MASTER THESIS

Hello?

Is there anybody out there?

Investigating the expectations of a virtual social coach:
a case of the Council of Coaches

Faculty of Behavioural, Management and Social Sciences (BMS)
Master Public Administration

Author
Ellis oude Kempers (S2098067)

First supervisor
Dr. P.J. Klok

Second supervisor
Prof. dr. A. Need

External organisation
Roessingh Research and Development

External supervisor
Dr. S. Jansen-Kosterink

Project
Council of Coaches

Roessingh
Research and Development

COUNCIL of COACHES

UNIVERSITY OF TWENTE.

General information

Author: E. oude Kempers
Student number: s2098067
E-mail: e.oudekempers@student.utwente.nl
Date: 28-09-2020

University of Twente

Faculty: Faculty of Behavioural, Management and Social Sciences (BMS)
Study direction: Public Administration
Master tracks: Health Care & Science and Technology

Supervisors

Supervision University of Twente:
1st Supervisor: Dr. P.J. Klok
2nd Supervisor: Prof. dr. A. Need
External supervision:
Roessingh Research and Development: Dr. S. Jansen-Kosterink

Acknowledgements

This Master Thesis is the final challenge I need to succeed before graduation. This challenge represents the ability to critically conduct academic study individually. Nonetheless, succeeding this final challenge could not have been accomplished without the help of my supervisors of Roessingh Research and Development and University of Twente, whom I would like to thank.

First and foremost, Stephanie Jansen-Kosterink for her guidance as my external supervisor. I am grateful for her time, enthusiasm, effort and constructive feedback during the whole thesis phase. You have not only been there to feed me with professional knowledge, you have also helped me when motivation was and missing and I was having a rough time getting it back. Thank you for that.

Second, I like to thank Pieter-Jan Klok and Ariana Need, who guided me as my first and second supervisor. You have given me constructive feedback to help me see the complete picture for my final version. Also, you have been very patient with me during rough times. I am grateful for that.

Further, I know it is not very professional, but I really would like to thank my parents. They have been there figuratively and literally to catch me when I needed them the most. Their trust and faith in me have helped me to go on and finish what I started, even when I was stubborn.

Abstract

Purpose: Many older adults are lonely, and this may lead to mental and physical consequences. At the time of writing this master thesis, COVID-19 has an extra impact on the experience of loneliness. The pandemic forces many older adults to stay alone at home and have less (physical) social contacts. Several studies show that Information and Communication Technologies (ICT) can prevent and reduce loneliness among the older adults. The present study focusses on reducing loneliness among older adults (people older than 55 years) with a virtual social coach.

Method: This study is a part of the *Council of Coaches* (COUCH). The Council of Coaches exists of multiple virtual coaches that form a personal council that supports the users in their health and well-being. Individual coaches have their own area of expertise, personality, and style of coaching and are displayed in a desktop version for the users. Within the final demonstration of COUCH, 25 participants got the opportunity to get in touch with the virtual social coach for four weeks. After this demonstration, interviews with the participants, questionnaires and the data of the desktop version provided an oversight in how these participants want to be coached virtually to feel motivated to maintain their social network.
This study within COUCH, together with the literature review, made it able to answer the following question: *How could a virtual coach motivate older adults to maintain a vital social network?* To answer the question, the study focused on two aspects: the way in which the technology should be shaped and the required coaching characteristics of the social coach.

Results: The findings of this study are relevant when designing a technology for older adults or to improve an existing technology for older adults. Several practical recommendations can be made when designing a virtual social coach for older adults. Looking at behavioural and coaching characteristics, this study shows that motivation is a very important key factor to make it able to coach participants. In this case, motivation is depending on the necessity that people feel to change their behaviour and the experience of the process. The participants seem to have a preference to be coached in an effective, efficient and goal-oriented way. This could be established by integrating high quantity of specific content with personal and goal-oriented sessions. In addition, usability is very important. It is recommended to design a technology that provides a threshold that is as low as possible and very easy to use. Speed of the system, triggers and short and clear pathways are key in this.

Conclusion: Motivation is a very important key factor to get people to use a technology. To accomplish the change in behaviour, people prefer to be coached in an effective, efficient and goal-oriented way. The system should be fast, trigger people and include concrete pathways.

