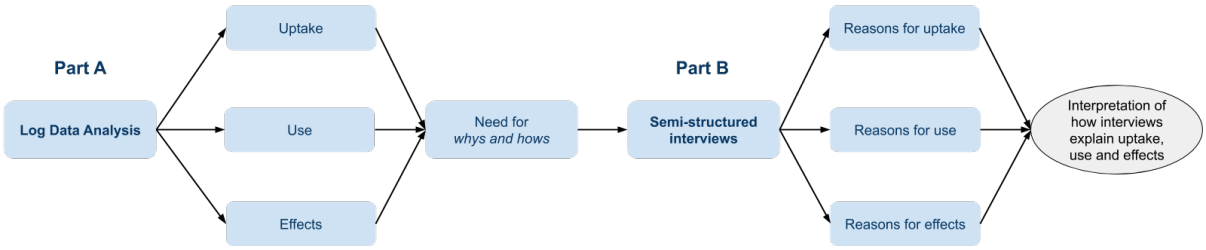


Figure 2 Study design in the form of an explanatory sequential mixed-methods research

Figure 2 illustrates the study's structure. First of all, the quantitative data were analysed via a Log Data Analysis (Part A). This analysis enabled to assess the *uptake* in terms of who decided to start using the platform. Furthermore, the Log Data represented the *use* by measuring what components of the platform were used and if it was used as intended. Lastly, the *effects* on clinical and behavioural outcomes and how the usage of different components contributed to these outcomes were analysed by conducting an analysis of effects with data derived from the log data analysis.

Subsequentially, semi-structured interviews (Part B) were performed with patients and nutritionists who used the platform to explore why they started to use the platform, to explain certain usage patterns and to investigate why the platform had or did not have impact on the life with diabetes.

An overview of the research instruments and the accompanying characteristics of the study can be found in Table 1. Furthermore, the participants, the outcomes and the data analyses of Part A and B will be described in the following paragraph.

Table 1 Research instruments

Research aim	Research instruments	n	Purpose
Uptake	**A** Log data Analysis	233 users	Percentage of enrollees Who uses the web application? Number of logins per user
	B Interviews	5 users 3 mentors	Experiences of enrolment-process Barriers for enrolment
Use	**A** Log data Analysis	101 users	What features of the web application are used and how often?
	B Interviews	5 users 3 mentors	Reasons for (non-)using (components of) the web application Reasons for the decline in usage
Effects	**A** Log Data Analysis	12 users 17 users	Platform's impact on habit-change Platform's impact BMI reduction
	B Interviews	5 users 3 mentors	Perceived effects Users' expectations and needs

2.4 Participants

In total, 236 people participated in the explanatory sequential mixed-methods design. In order to start the process of the platform's enrolment and to participate in this research, the user had to fulfil the platform's inclusion criteria of (1) being a patient diagnosed with T2DM or with a high risk of getting T2DM, (2) being motivated to perform self-management activities, and (3) having access to the internet. The users started the process of enrolment voluntarily after being informed by a newsletter of their health insurance or by a Google advertisement. The rights and authorisation to conduct research were consented by the users by agreeing with the general terms and conditions of the platform. Moreover, a paragraph about research-related privacy policies explicitly mentioned that all data are anonymized and that the user gives permission for being contacted for further questions. [50].

To conduct interviews, all users of Part A were asked to participate. Subsequentially, five users agreed to participate in the interviews. Since there was the need to get a holistic view of the use of the platform, the enrolled mentors were also asked to participate. Thus, four out of five nutritionists who acted as mentors in the platform also agreed to participate in the interviews.

2.5 Part A: Log Data Analysis

2.5.1 Participants

In total, 233 people participated in the log data analysis by starting to enrol in the platform between 01-07-2018 and 20-05-2019. As a consequence of launching the feature *self-reported bodyweight* was on 01-07-2018, log data from this day forward were used for the analyses. As a result, all enrolled users participated to analyse the platform's *uptake* and *use*.

To analyse the *effects* of *Floor* and its impact on the end-user, baseline and follow-up measurements were necessary. The analysis was performed with 17 participants of Part A who filled in their bodyweight and 12 participants who filled in their SRBAI at least two times in total time of use.

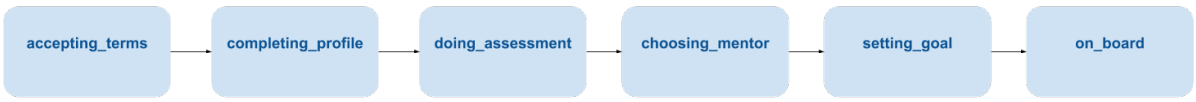
2.5.2 Measurements & Analyses

Part A combined both actively and passively collected data to investigate the platform's *uptake, use* and *effects*. The demographic data regarding the platform's *uptake* and the outcome-data regarding the platform's *effect* were actively collected by requiring self-reported input from the participants. Whereas, the log-data which described the platform's *use* were passively collected. Sieverink et al. defined log data as a history of anonymous records of real-time actions performed by each user in a technology [40]. In this research, provided log data contained information about the type of actions performed within the platform by counting the *use* of the components of *Floor* (see Table 2).
All statistical analyses were conducted in IBM SPSS Statistics (Version 25) [51].

2.5.2.1 Uptake

To investigate the *uptake,* percentages were calculated for users who passed the following step of enrolment and for users who did not (see Figure 3), to analyse the rate of people who actually enrolled in the platform and to explore which phases of enrolment represented a barrier in the platform's uptake.

Figure 3 Registration process



Subsequentially, means and Standard Deviations (SD) were calculated to examine the sociodemographics (i.e. gender and age) and medical states (i.e. BMI start, medication usage and diagnosis of T2DM) of enrollees and non-enrollees (see Appendix 6) to give insight into who made use of the platform and who decided against the use.

The Independent Samples T-test (for scale values) and Chi-Square Independent Test (for categorical values) were applied to analyse the *uptake* by comparing the means of sociodemographics and medical states between the groups of users who enrolled and who did not enrol in the platform. Lastly, the number of logins per user were descriptively analysed to investigate the rate of acceptance of the platform's use.

2.5.2.2 Use

The platform's *use* is analysed by passively collected log-data (see Appendix 7). It is objectively tracked by counting the number of the following used components between the first and last log-in per user: goals, sub-goals, SRBAI scores, satisfaction scores, weight measurements, conversations with mentor and the presence of a buddy.

The *use* was descriptively analysed by calculating the percentages of users who used a component at least one time and the average number of uses per component. The correlation between different components used in the platform was analysed by applying the Pearson Correlation (for scale values) and the Spearman's Correlation (for categorical values). A two-sided 5% level of significance was applied to all analyses.

2.5.2.3 Effects

Besides the analyses of its *uptake* and *use*, *Floor's* impact on the user was determined to evaluate the technology's *effects*. According to van Gemert-Pijnen et al., "effectiveness refers to the extent to which the technology actually produces the decided, decisive or desired effects" [24]. In terms of *Floor,* the desired effects were to make the user changing a (healthy) behaviour into a habit and to reduce the user's body weight. Those effects can be measured by calculating the difference between self-reported data. The impact of the platform on the user was analysed by investigating the differences in first and last entered BMI and SRBAI that are recorded in the log data (see Appendix 8).

To calculate the platform's *effects* on patients' outcomes, Means and Standard Deviations (SD) of the difference between the firstly and lastly entered BMI and SRBAI were calculated. The Paired Samples Test was applied to compare the mean change of clinical and behavioural outcomes (i.e. difference between the firstly and lastly entered BMI/SRBAI).

To investigate if the use of the platform did contribute to the *effects*, the dose-response relationship between the use of different components in the platform and the found effects in BMI reduction and SRABI improvement was calculated. A linear regression model was conducted by exploring the correlation between the use of components (i.e. number of steps, number of satisfaction scores, number of goals, number of entered weight, having a buddy and number of conversations) and the platform's impact on BMI reduction and SRBAI improvement. All statistical analysis was by applying a two-sided 5% level of significance.

2.6 Part B: Interview study

To investigate how users and mentors perceive the use of *Floor* and which aspects contribute to activity or non-activity within the platform, semi-structured interviews with 5 T2DM patients and 3 nutritionists were conducted in a period of 2 months. Being more precisely, 8 interviews were taken at 5 different locations. The average time of an interview was 27:30 minutes (SD = 11).

2.6.1 Participants

The participants in the interview study were users and mentors who were enrolled in the platform. The participating users were recruited from the log data pool of 233 people who started the process of enrolment. Additionally, all enrolled nutritionists who acted as mentors (n = 4) were asked to participate. Before conducting interviews, ethical approval for interviewing both groups were obtained by the Ethical Commission of the University of Twente (Request numbers: 190905 and 191035). Moreover, the participants were asked to sign the Informed Consents which can be found in Appendix 12 and 13.

The sampling size of the users who participated relied on the concept of *saturation*. It means that no further interviews were conducted if no new insights were found [52]. To be included for the research, the users and mentors had to agree the Informed Consent, used *Floor* for at least two weeks, were located in the Netherlands and spoke Dutch fluently. In case of meeting the inclusion criteria, the users of *Floor* received an invitational letter via e-mail. The participants' e-mail addresses were listed during the enrolment process.

2.6.2 Qualitative data

The interviews aimed to understand the prospective and current users of *Floor* and to obtain insight into why certain usage patterns occurred. Furthermore, the users' and mentors' experiences and points of improvement of the current version of the platform were explored by making use of semi-structured interview schemes.

Since both users and mentors were included in the qualitative part of the study, two interview schemes were designed. The topics of the two interview schemes (see Appendix 9 and 10) were presented as a standard set across the interviews. Although users and mentors differed in their perspectives, the topics were structured likewise. The topics were based on the found *uptake, use* and *effects* of Part A. Furthermore, some questions were formulated globally to get more insight into the life of patients with T2DM and how eHealth technology can play a role in it (see Table 2). Because of the fact, that the interviews were semi-structured, and the questions related to the topics were designed to be open-ended, it was possible to ask follow-up questions and focus on new topics that appeared [53].

Table 2 Interview structure users and mentors

Aims	**Topic**	**Opening question** User / mentor
General	Introduction	
	Diabetes and self-management	*Could you tell more about you and your life with diabetes? / Could you tell more about the support of people who suffer from diabetes type 2?*
	Use of internet and digital platforms	*How often do you use the internet?*
Uptake	Enrolment in *Floor*	*How did you experience the first time of using Floor?*
Use	Use of *Floor*	*How did you experience the use of Floor?*
	Contact between mentor and user in *Floor*	*What was your impression of getting support of a mentor? / What was your impression of having contact with the user?*
	Buddies in *Floor*	*What was your impression of a buddy?*
Effects	*Floor's* impact on the user	*To what extent had Floor a supportive role in your life with diabetes type 2? / To what extent had Floor a supportive role in supporting people with diabetes type 2?*
Uptake, use and effects	Recommendations and wishes	*Are there some points of improvements or things you would like to see to be changed?*

2.6.3 Analysis

A multi-step content analytic procedure was performed to analyse the qualitative data. After the interviews had been transcribed in Word, they were imported into Atlas.ti 8 for coding. These codes are words or short phrases that represent the essence or key attribute of verbal information to categorize and structure data. The analysis of the data was performed with open coding, applying both a deductive and an inductive analysis according the approach of Ritchie and Lewis [54, 55].

In the deductive analysis, relevant fragments were selected and coded in the predefined categories based on the interview scheme. Consequently, inductive analysis was further used to categorize selected fragments into subthemes. After that, those codes were negotiated and revised by an independent researcher (MW) until consensus was reached.

2.7 Synthesizing the quantitative and qualitative data

In the last phase of the explanatory sequential mixed methods, the quantitative and qualitative data collection and analyses were synthesized to answer the research questions. The discussion section (see Chapter 4) is used to mix and integrate the qualitative data with the outcomes of the quantitative data analysis to interpret, discuss and explain the outcomes.

3 Results

The first part of the results section examined the platform's *uptake*, its *use* and *effects* on the users. In Part B, the reasons for found results of Part A are described and the experiences among users and mentors are illustrated.

3.1 Part A: Log Data Analysis

3.1.1 Uptake

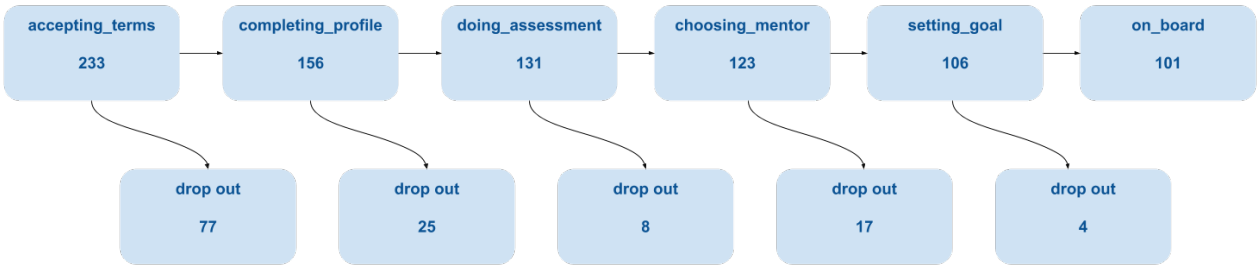


Figure 4 Users' dropouts

During the period from 01-07-2018 to 20-05-2019, 233 people started the enrolment process after visiting the homepage of *Floor* and passing the intake test. *Figure 4* shows the different registration steps and its number of users who dropped out. During the registration process, the number of potential users decreased by every step. Especially in the first two steps – accepting_terms and completing_profile – 43.8% of the potential users stopped to enrol. After passing through all five steps, 101 of 233 people (43.3%) were enrolled.

The people who finally enrolled in *Floor* had an average age of 60 years, an average Body Mass Index (BMI) of 30 kg/m² and more than half of them were male (55.4%). Furthermore, the enrollees were diagnosed with T2DM on average 6 years ago and 53% of them took medication. When comparing the group of users who actually enrolled in the platform and the users who did not, there is one statistically significant difference found between both groups: the age. The enrollees (59.6 years) were on average 6.5 years younger compared to the users who stopped to enrol (66.1 years).

Table 3 Baseline characteristics enrollees and non-enrollees

	Total (*n*= 233)	Enrollees (*n* =101)	Non-enrollees (*n* = 132)	*P* value (2-tailed)
Sociodemographics				
Gender				.78^
Female	55 (23.6%)	41 (40.6%)	14 (10.6%)	
Male	73 (31.3%)	56 (55.4%)	17(12.9%)	
Missing value	105 (45.1%)	4 (4%)	101 (76.5%)	
Age (SD)	61 (12.7)	59.6 (13.1)	66.13 (9.7)	.033*
< 50	19	18	1	
50 – 64	34	28	6	
65 – 74	41	30	11	
> 75	8	4	4	
Missing value	131	21	110	
Medical state				
BMI *Start* (SD)	30.6 (6.4)	30.3 (6.1)	31.1 (6.8)	.44*
Medication usage				.985^
No	42 (18%)	31 (30.7%)	11 (8.3%)	
Yes	73 (31.4%)	54 (53.5%)	19 (14.4%)	
Missing value	118 (50.6%)	16 (15.8%)	102 (77.3%)	
Diabetes in years (SD)	6 (7.3)	6 (7)	5 (7.3)	.49*
< 1	21	12	9	
1 - 5	53	40	13	
6 - 10	14	10	4	
> 10	23	19	4	
Missing value	122	20	102	

*Independent Samples T test.
^Chi-Square Independent Test.

Of the 101 people who enrolled, 46 (45.5%) users never returned to the platform during the study period (see Figure 5). In this period, the average number of logins per user was 3.9 times (SD = 9.7).

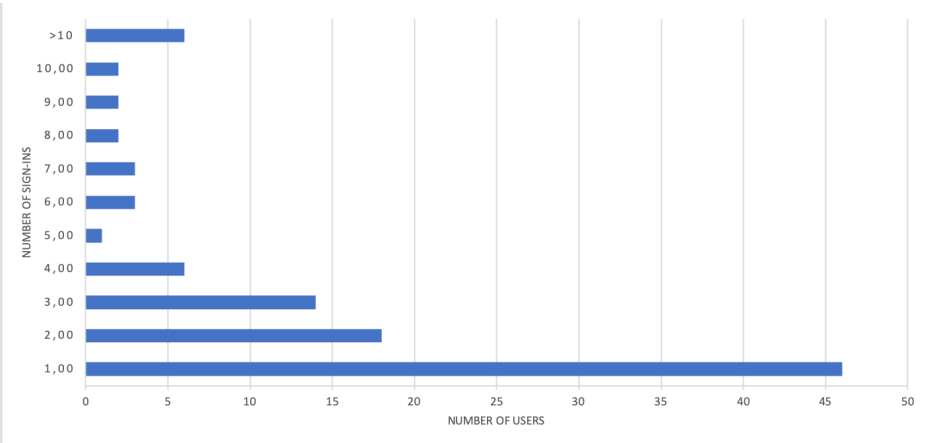


Figure 5 Number of sign-ins

3.1.2 Use

Table 4 illustrates the number of users who used a specific component of the platform and its frequency of use. The option to have a conversation with the mentor and to create a goal is employed by the majority of users with 91.1% and 82%. Less than the half of the users (42.6%) created a sub-goal. A quarter of the users (25.7%) filled in the satisfaction score with 8.73 (SD = 11.27) times on average. The SRBAI score (18.8%) and bodyweight (15.8%) are filled in by the minority of users with 4.32 and 4.31 times on average. This non-usage can also be found in the small number of users who added a buddy with just 16.8%. All in all, the platform's components were used rarely and not by all users. Comparing these findings with the developers' intention of how the platform is supposed to be used (i.e. self-entering the satisfaction score two times a week / self-entering the bodyweight and SRBAI one time a week at least), it can be said that most users did not use the platform as intended.

