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Abstract

This deliverable reports on the demonstration protocol for the final evaluation of the functional demonstrator of Council of Coaches. This protocol has been published in JMIR Research Protocols:

- Hurmuz, M.Z.M., Jansen-Kosterink, S.M., Op den Akker, H. & Hermens, H.J. (2020). *User Experience and Potential Health Effects of a Conversational Agent-Based Electronic Health Intervention: Protocol for an Observational Cohort Study*. *JMIR Res Protoc*, 9(4). Doi: 10.2196/16641.

This evaluation study aims to assess the user experience, the use and the potential health effects of a fully working Council of Coaches system implemented in a real-world setting among the target population, consisting of older adults or adults with diabetes mellitus type 2 or chronic pain.

Furthermore, this deliverable reports on the ethical approval of the study in the Netherlands and in Scotland. For the study in the Netherlands we received a waiver of ethical approval from the Medical Research Ethics Committee (MREC) CMO Arnhem-Nijmegen. This means that, according to the Dutch law, this study does not require formal medical ethical approval. For the study in Scotland the study protocol has been reviewed and approved on behalf of the School of Science and Engineering Research Ethics Committee (SSEREC) at the University of Dundee.

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Symbols, abbreviations and acronyms

CMC	Centre for Monitoring and Coaching
COUCH	Council of Coaches
D	Deliverable
DBT	Danish Board of Technology Foundation
ISPRINT	Innovation Sprint
M	Month
MREC	Medical Research Ethics Committee
RRD	Roessingh Research and Development
SDT	Self-Determination Theory
SMAS-S	Self-Management Ability Scale – short version
SMS-II	revised Sports Motivation Scale
SSEREC	School of Science and Engineering Research Ethics Committee
SU	Sorbonne University
SUS	System Usability Scale
TAM	Technology Acceptance Model
UDun	University of Dundee
UPV	Universitat Politècnica de València
UT	University of Twente
VAS	Visual Analogue Scale
WAI-ReD	Working Alliance Inventory questionnaire - Dutch version in rehabilitation setting
WMO	Wet medisch-wetenschappelijk onderzoek met mensen
WP	Work Package

1 Introduction

Due to socioeconomic developments, and progression in medicine and education, average human life expectancy has increased significantly (Gulland, 2014; Suzman, Beard, Boerma, & Chatterji, 2015). However, the aging population has also led to a larger group of older adults living with chronic diseases (Suzman, Beard, Boerma, & Chatterji, 2015; van Oostrom, et al., 2016). Although these diseases cannot be cured, their burden on patients can be reduced by adopting a healthy lifestyle (Suzman, Beard, Boerma, & Chatterji, 2015; Willett, Skerrett, & Giovannucci, 2017; World Health Organization [WHO], 2005). To enable the adoption of a healthy lifestyle, deep understanding of personal motivation and knowledge on the economic and social pressure a person experiences is needed (Bundy, 2004; Kelly & Barker, 2016). Based on these insights, personalized virtual coaching systems have been developed to support lifestyle changes (Kulyk, op den Akker, Klaassen, & van Gemert-Pijnen, 2014). For these systems, it has been found that using multiple coaches can be more effective than using a single coach. Multiple coaches allow for vicarious persuasion (i.e., persuasion of the crowd), which is potentially more effective than direct persuasion (i.e., directly persuading the person) (Kantharaju, De Franco, Pease, & Pelachaud, 2018). This insight has led to the current project 'Council of Coaches' (COUCH), a new concept of virtual coaching (op den Akker, et al., 2018).

The COUCH functional demonstrator comprises a council of 5-6 virtual coaches. These coaches inform and motivate the user, and discuss different topics about healthy living (op den Akker, et al., 2018). This functional demonstrator system has been developed together with end-users and parts of the system have already been tested on feasibility and usability in a lab setting (formative evaluations) (see D2.4, 2.5 and 2.6). The next step for COUCH is to gain, within a summative evaluation of the system, knowledge on the possible working mechanism and potential added value of this coaching system in a real world setting among the target population (Jansen-Kosterink, Vollenbroek-Hutten, & Hermens, 2016). To not interfere with the ongoing development of COUCH, we decided to develop a mature and simplified version of COUCH ready for testing in a real-world setting.

This deliverable describes the study protocol of this final evaluation of the functional demonstrator of the COUCH system. This protocol is published in JMIR Research Protocols (Hurmuz, Jansen-Kosterink, Op den Akker, & Hermens, 2020):

Hurmuz, M.Z.M., Jansen-Kosterink, S.M., Op den Akker, H. & Hermens, H.J. (2020). User Experience and Potential Health Effects of a Conversational Agent-Based Electronic Health Intervention: Protocol for an Observational Cohort Study. JMIR Res Protoc, 9(4). Doi:10.2196/16641.

This deliverable also includes a waiver of ethical approval for the part of the study performed in the Netherlands and an ethical approval for the part of the study performed in Scotland from the School of Science and Engineering Research Ethics Committee (SSEREC) at UDun. Moreover, this study is registered in the Netherlands Trial Register with trial number NL7911 on 29th of July 2019 (<https://www.trialregister.nl/trial/7911>).

More information is provided in the following chapters. Chapter 2 describes the objectives for this deliverable and Chapter 0 the methods used. In Chapter 0, the waiver of the ethical approval of the Netherlands and the ethical approval from Scotland are presented. Finally, Chapter 0 describes the planning for the evaluation period and Chapter 0 the next steps after executing the evaluation.

2 Objectives

The objectives of this deliverable are:

- To demonstrate the study protocol used in the final evaluation of the functional demonstrator of the COUCH-system in a real-world setting among the target population. The aim of this study is to evaluate the user experience, the use and potential health effects.
- To demonstrate the waiver of ethical approval received from the MREC CMO Arnhem-Nijmegen and the ethical approval from the School of Science and Engineering Research Ethics Committee (SSEREC) at UDun.

3 Methods final evaluation

3.1 Study design

This evaluation study is an observational cohort study with a pre-test/post-test design. Participants are included for at least five weeks, up to a maximum of nine weeks. The first week is the preparation phase. In this phase, baseline measurements are being collected. The following four weeks are the implementation phase. The participants interact with the system during this phase. The last four weeks belong to the facultative follow-up phase, in which participants can choose whether they want to interact with the system for four additional weeks. This study protocol strictly follows the CONSORT-EHEALTH checklist (Eysenbach & CONSORT-EHEALTH Group, 2011) for the methods section.

This study is being conducted in two countries (the Netherlands and Scotland), and consists of two rounds. Each round will include 25 participants per country. Figure 1 shows the study design.

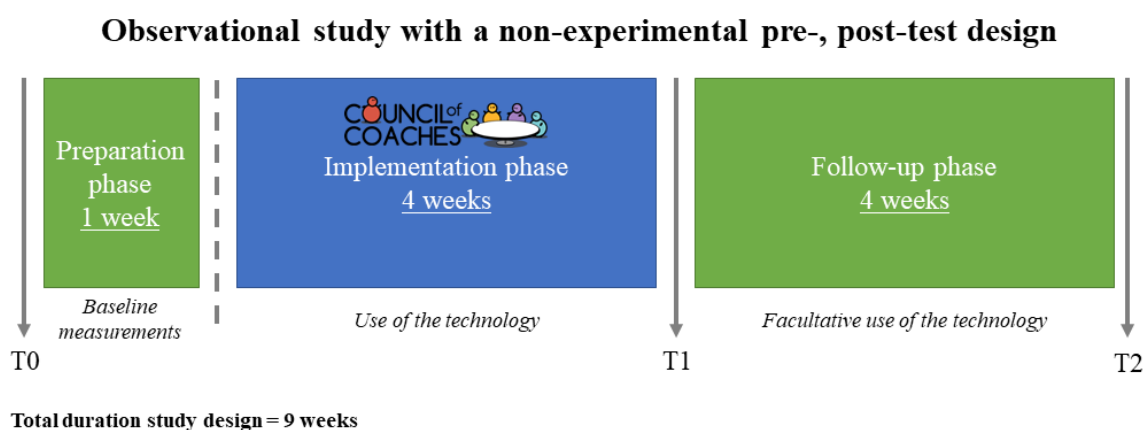


Figure 1: The study design of this evaluation study.