Table of contents

1. Introduction

1.1 Background

Loneliness as a chronic disease

More than half of the older adults (people aged over 55 years) in the Netherlands, indicate that they feel lonely (Volksgezondheidenzorg, 2016). Loneliness is a slow process that can happen to anyone. Among other things, lonely older adults are often experiencing emptiness, mis close friends and socializing and especially someone to feel connected to (Ouderenfonds, 2019). Lonely older adults appear to be 14 percent more likely to die early than the average older adults because it increases blood pressure, stress level and the chance of a depression (Ouderenfonds, 2019). The internet makes it able to overcome time and spatial restrictions, so it provides the opportunity to help lonely people with improving their social networks (Bargh, McKenna, & Fitzsimons, 2002; Sum, Mathews, Pourghasem, & Hughes, 2008).

The role of technology

Prevention and cure of illnesses like diabetes, COPD, vascular disease and depression are getting on top of the policy and scientific agendas. Since it is believed that technologies have a large potential to improve convenience, quality, safety and cost-effectiveness of healthcare, the development of e-health, e-coaching and e-medicine has become part of the Digital Agenda for Europe and many investments are done in Research and Development (George, Whitehouse, & Duquenoy, 2012; Union, 2014; McLean, Protti, & Sheikh, 2011). The investments made it possible to investigate and design potential health technologies.

Emma

This study will focus on the prevention of loneliness among older adults, using a virtual social coach: Emma. Emma is a part of the Council of Coaches (COUCH), which is an Innovation Action funded under the EU Horizon 2020 Framework. Emma is one of the multiple virtual coaches that form a personal council that supports the users (older adults over 55 years) in their health and well-being. The individual coaches have their own area of expertise, personality and style of coaching. By having carefully chosen for expertise and characteristic of Emma and the coaches and interaction between the coaches, the project should develop an attractive desktop version for the users (Council of Coaches, 2020). In the first figure, the start of a conversation with Emma is shown.

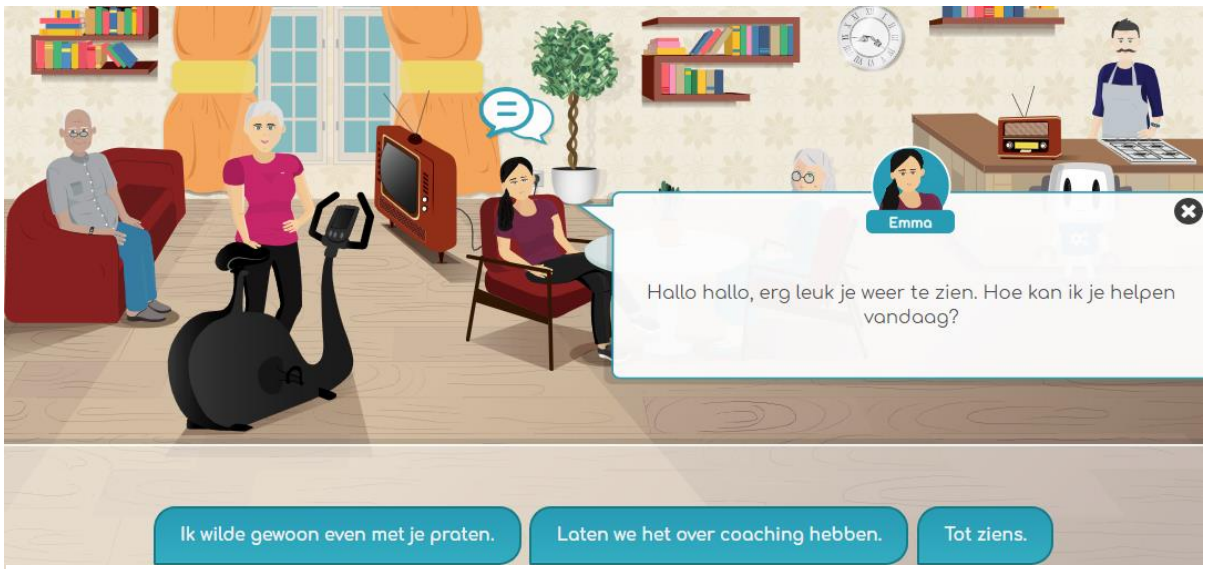


Figure 1: Emma in action

(Council-of-coaches.eu/beta)

1.2 Relevance

Scientific relevance

Despite earlier efforts to create technologies to coach people on their social behaviour, a gap still exists in evidence on what is needed and what has been developed. This gap exists because none have managed to find out what a virtual social coach actually should do according to actual users. This is the gap that this study aims to fill. The goal of this study, then, is to develop an insight in these views. By combining a literature review and the view of 25 participants of COUCH, this study distinguishes itself from other investigations.