Table 4 Frequency of use of different components in total period

	Number of users who used the component (%) (n = 101)	Average number of usages in total (SD)
Conversation with mentor	92 (91.1%)	1.04 (.21)
Created a goal	84 (83.2%)	1.01 (.11)
Created a sub-goal	43 (42.6%)	1.28 (.79)
Filled in satisfaction scores	26 (25.7%)	8.73 (11.27)
Filled in SRBAI	19 (18.8%)	4.32 (5.96)
Entered weight	16 (15.8%)	4.31 (2.96)
Buddy	17 (16.8%)	N/A

By looking at *Table 5*, the log data also provided insights into the correlation between different components used in the platform. All statistically significant correlations (*P* value ≤ 0.05) are shown in bold digits. First of all, the number of sub-goals had a positive correlation with the number of satisfaction scores (*p* .006) and the number of weight measurements (*p* .001). The number of satisfaction scores had a positive correlation with the option to have a buddy (*p* .000) and the number of filled in SRBAIs (*p* .044). Furthermore, the number of conversations with the mentor had a positive correlation with the number of filled in SRBAIs (*p* .029) and a negative correlation with changing the user's main goal (*p* .043).

Table 5 Correlation matrix between different components used by enrollees

Correlation (*P* value)	Number of sub-goals	Number of satisfaction scores	Have buddy	Number of conversations	Number of entered weight	Number of goals	Number of SRBAI
Number of sub-goals	X	**.41 (.006*)**	-.063 (.617^)	.173 (.187*)	**.73 (.001*)**	-.07 (.58*)	-.082 (.74*)
Number of satisfaction scores	**.414 (.006*)**	X	**.452 (.000^)**	.173 (.146*)	.347 (.187*)	-.079 (4.89*)	**.467 (.044*)**
Have buddy	-.063 (.617^)	**.452 (.000^)**	X	-.019 (.857^)	.228 (.396^)	.118 (.241^)	.334 (.162^)
Number of conversations	.173 (.187*)	.173 (.146*)	-.019 (.857^)	X	xx	**-.208 (.043*)**	**.529 (0.029*)**
Number of entered weight	**.73 (.001*)**	.347 (.187*)	.228 (.396^)	xx	X	.214 (.462*)	.259 (.471*)
Number of goals	-.07 (.58*)	-.079 (.489*)	.118 (.241^)	**-.208 (.043*)**	.214 (.426*)	X	-.372 (.117*)
Number of SRABI	-.082 (.74)	**.467 (.044*)**	.334 (.162^)	**.529 (0.029*)**	.259 (.471*)	-.372 (.117*)	X

*Pearson Correlation
^Spearman's Correlation
xx cannot be computed

3.1.3 Effects

A total number of 17 users filled in their bodyweight more than two times. After comparing the start- and end-measurements, a statistically significant difference was found in the users' BMI with a decreased BMI from 29.7 (SD = 5.6) to 29.0 (SD = 5.4). Furthermore, the Paired Samples Test showed that the 12 users who filled in the SRBAI more than two times had no statistically significant change (*p* = .206).

Table 6 Effects

	Start-measurement	End-measurement	*P* Value (2 – tailed)
BMI (SD) *(n = 17)*	29.7 (5.6)	29.0 (5.4)	.036*
SRBAI (SD) *(n = 12)*	11.1 (5.1)	13.6 (5.9)	.206*

*Paired Samples Test

The Linear Regression analysis indicated that the use of components in the platform was not statistically significant associated with the found effects (see Table 7).

*Table 7 Dose-Response Relationship Use and effects**

	Unstandardized B	*P* value
Constant (BMI Reduction)		
Number of logins	.07	.27
Number of steps	.17	.61
Number of goals	. 12	.87
Number of satisfaction scores	-.019	.46
Number of entered weight	.15	.17
Having buddy	.56	.41
Number of conversations	-.62	.64
Constant (SRBAI)		
Number of logins	-.05	.52
Number of steps		
Number of goals	-3.67	.35
Number of satisfaction scores	-.19	.27
Number of entered weight	-3.5	.62
Having buddy	-5.6	.13
Number of conversations	.97	.81

*Linear Regression analysis

All in all, the platforms *uptake* was comparable to other eHealth platforms and the *use* of most of the components was marginal. A statistically significant reduction was found in the users' BMI, but no change was found in the users' SRBAI. To get insight into the limited *uptake* and marginal *use* and *effects,* the interviews with mentors and users in chapter 3.2 give explanations and reasons.

3.2 Part B: Interview study

After investigating the uptake, use and effects of the platform and its components, the next step was to explain and substantiate the found appearances. After giving an overview of the participating respondents, the derived themes of the inductive coding analysis are shown in six tables. The first theme that recurred in the interviews was the enrolment and first impression of the platform, followed by the use of components in the platform, the communication and relationship between users and mentors and the role of the help-desk support and reminders. The interviews ended with the themes about the platform's effects and about recommendations for further improvements and future use.

3.2.1 The users and mentors of the platform

Table 8 Sociodemographics

Socio-demographics	Users (n = 5)	Mentors (n = 3)
Age in years (SD)	76 (6)	25 (0.6)
Duration of T2DM in years (SD)	11 (4)	n/a
Intake of medication (%)	4 (80)	n/a
Days of use the platform (SD)	35 (17)	240 (270)
Number of logins (SD)	34 (16)	113 (87)

All users who participated were retired and still used the platform. Two female and three male users participated with a mean age of 76 years (SD = 6). By looking at their life with T2DM, four out of five users suffered from T2DM and took medicine. The other user had the risk of getting diabetes and stated that he did not use medication yet. The users with T2DM were diagnosed with this condition 11 years ago on average (SD = 4). Regarding the platform's use, the participating users enrolled in the platform 35 days (SD = 17) on average before being interviewed and signed in 34 times (SD = 16).

All of the mentors who participated in the interviews worked as self-employed nutritionists with an average working experience of two years (SD = 1), were similar in age with 25 years (SD = 0.6) and were located in different regions of the Netherlands. The mentors differed in the time they used the platform with 8 months on average (SD = 9) and the numbers of logins with 113 (SD = 87).

The final version of the coding scheme consisted of 11 groups with 58 subthemes, applied to all transcripts. The intercoder reliability was measured after the first two coding sessions. In total, two coding sessions were conducted, in which respectively 97 and 82 text elements were coded. Eventually, the Krippendorf's alpha was 0,67 which is generally perceived as a good level of intercoder agreement [40].

3.2.2 The platform's uptake

3.2.2.1 The enrolment and first impression of the platform

Table 9 Codes enrolment and first impression

Codes Sub-codes	**# users (#citates) /** **# mentor (#citates)**	**Description code** Explanatory quote
How Floor caught attention	**5 (6) / 0 (0)**	**The way how Floor caught the attention.**
via health insurance	4 (5) / 0 (0)	" An email arrived from ONVZ if she wanted to participate in the project." (U4)
via friend	1 (1) / 0 (0)	"By a friend who pointed it out to me." (U2)
Expectations about Floor	**5 (9) / 0 (0)**	**What respondents expected of Floor before the enrolment.**
Getting coaching in nutrition	2 (3) / 0 (0)	"In the hope that they can support me, coach me in dealing well with my food and sweets." (U2)
Losing weight with Floor	2 (3) / 0 (0)	"What I want is that my bodyweight will reduce (…)." (U1)
Reducing medication intake	1 (1) / 0 (0)	"(...) that I finally, well I don't know if I succeed, get rid of the pills and my sugar (...)" (U1)
Learn something new	1 (1) / 0 (0)	"And yes, we are never too old to learn and then I started." (U1)
Prevent diabetes	1 (1) / 0 (0)	"I just want to say that it is important for me to prevent things in the years that I still have. And that is still possible. "(U4)
No clear vision	**2 (4) / 0 (0)**	**The intention and idea of Floor were not clear.**
Insufficient information about intention	2 (3) / 0 (0)	"When I search for Floor, I want to know… er… in a few catchy sentences about your drive. Why are you doing this? "(U5)
Health insurance cannot say what Floor is about	1 (1) / 0 (0)	"But then they came up with Floorhelpt and then I asked them" What does it mean?!". It was quiet on the other side of the line, because they didn't know that." (U5)
Positive first impression	**1 (1) / 2 (2)**	**The first impression of Floor was positive.**
User-friendly enrolment process	1 (1) / 1 (2)	"For the rest, it was simple to fill in, simple to do." (U1) "That was actually very simple. It worked out well. "(M3)
Negative first impression	**3 (6) / 0 (0)**	**The first impression of Floor was negative.**
Enrolment process not user-friendly	3 (3) / 0 (0)	"The first time I visited the site and saw the possibilities … it was very demotivating because I did not know what to do." (U5)
No manual / tutorial	1 (2) / 0 (0)	"The manual that is given ... if a manual is given ... is absolutely insufficient." (U5)
Unclear how to get in contact with mentor	1 (1) / 0 (0)	"(…) I thought it was a bit unclear. In the sense that I did not know who is participating who the coach is." (U3)
Costs of Floor	**4 (10) / 1 (1)**	**The presentation and transparency of costs.**
User is willing to pay	2 (2) / 1 (1)	"I have a bit of a rule about what helps my health, may also cost money." (U1)
Missing information about costs for users	2 (4) / 0 (0)	"(…) I don't know what it costs. No information is given at all about it. "(U5)
Costs of mentor not clear	2 (2) / 0 (0)	"From the perspective of the client ... I think it is indeed not clear how that is reimbursed." (M2)
Payment via health insurance not clear	2 (2) / 0 (0)	"So, I don't know how much the mentor can count. She simply submits that to the health Insurance. But that is not certain." (U1)
Declaration of the costs	**0 (0) / 3 (6)**	**They way of how mentors declared costs.**
Time registration is problematic	0 (0) / 1 (2)	"If someone enters some measurements and I respond " Well done! "Or" Pay attention to that." Look ... I can submit a claim to a health insurance company for every 15 minutes. "(M2)
Coping with time registration	0 (0) / 2 (2)	"Then I just wait until I think:" Oh yes, now I have fifteen minutes. Then I submit it" (M3)
Barriers in declaration	0 (0) / 1 (1)	"So, if another dietician declared this already to the health insurance company, I can't do it anymore." (M2)
Financial benefit not seen	0 (0) / 1 (1)	"(…) If you have five clients, then it already costs 25 euros per month and if you cannot claim it in that way because they also go to another dietitian or else… then it costs money and that is of course not the intention." (M2)

Being asked about how the users got in contact with the platform, four stated that their health insurance called the users' intention to the platform. Being more precise, the users received a newsletter of their health insurance with some information about Floor. The other user said that a friend recommended the platform.

The majority of users expected that Floor can give them support and coaching in nutrition-related topics, reduction of bodyweight, reduction or prevention of medication. Furthermore, one respondent who suffered from pre-diabetes hoped to avoid T2DM with assistance of the platform.

When they logged in the platform for the first time, the majority of users faced some issues. First of all, two users had no clue what the platform is about and how it could assist in the life with T2DM. One user got in contact with his health insurance to solve this problem, but even the health insurance was not able to say what *Floor* is about.

More negative comments emerged when the users were asked about the enrolment process and the first impression of the platform. A common view amongst the interviewees was that they had trouble to navigate through the platform. The platform's components were not clear for all users in the beginning. One user stated (User 2, male): *"So the introduction was very friendly, very nice. But not very efficient. Not very "to the point" and they can ... what was absolutely not clear to me ... I am not unalert ... it was not clear to me how to handle that" (NL: "Dus de introductie was heel vriendelijk, heel aardig. Maar niet heel efficiënt. Niet heel erg "through the point" en dat kunnen ze…wat mij absoluut niet duidelijk was… ik ben niet onalert… wat mij niet duidelijk was hoe ik dat aan moest pakken.")*

On the other hand, in spite of these recent findings of the users' perceptions, all mentors had a positive first impression of Floor. The enrolment and the option to fill in the mentor profile were experienced as user-friendly and efficient. In summary, it has been shown that the users' perception of the first use of Floor differed from the mentors' perception.

Even though the users were willing to pay for a platform, they described the costs as a negative aspect of the enrolment process. The fact that two users did not know what a nutritionist costs and if it is paid by the health insurance or not, showed that the presentation and information about the costs were a thorn in the users' side and not clear at all for them. They complained about missing information about the costs and indistinctness.

The majority of mentors agreed with the statement that the platform's costs were not presented clearly to the users. Furthermore, the way of declaring the consult costs to the health insurance was not clearly defined and the mentors experienced their way of declaring Floor as vague. As one mentor put it (Mentor 2, female): *"Sometimes I notice that people send messages where I think 'Yes, that is an answer. But I can't really declare anything on that.' " (NL: "Alleen ik merk wel dat soms sturen mensen berichten waarvan ik denk 'Ja dat is een antwoord. Maar daar kan ik eigenlijk niks op declareren'.")* Another mentor stated that she faced some barriers when she wanted to declare the costs to the user's health insurance. Because of the fact that the user was coached by another nutritionist before, the mentor was not able to declare the costs anymore.

3.2.3 The platform's use

3.2.3.1 Use of components in the platform

Table 10 Use of components

Codes Sub-codes	**# users (#citates) /** **# mentor (#citates)**	**Description code** Explanatory quote
Creating a goal	**2 (2) / 1 (2)**	**The definition of a goal during the enrolment.**
It was easy to create a goal	2 (2) / 0 (0)	"The goal was very simple. Just lose some weight and get rid of the pills." (U1)
Helpful feature	0 (0) / 1 (2)	"I always look at their goal. But I think it's important to look at what exactly is ... why do they start with it, I would say." (M3)
Self-report of bodyweight	**4 (4) / 0 (0)**	**The way how the users self-reported their bodyweight.**
Feature not found	2 (2) / 0 (0)	"But I would not know where I can find it. I would not know where to enter the weight. So, I'll wait for the mail." (U1)
Feature not used	1 (1) / 0 (0)	"I saw that yesterday or the day before yesterday. But I just chatted it." (U4)
Feature used regularly	1 (1) / 0 (0)	"I do that regularly too. If I get a message about "it's been a while", then we continue (...)" (U4)
Buddy	**4 (5) / 2 (2)**	**Respondents' opinions of having a buddy.**
Positive experience with buddy	1 (2) / 1 (1)	"That is of course very nice because she just participates. In any case, it does not make it difficult for me." (U1)
Not clear	0 (0) / 1 (1)	"So, I'm actually a bit unfamiliar with whether clients can support each other or what is that idea like?" (M2)
Not necessary	2 (2) / 0 (0)	"I try to solve it myself." (U5) "I had to find a buddy and I didn't succeed. Because that must be someone I like" (U2)
Not used	1 (1) / 0 (0)	"I haven't actually really used it yet. I think it can really help." (U3)
Chat	**3 (5) / 1 (1)**	**Respondents' opinions about the chat.**
Positive experience	2 (2) / 0 (0)	"I always have a lot to tell. So that takes a lot of time. But it is most efficient, though. I do not like some useless chatter." (U5)
Negative experience	1 (3) / 1 (1)	"(…) The caregiver simply does that less. She leaves many questions unanswered." (U2) "So, I sometimes find that harder. And once again you have to weigh even better about what you say or don't say." (M2)
Satisfaction-score	**3 (5) / 3 (5)**	**The way how the satisfaction score was experienced.**
Did not get attention	1 (1) / 1 (2)	"Well, she doesn't really take my satisfaction into account. But the messages." (U4) "I do indeed receive a message when someone has entered it. And I'll take a look at it. But actually, I don't do anything with it." (U4)
Misconception as mood-condition	2 (2) / 1 (1)	"What I do like is that I can indicate how I feel every day. Nice, not nice, great." (U1) "It depends on what they enter and sometimes there is no reason why they entered it." (M2)
Conception as satisfaction step	1 (1) / 1 (2)	"You must also indicate whether you are satisfied or dissatisfied on the day ... about diet." (U4) "I also like, for example, that they can indicate what their satisfaction is and their progress and so on." (M3)
Existence not known	1 (1) / 0 (0)	"No, I have not seen that." (U3)
Sub-goal	**1 (3) / 0 (0)**	**What respondent thought of a sub-goal.**
Conception of the feature	1 (3) / 0 (0)	"At the moment when everything is automatic, I can do another (step). And then I have to think about which one." (U1)
Time registration	**0 (0) / 1 (1)**	**The way how the time registration was used.**
Not used	0 (0) / 1 (1)	"If I have just had contact with someone, I just consider that it has been fifteen minutes and then I just submit fifteen minutes." (M3)
User-friendliness	**5 (12) / 3 (8)**	**Respondents' opinions about the platform's user-friendliness.**
User-friendly	3 (8) / 2 (3)	"I think it's understandable for everyone. And I think it's most important." (U1) "I think it's handy that you have everything in one system. You immediately see the weight and goals and also data and so on. "(M3)
Not user-friendly for users	2 (4) / 1 (3)	"And by coincidence I sometimes come up with things I wanted to find, but usually not." (U2) "I think it is a bit more unclear to clients." (M2)
Two-factor-authentication is not user-friendly	0 (0) / 2 (2)	"I also find it annoying that you always get a code and that you do not stay logged in." (M3)

By looking at how the users and mentors experienced the way of using the platform, the different experiences per function and the platform's general user-friendliness will be shown. After enrolling in the platform, the users had to formulate a goal to work on. All stated that it was not difficult to formulate and set up a goal. In fact, they described their goal as well-known because they struggled with those issues long before and were aware of their personal goal before. One mentor added that the goal was a helpful feature to support her clients.