3.1.1 Micro randomization trial (MRT)

To assess the effectiveness of technology-supported health services, such as COUCH in real-world as a proper evaluation is challenging (Ekeland, Bowes, & Flottorp, 2012; Kairy, Lehoux, Vincent, & Visintin, 2009; LaPlante & Peng, 2011). More and more it is acknowledged among experts that there is an urgent need for more pragmatic study designs to adequately evaluate technology-supported health services (Ekeland, Bowes, & Flottorp, 2010; Ekeland, Bowes, & Flottorp, 2012; Kairy, Lehoux, Vincent, & Visintin, 2009; LaPlante & Peng, 2011). The micro-randomized trial is such an alternative study design. It was introduced by Klasnja et al. (2015) to overcome limitations of current experimental methods, such as Randomized Controlled Trials, and to supplement the use of behavioural theory to guide the development of just-in-time adaptive interventions. As we are also interested in the effectiveness of the interaction between the user and the virtual coaches, we want to assess the applicability of the virtual coaches and the users' duration of interaction with the virtual coaches of a fully working Council of Coaches system implemented in a real-world setting among the target population. To assess the users' interaction with the virtual coaches of COUCH, the interaction with one of the primary coaches (physical activity coach) is being micro randomized: every time the user starts a conversation with this coach, the initiative in directing the conversation is based on micro randomisation. This micro randomisation consists of the following two conditions:

- Condition 1: The user gets the initiative and chooses the topic of the conversation; or
- Condition 2: The system takes the initiative and automatically suggest the topic of the conversation.

The pre-defined topics include: gathering information about the user, goal setting, strategy selection, learning skills, and feedback and support.

3.2 Participants

The study population will consist of older adults (defined as ≥ 50 years old), incl. older adults with diabetes mellitus type 2 or chronic pain. To be eligible for this study they have to: be able to read and speak Dutch or English, have a Wi-Fi connection at home, be able to provide informed consent, and be able to see smartphone/tablet screen clearly.

Eligible older adults will be recruited from December 2019 through January 2020 for the first round. Participants for the second round will be recruited from March through April 2020. The first round will start on the 31st of January 2020.

3.3 Procedure

Each round consists of three phases: preparation phase, implementation phase and follow-up phase.

The preparation phase (one week) will start with an initial meeting with a researcher at T0, either at the participant's home or at the researcher's lab. Here they will receive the required equipment (e.g. tablet, smartphone, activity tracker, etc.), including an explanation about how to use it and a manual. Additionally, the participants will complete the T0 questionnaire (demographics and health status) (see Appendix 1). After this meeting, the participants will wear a watch that tracks their physical activity and use a food diary to record their food intake for one week. In this phase the participant does not yet interact with the system.

After this preparation phase the implementation phase starts where the participants will use the COUCH system for four weeks. After four weeks, the participants will be asked to complete the T1 questionnaire (user experience, health status, applicability of the virtual coaches) (see Appendix 2), they will be interviewed over phone, and they will indicate whether they want to continue using the system for another four weeks (the facultative follow-up phase). After the follow-up phase, all participants will complete the T2 questionnaire (health status) (see Appendix 3).

3.4 Intervention Council of Coaches functional demonstrator

The system, i.e., the final Council of Coaches demonstrator, that will be evaluated in this study supports the following virtual coaches: physical activity, nutrition, social, cognition, peer/support, chronic pain, and diabetes. Depending on the user's needs and interests, a subset of these coaches can be selected by the user (e.g. disease-specific coaches will not be included in the absence of these diseases). In the current evaluation, the primary coaches will be the physical activity and nutrition coaches. These two coaches can assist the user in their domain in the following ways: providing information on health benefits, setting personalized goals, providing feedback and advice, reflecting on different coaching styles, and assisting with relevant sensor technology. Moreover, the coaching content is based on well-established health guidelines.

The secondary coaches (social, cognition, peer/support, chronic pain and diabetes) interact with the user by providing their points of view on physical activity and nutrition. For example, the social coach may suggest doing group activities outside the house when the user is discussing physical activity with his physical activity coach, while the cognitive coach can provide a memory game to do while doing grocery shopping for a recipe that the nutrition coach recommended. The peer/support coach is included to take on an user's perspective and stands by the user's side by providing encouragement for the user to achieve his/her goals. The secondary coaches, except for the chronic pain and diabetes coaches, can be removed from the council by the user.

Furthermore, the system supports the use of sensor technology, which allows for more personalized feedback and coaching to the users. The physical activity coach will suggest the user to wear a Fitbit watch (which is provided by the researchers to all participants), so that she may provide feedback on the user's actual physical activity. Similarly, the nutrition coach will ask the user to track dietary consumption through a provided smartphone app, and to provide information on body weight (self-reported or recorded by connected (smart) scale). Users can talk with the virtual coaches about the use of these devices, and the coaches will explain which data is collected, for which purpose, and offer the ability to stop tracking data when the user feels uncomfortable about this.

All of the interactions take place in the comfort of the coaches' living room, see Figure 2, that includes elements like a radio (playing the coaches' favourite classical songs), recipe books (that Francois, the nutrition coach, can use to suggest recipes), a television on which physical exercise can be demonstrated, etc.

During the whole evaluation period, there will be a helpdesk available for the participants on working days from 9 AM till 5 PM, and the participants will receive thrice a non-personalized informative newsletter by e-mail to inform them on the project and the running evaluation.



Figure 2: Screenshot of the current test version of the Council of Coaches web application with the chronic pain coach, without dialogue box (<https://www.council-of-coaches.eu/beta/>).

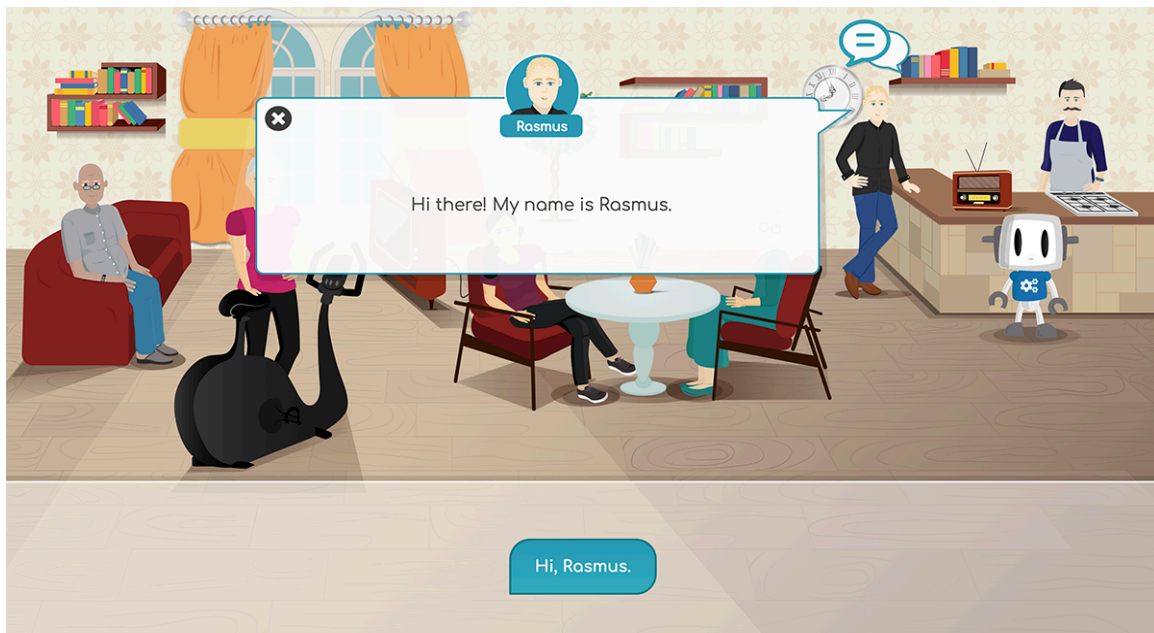


Figure 3: Screenshot of the current test version of the Council of Coaches web application with the chronic pain coach, with dialogue box (<https://www.council-of-coaches.eu/beta/>).