Societal relevance

Next to the addition to literature of this study, the study will also provide a societal addition. Since the population of aging people is growing fast and there is a growing demand for health technologies. By adding knowledge about the prevention of loneliness, healthy aging within this large population can be stimulated.

1.3 Research question

In order to find out what a virtual social coach should be able to do according to participants, a research question and several sub questions are stated:

What should a virtual social coach be able to offer to maintain a vital social network for older adults?

Sub questions

1a. What coaching characteristics should a virtual social coach be able to offer according to literature?
1b. What technological characteristics should a virtual social coach be able to offer according to literature?
2a. What coaching characteristics should a virtual social coach be able to offer according to users of COUCH?
2b. What technological characteristics should a virtual social coach be able to offer according to users of COUCH?

1.4 Structure of the paper

In order to answer the sub questions, and so, the main question, a theoretical research and case study will be conducted.
In chapter 2, the theoretical outcomes are explained, starting with a background of loneliness. After that, behavioural models will be explained to give an answer to the first sub question. The second sub question will be answered by looking at theories that focus on technologies as a tool in healthcare prevention.
In the following chapter, the methodology for this study will be explained based on the theories that have been found in the second chapter. It will be explained how the study will be done and which theoretical constructs will be considered.
Then, results will be presented, structured by the sub questions. First, it will be investigated how people want to be coached by a virtual coach. Then, the demands of the technology will be investigated. These results will be analysed based on the results of the case study.
Finally, the results will be interpreted and discussed and there will be a critical reflection on these results and the way in which the study has been done, ending with practical implications and recommendations for further research.

2. Theoretical Framework

Within this chapter, literature will be used to give an answer to the first two sub questions:
1a. What coaching characteristics should a virtual social coach be able to offer according to literature?
1b. What technological characteristics should a virtual social coach be able to offer according to literature?

In order to find out what coaching and technological characteristics are needed for a virtual social coach; it is important to understand underlying constructs of loneliness. Therefore, there will first be a conceptual study about the constructs of loneliness. When this is explained in the underlying paragraph, answer will be given to the first two sub questions.

2.1 Search strategy

The literature search was conducted in Google Scholar. The current search included all studies up to April 2020. There was a screening of titles, abstracts and full-text articles. Within question 1a and 1b, two concepts can be identified: Characteristics of technologies and technological coaching characteristics, related to a healthy living. In addition, the constructs of loneliness must be clear too, to provide a clear background. In order to find literature connected to both subjects, it is important to apply a search strategy.

For the first chapter, about loneliness, terms are used related to the subject. When looking at theories about coaching technologies, mainly technological terms are searched for. Further, terms about technological coaching characteristics are searched for, considered that these must provide more insight in behavioural changes, due to the use of technologies. In the underlying table, it the search strategy has been shown schematically.

Table 1: Literature review scheme

Literature review.
Search in Google Scholar; Dutch and English language; investigations concerning older adults.

	Loneliness	1a. Coaching characteristics	1b. Technological characteristics
Search term	Loneliness, Social isolation. Emotional loneliness, Social loneliness.	Social coaching, Motivational coaching, Behavioural change, social behaviour.	Virtual coaching, Coaching technologies, Telemedicine Teletherapy, E-health, telehealth.

This literature review is open and investigative. This means that other terms can be acknowledged too as interesting. So, the mentioned terms provide a basis for a search strategy, but other terms related to the search terms could help in providing a framework. In addition, when diving into the results of the search terms, articles may refer to other articles that are interesting too. These should rather get attention too than be skipped.

2.2 Loneliness

Loneliness is defined as a negative and subjective experience and impacts health and wellbeing. Roots of loneliness are found in absence quantity and quality of social networks. The concept of loneliness has been defined as a major indicator for social well-being by many scholars (Dykstra, de Jong, Gierveld, 1999). Researchers divide two dimensions of loneliness: social loneliness and emotional loneliness (Weiss 1973). Social loneliness is associated with one of the stress factors that was mentioned before.