Only one user stated that he used the option to self-report the bodyweight regularly. Other users indicated that they were not able to find the feature and one user did not see the benefit to self-report the bodyweight and to share it with the mentor.

The mentors had different thoughts about the users' buddies in the platform. There was one mentor who perceived the feature as helping to support the users. For another mentor, the buddy's role in the platform was not clear at all. The mentor asked (Mentor 2, female): *"So I'm actually a bit unfamiliar with whether clients can support each other or what is that idea like?"* *(NL: "Dus ik ben eigenlijk ook een beetje onbekend met of cliënten onder elkaar kunnen steunen of hoe is dat idee?")*

The users' differed in the acceptance of a buddy. One user described his relationship with the buddy as helpful and motivating. However, two users perceived a buddy as unnecessary. They stated that the support of a mentor would be sufficient and that they are not interested in getting support of a layperson. Another user cannot find a person who fulfilled the requirements to act as a buddy.

Both respondent groups, the users and the mentors, had mixed feelings about the option to chat in the platform. The positive feelings about the chat were its user-friendliness and its efficiency for the users. But on the other hand, one user perceived the possibility to chat as an irregular and inconsistent way of having contact with the mentor. Moreover, one mentor was concerned about the fact that the chat was archived and can be re-read by the client.

One of the platform's main components was the option to fill in the satisfaction score. This feature was perceived and used differently. One user stated that the feature did not get the mentors' attention at all. Moreover, one mentor admitted that user's satisfaction score was not embraced in their support and coaching. Furthermore, the users had different conceptions of how to interpret the option to fill in a daily satisfaction score. Whereas one user used the feature as intended by the developers, two users misinterpreted the component. As it can be seen in the following statement, theses users used the feature to express their daily emotional state instead of indicating their satisfaction regarding their behavioural change. User 1 (male) expressed: *"What I do like is that I can indicate how I feel every day. Nice, not nice, great."* *(NL: "Wat ik wel leuk vind is elke dag dacht je aangeeft van hoe voel je je. Gaat aardig, gaat niet aardig, gaat prima.")* Even more, one user did not even know that this feature was part of the platform.

The option to form a sub-goal was a rarely upcoming theme in the interviews. One user showed that the idea of creating sub-goals was adopted properly (User 1, male): "At the moment when everything is automatic, I can do another (step). And then I have to think about which one." *(NL:" Op het moment dat allemaal automatisch is, dan kan ik een ander doen. En dan moet ik even nadenken, welke er is.")*

The mentors had the option to registrate the time of coaching the clients. Only one mentor commented on this feature and stated that she did not use the feature at all. Reasons for that was the fact that she used another platform for time-registration.

The mentors perceived the platforms use in general as easy. All important features were easy to find and easy to understand. The only negative aspect regarding the user-friendliness according to the mentors was the fact that they had to make use of two-factor authentication to log into the platform. This security-related process is perceived as inefficiently and awkwardly.

The users were in disagreement with each other regarding the platform's user-friendliness. Two users described the platform as easy to use. In contrast, two other users said that they always had to look for functions within the platform and that they did not feel comfortable in the use. Furthermore, the users stated that they did not receive the support of mentors to use the platform more efficiently and to stay on target.

3.2.3.2 Communication between mentor and user

Table 11 Communication between mentor and user

Codes Sub-codes	**#users (#citates) /** **#mentors (#citates)**	**Description code** Explanatory quote
Expected contact	**2 (4) / 0 (0)**	**How the contact between mentor and user was expected before the use.**
User expected to have one time per week contact	1 (1) / 0 (0)	"I would rather chat with her once a week, so we can get in touch." (U2)
User expected to have every 2 weeks contact	1 (3) / 0 (0)	"We agreed that we will chat once every 14 days, so far. If she makes sure (the mentor) that I get the diets and everything goes well, then once in every 14 days will be sufficient." (U1)
Experienced contact	**4 (20) / 3 (6)**	**How the contact between mentor and users was experienced**
Higher than "normal"	2 (3) / 0 (0)	"And then there is actually such a digital contact ... (...) that means that the frequency is higher than with a normal dietician." (U3)
Contact was not complied	3 (3) / 0 (0)	"I thought that lady would contact me after I chose her. (...) But no contact was made and then I asked your support of "What about that?" (U5)
Users did not react on first contact	0 (0) / 1 (1)	"With two you have contact, with one you could get an intake and the rest just doesn't respond anymore." (M1)
Good way of support	3 (7) / 1 (2)	"Well, in the beginning it is nice as support. If I have any questions, I can pass that on as quickly as possible via Floor." (U1) "So that's really funny about Floor that those people don't mind doing it online." (M1)
Less involvement of users and mentors	1 (3) / 1 (1)	"I always give her a report, how I'm doing (...) and then she comes up with an answer that doesn't satisfy me." (U2) "Maybe Floor makes people think of 'Okay, let me mess around or something'." (M1)
The role of the mentor was not clear	2 (4) / 0 (0)	"(...) what the mentorship actually entails is not completely clear to me yet." (U5)
Conversation about platform	0 (0) / 1 (2)	"No, not really about Floor. No. No." (M1)
Ways of communication	**3 (8) / 3 (6)**	**The way how the mentors and users communicated**
Communication via chat	2 (3) / 1 (2)	"Yes, that is all via chat. I can tell, she has a system in it. "(U3) / "Currently only via chat." (M2)
Communication via e-mail and SMS	2 (2) / 0 (0)	"They are many SMS messages. Every few days. And also email messages." (U4)
Communication via phone or Skype	2 (3) / 2 (4)	"And we currently have video chat. It was the first time she has done hat in her life. "(U4) "I also try to skype people every two weeks. Just to ask how they're doing." (M3)

When asked about the contact with their mentors, the users were unanimous in the view that the contact with a mentor is an essential part of the platform. By having contact, they expected to get professional support. More precisely, the users explained that they looked for support in nutrition- and dietary-related changes. However, the expected frequency and moments of contacts were different in the users. One user reported that having contact with the mentor one time per week would be sufficient. In contrast, the other users expected to have contact with their mentors more often. In fact, they expected to have contact with their mentors several times per week and they expected to get a reply from their mentors as soon as possible.

Comparing the expectations with the users' experiences, it can be seen that in most of the cases the experienced frequencies of contacts were in line with the expected frequencies. The majority of respondents were positive about the frequency of contacts. Whereas one user made negative experiences regarding the contact with the mentor. After the user had to switch the mentor because of financial reasons, neither the frequency of contacts nor the way how the contact happened was experienced satisfyingly. Talking about this issue, this user complained (User 2, female): *"She leaves many questions unanswered (…) I would rather chat with her once a week, so that we can keep in touch. But that doesn't happen. She is always, let's say, offline."* *(NL: "Die laat veel vragen van mij onbeantwoord (…) Ik zou liever een keer in de week met haar chatten, zodat wij even contact hebben. Maar dat gebeurt niet. Ze is altijd, laat maar zo zeggen, offline.")* There was also one mentor who was not satisfied with the communication. She stated that a majority of users did not reply to the first chat message sent by the mentor and that the communication was stuck afterwards.

By comparing the way how the users and mentors experienced the way of contact, it can be said that those experiences recurred in the way how they perceived their relationship. When the moment of contacts was in a line with what the users expected, the relationship was described as a positive, trustful and helpful way of getting support. On the other hand, irregular and superficial contact with the mentor resulted in a withdrawn and troubled relationship between user and mentor and less involvement in the platform. Furthermore, the role of the mentor in the platform was not clear for two users and one mentor. One user stated that he did not know at all what he can expect of a having a mentor and how do deal with this possibility. Another user was not sure about the distinction of receiving feedback from the platform itself and receiving feedback from the mentor. All in all, both the users and mentors stated that the conversations were mainly about dietary changes. One mentor admitted that the conversations were never about the use of the platform or specific features in it.

There was only one mentor and two users who used the chat function as the only way of communication. The rest of the mentors and users got in contact via different ways. Most of them preferred to send e-mails and SMS. Moreover, Skype was also a popular mean of communication. The mentors substantiated the different ways of communication with the fact that video-chat and phone-calls can offer advantages like flexibility and being more personal.

3.2.3.3 Role of helpdesk support & reminders

Table 12 Role helpdesk & reminders

Codes Sub-codes	**#users (#citates)/** **#mentors (#citates)**	**Description code** Explanatory quote
Help-desk support	**3 (4) / 1 (2)**	**The way how the respondents experienced the way of getting support by the helpdesk.**
Support helped and was quick	3 (4) / 1(2)	"I get answers every minute if you ask something. So, the desk is well organized." (U3) "If I run into it, I know it will be arranged. It sometimes takes some time, but it is being worked on." (M1)
Reminders and notifications	**2 (3) / 2 (2)**	**The way how the respondents experienced the way of getting reminders and notifications.**
Reminders helped the users	2 (3) / 0 (0)	"That's great, that system. It's kind of focused on Floor. Well that is very thoughtful. Then I'll be fine. It is well thought." (U3)
Technical issues with notification	0 (0) / 2 (2)	"It is only when you receive support messages... when I open it on my phone then the message is gone and then I have to click on support and then there are no messages." (M2)

All in all, the support of the platform was perceived as positive and very quick. A help desk represented by the platform's product owner and an account manager provided the support of the platform. The support was independently provided alongside the contact between the mentors and users.

The users were also positive about the platform's built-in reminders. They stated that the reminders helped them to make use of the platform regularly and even more, it helped two of the users to get access to some platform's components without searching for it. Two mentors perceived messages from the helpdesk as problematic. When getting a notification about a new message, the mentors cannot open the message on their mobile phone. Subsequentially, the message was lost. This recurring technical issue was perceived as disruptive.

3.2.4 Effects of the platform

Table 13 Codes effects of the platform

Codes Sub-codes	**#users (#citates) /** **#mentors (#citates)**	**Description code** Explanatory quote
Effect on behavioural outcomes	**2 (4) / 0 (0)**	**The platform's impact on behavioural outcomes.**
Use of platform had positive effect on behavioural change	1 (1) / 0 (0)	"And that less snacking has succeeded. That was also very important (…)." (U2)
Use of platform had no effect on behavioural change	1 (1) / 0 (0)	"Well .... not much. They are clear of what you have to do. I get clear messages from the coach and yes further ..." (U1)
Use of platform had positive effect on user's motivation	2 (2) / 0 (0)	"Perhaps the frequency of your reporting and seeing if you are still doing well is giving you some extra incentive." (U3)
Effect on clinical outcomes	**5 (8) / 3 (3)**	**The platform's impact on clinical outcomes.**
Use of platform had effect on weight-reduction	1 (2) / 1 (1)	"She had already lost a few kilos anyway ... even before Floor. But since Floor it still is ... yes it went well. She is still a few pounds off." (U4) "actually, everyone is doing pretty well. Everyone is losing weight so far." (M3)
Use of Floor had effect on user's quality of life	1 (2) / 0 (0)	"That did happen because of that! Everything is much more positive, also because of the diet and her entire lifestyle. "(U4)
Effect not because of platform	2 (2) / 0 (0)	"But that's not the fault of Floor, I think it's my fasting. Less food." (U5)
Use of platform had effect because of larger range	0 (0) / 1 (1)	"I do have someone who says that he actually has been treated by a dietitian for years. And now I have just given some other advice (...) The values of sugar are very neat. Yes, he is really moving forward because he indicated that he actually did not move forward with the dietitian. (M2)
Effect is not known yet	1 (2) / 1 (1)	"How effective it is, that remains to be seen." (U3) So, I think the group is actually too small to really see a difference there. (M2)

When asked about their perceptions towards the effectiveness of the platform, the mentors and users had different opinions. Starting with the respondents who have experienced a positive effect of the platform, one user claimed that the platform helped to change her habits (User 2, female): *"And that less snacking has succeeded. That was also very important (…)."* *(NL: "En dat minder snoepen is wel gelukt. Dat was ook heel belangrijk (…).")* Furthermore, two users stated that the platform had a positive impact on their motivation to change their lifestyle. They ascribed the increased motivation to the regular contacts with their mentors.

Besides the platform's impact on habits, one user stated that the platform had also a positive effect on weight loss. Moreover, the same user perceived an improved quality of life. One of the mentors confirmed this experience and stated that the effect can be explained by the user's option to get in contact with mentors who are experts and spread across the country.

The majority of the users stated, that they were not able to evaluate the platform's impact yet. Two users stated that they started to lose weight and improved their blood glucose control before they enrolled in the platform. Because of that, it was difficult for them to weight the platform's contribution to their success. These users emphasised the need to be active for a longer period before they can evaluate the platform's impact on their life with T2DM.

3.2.5 Recommendations and future use

Table 14 Codes recommendations and future use

Codes Sub-codes	**#users (#citates) /** **#mentors (#citates)**	**Description code** Explanatory quote
Improvements	**2 (3) / 3 (9)**	**Recommendations for further improvements of the platform.**
User-friendliness	1 (1) / 2 (3)	"Just keep it simple." (U2) “I think it could be better. But that has to happen step by step.” (M1)
Better illustration of the platform’s costs	1 (2) / 1 (1)	"I think this should be clearer when enrolling, in particular." (U1)
Declaration process	0 (0) / 2 (4)	"That they should state whether they have been treated by another dietitian this year. That has to do with whether I am reimbursed as a dietitian or not.” (M2)
Need for formative evaluation	0 (0) / 1 (1)	“If changes have been made in a while, then you take a look at what has changed and what do the clients think and also the mentors. That would be very good.“ (M2)
Additional features	**0 (0) / 3 (11)**	**Additional features that are wished to implement.**
Peer-support among mentors	0 (0) / 3 (4)	“I always like to network a bit. Maybe they also have some tips of how they do it." (M3)
Monitoring blood glucose level	0 (0) / 1 (1)	"That sugar values drop and not if they are just losing weight, but if they are also improving their health and so on." (M3)
Standardized files and news	0 (0) / 2 (4)	“Yes, maybe some tools or something. Or formats. Then focused on diabetes. Just some sort of booklet or something. Simply general. "(M3)
Contact with healthcare professionals	0 (0) / 1 (2)	"In any case, it would be nice if you could report to the practice supporter ‘We are doing this. Can you adjust the medicine?’" (M2)
Future use of the platform	**4 (6) / 3 (3)**	**The future use of the platform by the respondents.**
Positive about future use	2 (2) / 3 (3)	"I think that she could sustain it in the medium term." (U4) / "I certainly like to keep doing it in longer term." (M3)
No future use because of missing relationship with mentor	1 (1) / 0 (0)	“That, in essence, I am very dissatisfied with what I can get from Floor. And so, I'm really thinking about it, I think I'll just stop. Because it just doesn't meet my expectations." (U2)
Depends on platform’s effectiveness	3 (3) / 0 (0)	“I certainly want that. But of course, I am still waiting for results.” (U5)

Being asked about points of improvements and recommendations, the users underlined the need for improved user-friendliness of the platform. For example, one user stated (User 5, male): *"Simply information at all. How does it work? Which button should I press to get results? The manuals are always written by people who know how it works. As a well-intentioned amateur, I have little use of that."* *(NL: "Gewoon überhaupt informatie. Hoe werkt het? Welk knopje moet ik drukken om resultaat te krijgen? De handleidingen worden altijd geschreven van mensen die weten hoe het moet. Daar heb ik weinig aan als goedwillende amateur.")*

Looking at the costs of Floor, both respondent groups asked for further improvement. Being more precise, the users wished for a more distinct and structured illustration of how Floor is charged and who has to pay. The majority of users recommended to show the platform's costs immediately in the beginning of the enrolment process instead in the end.

The biggest issue the mentors faced was the declaration of costs to the health insurances. In this connection, two mentors made complaints about the fact that the majority of users did no fill in declaration-related information during the enrolment process. Hence, the mentors stated that they had to ask the users repeatedly to send the missing information. To fix the issue, the mentors asked to make the information mandatory for the users. Furthermore, one mentor wished for a function that new users have to indicate if they received the support of a nutritionist before in the same year. According to that mentor, the declaration of dietary advise is in such a case not possible.

Another recommendation of the mentors was the need for formative evaluation of the platform. A mentor asked to involve users and mentors in feedback sessions when new features are launched.

Besides the recommendations for further improvements of existing components, the mentors stated that there is also a need for new features. All mentors were enthusiastic about an option to have a peer-support among the mentors. In this context, one mentor stated (Mentor 3, female): *"I always like to network a bit. Maybe they also have some tips of how they do it. "* *(NL: "Ik vind het altijd leuk om een beetje te netwerken en zo. Misschien hebben zij ook nog wat tips inderdaad van hoe hun dat doen en zo.")*

Moreover, one mentor asked to add two new features. More explicitly, to add the option that the users can fill in their blood glucose level as an additional clinical value and to add the option that the mentor can send a short message to the users' general practitioner assistance.