3.5 Data collection and outcomes

In this study, we focus mainly on user experience, potential effect on health-related factors, and the use of the system during the implementation phase and follow-up phase. Furthermore, we will look at the demographics, the applicability of the virtual coaches and the user's interaction with the virtual coaches. Table 1 gives an overview of the content of the questionnaires used during this study. The full questionnaires are provided in Appendix 1: T0 questionnaire, Appendix 2: T1 Questionnaire and Appendix 3: T2 Questionnaire.

Table 1: Overview of which questionnaires will be used when.

Questionnaire	T0	T1	T2
User experience			
Technology Acceptance Model		X	
System Usability Scale		X	
Willingness-to-Pay		X	
Potential health effect			
EQ-5D-5L	X	X	X
Positive Health dimensions	X	X	X
Self-Management Ability Scale – short version	X	X	X
Demographics	X		
Applicability of the virtual coaches			
Rating scale	X	X	
Working Alliance Inventory		X	

3.5.1 User experience

To determine the user experience, the Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) and the System Usability Scale (SUS) (Brooke, 1996) will be used. Furthermore, an exit-interview will be conducted, and the Willingness-to-Pay will be measured.

The **TAM** consists of external variables, perceived usefulness, perceived ease of use, attitude toward using technology, and intention to use. The following user experience domains will be used in this study as external variables of the TAM model:

- **Enjoyment:** Van der Heijden (2004) defined perceived enjoyment of a technology as the extent to which fun can be derived from using the system as such. Like Van der Heijden we will use four questions on a seven-point semantic differentials scale to measure the following four items:
 - Enjoyable – disgusting
 - Exciting – dull
 - Pleasant – unpleasant
 - Interesting – boring
- **Aesthetics:** Lavie and Tractinsky (2004) developed and validated a questionnaire to measure perceived website aesthetics. In the current evaluation study, only the classical aesthetics will be used.
- **Control:** Like Van Velsen et al. (2015) we will use a set of three questions, from Liu (2003), to measure the controllability of the system as perceived by the user.
- **Trust in technology:** This domain is also a predictor for someone's intention to use technology (van Velsen, van der Geest, van de Wijngaert, van den Berg, & Steehouder, 2015). Van Velsen et al. (2015) used four statements about trust in technology, based on the study of Harrison McKnight, Choudhury and Kacmar (2002) about the impact of consumer trust on intentions to transact with a website, which will be used in the current study as well.

TAMs perceived usefulness, perceived ease of use, and intention to use will be included as constructs in this study's questionnaire (T1 questionnaire) as well. The attitude toward the technology domain will be used as demographic for the secondary outcomes.

- Perceived usefulness and Perceived ease of use: both constructs are derived from Davis (1989). In his study, a new measurement scale for perceived usefulness and perceived ease of use was developed and validated. Both constructs are important when determining the intention to use; the less effortful a technology is, the more it will be used, and the higher someone's belief that using the technology would enhance his/her performance, the more it will be used (Davis, 1989; Venkatesh & Davis, 2000). These constructs will both be used in the current study.
- Intention to use: In the study of Van Velsen et al. (2015) the construct intention to use was based on Davis, Bagozzi, and Warshaw (1989) and Gefen, Karahanna, and Straub (2003), expanded with one item of their own. The three statements that were best in assessing the intention to use in these studies will be used in the current study.

The constructs aesthetics, control, trust in technology, perceived usefulness, perceived ease of use, and intention to use all used statements with a 7-point Likert scale, ranging from total disagreement to total agreement.

The **System Usability Scale (SUS)** will be used to measure the usability of the system. The SUS consists of ten statements with five response options: 5-points Likert scale ranging from strongly disagree to strongly agree. The SUS score takes a grade between 0 (worst imaginable) and 100 (best imaginable) points.

Moreover, qualitative feedback from the participants will be obtained through a short semi-structured exit-interview at T1 (after interacting with COUCH for four weeks). During this interview, participants will be asked to share their ideas about COUCH. We will discuss the advantages, points for improvement, and the experienced problems.

Finally, the **Willingness-to-Pay** will be measured by asking whether the participants would be willing to pay for the system, and, if so, how much Euros/Scottish Pounds they are willing to pay for it.

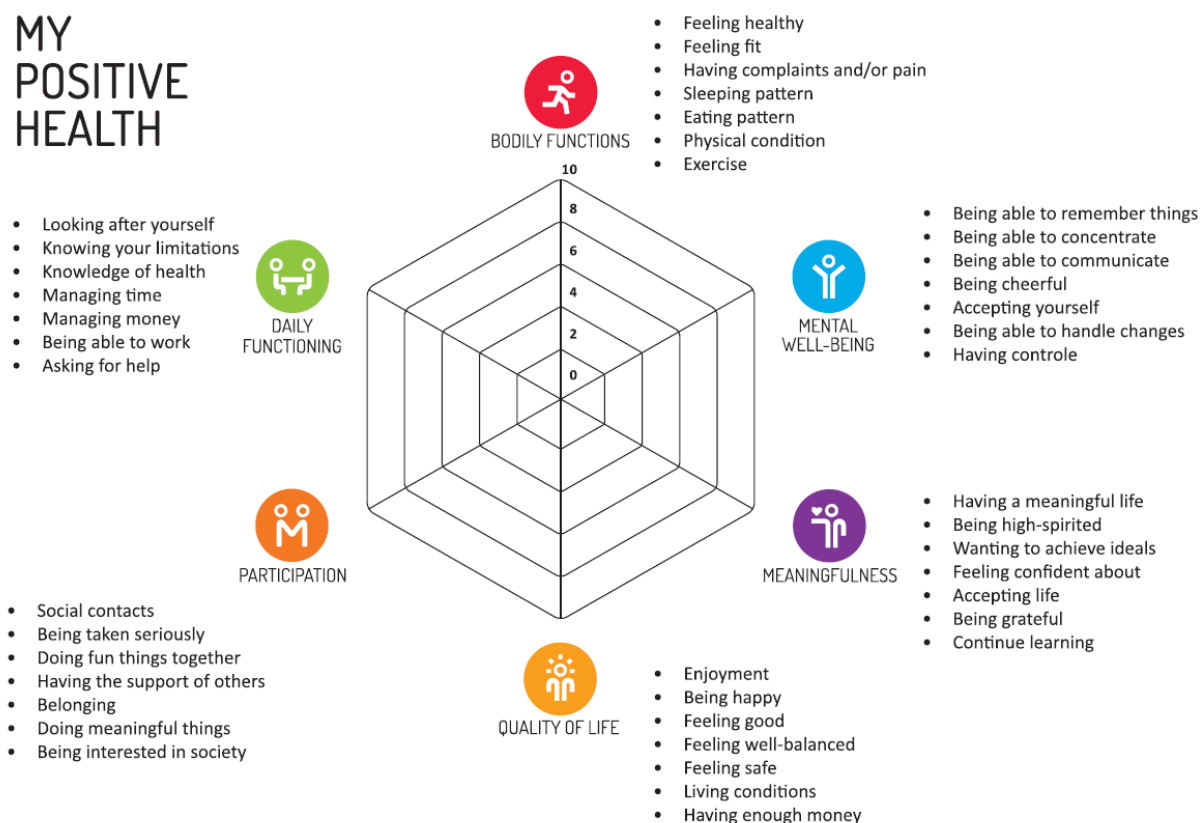
3.5.2 Potential effect on health-related factors

Health effects will be measured using the EQ-5D-5L questionnaire, the six domains of Positive Health tool, and the 'Self-Management Ability Scale – short version' (SMAS-S).

The **EQ-5D-5L** questionnaire measures quality of life, and consists of a descriptive system, which includes five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression), and a Visual Analogue Scale (EQ VAS). Each dimension has five levels from no problems to extreme problems. With the EQ VAS, the participants rate their health on a vertical scale, labelled from the worst health you can imagine (0) to the best health you can imagine (100) (Van Reenen & Janssen, 2015).