This includes the disrupted linkages to the person's supportive social network. Social isolation could mark marks and lead to the loss of a supportive network and may expose the older person to feelings of vulnerability, marginality, tension and boredom (Weiss 1989). Emotional loneliness is also associated with disrupted linkages in the supportive social network. However, this dimension is mainly influenced by the emotional experience of the person. The loss of a spouse, a confidant or children influences social loneliness because the link in the social network vanishes and it influences the emotional loneliness because this also involves feelings of emptiness.

2.2.1 Effects of loneliness

Psychological consequences

Loneliness is related to a decline in physiological wellbeing of older adults. Research demonstrates that it is, among other, associated with the development of mental illnesses and risk of depression (Losada et al., 2012; Coyle & Dugan, 2012; 2011; Van Beljouw et al., 2014; Prieto-Flores, et al.). Both emotional and social loneliness have been positively associated with levels of depression (Alpass & Neville, 2003; Drageset et al., 2011).
In addition, loneliness has been related other areas concerning mental functioning. For example, to dementia and decreased cognition and visual memory (Holwerda et al., 2012; Luanaigh and Lawlor, 2008). Social isolation and loneliness are also associated with increases of health risk behaviours. Examples here are inactivity and smoking Theeke, 2010; Shankar, McMunn, Banks, & Steptoe, 2011).

Physical consequences

Loneliness is not only related to direct health risk behaviours; it is also associated with chronic conditions. An example here is hypertension, that can be resulting from the mentioned health risk behaviours (Cacioppo et al., 2002; Cacioppo, Hawkley, & Thisted, 2010). It is also suggested that social isolation directly increases C- Reactive proteins, fibrinogen levels and blood pressure. These increases can lead eventually to an increased risk of the development of cardiovascular diseases and related chronic illnesses (Reed, Crespo, Harvey & Anderson, 2011).

Furthermore, loneliness is related to altered immunity in older adults and a triggering factor for stress responses (Pressman et al., 2005; Luanaigh & Lawlor, 2008). It increases hypothalamic pituitary adrenocortical activity, and which reduces the anti-inflammatory response whilst increasing the pro-inflammatory response (Adam, Hawkley, Kudielka, & Cacioppo, 2006; Cole, Hawkley, Arivalo, & Cacioppo, 2011). A result is that older adults who are experiencing loneliness have a bigger change to get an infection and will have less ability to recover. In addition, Luo et al. (2012) found a significant association between loneliness and an increased risk of mortality; on the basis of their results, those with higher level of loneliness are almost twice as likely to die over a six-year period compared to those with lowest levels of loneliness.

2.2.2 Socio-demographic and health factors associated with loneliness

Age

& Victor (2011) stated that loneliness increases with age because the relationship between age and loneliness is very clear. In 25 European nations, they explored the prevalence of loneliness across different age groups and focussed on older adults. Their results suggest that the prevalence of loneliness does increase with age. Subsequently, Volksgezondheidenzorg (2016), found that 51 percent of the people with the age of 55 and over in the Netherlands feel lonely. This percentage rises to 53 percent from the age of 75 and from the age of 85, it increases to almost 63 percent. Thus, the age of the older adults has an influence on their state of loneliness.

Gender

Looking at recent literature, a relationship between gender and loneliness is not clearly established. Numerous studies associate increased loneliness in women (Losada et al., 2012; Golden et al., 2009). For example, Locher et al. (2005) confirm the association of increased loneliness in women and adds that this is in relation to self-labelling, because the older adult women admit more frequently than the older adult men that they are being lonely. One of the possible explanations of this difference in self-labelled loneliness, is assumed by Locher et al. (2005), that social influence processes play a crucial role. They support the view that women are more likely and capable to acknowledge their loneliness than men because the negative consequences of admitting loneliness are greater for men.

Marital status

Various studies prove that unmarried older adults are lonelier than married older adults (Volksgezondheidenzorg, 2016, Rokach et al., 2017). According to Volksgezondheidenzorg (2016), 50 percent of the unmarried older adults are lonely and only 37 percent of the married older adults are lonely. Rokach et al. (2017) confirm that married older adults are less lonely than unmarried older adults, even despite of the quality of the relationship. So, married older adults experience less loneliness. However, being widowed results in the largest amount of experience in loneliness (Golden et al., 2009; Dahlberg & McKee, 2014; Theeke, 2010; Kobayashi et al., 2009; Honing-de Vlaming et al., 2014; Prieto-Flores et al., 2011).