Being asked about if they want to use the platform in future or not, the majority of users and all mentors were positive. Two of the users stated that they want to use the platform for a long period anyway because of their opinion that it was easy to use and that the mentor helped them to change their lifestyle. Two other users were not averse to use the platform in future but linked a future use to its (possible) effectiveness. Whereas, one user considered to stop with the platform. Reasons for that was a bad relationship with the current mentor and that the platform underachieved her expectations.

All in all, the results of the interviews gave more insight into the reasons for the platform's uptake und use and what has to be improved to fulfil the expectations of both the users and the mentors. In the next chapter, the synthesis and evaluation of the quantitative and qualitative data are described.

4 Discussion

This chapter answers the research questions of this thesis by synthesizing the quantitative data of Part A and the qualitative data of Part B. Furthermore, these results will be substantiated by existing literature and theoretical frameworks. Subsequently, the discussion will be followed by methodological considerations and will end with recommendations for the platform.

4.1 Aim and research questions

This explanatory sequential mixed-methods study aimed to investigate and to substantiate (1) the *uptake* of a platform based on behavioural change model and digital encounters with nutritionists, (2) the *use* of the platform and its components and (3) the platform's *effects* on weight reduction and behavioural change. Hence, we want to answer to following research question:

To what extent can a web-based platform – based on behavioural change models and digital encounters with nutritionists – contribute to the improvement of the current way of supporting people with T2DM?

4.1.1 The uptake of a web-based platform in T2DM

1st and 2nd Sub-question: What is the platform´s uptake and what are reasons for (non)-starting to use of the platform?

An initial objective of the project was to identify the platform's *uptake*. As mentioned in the introduction, several researches showed that most eHealth interventions do not tap the full potential because of a limited number of users and high dropout rates [32-36]. Since the platform is recently developed and even built on behavioural change models and digital encounters, there could be the claim that both uptake and adherence should be higher in *Floor* compared to previous platforms. However, the results of this study show that the dissemination of *Floor* in T2DM-related healthcare is also slow and comparable to other platforms [56, 57].

The log data revealed that during the enrolment process, more than half of the potential users stopped to enrol in *Floor* with an overall uptake of 101 users (between 01-07-2018 and 20-05-2019). Furthermore, the users only logged in 3.9 times on average and nearly half of them (45.5%) never returned after the first visit. These results are clearly in line with previous research into the uptake of *e-Vita* – another eHealth intervention for T2DM patients – where the researchers found that also more than the half stopped to enrol [56] and 46% of the enrollees never returned to the platform [57]. To investigate why those familiar issues and modest numbers recur in *Floor*, the experiences of the participants who actually enrolled in the platform are analysed to find possible explanations for not finishing the enrolment process. Once the participants started to enrol in the platform, they faced two issues. First, the users stated that they visited the platform because of curiosity or upon the advice of their health insurance. When the users started to enrol, they complained that the platform's role and intention was vague. They did not understand how far a web-based platform could assist in their life with T2DM and what advantages a digital platform can offer compared to a non-digital contact with a nutritionist while enrolling in the platform. Second, the users criticized the way how the platform's costs were presented during the enrolment process. Presenting the costs in the last stage of the enrolment process was experienced as unfavourable and unexpected. Because the missing information was

perceived as disruptive and demotivating, it can be assumed that the unclear presentation of the platform's intention and costs hinders many interested persons to enrol. Those barriers can be linked to the findings of Rogers et al. who defined the *Diffusion of Innovation Theory* [58]. Comparing both, it can be assumed that especially the lack of *relative advantage* (i.e. the advantages of a new technology outweigh the advantages of an existing approach) and the lack of *compatibility* (i.e. the platform should fit into the needs, values and routines of the users) hinders the uptake and successful implementation of the platform. The lack of relative advantage and compatibility are important implications for improving the presentation of the platform and the enrolment process. In chapter 4.3 it will be looked at how those implications can be realized.

Lastly, the log data revealed that the users who actually enrolled in *Floor* were more likely to be younger than the users who decided against the use (60 years and 66 years). This finding reflects those of Roelofsen et al. who also found that interested patients were more often younger [56]. However, the interviews with the users neither supports the hypothesis that younger users are more attracted by the platform's use nor gave explanations for the found difference in age. Hence, the small different in age will not be further discussed in this study but could stimulate for further research.

4.1.2 The use of a web-based platform in T2DM

3rd and 4th Sub-question: To what extent was the platform and its components used and what are the reasons for (in-) frequent use of the platform?

Besides looking at the *uptake,* it was also revealing to gain insight into the extent to which the platform and the components were used. In this connection, it was looked at the different components of the platform and how they were used. At this juncture, it helps to realize that *Floor* is a unique platform by combining conceptual behavioural change models with digital encounters. The log data analysis showed that almost all users contacted a mentor via the platform (91%). Similarly, the interviews supported that a regular contact was wanted by the users and the mentors and an interaction was appreciated and described as productive by the users when they experienced regular support in diet-related questions. Likewise, previous research has noted the importance of having a productive interaction among patients and healthcare professionals in eHealth interventions. Gee et al. for example highlighted the need of having a complete feedback loop between an informed, active patient and a prepared, proactive practise team to generate improved outcomes in health and/or behaviour [59]. Moreover, Lie et al. points to the importance of eHealth with face-to-face consultations to maintain the users' motivation [60].

Whereas, the other platform's components which are based on conceptual behavioural change models (i.e. sub-goals, satisfaction scores, SRBAI and bodyweight) are used by less participants and got minor appreciation. To explain the small number of users and the low frequency of use, two different considerations can be taken into account.

First, a possible explanation for the low use of those components may be the platform's unclear design or circuitous navigation. The analysed log data showed a low use of the SRBAI and bodyweight feature (both 4.3 times per user). Those found patterns can be explained by the statements of some respondents who were not able to navigate to the SRBAI and bodyweight feature because they were not able to find these. Hence, these issues may be due to a unclear design where some components are

hidden. This is in line with previous research which indicated that professional design and simple navigation can increase user-engagement [61-63]. Hence, an improvement of the navigational design is inevitable and needs formative evaluations (see chapter 4.3 and 4.4).

Second, possible reasons for the non-use of some components can be the way how the *Theory of Planned Behaviour (ToPB)* [47] and the *Habit-Goal Interface (HGI)* [42] are implemented in *Floor*. Prior studies have noted the importance of behavioural change techniques in eHealth interventions to improve the users' engagement to use the platform and in health outcomes of T2DM patients [29, 64]. As mentioned in the systematic literature review of Kebede et al., behavioural change techniques in digital interventions appear effective for reducing HbA1c levels in T2DM patients [64]. However, there is limited information about how these techniques can be implemented in an engaging way [65]. In the following, the conceptual behavioural change techniques and their implementation in *Floor* will be critically assessed.

Both, the *ToPB* and the *HGI* are implemented and intertwined with each other in the platform's design. The sub-goals as one of the platform's main features are mainly based on the *HGI* by Wood & Neal [42]. By splitting the main goal into sub-goals, the developers aimed to stimulate the user in forming new and healthy habits to maintain and achieve a healthy lifestyle. All in all, the feature was described as helpful and essential by most of the users. The importance and acceptance of goal-setting is underlined by previous research [66]. However, a few users stated that they missed support in formulating a sub-goal and even more stated that they missed support when they tried to achieve their sub-goals. These issues may be explained by an incomplete implementation of the *ToPB* by Ajzen [47]. This model and the way how to improve its realisation in the platform (see Chapter 4.3) will be described in the following.

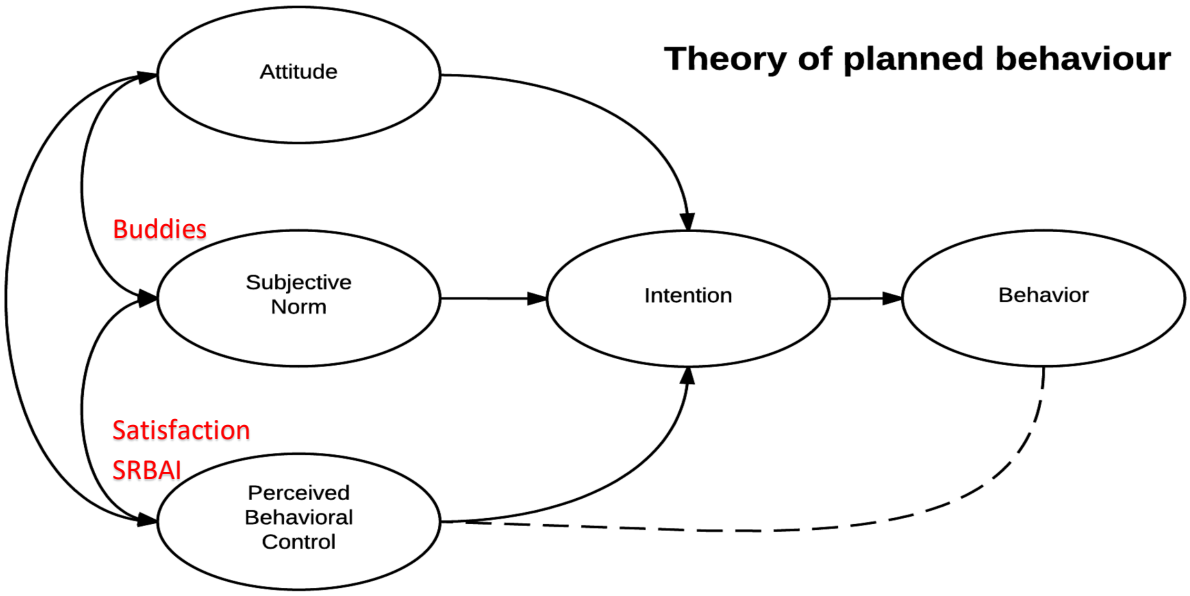


Figure 6 Theory of Planned Behaviour and components of the platform

To improve the user's ability to set up a sub-goal and to work on a behavioural change, the developers of *Floor* decided to implement the *ToPB* (see Figure 6) by Ajzen [47]. Based on that theory, an individual's behavioural intention and behaviour is shaped by the attitude toward behaviour, subjective norms, and perceived behavioural control [47]. Considering the way how the theory is implemented in

the platform, it can be assumed that the developers mainly focussed on the users' subjective norms and perceived behavioural control. Starting with the users' subjective norms (i.e. experienced support given by significant others), the developers hoped to improve this factor in an injunctive way [67]. This means that the users are influenced by others who encourage the behaviour of the user. In *Floor,* the buddies are meant to encourage the users. However, the log data and interviews indicate that there was little need for having a buddy. Based on the results, facilitating the subjective norms with buddies do not seem to be an appropriate approach. Hence, it could be considered to improve the subjective norms by applying descriptive norms which will be explained in chapter 4.3.

Furthermore, the developers intended to support the users in their perceived behavioural control by implementing a satisfaction score and the *Self-report Behavioral Automaticity Index (SRBAI)* in the platform. The interviews revealed that some users misinterpreted the satisfaction scores. They used the satisfaction score to express their general conception of mood instead of their progress in working on their behaviour. This misinterpretation suggests that the desired support in the users' perceived behavioural control is not realised in most of the cases. Such misinterpretation should be avoided by giving the users more information or guidance in the use of the satisfaction score. Furthermore, the SRBAI score was not user-friendly and understandable for some of the respondents. They described the design of this feature as too scientific and abstract. Hence, they did not understand the feature's intention. Both issues suggest that the platform's features to support the users' perceived behavioural control should be unambiguous and applied to the intellectual level of the end-user.

The users' attitude as the third building block of the ToPB is less realised in the platform. Being asked about their attitude towards their (new) behaviour, most participants had an instrumental attitude by recognizing their (target) behaviour as beneficial for their health [68]. However, some participants stated that the platform may be less applicable for users who are not ready for change yet. The importance of an active and motivated attitude of users to increase the use of eHealth interventions and to improve outcomes is found in several theories. For example, the Stages of Change Theory [69] underlines the fact that users who are not ready to change will not be engaged in the platform. Hence, in future development, it should be looked at different options to influence the users' attitudes positively. In summary, it can be said that the implementation of the *HGI* and *ToPB* offers room for improvement. Recommendations regarding the improvements will be presented later (see chapter 4.3).

4.1.3 The platform's effects on changing the lifestyle of patients with T2DM

5th Sub-question: What is the platform's impact on clinical and behavioural outcomes and which components of the platform contribute to it?

As it was already shown in chapter 3.2, considering the platform's impact on the weight reduction and behavioural change of people with T2DM, a small change was found in the users' reduction of the BMI. However, the interviews support the results found in the Linear Regression Analysis – most of the users cannot link the weight reduction to the use of the platform.

Based on the fact that the use of the platform's components was low (12 users filled in the SRBAI score 2 times minimum), a significant effect on the patients' ability to change their habits was *not* expected. This expectation was affirmed by the log data analysis which showed that no statistically significant effects were found. However, we know that a positive impact on behavioural changes is possible [70,

71]. The implications of chapter 4.1.2 regarding the implementation of the conceptual behavioural change models can be taken into consideration to assess the platform's effects. Especially improving the focus on the users' attitudes and therefore a higher use of the platform's components could eventually result in a higher effect.

4.2 Strength & Limitations

The goal was to evaluate the platform holistically. For that reason, the study made use of an explanatory sequential mixed-methods design. The chosen study designs consisted of a log data analysis and interviews. Both designs have some strength and limitations. First, at will be looked at the studies' strength.

The biggest strength of this study was the fact that quantitative and qualitative data were conducted in a mixed-methods design. The log data analysis and the interviews offer different advantages. A combination of both research designs enabled the option not only to get insight into the *uptake, use* and *effects* of the platform but also into why those patterns occurred and how it could be improved [40]. The biggest advantage of performing a log data analysis is the provision of objective and continuous data [37]. Because the users did not feel observed, the so-called Hawthorne effect was not present. This effect concerns the research participation and its possible impact on behaviour because of the consequent awareness of being studied [72]. In contrast to an RCT, a log data analysis does not investigate the intervention's effectiveness only. It can give insight into which components contributed to its impact and which did not [37]. Conducting interviews with users and mentors gave insight into the reasons for using or non-using specific components and their experiences. Another strength of the mixed-methods study are the respondents who participated in the interviews. A multi-perspective view was enabled by interviewing both mentors and users. These different groups of respondents act as different stakeholders which often have different values and goals for an eHealth platform [73].

The study had also some limitations. The biggest limitation of this research was the limited extent of provided log data because of a marginal number of participants. The analysis of use was based on the number of self-entered features. However, it was not technically possible to provide insight into the navigation process of the user which is according to Sieverink et al. a promising approach to explain the found effects of a technology [40]. Furthermore, using the number of sign-ins as an indicator for the platform's use can result in an overestimation. We do not know in which period the measurements occurred. Hence, it was not possible to filter repeated logins which occurred in a short period (e.g. in one hour) and therefore can falsify the platform's use. The same limitation has to be considered in analysing the platform's effect. The effect analysis was performed with the firstly and lastly entered weight and SRBAI measurements per user. However, the problem reoccurred that we do not know in which period the measurements occurred. From this, it can be assumed that an undelivered effect is not necessarily due to ineffectiveness of the platform, but rather to a too short period. Moreover, the self-reported data to analyse the platform's *uptake* and *effects* presume the users' reliability and engagement to enter the data correctly and regularly. However, this study showed that most of the users did not enter these data frequently. Such missing data may result in an incomplete data set to analyse the platform's effects. It can be assumed that more positive and negative changes in body weight and SRBAI occurred but were not analysed because the users did not enter the measurements. This could result in biased effects of the platform's use. Anyway, the small sample size resulted in a very

low power of the analysis. By looking at the platform's impact on BMI reduction and an increased SRBAI score, there is a chance of 91.6% and 93.9% respectively that a type II error occurred. This means that there is a high chance that the null hypothesis (the platform has no impact on habit-changes) is accepted wrongously.

The last limitation of the study was the homogenous presence of interview-respondents. All five users enrolled in the platform recently. Because none of them used the platform longer than three months, the experiences of long-term use cannot be investigated. As one of the biggest goals is to improve the patients' control of their disease by changing their habits on long-term [8-10], we do not know if and why the platform could play a significant role in the management of T2DM.

4.3 Recommendations for improving platforms in the future

To make platforms which are based on behavioural change models and digital encounters with nutritionists more effective and more used in the context of T2DM, different recommendations should be implemented in the future.

4.3.1 Recommendations to improve the uptake

To improve the *uptake* and implementation of the platform, the development team should re-consider the presentation of the platform and its enrolment process. First, the added value compared to the current way of practice and the vision of *Floor* can be shown more clearly for all involved stakeholders. Without having a relative advantage, the users or mentors do not feel up to enrol in an eHealth intervention [58]. According to the developers, the platform is unique in combining behavioural change theories with professional support. The intention is to change the users' habits on long-term and to give them reliable support. Combining these components with an eHealth platform provide the chance to support the users in a motivational way. These advantages should be represented more clearly and should be better promoted.

Moreover, the *uptake* can be improved by evaluating and reconsidering the design and structure of the enrolment process. Especially, the presentation of the costs was experienced as vague and unreliable. Until now, information about the costs can be found in the FAQs. But the interviews have shown that most of the users cannot find this information. To increase the credibility and the reliability of the platform, it is recommended to implement the information in an earlier and more apparent way. One possibility it to show the costs in the existing introduction video on the homepage, another possibility could be to present the costs at the beginning of the enrolment process. Furthermore, by asking the users about their health insurances and their deductible, personalized information regarding the costs could give more clarity and could result in a higher *uptake*.