The **Positive Health tool** measures the six dimensions of health as established by (Huber, et al., 2016): bodily functions, mental well-being, meaningfulness, quality of life, participation and daily functioning. Figure 4 shows this positive health tool. Participants will complete a questionnaire, resulting in a score between 0 and 10 on each dimension (Huber, et al., 2016). In the current study, an adapted version will be used. Instead of completing a questionnaire consisting of 42 questions, the participants score each dimension from 0 to 10, as done in Van Velsen, Broekhuis, Jansen-Kosterink and op den Akker (2019).

The **SMAS-S** is a questionnaire to measure six self-management abilities in older adults: taking initiatives, investment behaviour, variety, multifunctionality, self-efficacy, and positive frame of mind. It determines whether older adults are in need of self-management courses (Schuurmans, et al., 2005).



Institute for Positive Health (IPH) | Dialogue tool 1.0

Figure 4: Positive health spider plot (Institute for Positive Health, 2019)

3.5.3 Use of COUCH

The actual use will be determined by the log history of the platform. This outcome measure is defined as the frequency and duration of use overall, per week, and per session.

3.5.4 Demographics

Demographics included in the T0 questionnaire are: gender, age, educational level, living situation, working status, attitude toward technology, self-reported level of physical activity, health literacy (Chew, Bradley, & Boyko, 2004), and motivation level to live healthy. Attitude toward using technology and motivation level to live healthy will be explained in the following paragraphs.

To determine the participant's *attitude toward using technology*, four items from Agarwal and Prasad (1998) are included in the questionnaire. They developed and validated a new instrument consisting of four statements with a 7-point Likert scale, ranging from totally disagreement to totally agreement.

To get participants engaged in working on their health, it is important to determine their *motivation to live healthy*. With this information, the best suitable persuasive feature can be used in the system for each participant (van Velsen, Broekhuis, Jansen-Kosterink, & op den Akker, 2019). The motivation of an older adult to live healthy can be measured by a tool developed by Van Velsen et al. (2019) based on the revised Sport Motivation Scale (SMS-II). The SMS-II is created and validated by Pelletier et al. (2013). This questionnaire measures sport motivation using the Self-Determination Theory (SDT). The SDT distinguishes six types of motivation: intrinsic motivation, extrinsic external regulation, extrinsic introjected regulation, extrinsic identified regulation, extrinsic integrated regulation, and a-motivation (Deci & Ryan, 2004). Those six types are included in the SMS-II tool. According to Van Velsen et al. (2019) there are only three types of motivation in older adults to live healthy: intrinsic motivation, extrinsic external regulated, and a-motivation. They provided a set of eleven statements that will be used in the current study. In the current study, a fourth motivation type will be included, the dual motivation. Because some participants are not obviously intrinsic motivated or obviously external motivated.

3.5.5 Applicability of the virtual coaches

The applicability of the virtual coaches will be measured by a rating scale (from 0 to 10) and by an adapted version of the 'Working Alliance Inventory questionnaire - Dutch version in rehabilitation setting' (WAI-ReD). This WAI-ReD questionnaire will be completed for the two primary virtual coaches. This questionnaire measures how the patient feels about the therapeutic alliance. The better the therapeutic alliance, the more likely the patient will follow the treatment faithfully. The coaches will receive a score between 12 and 60. The higher the score, the more satisfied the participant is with the physical activity/nutrition coach and the more (s)he trusts the coach (Paap, Schrier, & Dijkstra, 2018).

3.6 Sample size

Because of the explorative character of this study, no sample size calculation has been conducted beforehand. To be able to answer the objectives of this study, the goal is to include 50 participants per country. So, in each round, 25 participants will be included per country. To our experience, participants are beforehand very enthusiastic to participate in this kind of evaluations with new technology, but based on our experience we expect that around 50% of the participants will drop-out before the end of the implementation phase. So, in this worst-case scenario, we will have a total of 50 participants that completed the implementation phase.

3.7 Statistical analysis

Statistical analyses will be performed using SPSS, version 19 for Windows. For all the analyses, the confidence intervals will be set at 95%. Descriptive statistics, such as frequency, mean, standard deviation and percentages, will be used to describe demographics, user experience, actual use, and the applicability of the coaches.

The outcome on the EQ-5D-5L, the Positive Health tool, and the SMAS-s will be investigated using a mixed-model analysis for repeated measures to obtain an effect of using the system over the different measurements. The time of measurement (T0, T1 or T2) will be included as a fixed factor. Post hoc comparisons will be made when required and Sidak adjustments will be used to correct for multiple tests.

To assess the users' interaction with the virtual coaches, the duration of the interaction (in seconds) and the number of dialogue steps with the coach will be used. With this analysis, we want to assess the effect of the conversation with the virtual coaches. To discover changes and possible trends, the duration of the interaction and number of dialogue steps will be analysed for the two conditions. When the data follows a normal distribution, the outcome will be investigated using a paired t-test, else a Wilcoxon signed-rank test will be performed.

4 Ethical approval

This study is being conducted according to the principles of the Declaration of Helsinki (64th WMA General Assembly, Fortaleza, Brazil, October 2013) and in accordance with the Medical Research Involving Human Subjects Act (Dutch law: *Wet medisch-wetenschappelijk onderzoek met mensen* (WMO)). According to the WMO, this study does not require formal medical ethical approval to carry this out in the Netherlands. This has been checked by the MREC CMO Arnhem-Nijmegen (file number: 2019-5555) (see Figure 5). For Scotland, the ethical approval has been given by the School of Science and Engineering Research Ethics Committee (SSEREC) at UDun (see Figure 6). Each participant will give his/her informed consent on paper.