Social networks

An important part of healthy ageing are meaningful social contacts (Dahlberg & McKee, 2014; Theeke, 2010; Honing-de Vlaming et al., 2014). Not only the amount and quality of social contacts are important for healthy aging, activities with those contacts are important as well. Greater overall involvement with formal ties, like religious organizations and informal ties, like friends and relatives is associated with more positive health behaviours (Berkman and Breslow, 1983). For example, it is found that being retired is related to the likelihood of loneliness (Theeke, 2010). Older adults who retire, take distance of a large part of their social network.

Health and wellbeing

It has already been mentioned that loneliness affects health and wellbeing, but this also works the other way around. Chronic health conditions, disabilities and poor health are strong predictors of loneliness (Arslantaş, Adana, Abacigil Ergin, Kayar, & Acar, 2015; Losada et al., 2012; Theeke, 2010). People without any disability tend to be less lonely than older adults suffer from visual or auditory problems who are or are physically disabled (Dykstra et al., 1999; Mullins et al., 1996 & Noguchi et al. 1998). In addition, older people with such problems that are limiting health and wellbeing, like cognitive impairment may not be able to form new meaningful relationships once they move into long term settings.Another variable that strengthens the relationship between aging and loneliness includes stressful situations. Older adults experience more often stressful situations, because they experience that more relatives and friends are suffering from a decline in health and even must face death. Such losses may impede maintenance or acquisition of desired relationships, and eventually results in higher incidences of loneliness (Walton et al., 1991).

Conclusion

To summarize, loneliness is defined as a negative and subjective experience and is divided into two dimensions. The difference between social loneliness and emotional loneliness is that the first dimension, objectively, concerns the amount of social contacts and the second dimension, subjectively, concerns the experience of loneliness of the individual.

In the causal model, in figure 2, it is shown that social networks, gender and age influence loneliness. Further, loneliness affects both physical and psychological wellbeing. However, this also works the other way around because health and stressful situations have an impact on the (experience of) loneliness too. Further, there are many other factors that have an influence on the (experience of) loneliness, of which the amount of social contacts, social activities are important ones.

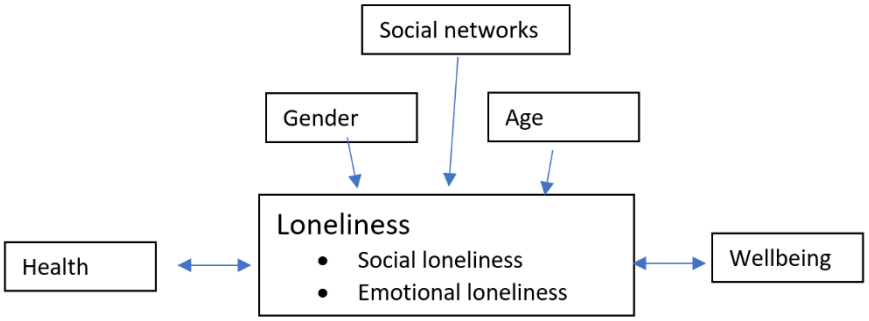


Figure 2: Causal model of loneliness

2.3 Theories about behavioural change

In this part of chapter two, theories about behavioural change will be explained, in order to find an answer to the first sub question:
1a. What coaching characteristics should a virtual social coach be able to offer according to literature?

2.3.1 Behavioural Learning Theory

Until the 1960s, a dominant way of understanding behaviour was based on the Behavioural Learning Theory (BLT). Of many versions, operant conditioning was most common (Skinner, 1938). According to this theory, behaviours are activated by stimuli, and increases the frequency of occurrence of the behaviour after a stimulus is reinforced (Hull, 1943). A group of scholars believed that reinforcements worked because these reduced physiological drives, for example hunger or thirst (Thorndike, 1970). Within this framework, cognitions or thoughts are not needed to explain a behaviour. Therefore, it is a very simplified version of potentially complex issues. Learning models were first developed to explain animal behaviour and were later applied to human behaviour. Within BLT, the motivation to perform a behaviour is an aversive physiological drive, for example, the urge to eat in the case of hunger (Skinner, 1938; Hull, 1943; Thorndike, 1970).