4.3.2 Recommendations to improve the use

To improve and stimulate the *use* of the platform, it is recommended to 1) improve and re-structure the platform's design partially and 2) to reconsider the way how the *ToPB* is implemented in technology. First, the log data and interviews have shown that most of the users did not enter the SRBAI and body weight because of its unclear design. Beginning at the start page, the users had to navigate with three clicks (Goals & Sub-goals → My goal → view) to enter their scores and measurements. It could be assumed that both the circuitous navigation process and the descriptions of the components hindered the use. Therefore, it can be reconsidered to change the components of the main menu and to split up the feature "Goals & Sub-goals" (*Dutch: Doel & Stappen)* into single features and to rename them for example into "Goal & Weight" and "Sub-goals & Satisfaction" where the user immediately can enter the scores. If those recommended changes result in an increased use and user-friendliness cannot be said yet. Hence, it is very important to re-evaluate the design-related changes in form of a usability test (see chapter 4.4). It helps to investigate if the accuracy and discoverability of the users is increased or not [74].

As described in 4.1.2, the platform and its working mechanisms are based on the *Theory of Planned Behaviour* [47]. The way how this theory is implemented in the platform and how those features are used imply that some features can be improved or added. First, the option to have a buddy was created to influence the users' subjective norms in an injunctive way [67]. Because this option was used and appreciated by a very little number of users, it can be recommended to improve the presentation of a buddy to make the users more engaged. As an alternative, the subjective norms of the users can be also supported descriptively by letting the users show that others try to change that behaviour too. This descriptive approach could be realised by implementing a peer-support environment in the platform. According to Peimani et al., peer-support strategies should be implemented in eHealth systems to meet the needs of people with T2DM [75]. Second, the largest gap in applying the *ToPB* to the platform was found in the users' attitude towards behavioural changes. Especially users who are not ready for a change yet seem to have a high risk in stopping the platform's use. Hence, it might be better to involve also these users by including techniques such as *motivational interviewing* and *focusing on raising awareness* [76]. Perhaps, combining those interventions with the digital face-to-face encounters with mentors may result in a higher use and also in a higher effect of *Floor*. All in all, a clearer design of the platform and an improved implementation of the *ToPB* could result in more engaged users and improved outcomes. However, this study has shown that it is not sufficient to rely on the implementation of behavioural change models and design guidelines – rather the need for evaluation of all (future) developments together with all stakeholders is essential and will be shown in the next paragraph.

4.4 Future research of platforms

In this research, it was aimed to investigate the platform's effect by looking at its impact on reducing the BMI and scoring better in the SRBAI test. Because of the limited use of several components in the platform, it is not possible to draw a statistically underpinned conclusion about the platform's impact on the users. Hence, it is recommended to implement the recommended changes (see chapter 4.3) first and to test if those changes result in a better user-friendliness and in an increased *uptake* and *use.* Kip et al. highlighted the need for formative evaluations to ensure that the changes are related to the stakeholders perspective [38]. Besides that, there are three other aspects important to consider.

First, it is advised to keep the study's design in the form of a log data analysis or to make use of a fractional factorial design instead of performing an RCT. The latter answers the question if the platform works or not [77], but it cannot be investigated which components of the platform contributed to the impact. Furthermore, log data is always available and easy to collect [40]. This current study faced the problem to find users who wanted to participate in the interviews – this issue is not present in log data analyses [40].

Second, the measurements of effects should be adjusted in future research. According to Gardner et al., the SRBAI is an eligible score to measure the users' ability to change a behaviour to a habit [78]. But looking at the BMI as a measurement of clinical outcomes, a lot of resistance can be found in the scientific literature. Instead of only gathering the BMI as a clinical outcome, measurements like the waist-to-hip ratio and the HbA1c are recommended to implement in a clinical setting in future research [79-83].

Last and very important for conducting a future effectivity study is the sample size. In this current study, the sample size was too small to draw conclusions with high statistical power. Based on Cohen et al., following guidelines have to be used to perform an analysis of effectivity with a sufficient power of .8 and with a standard α-level of .05: 783 participants are needed to detect small effect sizes (r = .1), 85 participants are needed to detect medium effect sizes (r = .3) and 28 participants are needed to detect a large effect size (r = .5) in future research [84]. Applying these guidelines to future research, it can be assumed that small effect sizes must be detected, resulting in a need for a large sample size. However, large sample sizes can only be realised by increasing the platform's uptake.

5 Conclusion

This mixed-methods approach aimed to evaluate to what extent a web-based platform – based on behavioural change models and digital encounters with nutritionists – contributes to the improvement of the current way of supporting people with T2DM. In this study, a small effect on weight reduction of the users was found. However, one of the largest barriers in eHealth technologies – a low uptake and use [32-36] – recurred in this study. Besides an enrolment process that is in need of improvement, the idea of combining conceptual behavioural change theories and digital consults with nutritionists was appreciated, but the way how these theories are implemented in the platform's design can also be improved. Especially the implementation of the *Theory of Planned Behaviour* [47] could be improvement by focussing more on the user's attitude by integrating motivational change techniques. Concluding, it is not only the choice to implement behavioural change theories that contributes to a platform's *uptake* and *use.* Rather, the way how these theories are implemented in the platform are crucial for further development and research.

References

1. Volksgezondheidszorg. Volksgezondheidszorg.info [Available from: https://www.volksgezondheidenzorg.info/onderwerp/diabetes-mellitus/cijfers-context/huidige-situatie#bron--node-tabel-bronnen-bij-de-cijfers-over-diabetes-mellitus.

2. Organisation WH. Diabetes 2018 [Available from: https://www.who.int/news-room/fact-sheets/detail/diabetes.

3. Kosten van zorg voor diabetes mellitus 2015 [Available from: https://www.volksgezondheidenzorg.info/onderwerp/diabetes-mellitus/kosten/kosten#node-kosten-van-zorg-voor-diabetes-mellitus.

4. Hu FB, Leitzmann MF, Stampfer MJ, Colditz GA, Willett WC, Rimm EB. Physical Activity and Television Watching in Relation to Risk for Type 2 Diabetes Mellitus in Men. Archives of Internal Medicine. 2001;161(12):1542-810.1001/archinte.161.12.1542

5. Hu FB, van Dam RM, Liu S. Diet and risk of Type II diabetes: the role of types of fat and carbohydrate. Diabetologia. 2001;44(7):805-1710.1007/s001250100547

6. Willi C, Bodenmann P, Ghali WA, Faris PD, Cornuz J. Active Smoking and the Risk of Type 2 DiabetesA Systematic Review and Meta-analysis. JAMA. 2007;298(22):2654-6410.1001/jama.298.22.2654

7. Funnell MM, Brown TL, Childs BP, Haas LB, Hosey GM, Jensen B, et al. National Standards for diabetes self-management education. Diabetes care. 2011;34 Suppl 1(Suppl 1):S89-S9610.2337/dc11-S089

8. Dempsey PC, Owen N, Yates TE, Kingwell BA, Dunstan DW. Sitting Less and Moving More: Improved Glycaemic Control for Type 2 Diabetes Prevention and Management. Current Diabetes Reports. 2016;16(11):11410.1007/s11892-016-0797-4

9. Balducci S, Zanuso S, Cardelli P, Salvi L, Mazzitelli G, Bazuro A, et al. Changes in Physical Fitness Predict Improvements in Modifiable Cardiovascular Risk Factors Independently of Body Weight Loss in Subjects With Type 2 Diabetes Participating in the Italian Diabetes and Exercise Study (IDES). Diabetes Care. 2012;35(6):134710.2337/dc11-1859

10. Lawn S. Chronic physical illness: self-management and behavioural interventions. International Journal of Integrated Care. 2009;9:e07

11. Van De Laar FA, Van De Lisdonk EH, Lucassen PLBJ, Stafleu A, Mulder J, Van Den Hoogen HJM, et al. Eating behaviour and adherence to diet in patients with Type 2 diabetes mellitus. Diabetic Medicine. 2006;23(7):788-9410.1111/j.1464-5491.2006.01885.x

12. He X, Li J, Wang B, Yao Q, Li L, Song R, et al. Diabetes self-management education reduces risk of all-cause mortality in type 2 diabetes patients: a systematic review and meta-analysis. Endocrine. 2017;55(3):712-3110.1007/s12020-016-1168-2

13. Chao J, Yang L, Xu H, Yu Q, Jiang L, Zong M. The effect of integrated health management model on the health of older adults with diabetes in a randomized controlled trial. Archives of Gerontology and Geriatrics. 2015;60(1):82-8https://doi.org/10.1016/j.archger.2014.10.006

14. Loveman E, Cave C, Green C, Royle P, Dunn N, Waugh N. The clinical and cost-effectiveness of patient education models for diabetes: A systematic review and economic evaluation2003. iii, 1-190 p.

15. van Ommen B, Wopereis S, van Empelen P, van Keulen HM, Otten W, Kasteleyn M, et al. From Diabetes Care to Diabetes Cure—The Integration of Systems Biology, eHealth, and Behavioral Change. Frontiers in Endocrinology. 2018;8(381)10.3389/fendo.2017.00381

16. Bilo HJG DGW, Holleman F, Houweling ST, Janssen PGH, Van de Laar FA, Nijpels G, Rutten GEHM, Wiersma Tj. NHG-Standaard Diabetes mellitus type 2 2018 [4th:[Available from: https://www.nhg.org/standaarden/volledig/nhg-standaard-diabetes-mellitus-type-2#idm1172736.

17. Colberg SR, Sigal RJ, Fernhall B, Regensteiner JG, Blissmer BJ, Rubin RR, et al. Exercise and Type 2 Diabetes. Diabetes Care. 2010;33(12):269210.2337/dc10-1548

18. Shigaki C, Kruse RL, Mehr D, Sheldon KM, Bin G, Moore C, et al. Motivation and diabetes self-management. Chronic Illness. 2010;6(3):202-1410.1177/1742395310375630

19. Sebire SJ, Toumpakari Z, Turner KM, Cooper AR, Page AS, Malpass A, et al. I've made this my lifestyle now: A prospective qualitative study of motivation for lifestyle change among people with newly diagnosed type two diabetes mellitus. BMC Public Health. 2018;18(1)10.1186/s12889-018-5114-5

20. Rothman AJ, Baldwin AS, Hertel AW, Fuglestad PT. Self-regulation and behavior change: Disentangling behavioral initiation and behavioral maintenance. 2011

21. El-Gayar O, Timsina P, Nawar N, Eid W. A systematic review of IT for diabetes self-management: Are we there yet? International Journal of Medical Informatics. 2013;82(8):637-52https://doi.org/10.1016/j.ijmedinf.2013.05.006

22. Research2Guide.com. Health app publishers in 2017 2017 [Available from: https://research2guidance.com/84000-health-app-publishers-in-2017/.

23. Hood M, Wilson R, Corsica J, Bradley L, Chirinos D, Vivo A. What do we know about mobile applications for diabetes self-management? A review of reviews. Journal of behavioral medicine. 2016;39(6):981-94

24. Gemert-Pijnen Lv, Kelders SM, Kip H, Sanderman R. EHealth Research, Theory and Development : A Multi-Disciplinary Approach. Milton: Routledge; 2018. Available from: https://ebookcentral.proquest.com/lib/qut/detail.action?docID=5400719.

25. Neuhauser L, Kreps GL. Rethinking Communication in the E-health Era. Journal of Health Psychology. 2003;8(1):7-2310.1177/1359105303008001426

26. Ekeland AG, Bowes A, Flottorp S. Effectiveness of telemedicine: A systematic review of reviews. International Journal of Medical Informatics. 2010;79(11):736-71https://doi.org/10.1016/j.ijmedinf.2010.08.006

27. Krebs P, Prochaska JO, Rossi JS. A meta-analysis of computer-tailored interventions for health behavior change. Preventive Medicine. 2010;51(3):214-21https://doi.org/10.1016/j.ypmed.2010.06.004

28. Vandelanotte C, Müller AM, Short CE, Hingle M, Nathan N, Williams SL, et al. Past, Present, and Future of eHealth and mHealth Research to Improve Physical Activity and Dietary Behaviors. Journal of Nutrition Education and Behavior. 2016;48(3):219-28.e110.1016/j.jneb.2015.12.006

29. Webb TL, Joseph J, Yardley L, Michie S. Using the Internet to Promote Health Behavior Change: A Systematic Review and Meta-analysis of the Impact of Theoretical Basis, Use of Behavior Change Techniques, and Mode of Delivery on Efficacy. J Med Internet Res. 2010;12(1):e410.2196/jmir.1376

30. Dusseldorp E, Van Genugten L, van Buuren S, Verheijden MW, van Empelen P. Combinations of techniques that effectively change health behavior: Evidence from Meta-CART analysis. Health Psychology. 2014;33(12):1530

31. van Beugen S, Ferwerda M, Hoeve D, Rovers MM, Spillekom-van Koulil S, van Middendorp H, et al. Internet-based cognitive behavioral therapy for patients with chronic somatic conditions: a meta-analytic review. J Med Internet Res. 2014;16(3):e88

32. van Gemert-Pijnen JEWC, Nijland N, van Limburg M, Ossebaard HC, Kelders SM, Eysenbach G, et al. A Holistic Framework to Improve the Uptake and Impact of eHealth Technologies. J Med Internet Res. 2011;13(4):e11110.2196/jmir.1672

33. Stellefson M, Chaney B, Barry AE, Chavarria E, Tennant B, Walsh-Childers K, et al. Web 2.0 chronic disease self-management for older adults: a systematic review. J Med Internet Res. 2013;15(2):e35-e10.2196/jmir.2439

34. Eysenbach G. The law of attrition. J Med Internet Res. 2005;7(1):e11-e10.2196/jmir.7.1.e11

35. Geraghty AWA, Torres LD, Muñoz RF, Leykin Y, Pérez-Stable EJ. Understanding attrition from international internet health interventions: a step towards global eHealth. Health Promotion International. 2012;28(3):442-5210.1093/heapro/das029

36. Donkin L, Christensen H, Naismith SL, Neal B, Hickie IB, Glozier N. A Systematic Review of the Impact of Adherence on the Effectiveness of e-Therapies. J Med Internet Res. 2011;13(3):e5210.2196/jmir.1772

37. Sieverink F, Kelders S, Akkersdijk S, Poel M, Siemons L, Gemert-Pijnen Lv. Work in progress: a protocol for the collection, analysis, and interpretation of log data from eHealth technology2016. Available from: http://purl.utwente.nl/publications/101923.

38. Kip HvG-P, Lisette. Holistic development of eHealth technology. In: van Gemert-Pijnen LK, Saskia M.; Kip, Hanneke; Sanderman, Robbert, editor. eHealth Research, Theory and Development – A Multidisciplinary Approach. 1: Routledge; 2018. p. 156.

39. Dictionary C. Definition Uptake 2019 [Available from: https://dictionary.cambridge.org/de/worterbuch/englisch/uptake.

40. Sieverink FK, N; Cheung, K; Roefs, A; Trompetter, H; Keizer, J; Braakman-Jansen, A; Kelders, S. Evaluating eHealth. In: van Gemert-Pijnen LK, S; Kip, H; Sanderman, R, editor. eHealth Research, Theory and Development - A Mulitdisciplinary Approach: Routledge; 2018.

41. Ajzen I. Behavioral Interventions Based on the Theory of Planned Behavior2006.

42. Wood W, Neal DT. A new look at habits and the habit-goal interface. (0033-295X (Print))

43. Gardner B, Abraham C, Lally P, de Bruijn G-J. Towards parsimony in habit measurement: Testing the convergent and predictive validity of an automaticity subscale of the Self-Report Habit Index. International Journal of Behavioral Nutrition and Physical Activity. 2012;9(1):10210.1186/1479-5868-9-102

44. Eysenbach G. CONSORT-EHEALTH: Improving and Standardizing Evaluation Reports of Web-based and Mobile Health Interventions. J Med Internet Res. 2011;13(4):e12610.2196/jmir.1923

45. Vermaas S. De toekomst van preventieve zorg. 2015.

46. Prochaska JO, Redding CA, Evers KE. The transtheoretical model and stages of change. Health behavior: Theory, research, and practice. 2015:125-48

47. Ajzen I. From Intentions to Actions: A Theory of Planned Behavior. In: Kuhl J, Beckmann J, editors. Action Control: From Cognition to Behavior. Berlin, Heidelberg: Springer Berlin Heidelberg; 1985. p. 11-39.

48. Creswell JW, Clark VLP. Designing and conducting mixed methods research: Sage publications; 2017.

49. Creswell JW, Plano Clark VL, Gutmann ML, Hanson WE. Advanced mixed methods research designs. Handbook of mixed methods in social and behavioral research. 2003;209:240

50. Privacy Policy of Floor 2019 [Available from: https://www.floorhelpt.nl/privacy.

51. Corp. I. IBM SPSS Statistics for Macintosh. 25 ed. Armonk, NY: IBM Coprs.; 2017.

52. Guest G, Bunce A, Johnson L. How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability. Field Methods. 2006;18(1):59-8210.1177/1525822X05279903

53. Baarda B, Hulst Mvd. Basisboek Interviewen : Handleiding voor het voorbereiden en afnemen van interviews. Groningen/Houten, The Netherlands: Noordhoff Uitgevers BV; 2017.

54. Elo S, Kyngas H. The qualitative content analysis process. (1365-2648 (Electronic))

55. Ritchie J, Lewis J, Nicholls CM, Ormston R. Qualitative research practice: A guide for social science students and researchers: sage; 2013.