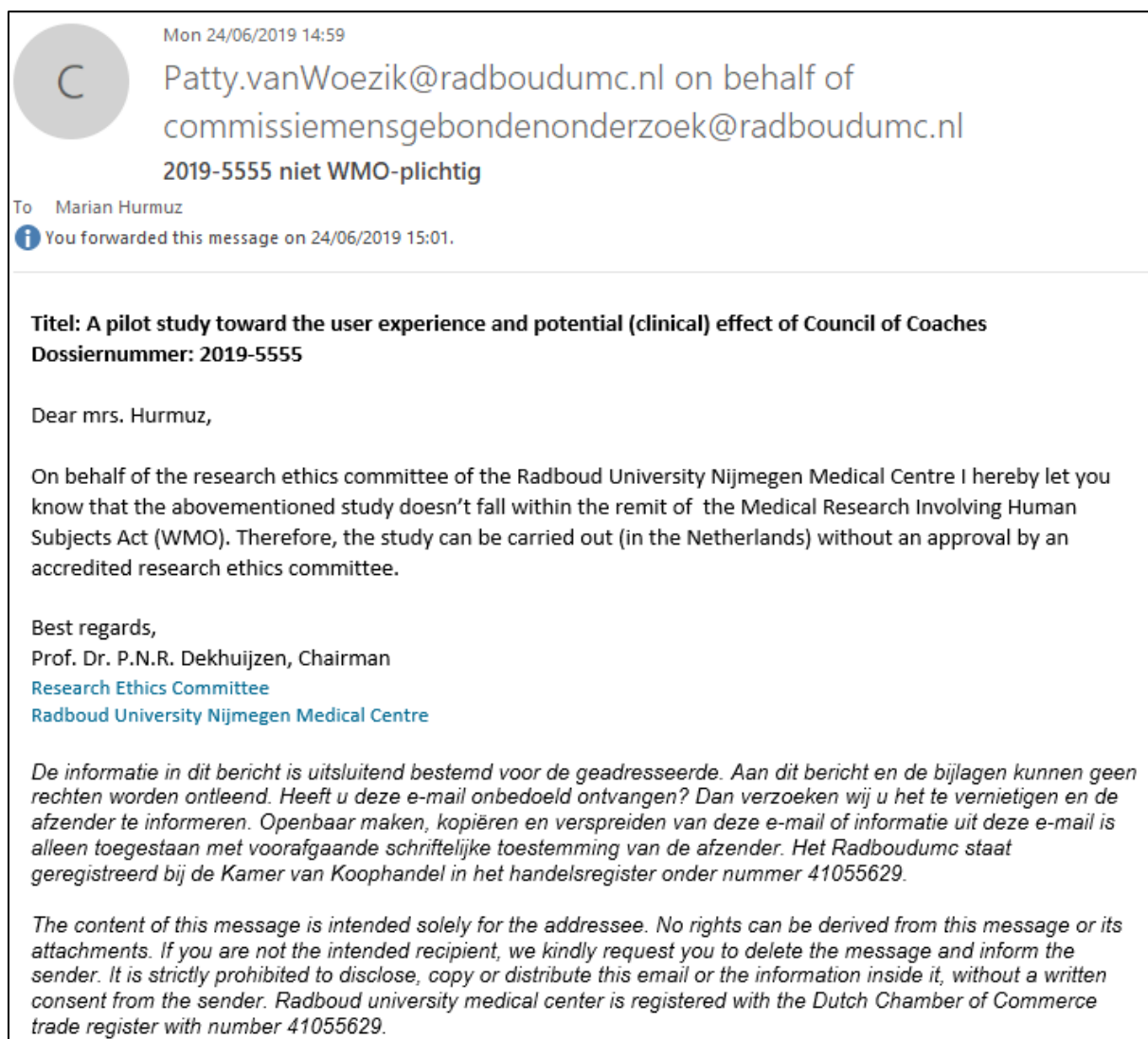


Figure 5: Waiver of ethical approval for the Netherlands checked by CMO Arnhem-Nijmegen.



Figure 6: Ethical approval for Scotland checked by SSEREC at the University of Dundee.

5 Planning

5.1 The Netherlands

In the Netherlands the first round will start the 31st of January 2020 and will last until the 15th of April 2020. The second round will start the 6th of May 2020 and will last until the 16th of July. Figure 7 shows the planning of the first and second round of the evaluation.

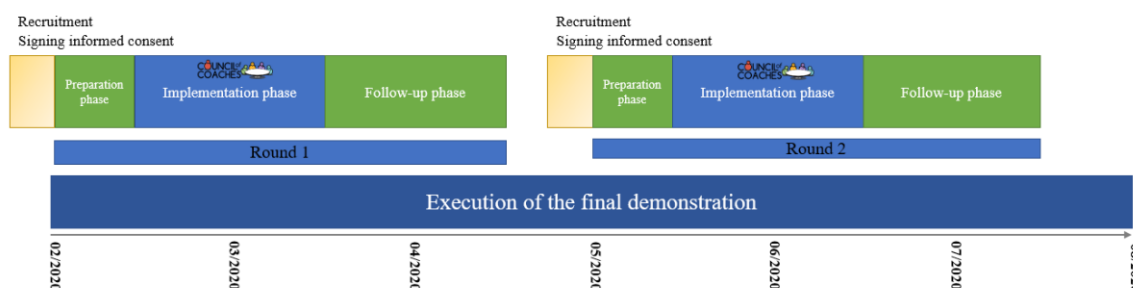


Figure 7: Timeline of evaluation period.

For the first round of evaluation, 25 participants will be included and will use the system.

Note: At the time of writing, the preparation and implementation phase of the first round finished. 26 participants are included this round. All participants wore their Fitbit for one week, used the COUCH system for four weeks, were interviewed, and can use the system now facultatively. During the preparation phase, the participants of the first round did not complete the nutrition diary, because this diary was not connected with COUCH at the start of the first round. We hope we can use the nutrition diary in the second round. For the second round, 13 participants are already included. Next to these 13 participants, we have 11 potential participants for the second round.

5.2 Scotland

In Scotland the first round will start the 20th of February 2020 and will last until the 30th of April 2020. The second round will start on the 11th of May 2020 and will last until the 20th of July. Recruitment is ongoing; however, we estimate that we will have 25 participants for the first round of evaluations.

Note: At the time of writing, the preparation phase of the first round finished. 19 participants are included in this round. All participants wore their Fitbit for one week and are using the COUCH system now. So far, we have 7 participants due to begin in May.

6 Next steps

This demonstration protocol describes the final evaluation of the functional demonstrator of the system. This study will highlight points of improvement for the system and will contribute to a better understanding of the potential of virtual coaches for behaviour change. This protocol was published in JMIR Research Protocols in **April 2020**:

- Hurmuz, M.Z.M., Jansen-Kosterink, S.M., Op den Akker, H. & Hermens, H.J. (2020). User Experience and Potential Health Effects of a Conversational Agent-Based Electronic Health Intervention: Protocol for an Observational Cohort Study. JMIR Res Protoc, 9(4). Doi: 10.2196/16641

We expect to have all results from the first round by the end of April 2020 and from the second round by the end of July 2020, which will be reported in Deliverable 7.7 (due in August 2020). These results will be published in at least four scientific papers about:

- User experience, use, and health effects: *"User Experience, Use, and Potential Health Effect of a Conversational Agent-Based Electronic Health Intervention: An Observational Cohort Study"*
- The micro randomized trial: *"Automatic topic selection for embodied conversational agents in health coaching: a micro-randomized trial."*
- The virtual coaches: *"The Effect of Agent Design in a Multi-Agent eHealth Application: From First Glance to Daily Use"*
- Persuasive Narratives in Virtual Health Coaching: *"Personalising Argumentation through Narrative within Health Behaviour Change Support Systems."*

Next to this, two master students are involved in this study and will graduate with results from this evaluation.

7 Bibliography

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8 Appendix 1: T0 questionnaire

Demographics

1. What is your gender?
 - ☐ Male
 - ☐ Female
2. What is your age?

..... years old
3. What is your highest level of education?
 - ☐ Primary school
 - ☐ Preparatory secondary vocational education
 - ☐ Higher general secondary education, pre-university education
 - ☐ Higher vocational education, university
4. What is your living situation?
 - ☐ Alone
 - ☐ Married/living together
 - ☐ Living together with my caregiver
 - ☐ Other
5. Which of the following categories best describes your work status?
 - ☐ Employed
 - ☐ Volunteer/caregiver
 - ☐ Retired
 - ☐ Job seeker
 - ☐ Other

Health literacy (Chew, Bradley, & Boyko, 2004)

6. How often do you have problems learning about your medical condition because of difficulty understanding written information?

Never	Occasionally	Sometimes	Often	Always
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7. How confident are you filling out medical forms by yourself?

Not at all	A little bit	Somewhat	Quite a bit	Extremely
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8. How often do you have someone help you read hospital materials?

Never	Occasionally	Sometimes	Often	Always
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Self-reported level of physical activity

9. How often do you engage in physical or sports activities?
 - ☐ Not at all
 - ☐ Not at all, but thinking about beginning
 - ☐ Less than 2.5 hours a week
 - ☐ More than 2.5 hours a week in the last six months
 - ☐ More than 2.5 hours a week for more than six months

Attitude toward using technology (Agarwal & Prasad, 1998)

10. *How do you think about new technologies in general? Circle the answer that best fits your thoughts.*

a. If I heard about a new information technology, I would look for ways to experiment with it.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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b. Among my peers, I am usually the first to try out new information technologies.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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c. In general, I am hesitant to try out new information technologies.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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d. I like to experiment with new information technologies.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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Motivation to live healthy (van Velsen, Broekhuis, Jansen-Kosterink, & op den Akker, 2019)

11. *We would like to look at your motivation to live a healthy life. We give you a number of statements, circle the answer that best fits your motivation.*

a. I live healthy, because people around me reward me when I do.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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b. I live healthy, because I like to learn more about healthy living.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

c. I live healthy, because I think others would disapprove of me if I did not.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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d. I live healthy, because I like to discover new ways to lead a healthier life.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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e. I live healthy, so that I get compliments from others.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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f. I do not think a healthy life really fits me.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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g. I live healthy, because I think it is one of the best ways to develop other sides of myself.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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h. I live healthy, because I think it is very interesting to learn how to live a healthier live.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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i. I live healthy, because the people that are important to me would be angry at me if I did not.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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j. I live healthy, because I think it is a good way to develop my strong suits.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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k. In the past, I had good reasons to live healthy, but nowadays I am doubting whether I want to continue healthy living.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
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Potential health effect questionnaires**Self-Management Ability Scale – Short version** (Schuurmans, et al., 2005)

12. The following questions are about all different kind of things in you daily living. E.g. things you do, your hobbies, your contacts with others, etc. The questions relate on your situation in general. Consider for example how it was in the last three months.

a. How often do you take the initiative to keep yourself busy?