2.3.2 Health Belief Model

The first conceptual model of behaviour developed with a concern for public health issues was the Health Belief Model (HBM) (Rosenstock et al., 1974). The primary HBM constructs ae based on the theory of Rogers (1983), who indicates that motivation to change behaviour arise from perceived threat. This is called the protection motivation perspective (Rogers, 1983). The perceived threat associated with unhealthy living can be viewed using Rogers' model of fear associated with a specific event and will make it able predict how these can facilitate change in an individual's behaviour to protect oneself from the perceived threat. For example, the HBM refers to cues to action, the environmental events that teach people in an (in)direct way what consequences are of unhealthy behaviour. Like learning that a parent had too high blood pressure, resulting in a heart attack, or stories in the media that trigger perceptions of susceptibility (Weinstein, 2000). In this regard, awareness of the consequences of unhealthy (social) behaviour, can lead to a change in motivation (Weinstein, 2000; Courneya, & Hellsten, 2001).

2.3.3 Motivation

Based on the BLT and HBM, actual behavioural change can only take place if people feel motivated to change the behaviour. Motivation is something you don't easily put on a scale, smell or simply see. Because of this complexity, Touré-Tillery and Ayelet Fishbach (2014) provided a guideline to help psychologists in measuring it.

There are two types of motivation that have been studied when dealing with the kind of satisfaction or reward a person receives changing behaviour; intrinsic and extrinsic. These two types of motivation are referred to by ToureTillery & Fishbach (2014) as process-focused and outcome-focused, respectfully. Process focused motivation, also known as intrinsic motivation, is about the internal benefits one experiences from doing a task; feeling good and boosting self-esteem is the process of completing the intended goal (Toure-Tillery & Fishbach, 2014). Intrinsic motivation is enjoying what you are doing and can range from passive to active. The goal for someone who is intrinsically motivated is enjoying the act or experience, not the rewards that follow (Locke & Schattke, 2018). Intrinsic, or process focussed motivation is doing things for fun, or because you just feel like doing it, with no regards of getting better at it or achieving a certain goal. In the case of healthy living, process focused motivation an example could be that the person likes to focus on more physical activity and healthier food. Extrinsic, or outcome focused motivation could be that someone's goal is to lose a certain amount of weight. The differences between intrinsic and extrinsic motivation are shown in figure 3. The examples are related to the motivation to do social activities.

Figure 3: Intrinsic and extrinsic motivation, examples

Because there are differences between being intrinsic and extrinsic motivated, Touré-Tillery and Ayelet Fishbach (2014) investigated which specific measures could be linked to the two dimensions of motivation. These measures are called cognitive, affective, and behavioural measures of motivation and are each divided in more constructs. Cognitive and affective measures are psychologically and depended on *accessibility and inhibition of goal related constructs; evaluation* and *devaluation* (conscious and non-conscious); *experience and perceptual biases*. The behavioural measures can be measured by looking at behaviour and consist of *speed, performance* and *choice*. In table 2 the constructs and how they could be measured are shown systematically.

Table 2: Motivational measures (Touré-Tillery & Fishbach, 2014)

	Outcome-focused motivation	Process-focused motivation
Cognitive and affective measures		
Accessibility and inhibition of goal-related constructs	Higher accessibility and better memory for goal-congruent constructs (means, objects, persons) Lower accessibility and worse memory of goal-incongruent and goal-unrelated constructs (temptations)	(Not typically used to measure process-focused dimensions of motivation)
Evaluation and devaluation (conscious and non-conscious)	Positive evaluation of goal-congruent constructs (means, objects, persons) Negative evaluation of goal-incongruent and goal-unrelated constructs (temptations, distractions)	Positive evaluation of the process
Experience	(Not typically not used to measure outcome-focused motivation)	Positive experience from process
Perceptual biases	Visual/perceptual biases congruent with active goals	(Not typically used to measure process-focused dimensions of motivation)
Behavioral measures		
Speed	Higher speed on goal-related tasks (short duration) Higher speed when moving from one goal-related task to the next (short duration)	Lower speed on goal-related tasks (long duration and greater persistence)
Performance	Higher accuracy Higher amount of work done Higher level of achievement	Higher accuracy Higher amount of work done Higher level of achievement
Choice	Increased selection of goal-congruent objects and actions	Increased selection of objects and actions congruent with the process

It is important to be aware which type of motivation, process focused, or outcome focused, is being measured. It depends on what type, which constructs are involved. For example, *experience* is not a typically used measure in outcome focused motivation, but it is in process focused motivation; In addition, *speed* is typical to measure in both process focused and outcome focused motivation, but is higher in goal related tasks in outcome focused motivation and lower in goal related tasks in process focused motivation; Further, in measuring performance, this is the same in both process focused and outcome focused motivation. The types of motivation, with actual underlying constructs are displayed in table 2.