56. Roelofsen Y, Hendriks SH, Sieverink F, Landman GWD, Groenier KH, Bilo HJG, et al. Differences Between Patients With Type 2 Diabetes Mellitus Interested and Uninterested in the Use of a Patient Platform (e-VitaDM-2/ZODIAC-41). Journal of Diabetes Science and Technology. 2014;8(2):230-710.1177/1932296814524496

57. Van Vugt M, De Wit M, Sieverink F, Roelofsen Y, Hendriks SH, Bilo HJG, et al. Uptake and Effects of the e-Vita Personal Health Record with Self-Management Support and Coaching, for Type 2 Diabetes Patients Treated in Primary Care. Journal of Diabetes Research. 2016;201610.1155/2016/5027356

58. Rogers EM. Diffusion of innovations: Simon and Schuster; 2010.

59. Gee PM, Greenwood DA, Paterniti DA, Ward D, Miller LMS. The eHealth Enhanced Chronic Care Model: a theory derivation approach. J Med Internet Res. 2015;17(4):e86-e10.2196/jmir.4067

60. Lie SS, Karlsen B, Oord ER, Graue M, Oftedal B. Dropout From an eHealth Intervention for Adults With Type 2 Diabetes: A Qualitative Study. J Med Internet Res. 2017;19(5):e18710.2196/jmir.7479

61. Brouwer W. What makes people decide to visit and use an internet‐delivered behavior‐change intervention? Health Education. 2009;109(6):460-7310.1108/09654280911001149

62. Ludden GDS, Van Rompay TJL, Kelders SM, Van Gemert-Pijnen JEWC. How to increase reach and adherence of web-based interventions: A design research viewpoint. J Med Internet Res. 2015;17(7)10.2196/jmir.4201

63. Nijland N, van Gemert-Pijnen JEWC, Kelders SM, Brandenburg BJ, Seydel ER. Factors influencing the use of a Web-based application for supporting the self-care of patients with type 2 diabetes: a longitudinal study. J Med Internet Res. 2011;13(3):e71-e10.2196/jmir.1603

64. Kebede MM, Zeeb H, Peters M, Heise TL, Pischke CR. Effectiveness of Digital Interventions for Improving Glycemic Control in Persons with Poorly Controlled Type 2 Diabetes: A Systematic Review, Meta-analysis, and Meta-regression Analysis. Diabetes Technology and Therapeutics. 2018;20(11):767-8210.1089/dia.2018.0216

65. Vandelanotte C, Muller AM, Short CE, Hingle M, Nathan N, Williams SL, et al. Past, Present, and Future of eHealth and mHealth Research to Improve Physical Activity and Dietary Behaviors. (1878-2620 (Electronic))

66. Poppe L, Van der Mispel C, Crombez G, De Bourdeaudhuij I, Schroé H, Verloigne M. How Users Experience and Use an eHealth Intervention Based on Self-Regulation: Mixed-Methods Study. J Med Internet Res. 2018;20(10):e1041210.2196/10412

67. White KM, Smith JR, Terry DJ, Greenslade JH, McKimmie BM. Social influence in the theory of planned behaviour: The role of descriptive, injunctive, and in-group norms. British Journal of Social Psychology. 2009;48(1):135-5810.1348/014466608x295207

68. Carmack CC, Lewis-Moss RK. Examining the theory of planned behavior applied to condom use: the effect-indicator vs. causal-indicator models. J Prim Prev. 2009;30(6):659-7610.1007/s10935-009-0199-3

69. Maes S, Karoly P. Self-Regulation Assessment and Intervention in Physical Health and Illness: A Review. Applied Psychology. 2005;54(2):267-9910.1111/j.1464-0597.2005.00210.x

70. Baron JS, Hirani SP, Newman SP. Investigating the behavioural effects of a mobile-phone based home telehealth intervention in people with insulin-requiring diabetes: Results of a randomized controlled trial with patient interviews. Journal of Telemedicine and Telecare. 2017;23(5):503-1210.1177/1357633X16655911

71. Boels AM, Rutten G, Zuithoff N, De Wit A, Vos R. Effectiveness of diabetes self-management education via a smartphone application in insulin treated type 2 diabetes patients - Design of a randomised controlled trial ('TRIGGER study'). BMC Endocrine Disorders. 2018;18(1)10.1186/s12902-018-0304-9

72. Parsons HM. What Happened at Hawthorne?: New evidence suggests the Hawthorne effect resulted from operant reinforcement contingencies. Science. 1974;183(4128):922-32

73. Pieterse MK, H; Cruz-Martinez, R. The complexity of eHealth implementation. In: van Gemert-Pijnen LK, S; Kip, H; Sanderman, R, editor. eHealth Research, Theory and Development: Routledge; 2018. p. 256.

74. Tullis T, Albert W. Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics: Morgan Kaufmann Publishers Inc.; 2008. 336 p.

75. Peimani M, Monjazebi F, Ghodssi-Ghassemabadi R, Nasli-Esfahani E. A peer support intervention in improving glycemic control in patients with type 2 diabetes. Patient Education and Counseling. 2018;101(3):460-610.1016/j.pec.2017.10.007

76. Rollnick S, Miller WR. What is Motivational Interviewing? Behavioural and Cognitive Psychotherapy. 1995;23(4):325-3410.1017/S135246580001643X

77. Oakley A, Strange V, Bonell C, Allen E, Stephenson J. Process evaluation in randomised controlled trials of complex interventions. Bmj. 2006;332(7538):413-6

78. Gardner B. Habit as automaticity, not frequency. European Health Psychologist. 2012;14(2):32-6

79. Janghorbani M, Amini M. Comparison of body mass index with abdominal obesity indicators and waist-to-stature ratio for prediction of type 2 diabetes: The Isfahan diabetes prevention study. Obesity Research and Clinical Practice. 2010;4(1):e25-e3210.1016/j.orcp.2009.07.002

80. Łopatyński J, Mardarowicz G, Szcześniak G. A comparative evaluation of waist circumference, waist-to-hip ratio, waist-to-height ratio and body mass index as indicators of impaired glucose tolerance and as risk factors for type-2 diabetes mellitus. Annales Universitatis Mariae Curie-Skłodowska Sectio D: Medicina. 2003;58(1):413-9

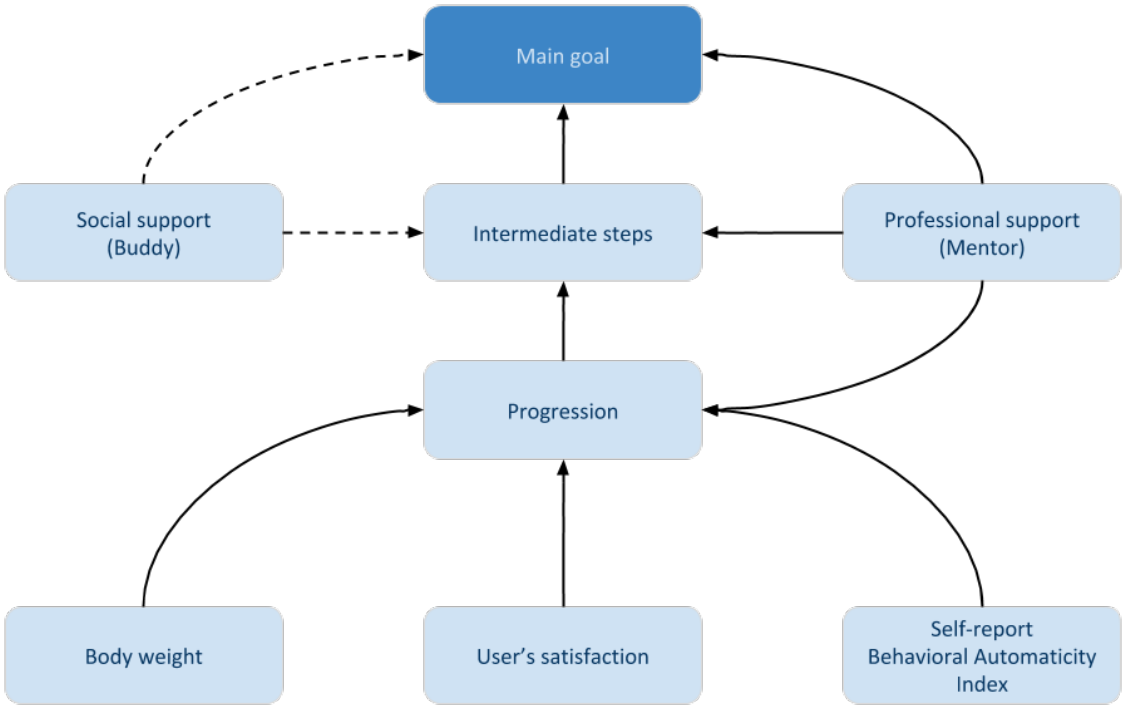
81. Prakash K, Chandran DS, Khadgawat R, Jaryal AK, Deepak KK. Waist circumference rather than body mass index is better indicator of insulin resistance in type 2 diabetes mellitus in North Indian population. Indian Journal of Physiology and Pharmacology. 2016;60(1):52-6

82. Sartore G, Chilelli NC, Burlina S, Stefano PD, Piarulli F, Fedele D, et al. The importance of HbA1c and glucose variability in patients with type 1 and type 2 diabetes: Outcome of continuous glucose monitoring (CGM). Acta Diabetologica. 2012;49(1 SUPPL.):S153-S6010.1007/s00592-012-0391-4

83. Parsanasab H, Pudeh BM, Alizadeh A, Abediankenari S. Evaluation of correlation between HbA1c with the Risk factors of lipid profile in patients with type 2 diabetes. Journal of Mazandaran University of Medical Sciences. 2013;22(SUPPL. 2):152-6

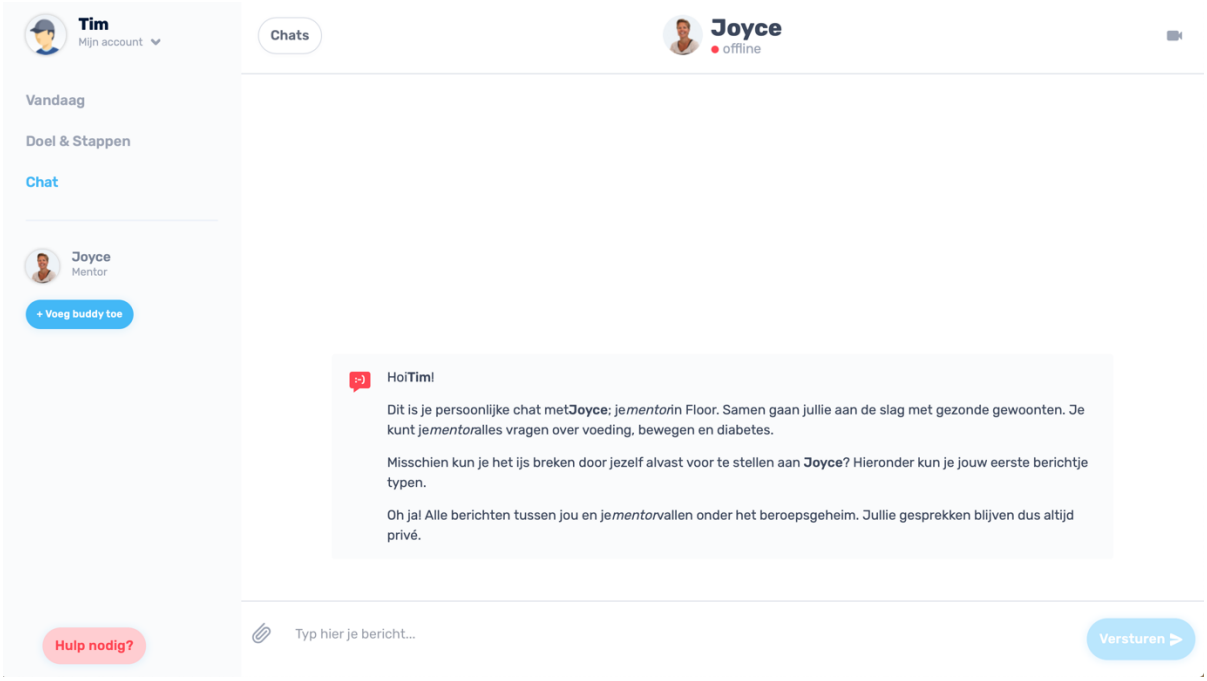
84. Field A, Miles J, Field Z. Discovering Statistics Using R: SAGE Publications; 2012

Appendices



Appendix 1 Structural setup of Floor

Appendix 2 Setting a goal



Appendix 3 Chat with mentor

Welkom bij Floor 👋

Ontzettend gaaf dat je hebt besloten om een buddy te worden. Je gaat een **hele belangrijke rol** spelen voor de persoon voor wie je een buddy bent. Wij - *van Floor* - gaan je helpen met het vinden van jouw rol als buddy. En we gaan je helpen bij het opbouwen van kennis en ervaring, zodat jij de best mogelijke buddy kunt zijn. Maar wie of wat is Floor?

Floor is een online platform dat helpt mensen met diabetes type 2 bij het ontdekken en volhouden van gezonde gewoontes. Dit doen we met behulp van professionele mentoren, maar ook met jouw hulp.

In deze online introductie helpen we je op weg helpen om een goede buddy te worden. We zullen het hebben over onderwerpen als "**het goede voorbeeld geven**", "**het ondersteunen van je buddy's zelfvertrouwen**", "**het geven van feedback**" en "**hoe je proactief kunt zijn**".

Veel plezier!

Appendix 4 Buddy in platform

Proactief zijn

Een proactieve houding is misschien wel de belangrijkste kwaliteit voor een buddy. We raden het daarom ook aan om een proactieve rol aan te nemen. Dit houdt in dat je het initiatief moet nemen.

Hoe kan ik een proactieve buddy zijn?

- *Je kunt contact opnemen met de ander* door te bellen of berichten te sturen. Jouw steun is nuttig wanneer het goed gaat met het doel, maar ook wanneer dingen niet zo goed gaan.
- Als de persoon, die je steunt, niet tevreden is met zijn/haar voortgang, of niet op de hoogte is van zijn/haar doel, *begin dan een opbouwend gesprek over waarom en wat kan worden gedaan om dat te veranderen*. Bespreek waarom dit mogelijk is en wat je kunt doen om hem/haar weer tevreden te laten zijn met zijn/haar gedrag of terug op het goede spoor te zetten.
- *Bedenk samen over wat kan worden gedaan om tegenslagen op te lossen en obstakels te overwinnen*. Je kunt dit doen door bijvoorbeeld als het probleem gebrek aan tijd is, stel dan een alarm in om jezelf eraan te herinneren iets te doen.

Appendix 5 Information for buddy

Measurement	**Description**
Gender	- self-reported gender (female/male)
Age	- self-reported date of birth - transformed into age in years for further analysis with moment of first sign up as measure point
BMI Start	- self-reported height in centimetres and their bodyweight in kilograms - the metric formula for calculating the BMI is: weight (kg) ÷ heigth² (m^2)
Medication usage	- self-reported medication usage of user (Yes/No)
Diabetes since	- self-reported date since the user suffered from T2DM

Appendix 6 Measurements uptake

Measurement	Description
Number of goals	- the number of goals indicated if a goal was set and if an adjustment took place
Number of sub-goals	- the number of sub-goals between first and last login represented the total number of intermediate steps towards the self-reported goal
Number of SRBAI	- the number of filled-in Self-report Behavioral Automaticity Index
Number of satisfaction scores	- the users could monitor their satisfaction regarding the progress of their intermediate steps daily - the number of satisfaction scores indicated how often the users used this feature
Number of entered weight	- the number of entered bodyweight to monitor clinical outcomes
Number of conversations	- the number of conversations between user and mentor
Buddy	- the user had the option to invite a buddy for personal support

Appendix 7 Measurements use

Outcome	Purpose	Description
Change in SRBAI	Behavioural impact	- difference between first and last entered SRBAI on first sub-goal
Change in BMI	Clinical impact	- difference between first and last entered BMI

Appendix 8 Measurements effects

Appendix 9: Interview schema user

I: Mijn naam is Tim Sensendorf, student aan de masteropleiding Gezondheidswetenschappen aan de Universiteit van Twente in Enschede en afstudeerder bij Nedap Healthcare In Groenlo. Nedap is de maker van Floor. Omdat Nedap graag de producten en diensten wil blijven verbeteren, is mij gevraagd om onderzoek te doen naar het gebruik en de effectiviteit van het platform *Floor.* Dit onderzoek wil ik afronden met inzichten van deelnemers die het afgelopen half jaar gebruik hebben gemaakt van *Floor*, waaronder u. Heel graag hoor ik wat uw ervaringen zijn met *Floor*. Met het onderzoek wil ik inzichtelijk krijgen waarom *Floor* gebruikt wordt op de manier zoals gebruikers dit het afgelopen half jaar hebben gedaan en wat er nog beter kan.

We willen heel graag leren van uw ervaringen, dus daarom zou ik u graag een aantal vragen willen stellen. Omdat ik graag alle vragen wil behandelen, kan het zijn dat ik u soms moet onderbreken om naar het volgende onderwerp te gaan. Dit betekent niet dat het niet interessant is wat u vertelt, maar juist dat ik graag meer over uw ervaringen wil horen. Tijdens het interview zijn er geen goede of foute antwoorden op de gestelde vragen. Verder worden de antwoorden geanonimiseerd, waardoor niemand terug kan zien wat u heeft verteld. De geanonimiseerde data wordt verwerkt in mijn afstudeerverslag. Tenslotte is het nog belangrijk te weten dat u op ieder moment de mogelijkheid heeft om te stoppen met dit interview en dat u altijd bij onduidelijkheden kunt vragen. Het interview zal ongeveer een half uurtje duren.