Never	Almost never	Sometimes	Regularly	Often	Very often
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b. How often do you take initiative to get in touch with people who are dear to you?

Never	Almost never	Sometimes	Regularly	Often	Very often
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c. How often do you make an effort to have friendly contacts with other people?

Never	Almost never	Sometimes	Regularly	Often	Very often
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d. Do you ensure you have enough interests on a regular basis (such as a hobby) to keep you active?

Never	Almost never	Sometimes	Regularly	Often	Very often
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e. Do you devote some time and attention to those who are dear to you in order to maintain good contact?

Never	Almost never	Sometimes	Regularly	Often	Very often
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f. Do you keep busy with the things you are good at so that you stay good at them?

Never	Almost never	Sometimes	Regularly	Often	Very often
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g. How many hobbies or activities do you have on a regular basis?

Zero	One	Two	Three or four	Five or six	More than six
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h. Do you have different occasions on which you have friendly contact with others?

Zero	One	Two	Three or four	Five or six	More than six
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i. Are there certain things that you are good at?

Zero	One	Two	Three or four	Five or six	More than six
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j. The activities I enjoy, I do together with others.

Never	Almost never	Sometimes	Regularly	Often	Very often
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k. I sometimes help the people I care about.

Never	Almost never	Sometimes	Regularly	Often	Very often
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l. Others benefit from the things I do for my pleasure.

Never	Almost never	Sometimes	Regularly	Often	Very often
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m. Are you able to find agreeable activities?

Never	Almost never	Sometimes	Regularly	Often	Very often
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n. Are you able to have friendly contacts with others?

Never	Almost never	Sometimes	Regularly	Often	Very often
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o. Are you able to let others know that you care about them?

Never	Almost never	Sometimes	Regularly	Often	Very often
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p. When things go against you, how often do you think that it could always be worse?

Never	Almost never	Sometimes	Regularly	Often	Very often
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q. When you have a bad day, how often do you think that things will be better tomorrow?

Never	Almost never	Sometimes	Regularly	Often	Very often
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r. When things are not going so well, how often do you succeed in thinking positively?

Never	Almost never	Sometimes	Regularly	Often	Very often
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Quality of life (EQ-5D-5L) (Van Reenen & Janssen, 2015)

13. The following statements are about your quality of life. Under each heading, please tick the one box that best describes your health today.

MOBILITY

- ☐ I have no problems in walking about
- ☐ I have slight problems in walking about
- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

SELF-CARE

- ☐ I have no problems washing or dressing myself
- ☐ I have slight problems washing or dressing myself
- ☐ I have moderate problems washing or dressing myself
- ☐ I have severe problems washing or dressing myself
- ☐ I am unable to wash or dress myself

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- ☐ I have no problems doing my usual activities
- ☐ I have slight problems doing my usual activities
- ☐ I have moderate problems doing my usual activities
- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

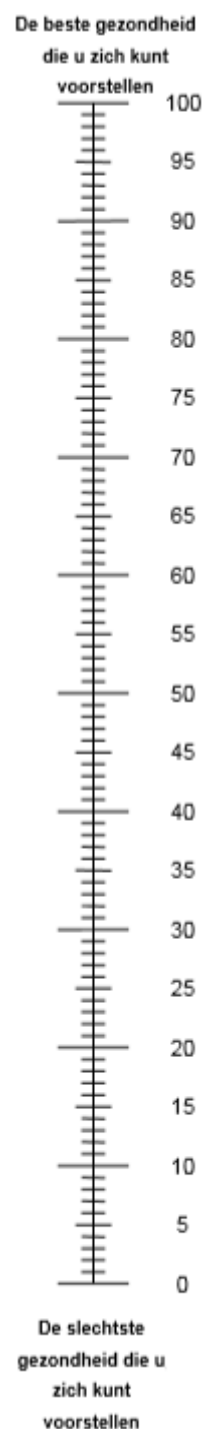
PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am severely anxious or depressed
- ☐ I am extremely anxious or depressed

14. We would like to know how good or bad your health is **today**. The scale on the right side of the page is numbered from 0 to 100. 100 means the **best** health you can imagine. 0 means the **worst** health you can imagine. Mark an X on the scale to indicate how your health is **today**, and please write the number you marked on the scale in the box below.



Positive Health dimensions (Huber, et al., 2016; van Velsen, Broekhuis, Jansen-Kosterink, & op den Akker, 2019)

15. A number of questions about positive health will follow. For each question, circle the number that best fits your health. On a scale of 1 (low) to 10 (high).

- a. How healthy do you think your body is? Do you feel fit? Are you in pain somewhere? Can you sleep and eat well?

1	2	3	4	5	6	7	8	9	10
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- b. What do you think of your mental fitness? Can you concentrate well? Are you feeling well? Do you feel that you are in control of your life?

1	2	3	4	5	6	7	8	9	10
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- c. We want to know how much satisfaction you get out of your life. Do you have a great zest for life? Do you have ideals that you want to achieve? Are you grateful for the things that life has given you?

1	2	3	4	5	6	7	8	9	10
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- d. Can you indicate what the quality of your life is? Do you enjoy life? Do you feel safe? Do you have the idea that your life is in balance? Do you have a comfortable life?

1	2	3	4	5	6	7	8	9	10
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- e. What do you think of your social life? Do you have enough friends? Do you have others to do fun things with? Do you get help if you need it? Do you feel like you belong somewhere?

1	2	3	4	5	6	7	8	9	10
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- f. Can you indicate how well you can take care of yourself? Can you handle money well? Can you work? Do you know your limits? Can you ask for help if necessary?

1	2	3	4	5	6	7	8	9	10
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16. Please score each coach on a scale of 1 (low) to 10 (high).

Olivia Simons (physical activity)



1 2 3 4 5 6 7 8 9 10

François Dubois (nutrition)



1 2 3 4 5 6 7 8 9 10

Emma Li (social)



1 2 3 4 5 6 7 8 9 10

Helen Jones (cognitive)



1 2 3 4 5 6 7 8 9 10

Council of Coaches

Carlos Silva (peer & support)



1 2 3 4 5 6 7 8 9 10

Rasmus Johansen (chronic pain)



1 2 3 4 5 6 7 8 9 10

Katarzyna Kowalska (diabetes)



1 2 3 4 5 6 7 8 9 10

9 Appendix 2: T1 Questionnaire

Potential health effect questionnaires

Self-Management Ability Scale – Short version (Schuurmans, et al., 2005)

1. The following questions are about all different kind of things in you daily living. E.g. things you do, your hobbies, your contacts with others, etc. The questions relate on your situation in general. Consider for example how it was in the last three months.

- a. How often do you take the initiative to keep yourself busy?

Never	Almost never	Sometimes	Regularly	Often	Very often
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- b. How often do you take initiative to get in touch with people who are dear to you?

Never	Almost never	Sometimes	Regularly	Often	Very often
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- c. How often do you make an effort to have friendly contacts with other people?

Never	Almost never	Sometimes	Regularly	Often	Very often
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- d. Do you ensure you have enough interests on a regular basis (such as a hobby) to keep you active?

Never	Almost never	Sometimes	Regularly	Often	Very often
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- e. Do you devote some time and attention to those who are dear to you in order to maintain good contact?

Never	Almost never	Sometimes	Regularly	Often	Very often
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- f. Do you keep busy with the things you are good at so that you stay good at them?

Never	Almost never	Sometimes	Regularly	Often	Very often
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- g. How many hobbies or activities do you have on a regular basis?

Zero	One	Two	Three or four	Five or six	More than six
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- h. Do you have different occasions on which you have friendly contact with others?