2.2.4 Behavioural theories and technologies

Theories such as the Behavioural Learning Theory (BLT), the Health Belief Model (Rosenstock et al., 1974), operant conditioning (Skinner, 1938) and the theory of perceived threat (Rogers, 1983) are widely implemented, classical, psychological theories that focus on cognitive variables as part of behaviour change. Attitudes, beliefs, and expectations of future events and outcomes are major determinants of health-related behaviour.

Over time, many scholars have been combining these behavioural change models and have been trying to make them applicable to e-coaching systems (Asbjørnsen, et al., 2019; Kankanhalli, Shin & Oh, 2019; Lyons, Lewis, Mayrsohn, & Rowland, 2014; Lentferink et al., 2017). To conduct a framework, Lentferink and colleagues (2017), conducted a literature review of health technologies with the aim to identify key components in the application of different theories that contribute to the coaches' effectiveness on health outcomes. These key characteristics are the following:

- setting short-term goals to eventually reach long-term goals
- personalization of goals;
- praise messages;
- reminders and suggestion;
- provide feedback based on how well the user changed behaviour;
- and self-tracking to observe progress toward defined goal (Lentferink et al., 2017).

The first two characteristics from the framework of Lentferink and colleagues (2017) were added because several studies showed that participants showed to achieve more long-term goals when these were sorted in personalized short-term goals. For example, people are going to perform more physical activity if the activity is matching to the person and scheduled daily. So, someone who likes to be in nature, could set the goal to walk outside for one hour, every day.

The following points in the framework of Lentferink and colleagues (2017) are praise messages; reminders and suggestion; provided feedback. These are all linked to the communication with the system. They all indicate that the users of the technology must be reminded of their goals constantly by getting personal hints and tips. Preferably, these tips should be personalized, based on the behaviour of the users. This connect to the last point of the framework of Lentferink and colleagues (2017), which indicates that the users should be able to get an insight in their own progress which will make them more motivated to achieve the long-term goals.

Conclusion

In 2.2, the behavioural learning theory and the health belief model have been explained. Both assume that behavioural change can only take place if someone is motivated to change behaviour. Based on this assumption it has been explained that people can be motivated because of perceived threat. To understand motivation, the motivational theory of Touré-Tillery and Ayelet Fishbach (2014) has been explained. Further, it has been shown that researchers can determine what components in health technologies are important to motivate people to change behaviour.
This oversight of theories gives an opportunity to give an answer to the first sub question:
1a. What coaching characteristics should a virtual social coach be able to offer according to literature?
According to the theories on behavioural change: BLT and HBM, motivation to perform a behaviour is a physiological drive that can be driven by a perceived threat. Both psychological structures are based on the need to be motivated to be able to change behaviour. According to Touré-Tillery and Ayelet Fishbach (2014), there are two types of motivation that can be measured: outcome focused, and process focused. So, it has been shown that a virtual coach needs to be able to motivate the users to be able to make them change behaviour. Based on framework of Lentferink and colleagues (2017), the user will feel motivated by setting short term, personalized goals; getting praise messages, reminders, suggestions and feedback and by being able to track and observe progress.

2.3 Theories about technology usage

Many different theories about technology usage stem from behavioural models, which is why there can be a grey area in what models are actual behavioural and what are focused on theory usage. However, this chapter will try to give an answer to the sub question:
1b. What technological characteristics should a virtual social coach be able to offer according to literature?

2.3.1 Fogg's Behaviour Model.

In 2009, Fogg developed a model to understand human behaviour related to technologies: Fogg's Behaviour Model (FBM). The simplistic model makes it able to describe and understand the success and failure of existing persuasive technologies easily. It also helps in designing and evaluating new persuasive technologies. The FBM describes human as the product of three key factors; triggers, ability and motivation.

Ability -A change of behaviour will never occur if the user does not hold enough ability to do so. E.g. say that a user wants to send an e-mail. Even if the motivation to act is high, the target behaviour will not be reached unless the user also holds the ability to do it.

Triggers **-**One needs to be reminded to act, otherwise is it likely that the user will not reach the target behaviour. Common triggers in our society are pop-ups, spam, ads, but these triggers do not always have a good timing. To have timed triggers means that the user is triggered once they hold enough motivation and ability. Otherwise it is likely that the trigger will only be annoying and decrease the likelihood of a specific behaviour.