Voordat we starten met het interview, wil ik u bedanken dat u bereid bent om iets meer te vertellen over uw ervaringen met *Floor.* Verder wil ik u vragen dit toestemmingsformulier in tweevoud te tekenen en of u mij toestemming geeft om het interview op te nemen. Gaat u hiermee akkoord?

In het geval van toestemming met het opnemen van het interview, wordt de opname gestart. Daarna wordt nog een keer om toestemming gevraagd om het interview op te nemen. De bevestiging van de respondent wordt hiermee ook opgenomen.

Zijn er op dit moment al vragen?

Als er verder geen opmerkingen of vragen zijn, wordt het interview gestart.

Topic 1: Introductie

- *"Ik wil het graag eerst met u over u zelf hebben! Kunt u zich even voorstellen?"*

- Hoe oud bent u?
- Kunt u even iets vertellen over uw gezinssamenstelling en uw beroep?

Topic 2: Diabetes en zelfmanagement

"Kunt u me iets vertellen over uw leven met diabetes en wat het in houdt?"

- Sinds wanner bent u gediagnosticeerd met diabetes?
- Hoe gaat u met uw ziekte om?
- In hoeverre is het verloop van de ziekte veranderd over tijd?
- Wat zijn uw behoeftes in de omgang met diabetes?
- Wat voor barrières hebt u ervaren in uw leven met diabetes?

"Een belangrijk onderdeel van het omgaan met diabetes is het aanpassen van de leefstijl. Waar denkt u aan bij de woorden "leefstijl" en "gezond leven" en hoe ziet u deze dingen in uw eigen leven terug?"

- Hoe ziet uw eigen leefstijl eruit?
- Wat zijn uw ervaringen met uw eigen omgang met diabetes?
- Wat voor soort begeleiding of ondersteuning ervaart u in de omgang met diabetes?
- Wat vindt u prettig in de begeleiding en ondersteuning, en wat gaat minder goed?

Topic 3: Internet gebruik en digitale platformen

"Voordat wij het over het platform Floor hebben, wil ik graag meer weten over uw gebruik van technologie.

- Welk soort van digitale technologieën gebruikt u in uw dagelijkse leven?
- Wat houdt het begrip *digitale platform* voor u in?
- Welk soorten van digitale platformen gebruikt u?
- Wat vindt u van digitale platformen?

- Op welke manier gebruikt u uw smartphone/iPad/pc/laptop in verband met uw leefstijl en gezondheid?
- Welke platformen of apps gebruikt u in verband met diabetes?
- Wat vindt u handig? En wat zou beter kunnen?

Topic 4: Registratie proces en het eerste gebruik van *Floor*

"Floor is natuurlijk ook een digitaal platform dat u kunt gebruiken in verband met leefstijl en gezond leven. Kunt u beschrijven hoe u het eerste gebruik van Floor hebt ervaren?"

Eerst contactmoment met *Floor*
- Wat was uw belangrijkste reden om u aan te melden voor Floor

Ervaring omtrent registratie proces
- Hoe hebt u het registratie proces ervaren?
- Wat voor drempels hebt u hierbij ervaren?
- Wat kan bij het registratie proces beter?

Eerste indruk van het platform
- Wat zijn uw eerste stappen binnen *Floor* geweest?
- Hoe hebt u van *Floor* ervaren?
- Hoe hebt u uw eerst contactmoment met uw mentor ervaren?
- De intentie van het platform is dat u een doel opzet en aan dit doel werkt met behulp van kleine stappen. Hoe hebt u het opzetten van een doel ervaren?
- Hoe hebt u het aanmaken van een stap ervaren?
- Verder is er ook de mogelijkheid een zogenaamd buddy uit te nodigen. Hoe hebt u deze mogelijkheid ervaren? Wie nodigen ze uit, en waarom? Of waarom nodigen ze niemand uit?
- Hoe hebt u het ervaren uw gewicht in te vullen? Algemeen en wat vindt u ervan hoe de functie werkt?

Topic 5: Gebruik van *Floor*

"Ik wil graag meer weten hoe u het gebruik van *Floor* in uw dagelijkse leven hebt ervaren. Wat komt hierbij als eerste bij u op?"

- Hoe vaak hebt u *Floor* gebruikt?
- Wat zijn redenen geweest om regelmatig gebruik of niet regelmatig gebruik te maken van *Floor*?
- Binnen het platform wordt er gebruik gemaakt van *reminders* in de vorm van e-mails. Wat zijn uw ervaringen hiermee?
- Welke componenten binnen *Floor* hebt u vaak gebruikt? Wat zijn redenen hiervoor geweest?
- Welke componenten binnen *Floor* hebt u zelden of nooit gebruikt? Wat zijn redenen hiervoor geweest of wat kan hierbij beter?

In het geval van stoppen met *Floor*:
- Waarom bent u gestopt met *Floor?*

Topic 6: Mentoren binnen *Floor*

"Binnen het platform is er ook de mogelijkheid zelf een mentor te kiezen in vorm van een diëtist. Hoe hebt u deze mogelijkheid ervaren?"

- Hoe zagen de contactmomenten met uw mentor uit?
- Op welke manier had u contact met uw mentor? Via chat, telefonisch, videobellen?
- Waarom hebt u contact opgenomen met uw mentor?
- Wat zijn uw ervaringen met uw mentor?
- Hoe hebt u de digitale manier hierbij ervaren?
- Kunnen er dingen beter of kunnen er dingen anders?

Topic 7: Buddy's in Floor

"Vervolgens is er ook de mogelijkheid een buddy uit te nodigen. Dit kan iemand zijn uit je persoonlijke omgeving en die u helpt om aan uw stappen te werken"

- Hoe hebt u de rol van uw buddy ervaren?

(Als er niet voor een buddy werd gekozen: Waarom hebt u geen buddy uitgenodigd?)

- Wat is volgens u het verschil tussen een buddy en een mentor?
- Wat zijn voordelen bij het hebben van een buddy?
- Wat zijn nadelen bij het hebben van een buddy?

Topic 8: *Floor's impact op de gebruiker*

"Nadat wij het met name over het gebruik van het platform zelf hadden, ben ik heel benieuwd in uw conclusie Op welke manier bood Floor ondersteuning bij uw leven met diabetes?

- In hoeverre had *Floor* ook invloed op uw omgang met diabetes? En op welke manier/door welke onderdelen van *Floor* kwam dit volgens u?
- Wat is er veranderd in uw opvatting van digitale platformen?
- In hoeverre had *Floor* het beloop van ziekte veranderd?
- In hoeverre bood *Floor* ondersteuning in het veranderen van gewoonheiden?
- In hoeverre had *Floor* uw relatie met de mentor veranderd?

Topic 9: Aanbevelingen en wensen

"Gedurende dit interview zijn er heel interessante aspecten naar voren gekomen. Tenslotte zou ik graag willen weten op welke manier u Floor ook in toekomst wilt gebruiken en of er mogelijke verbeterpunten zijn of veranderingen nodig zijn?"

- Zou u Floor ook op de langere termijn willen blijven gebruiken? Waarom wel of waarom niet?
- Hoe zouden we het platform volgens u kunnen verbeteren?

I: Als er verder geen vragen meer zijn, wil ik het interview nu beëindigen. Nogmaals van harte bedankt voor de medewerking en uw interessante inzichten! Zoals aan het begin aangegeven, kunt u nog steeds terugtrekken, uitspraken aanpassen of mij via email of telefoon voor verdere opmerkingen of vragen benaderen.

Appendix 10: Interview schema mentor

I: Mijn naam is Tim Sensendorf, student aan de masteropleiding Gezondheidswetenschappen aan de Universiteit van Twente in Enschede en afstudeerder bij Nedap Healthcare In Groenlo. Nedap is de maker van Floor. Omdat Nedap graag de producten en diensten wil blijven verbeteren, is mij gevraagd om onderzoek te doen naar het gebruik en de effectiviteit van het platform *Floor.* Dit onderzoek wil ik afronden met inzichten van deelnemers en mentoren die het afgelopen half jaar gebruik hebben gemaakt van *Floor*, waaronder u. Heel graag hoor ik wat uw ervaringen zijn met *Floor*.

We willen heel graag leren van uw ervaringen, dus daarom zou ik u graag een aantal vragen willen stellen. Omdat ik graag alle vragen wil behandelen, kan het zijn dat ik u soms moet onderbreken om naar het volgende onderwerp te gaan. Dit betekent niet dat het niet interessant is wat u vertelt, maar juist dat ik graag meer over uw ervaringen wil horen. Tijdens het interview zijn er geen goede of foute antwoorden op de gestelde vragen. Verder worden de antwoorden geanonimiseerd, waardoor niemand terug kan zien wat u heeft verteld. De geanonimiseerde data wordt verwerkt in mijn afstudeerverslag. Tenslotte is het nog belangrijk te weten dat u op ieder moment de mogelijkheid heeft om te stoppen met dit interview en dat u altijd bij onduidelijkheden kunt vragen. Het interview zal ongeveer een half uurtje duren.

Voordat we starten met het interview, wil ik u bedanken dat u bereid bent om iets meer te vertellen over uw ervaringen met *Floor.* Verder wil ik u vragen dit toestemmingsformulier in tweevoud te tekenen en of u mij toestemming geeft om het interview op te nemen. Gaat u hiermee akkoord?

In het geval van toestemming met het opnemen van het interview, wordt de opname gestart. Daarna wordt nog een keer om toestemming gevraagd om het interview op te nemen. De bevestiging van de respondent wordt hiermee ook opgenomen.

Zijn er op dit moment al vragen?

Als er verder geen opmerkingen of vragen zijn, wordt het interview gestart.

Topic 1: Introductie

- *"Ik wil het graag eerst met u over u zelf hebben! Kunt u zich even voorstellen?"*

- Hoe oud bent u?
- Kunt u even iets vertellen over uw carrière als diëtiste?

Topic 2: Diabetes en zelfmanagement

"Kunt u me iets vertellen over wat de begeleiding van mensen met diabetes inhoudt?"

- In hoeverre verschillen de behandelingen en begeleiden van mensen met diabetes en anderen cliënten?
- Wat zijn uw behoeftes in de begeleiding van mensen met diabetes?
- Wat voor barrières hebt u ervaren in het begeleiden van mensen met diabetes?

Topic 3: *Floor's impact op de begeleiding van de deelnemers*

"Nadat wij het met name over de begeleiding van mensen met diabetes in een "offline" omgeving hadden, ben ik heel benieuwd in de rol van het platform Floor. Op welke manier bood Floor ondersteuning bij het begeleiden van deze mensen?

- In hoeverre had *Floor* ook invloed op de deelnemers qua omgang met diabetes? En op welke manier/door welke onderdelen van *Floor* kwam dit volgens u?
- Wat is er veranderd in uw opvatting van digitale platformen?

- In hoeverre had *Floor* het beloop van ziekte veranderd?
- In hoeverre bood *Floor* ondersteuning in het veranderen van gewoonheiden?
- In hoeverre had *Floor* uw relatie met de deelnemers veranderd?

Topic 4: Internet gebruik en digitale platformen

"Voordat wij het over het platform Floor hebben, wil ik graag meer weten over uw gebruik van technologie in de praktijk.

- Welk soort van digitale technologieën gebruikt u in uw werk als diëtist(e)?
- Wat houdt het begrip *digitale platform* voor u in?
- Welk soorten van digitale platformen gebruikt u?
- Wat vindt u van digitale platformen?

- Welke platformen of apps gebruikt u in verband met diabetes?
- Wat vindt u handig? En wat zou beter kunnen?

Topic 5: Registratie proces en het eerste gebruik van *Floor*

"Floor is natuurlijk ook een digitaal platform dat u kunt gebruiken mensen met diabetes te ondersteunen. Kunt u beschrijven hoe u op Floor bent gekomen?"

Eerst contactmoment met *Floor*
- Wat was uw belangrijkste reden om mentor de worden op Floor?

Ervaring omtrent registratie proces
- Hoe hebt u het registratie proces ervaren?
- Wat voor drempels hebt u hierbij ervaren?
- Wat kan bij het registratie proces beter?

Eerste indruk van het platform
- Hoe hebt u uw eerst inlog moment ervaren?
- Hoe hebt u het aanvullen van uw mentorprofiel ervaren?
- Hoe hebt u uw eerste contactmomenten met de deelnemers ervaren?

Topic 6: Gebruik van *Floor*

"Ik wil graag meer weten hoe u het gebruik van *Floor* in uw begeleiding van mensen met diabetes hebt ervaren. Wat komt hierbij als eerste bij u op?"

- Hoe vaak hebt u *Floor* gebruikt?
- Wat zijn redenen geweest om regelmatig gebruik of niet regelmatig gebruik te maken van *Floor*?
- Binnen het platform wordt er gebruik gemaakt van *reminders* in de vorm van e-mails. Wat zijn uw ervaringen hiermee?
- Welke componenten binnen *Floor* hebt u vaak gebruikt? Wat zijn redenen hiervoor geweest?
- Welke componenten binnen *Floor* hebt u zelden of nooit gebruikt? Wat zijn redenen hiervoor geweest of wat kan hierbij beter?
- De intentie van het platform is dat de deelnemers een doel opzetten en aan dit doel werkt met behulp van kleine stappen. Hoe hebt u het opzetten van een doel ervaren?
- Deelnemers kunnen ook hun gewicht op het platform invullen. Hoe hebt u deze mogelijkheid ervaren?

In het geval van stoppen met *Floor*:

- Waarom bent u gestopt met *Floor?*

Topic 7: Contact tussen mentor en deelnemer binnen *Floor*

"Binnen het platform staat u als mentor centraal. Hoe hebt u het contact tussen de deelnemers en u ervaren?"

- Hoe ziet een eerst contactmoment met een deelnemer uit?
- Hoe zagen de contactmomenten met de deelnemers uit?
- Op welke manier had u contact met uw deelnemers?
  Via chat, telefonisch, videobellen?
- Uit welke redenen hebt u contact opgenomen met uw deelnemer?
- Hoe hebt u de digitale manier hierbij ervaren?
- Kunnen er dingen beter of kunnen er dingen anders?

Topic 8: Buddy's in Floor

"Vervolgens is er ook de mogelijkheid voor de deelnemers een buddy uit te nodigen. Dit kan iemand zijn uit hun persoonlijke omgeving en die helpt om aan hun stappen te werken"

- Hoe hebt u de rol van de buddy's ervaren?
- Wat is volgens u het verschil tussen een buddy en een mentor?
- Wat zijn voordelen bij het hebben van een buddy?
- Wat zijn nadelen bij het hebben van een buddy?

Topic 9: Aanbevelingen en wensen

"Gedurende dit interview zijn er heel interessante aspecten naar voren gekomen. Tenslotte zou ik graag willen weten op welke manier u Floor ook in toekomst wilt gebruiken en of er mogelijke verbeterpunten zijn of veranderingen nodig zijn?"

- Zou u Floor ook op de langere termijn willen blijven gebruiken? Waarom wel of waarom niet?
- Hoe zouden we het platform volgens u kunnen verbeteren?

I: Als er verder geen vragen meer zijn, wil ik het interview nu beëindigen. Nogmaals van harte bedankt voor de medewerking en uw interessante inzichten! Zoals aan het begin aangegeven, kunt u nog steeds terugtrekken, uitspraken aanpassen of mij via email of telefoon voor verdere opmerkingen of vragen benaderen.

Appendix 11: INFORMED CONSENT FORMULIER USER

Naam van het onderzoeksproject
Evaluatie van een web-gebaseerd platform voor diabetes type 2 patiënten

Doel van het onderzoek

Dit onderzoek wordt geleid door Tim Sensendorf. U bent van harte uitgenodigd om deel te nemen aan dit onderzoek. Het doel van dit onderzoek is inzicht te krijgen in hoeverre *Floor* ondersteuning kan bieden in het leven met diabetes en hoe we het platform beter aan kunnen laten sluiten bij uw wensen en ervaringen.

Gang van zaken tijdens het onderzoek
U neemt deel aan een interview waarin aan u vragen zullen worden gesteld over uw gebruik van en ervaringen met *Floor*. Een voorbeeld van een typische vraag die u zal worden gesteld is: “Ik wil graag meer weten hoe u het gebruik van Floor in uw dagelijkse leven ervaart. Kunt u hier iets meer over vertellen?”

U dient tenminste 18 jaar te zijn om deel te nemen aan dit onderzoek.

Voorafgaand aan het interview vullen alle deelnemers een korte vragenlijst in. Hierin staan onder andere vragen over achtergrondgegevens, persoonlijke eigenschappen en duur van gebruik van *Floor.* Tijdens het interview zal, aan de hand van een topic list, dieper worden ingegaan op uw leven met diabetes, gebruik van internet, het (eerste) gebruik van *Floor*, uw ervaring met mentoren en buddy’s binnen *Floor*, en hoe Floor u ondersteunt bij het volhouden van een gezonde leefstijl.

Van het interview zal een audio-opname worden gemaakt, zodat het gesprek later ad-verbum (woord voor woord) kan worden uitgewerkt. Dit transcript wordt vervolgens gebruikt in het verdere onderzoek.