Zero	One	Two	Three or four	Five or six	More than six
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- i. Are there certain things that you are good at?

Zero	One	Two	Three or four	Five or six	More than six
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- j. The activities I enjoy, I do together with others.

Never	Almost never	Sometimes	Regularly	Often	Very often
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- k. I sometimes help the people I care about.

Never	Almost never	Sometimes	Regularly	Often	Very often
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l. Others benefit from the things I do for my pleasure.

Never	Almost never	Sometimes	Regularly	Often	Very often
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m. Are you able to find agreeable activities?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

n. Are you able to have friendly contacts with others?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

o. Are you able to let others know that you care about them?

Never	Almost never	Sometimes	Regularly	Often	Very often
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p. When things go against you, how often do you think that it could always be worse?

Never	Almost never	Sometimes	Regularly	Often	Very often
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q. When you have a bad day, how often do you think that things will be better tomorrow?

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r. When things are not going so well, how often do you succeed in thinking positively?

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Quality of life (EQ-5D-5L) (Van Reenen & Janssen, 2015)

2. The following statements are about your quality of life. Under each heading, please tick the one box that best describes your health today.

MOBILITY

- ☐ I have no problems in walking about
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- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

SELF-CARE

- ☐ I have no problems washing or dressing myself
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- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

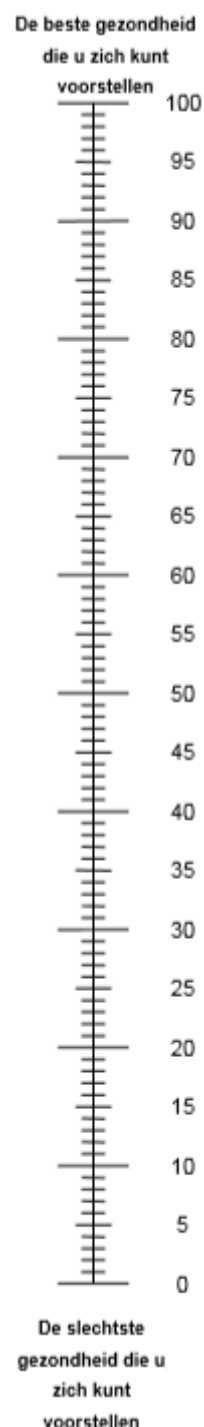
PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
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- ☐ I am extremely anxious or depressed

3. We would like to know how good or bad your health is **today**. The scale on the right side of the page is numbered from 0 to 100. 100 means the **best** health you can imagine. 0 means the **worst** health you can imagine. Mark an X on the scale to indicate how your health is **today**, and please write the number you marked on the scale in the box below.



Positive Health dimensions (Huber, et al., 2016; van Velsen, Broekhuis, Jansen-Kosterink, & op den Akker, 2019)

4. A number of questions about positive health will follow. For each question, circle the number that best fits your health. On a scale of 1 (low) to 10 (high).

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1	2	3	4	5	6	7	8	9	10
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b. What do you think of your mental fitness? Can you concentrate well? Are you feeling well? Do you feel that you are in control of your life?

1	2	3	4	5	6	7	8	9	10
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c. We want to know how much satisfaction you get out of your life. Do you have a great zest for life? Do you have ideals that you want to achieve? Are you grateful for the things that life has given you?

1	2	3	4	5	6	7	8	9	10
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d. Can you indicate what the quality of your life is? Do you enjoy life? Do you feel safe? Do you have the idea that your life is in balance? Do you have a comfortable life?

1	2	3	4	5	6	7	8	9	10
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e. What do you think of your social life? Do you have enough friends? Do you have others to do fun things with? Do you get help if you need it? Do you feel like you belong somewhere?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

f. Can you indicate how well you can take care of yourself? Can you handle money well? Can you work? Do you know your limits? Can you ask for help if necessary?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

User experience

Technology Acceptance Model (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Lavie & Tractinsky, 2004; van Velsen, van der Geest, van de Wijngaert, van den Berg, & Steehouder, 2015; Liu, 2003; Harrison McKnight, Choudhury, & Kacmar, 2002; Gefen, Karahanna, & Straub, 2003; Venkatesh & Davis, 2000) (Van der Heijden, 2004)

5. *The following statements are about your user experience with COUCH. Circle the answer that best fits your experience.*

a. The COUCH app was ...

Disgusting						Enjoyable
1	2	3	4	5	6	7

b. The COUCH app was ...

Dull						Exciting
1	2	3	4	5	6	7

c. The COUCH app was ...

Unpleasant						Pleasant
1	2	3	4	5	6	7

d. The COUCH app was ...

Boring						Interesting
1	2	3	4	5	6	7

e. The COUCH app looks clean.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

f. The COUCH app looks clear.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

g. The COUCH looks pleasant.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

h. The COUCH app looks well balanced.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

i. The COUCH app looks pretty.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

j. I have a lot control over what I can do on the COUCH app.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

k. On the COUCH app I can choose freely what I want to see.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

l. I can determine for myself what happens on the COUCH app.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

m. The security of the COUCH app gives me a comfortable feeling.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

n. The law and security technology protect me well against problems with the COUCH app.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

o. My personal data are well protected when I use the COUCH app.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

p. The COUCH app is safe.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

q. Using COUCH helps me understand my physical condition.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

r. Using COUCH improves my physical condition.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

s. Using COUCH improves my health.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

t. Using COUCH gives me insight in my health.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

u. It is clear and understandable how I can work with the COUCH app.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

v. I do not have to think hard when working with the COUCH app.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

w. I find the COUCH app easy to use.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

x. I find it easy to get the COUCH app to do what I want it to do.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

y. If the COUCH app would be available for me, I would definitely use it.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

z. I would recommend the COUCH app to others.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

aa. I hope that the COUCH app becomes available for me.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
-------------------	----------	-------------------	---------	----------------	-------	----------------

System Usability Scale (Brooke, 1996)

6. The following statements are about the user friendliness of the COUCH app. Indicate for each of the statements to what extent you agree with it.

a. I think that I would like to use the COUCH app frequently.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

b. I found the COUCH app unnecessarily complex.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

c. I thought the COUCH app was easy to use.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

d. I think that I would need the support of a technical person to be able to use the COUCH app.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

e. I found the various functions in the COUCH app were well integrated.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

f. I thought there was too much inconsistency in the COUCH app.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

g. I would imagine that most people would learn to use the COUCH app very quickly.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

h. I found the COUCH app very cumbersome to use.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

i. I felt very confident using the COUCH app.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

j. I needed to learn a lot of things before I could get going with this system.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
-------------------	----------	---------	-------	----------------

Willingness-to-pay

7. Are you willing to pay for using the COUCH app?

- ☐ Yes
- ☐ No

8. Imagine the COUCH app is available in the Play Store/App Store of your phone, how much euros are you willing to pay for it?

- ☐ 0 euros per month
- ☐ 5 euros per month
- ☐ 10 euros per month
- ☐ 20 euros per month

Applicability of the virtual coaches (Paap, Schrier, & Dijkstra, 2018)

9. *The following statements provide a description of how you can think or feel about the relationship with the primary virtual coaches. Indicate for each of the statements to what extent you agree with it.*

	Physical activity coach (Olivia)	Nutrition coach (François)
A result from communicating with the coach is that it is more clear what to do to improve my situation.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
What I am doing via the coach, gives me new ways of looking at my problem.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
I believe that the coach likes me.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
The coach and I work together in determining my goals.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
The coach and I respect each other.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
The coach and I are working towards mutually agreed upon goals.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never

I feel that the coach appreciates me.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
The coach and I agree on what is important for me to work on.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
I think the coach cares about me even when I do things that (s)he does not approve.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
I think the thing I do via/with the coach will help me achieve the changes I want.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
The physical activity/diet coach and I have established a good understanding of the kind of changes that would be good for me.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never
I believe the way the physical activity/diet coach and I are working with my problem is correct.	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never	<input type="checkbox"/> Always <input type="checkbox"/> Very often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Never

10. Please indicate for each of the coaches whether you talked to him/her, whether you, if possible, would like to talk for a longer period of time with him/her, and which score on a scale from 1 (low) to 10 (high) want to give him/her.

a. Did you talk to the physical activity coach (Olivia Simons)?