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

Vergoeding
U ontvangt voor deelname aan dit onderzoek geen vergoeding. Door deel te nemen aan dit onderzoek zult u meer inzicht krijgen in het ontwikkelproces van het platform *Floor*. Het bredere doel van dit onderzoek is: inzicht te krijgen in hoe Floor gebruikers op de langere termijn kan helpen bij het ontwikkelen van een gezonde(re) leefstijl.

Vertrouwelijkheid van gegevens
Uw privacy is en blijft maximaal beschermd. Er wordt op geen enkele wijze vertrouwelijke informatie of persoonsgegevens van of over u naar buiten gebracht, waardoor iemand u zal kunnen herkennen.

Voordat onze onderzoeksgegevens naar buiten gebracht worden, worden uw gegevens **anoniem** gemaakt: geanonimiseerd. Enkele eenvoudige voorbeelden hiervan:

- uw naam wordt vervangen door anonieme, op zichzelf betekenisloze combinatie van getallen.
- uw leeftijd zelf wordt niet verwerkt, maar in een categorie geplaatst. Bijvoorbeeld: leeftijd: tussen 18-25 jaar/ tussen 25-35 jaar etc.
- uw woonplaats wordt niet gebruikt, maar de provincie waarin u woont.

Bij de start van ons onderzoek krijgt uw naam direct een **pseudoniem**; uw naam wordt gepseudonimiseerd ofwel ‘versleuteld’. Op deze manier kan wel worden onderzocht wat u in het gesprek aangeeft, maar weten de getrainde onderzoekers niet dat u het bent. De onderzoeksleider is zelf verantwoordelijk voor dit pseudoniem en de sleutel en zal uw gegevens niet delen met anderen. De sleutel zal na afronding van het onderzoek worden vernietigd.

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

Vrijwilligheid

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

Dit betekent dat als u voorafgaand aan het onderzoek besluit om af te zien van deelname aan dit onderzoek, dat dit op geen enkele wijze gevolgen voor u zal hebben. Tevens kunt u tot 10 werkdagen (bedenktijd) na het interview alsnog de toestemming intrekken die u hebt gegeven om gebruik te maken van uw gegevens.

In deze gevallen zullen uw gegevens uit onze bestanden worden verwijderd en vernietigd.
Als u tijdens het onderzoek, na de bedenktijd van 10 werkdagen, besluit om uw medewerking te staken, zal dat eveneens op geen enkele wijze gevolgen voor u hebben. Echter: de gegevens die u hebt verstrekt tot aan het moment waarop uw deelname stopt, zal in het onderzoek gebruikt worden, inclusief de bescherming van uw privacy zoals hierboven beschreven. Er worden uiteraard geen nieuwe gegevens verzameld of gebruikt.

Als u besluit om te stoppen met deelname aan het onderzoek, of als u vragen of klachten heeft, of uw bezorgdheid kenbaar wilt maken, of een vorm van schade of ongemak vanwege het onderzoek, neemt u dan a.u.b. contact op met de onderzoeksleider:

Tim Sensendorf
t.sensendorf@student.utwente.nl

Toestemmings-verklaring
Met uw ondertekening van dit document geeft aan dat u minstens 16 jaar oud bent; dat u goed bent geïnformeerd over het onderzoek, de manier waarop de onderzoeksgegevens worden verzameld, gebruikt en behandeld en welke eventuele risico's u zou kunnen lopen door te participeren in dit onderzoek

Indien u vragen had, geeft u bij ondertekening aan dat u deze vragen heeft kunnen stellen en dat deze vragen helder en duidelijk zijn beantwoord. U geeft aan dat u vrijwillig akkoord gaat met uw deelname aan dit onderzoek. U ontvangt een kopie van dit ondertekende toestemmingsformulier.

Ik ga akkoord met deelname aan een onderzoeksproject geleid door Tim Sensendorf. Het doel van dit document is om de voorwaarden van mijn deelname aan het project vast te leggen.

1. Ik kreeg voldoende informatie over dit onderzoeksproject. Het doel van mijn deelname als een geïnterviewde in dit project is voor mij helder uitgelegd en ik weet wat dit voor mij betekent.

2. Mijn deelname als geïnterviewde in dit project is vrijwillig. Er is geen expliciete of impliciete dwang voor mij om aan dit onderzoek deel te nemen.

3. Mijn deelname houdt in dat ik word geïnterviewd door een onderzoeker van de Universiteit van Twente. Het interview zal ongeveer 30 minuten duren. Ik geef de onderzoeker toestemming om tijdens het interview geluidsopnames te maken en schriftelijke notities te nemen. Het is mij duidelijk dat, als ik toch bezwaar heb met een of meer punten zoals hierboven benoemd, ik op elk moment mijn deelname, zonder opgaaf van reden, kan stoppen.

4. Ik heb het recht om vragen niet te beantwoorden. Als ik me tijdens het interview ongemakkelijk voel, heb ik het recht om mijn deelname aan het interview te stoppen.

5. Ik heb van de onderzoeksleider de uitdrukkelijke garantie gekregen dat de onderzoeksleider er zorg voor draagt dat ik niet ben te identificeren in door het onderzoek naar buiten gebrachte gegevens, rapporten of artikelen. Mijn privacy is gewaarborgd als deelnemer aan dit onderzoek.

6. Ik heb de garantie gekregen dat dit onderzoeksproject is beoordeeld en goedgekeurd door de ethische commissie van de BMS Ethics Committee. Voor bezwaren met betrekking tot de opzet en of uitvoering van het onderzoek kan ik me wenden tot de Secretaris van de Ethische Commissie van de faculteit Behavioural, Management and Social Sciences op de Universiteit Twente via ethicscommittee-bms@utwente.nl of tot de begeleider van de onderzoeker dr. Floor Sieverink via f.sieverink@utwente.nl.

7. Ik heb dit formulier gelezen en begrepen. Al mijn vragen zijn naar mijn tevredenheid beantwoord en ik ben vrijwillig akkoord met deelname aan dit onderzoek.

8. Ik heb een kopie ontvangen van dit toestemmingsformulier dat ook ondertekend is door de interviewer.

_____	_____	_____
Naam deelnemer	Handtekening	Datum

_____	_____	_____
Naam Onderzoeker	Handtekening	Datum

Appendix 12: INFORMED CONSENT FORMULIER MENTOR

Naam van het onderzoeksproject
Evaluatie van een web-gebaseerd platform voor diabetes type 2 patiënten

Doel van het onderzoek
Dit onderzoek wordt geleid door Tim Sensendorf. U bent van harte uitgenodigd om deel te nemen aan dit onderzoek. Het doel van dit onderzoek is inzicht te krijgen in hoeverre *Floor* ondersteuning kan bieden in het begeleiden van mensen met diabetes en hoe we het platform beter aan kunnen laten sluiten bij uw wensen en ervaringen.

Gang van zaken tijdens het onderzoek
U neemt deel aan een interview waarin aan u vragen zullen worden gesteld over uw gebruik van en ervaringen met *Floor*. Een voorbeeld van een typische vraag die u zal worden gesteld is: “Ik wil graag meer weten hoe u het gebruik van *Floor* in uw begeleiding van mensen met diabetes hebt ervaren. Wat komt hierbij als eerste bij u op?”

U dient tenminste 18 jaar te zijn om deel te nemen aan dit onderzoek.

Voorafgaand aan het interview vullen alle deelnemers een korte vragenlijst in. Hierin staan onder andere vragen over achtergrondgegevens, persoonlijke eigenschappen en duur van gebruik van *Floor.* Tijdens het interview zal, aan de hand van een topic list, dieper worden ingegaan op uw begeleiding van mensen met diabetes, gebruik van internet, het (eerste) gebruik van *Floor*, uw ervaring met het contact met deelnemers, buddy’s binnen *Floor*, en hoe Floor u ondersteunt bij begeleiden van mensen met diabetes.

Van het interview zal een audio-opname worden gemaakt, zodat het gesprek later ad-verbum (woord voor woord) kan worden uitgewerkt. Dit transcript wordt vervolgens gebruikt in het verdere onderzoek.

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

Vergoeding
U ontvangt voor deelname aan dit onderzoek geen vergoeding. Door deel te nemen aan dit onderzoek zult u meer inzicht krijgen in het ontwikkelproces van het platform *Floor*. Het bredere doel van dit onderzoek is: inzicht te krijgen in hoe Floor gebruikers op de langere termijn kan helpen bij het ontwikkelen van een gezonde(re) leefstijl.

Vertrouwelijkheid van gegevens
Uw privacy is en blijft maximaal beschermd. Er wordt op geen enkele wijze vertrouwelijke informatie of persoonsgegevens van of over u naar buiten gebracht, waardoor iemand u zal kunnen herkennen.

Voordat onze onderzoeksgegevens naar buiten gebracht worden, worden uw gegevens **anoniem** gemaakt: geanonimiseerd. Enkele eenvoudige voorbeelden hiervan:

- uw naam wordt vervangen door anonieme, op zichzelf betekenisloze combinatie van getallen.
- uw leeftijd zelf wordt niet verwerkt, maar in een categorie geplaatst. Bijvoorbeeld: leeftijd: tussen 18-25 jaar/ tussen 25-35 jaar etc.
- uw woonplaats wordt niet gebruikt, maar de provincie waarin u woont.

Bij de start van ons onderzoek krijgt uw naam direct een **pseudoniem**; uw naam wordt gepseudonimiseerd ofwel ‘versleuteld’. Op deze manier kan wel worden onderzocht wat u in het gesprek aangeeft, maar weten de getrainde onderzoekers niet dat u het bent. De onderzoeksleider is zelf verantwoordelijk voor dit pseudoniem en de sleutel en zal uw gegevens niet delen met anderen. De sleutel zal na afronding van het onderzoek worden vernietigd.

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

Vrijwilligheid

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

Dit betekent dat als u voorafgaand aan het onderzoek besluit om af te zien van deelname aan dit onderzoek, dat dit op geen enkele wijze gevolgen voor u zal hebben. Tevens kunt u tot 10 werkdagen (bedenktijd) na het interview alsnog de toestemming intrekken die u hebt gegeven om gebruik te maken van uw gegevens.

In deze gevallen zullen uw gegevens uit onze bestanden worden verwijderd en vernietigd.
Als u tijdens het onderzoek, na de bedenktijd van 10 werkdagen, besluit om uw medewerking te staken, zal dat eveneens op geen enkele wijze gevolgen voor u hebben. Echter: de gegevens die u hebt verstrekt tot aan het moment waarop uw deelname stopt, zal in het onderzoek gebruikt worden, inclusief de bescherming van uw privacy zoals hierboven beschreven. Er worden uiteraard geen nieuwe gegevens verzameld of gebruikt.

Als u besluit om te stoppen met deelname aan het onderzoek, of als u vragen of klachten heeft, of uw bezorgdheid kenbaar wilt maken, of een vorm van schade of ongemak vanwege het onderzoek, neemt u dan a.u.b. contact op met de onderzoeksleider:

Tim Sensendorf
t.sensendorf@student.utwente.nl

Toestemmings-verklaring
Met uw ondertekening van dit document geeft aan dat u minstens 16 jaar oud bent; dat u goed bent geïnformeerd over het onderzoek, de manier waarop de onderzoeksgegevens worden verzameld, gebruikt en behandeld en welke eventuele risico's u zou kunnen lopen door te participeren in dit onderzoek

Indien u vragen had, geeft u bij ondertekening aan dat u deze vragen heeft kunnen stellen en dat deze vragen helder en duidelijk zijn beantwoord. U geeft aan dat u vrijwillig akkoord gaat met uw deelname aan dit onderzoek. U ontvangt een kopie van dit ondertekende toestemmingsformulier.

Ik ga akkoord met deelname aan een onderzoeksproject geleid door Tim Sensendorf. Het doel van dit document is om de voorwaarden van mijn deelname aan het project vast te leggen.

1. Ik kreeg voldoende informatie over dit onderzoeksproject. Het doel van mijn deelname als een geïnterviewde in dit project is voor mij helder uitgelegd en ik weet wat dit voor mij betekent.

2. Mijn deelname als geïnterviewde in dit project is vrijwillig. Er is geen expliciete of impliciete dwang voor mij om aan dit onderzoek deel te nemen.

3. Mijn deelname houdt in dat ik word geïnterviewd door een onderzoeker van de Universiteit van Twente. Het interview zal ongeveer 30 minuten duren. Ik geef de onderzoeker toestemming om tijdens het interview geluidsopnames te maken en schriftelijke notities te nemen. Het is mij duidelijk dat, als ik toch bezwaar heb met een of meer punten zoals hierboven benoemd, ik op elk moment mijn deelname, zonder opgaaf van reden, kan stoppen.

4. Ik heb het recht om vragen niet te beantwoorden. Als ik me tijdens het interview ongemakkelijk voel, heb ik het recht om mijn deelname aan het interview te stoppen.

5. Ik heb van de onderzoeksleider de uitdrukkelijke garantie gekregen dat de onderzoeksleider er zorg voor draagt dat ik niet ben te identificeren in door het onderzoek naar buiten gebrachte gegevens, rapporten of artikelen. Mijn privacy is gewaarborgd als deelnemer aan dit onderzoek.

6. Ik heb de garantie gekregen dat dit onderzoeksproject is beoordeeld en goedgekeurd door de ethische commissie van de BMS Ethics Committee. Voor bezwaren met betrekking tot de opzet en of uitvoering van het onderzoek kan ik me wenden tot de Secretaris van de Ethische Commissie van de faculteit Behavioural, Management and Social Sciences op de Universiteit Twente via ethicscommittee-bms@utwente.nl of tot de begeleider van de onderzoeker dr. Floor Sieverink via f.sieverink@utwente.nl.

7. Ik heb dit formulier gelezen en begrepen. Al mijn vragen zijn naar mijn tevredenheid beantwoord en ik ben vrijwillig akkoord met deelname aan dit onderzoek.

8. Ik heb een kopie ontvangen van dit toestemmingsformulier dat ook ondertekend is door de interviewer.

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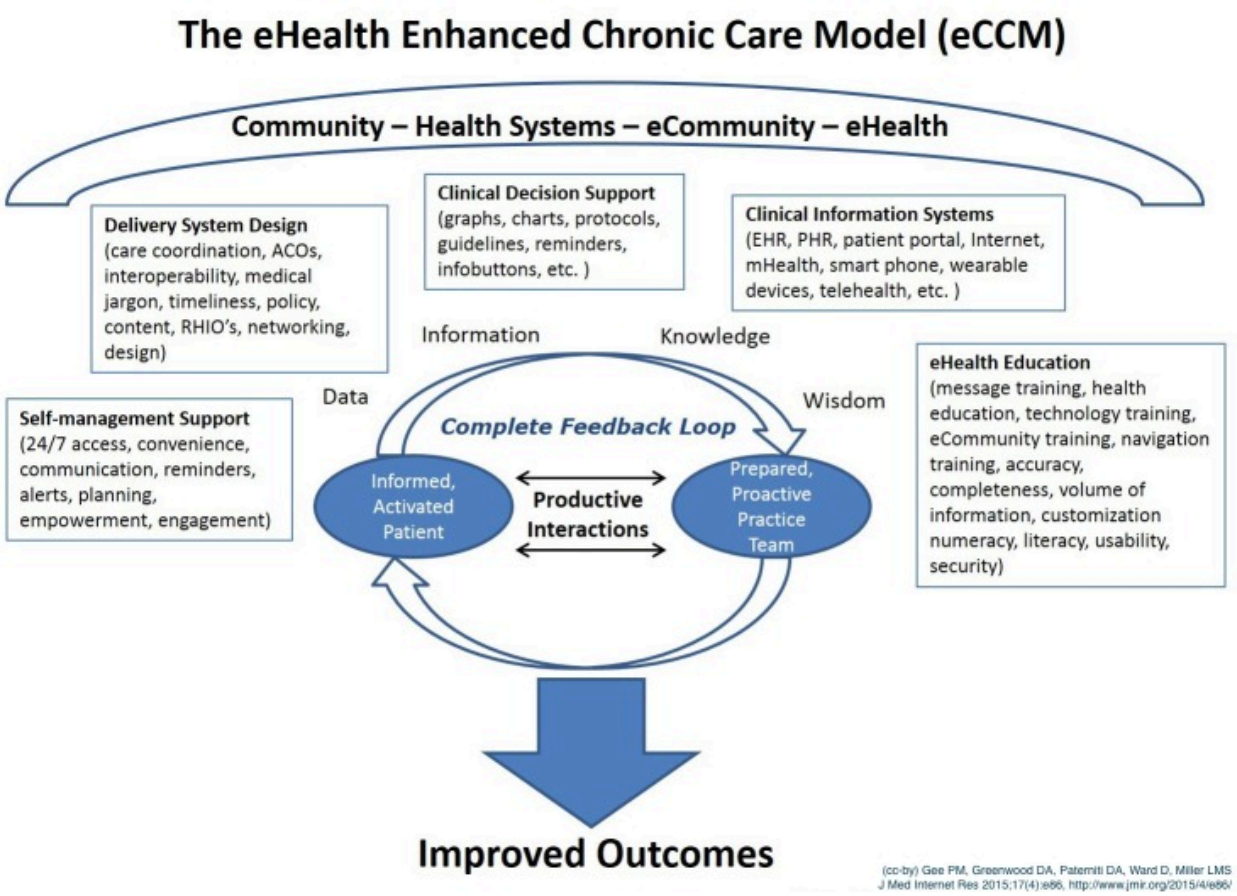

Appendix 13 eCCM Model