- ☐ Yes
- ☐ No

b. If possible, would you like to talk for a longer period of time with the physical activity coach (Olivia Simons)?

- ☐ Yes
- ☐ No

c. Please score the physical activity coach (Olivia Simons) on a scale from 1 (low) to 10 (high)

1 2 3 4 5 6 7 8 9 10

d. Did you talk to the nutrition coach (François Dubois)?



- ☐ Yes
- ☐ No

e. If possible, would you like to talk for a longer period of time with the nutrition coach (François Dubois)?

- ☐ Yes
- ☐ No

f. Please score the nutrition coach (François Dubois) on a scale from 1 (low) to 10 (high)

1 2 3 4 5 6 7 8 9 10

g. Did you talk to the social coach (Emma Li)?



- ☐ Yes
- ☐ No

h. If possible, would you like to talk for a longer period of time with the social coach (Emma Li)?

- ☐ Yes
- ☐ No

i. Please score the social coach (Emma Li) on a scale from 1 (low) to 10 (high)

1 2 3 4 5 6 7 8 9 10

j. Did you talk to the cognitive coach (Helen Jones)?



- ☐ Yes
- ☐ No

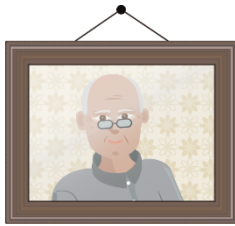
k. If possible, would you like to talk for a longer period of time with the cognitive coach (Helen Jones)?

- ☐ Yes
- ☐ No

l. Please score the cognitive coach (Helen Jones) on a scale from 1 (low) to 10 (high)

1 2 3 4 5 6 7 8 9 10

m. Did you talk to the peer & support coach (Carlos Silva)?



- ☐ Yes
- ☐ No

n. If possible, would you like to talk for a longer period of time with the peer & support coach (Carlos Silva)?

- ☐ Yes
- ☐ No

o. Please score the peer & support coach (Carlos Silva) on a scale from 1 (low) to 10 (high)

1 2 3 4 5 6 7 8 9 10

p. Did you talk to the chronic pain coach (Rasmus Johansen)?



- ☐ Yes
- ☐ No

q. If possible, would you like to talk for a longer period of time with the chronic pain coach (Rasmus Johansen)?

- ☐ Yes
- ☐ No

r. Please score the chronic pain coach (Rasmus Johansen) on a scale from 1 (low) to 10 (high)

1 2 3 4 5 6 7 8 9 10

- s. Did you talk to the diabetes coach (Katarzyna Kowalska)?



- ☐ Yes
☐ No

- t. If possible, would you like to talk for a longer period of time with the diabetes coach (Katarzyna Kowalska)?

- ☐ Yes
☐ No

- u. Please score the diabetes coach (Katarzyna Kowalska) on a scale from 1 (low) to 10 (high)

1 2 3 4 5 6 7 8 9 10

10 Appendix 3: T2 Questionnaire

1. Did you use COUCH in the past four weeks?

☐ Yes

☐ No

2. Can you indicate why you have (not) used COUCH in the past four weeks?

Potential health effect questionnaires

Self-Management Ability Scale – Short version (Schuurmans, et al., 2005)

3. The following questions are about all different kind of things in you daily living. E.g. things you do, your hobbies, your contacts with others, etc. The questions relate on your situation in general. Consider for example how it was in the last three months.

a. How often do you take the initiative to keep yourself busy?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

b. How often do you take initiative to get in touch with people who are dear to you?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

c. How often do you make an effort to have friendly contacts with other people?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

d. Do you ensure you have enough interests on a regular basis (such as a hobby) to keep you active?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

e. Do you devote some time and attention to those who are dear to you in order to maintain good contact?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

f. Do you keep busy with the things you are good at so that you stay good at them?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

g. How many hobbies or activities do you have on a regular basis?

Zero	One	Two	Three or four	Five or six	More than six
------	-----	-----	---------------	-------------	---------------

h. Do you have different occasions on which you have friendly contact with others?

Zero	One	Two	Three or four	Five or six	More than six
------	-----	-----	---------------	-------------	---------------

i. Are there certain things that you are good at?

Zero	One	Two	Three or four	Five or six	More than six
------	-----	-----	---------------	-------------	---------------

j. The activities I enjoy, I do together with others.

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

k. I sometimes help the people I care about.

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

l. Others benefit from the things I do for my pleasure.

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

m. Are you able to find agreeable activities?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

n. Are you able to have friendly contacts with others?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

o. Are you able to let others know that you care about them?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

p. When things go against you, how often do you think that it could always be worse?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

q. When you have a bad day, how often do you think that things will be better tomorrow?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

r. When things are not going so well, how often do you succeed in thinking positively?

Never	Almost never	Sometimes	Regularly	Often	Very often
-------	--------------	-----------	-----------	-------	------------

Quality of life (EQ-5D-5L) (Van Reenen & Janssen, 2015)

4. The following statements are about your quality of life. Under each heading, please tick the one box that best describes your health today.

MOBILITY

- ☐ I have no problems in walking about
- ☐ I have slight problems in walking about
- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

SELF-CARE

- ☐ I have no problems washing or dressing myself
- ☐ I have slight problems washing or dressing myself
- ☐ I have moderate problems washing or dressing myself
- ☐ I have severe problems washing or dressing myself
- ☐ I am unable to wash or dress myself

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- ☐ I have no problems doing my usual activities
- ☐ I have slight problems doing my usual activities
- ☐ I have moderate problems doing my usual activities
- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

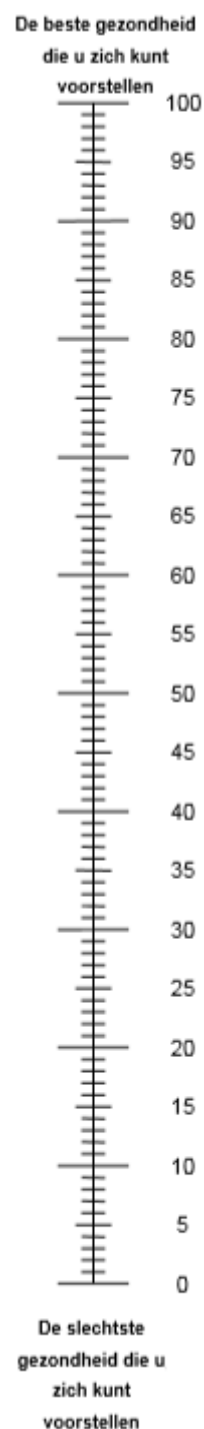
PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am severely anxious or depressed
- ☐ I am extremely anxious or depressed

5. We would like to know how good or bad your health is **today**. The scale on the right side of the page is numbered from 0 to 100. 100 means the **best** health you can imagine. 0 means the **worst** health you can imagine. Mark an X on the scale to indicate how your health is **today**, and please write the number you marked on the scale in the box below.



Positive Health dimensions (Huber, et al., 2016; van Velsen, Broekhuis, Jansen-Kosterink, & op den Akker, 2019)

6. A number of questions about positive health will follow. For each question, circle the number that best fits your health. On a scale of 1 (low) to 10 (high).

a. How healthy do you think your body is? Do you feel fit? Are you in pain somewhere? Can you sleep and eat well?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

b. What do you think of your mental fitness? Can you concentrate well? Are you feeling well? Do you feel that you are in control of your life?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

c. We want to know how much satisfaction you get out of your life. Do you have a great zest for life? Do you have ideals that you want to achieve? Are you grateful for the things that life has given you?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

d. Can you indicate what the quality of your life is? Do you enjoy life? Do you feel safe? Do you have the idea that your life is in balance? Do you have a comfortable life?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

e. What do you think of your social life? Do you have enough friends? Do you have others to do fun things with? Do you get help if you need it? Do you feel life you belong somewhere?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

f. Can you indicate how well you can take care of yourself? Can you handle money well? Can you work? Do you know your limits? Can you ask for help if necessary?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

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