Motivation -For a perceive technology to work successfully and change behaviour one needs to have enough motivation for the change to occur. If the user does not have/get enough motivation, the technology will not be successful since the target behaviour will never be reached. This indicates that one of the main goals when designing to persuade is to make the user gain enough motivation. Users must be enough motivated, they need to have the ability to perform the behaviour and they need to get triggers to perform the behaviour (Fogg, 2009).

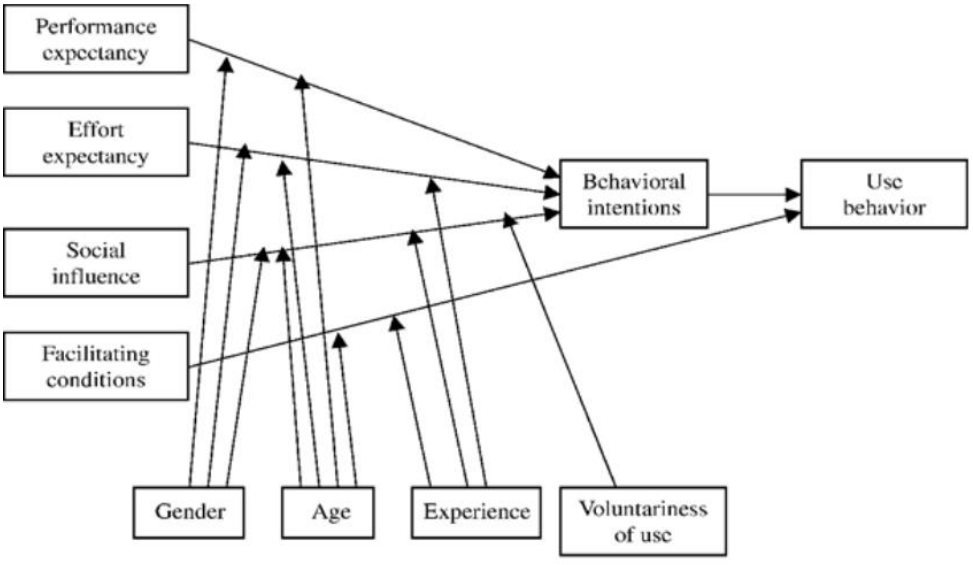
2.3.2 UTAUT

The Technology Acceptance Model (TAM) is, among many different models that have been proposed in understanding factors that are impacting acceptance of information technologies, one of the most influential and robust in explaining behaviour around technology adoption. TAM has the purpose to provide a basis for discovering the impact of external variables on internal beliefs, attitudes, and intentions in relation to technologies.

TAM assumes that usefulness and ease of use are always primary determinants of technology adoption. In this respect, these two determinants serve as the basis for attitudes toward using a system, which in turn determines the intention to use, and then generates the actual usage behaviour. Flowing from this understanding, *perceived usefulness* is defined as the extent to which a person believes that using a system would enhance job performance. *Perceived ease* of use refers to the extent to which a person believes that using a system would be free of mental efforts (Davis, 1989). The original TAM model was created to examine technology adoption in business organizations. The suitability to be able to indicate individual acceptance, needed to be explored further.

As follow up, Venkatesh, Morris, Davis and Davis (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT). To incorporate the constructs of perceived usefulness and ease of use, performance expectancy and effort expectancy were used in the new UTAUT model. Figure 4 shows that UTAUT consists of these four determinants to predict behavioural intention and usage (Venkatesh et al., 2003). In addition, four moderators were added: gender, age, experience and voluntariness of use (Venkatesh et al., 2003).

Figure 4: UTAUT (Venkatesh et al., 2003).



Venkatesh et al. (2003) defined Facilitating Conditions (FC) is as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system”. Social Influence (SI) is defined as “the degree to which an individual perceives the important others believe he or she should use the new system”. Effort Expectancy (EE) is defined as “the degree of ease associated with the use of the system”. Further, Performance Expectancy (PE) was defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance”. PE, EE and SI will influence the behavioural intention and therefore indirectly influence the use behaviour. Facilitating conditions will directly influence use behaviour. The moderating factors at the bottom should be considered too (Venkatesh et al., 2003).

2.3.3 The Working Alliance

The term working alliance refers to collaborative aspects of the relationship between therapist and client in therapy. Discussions concerning this relationship and related concepts date back to the birth of psychotherapy and Freud (1927) who already recognized the importance of this special bond and its impact on psychoanalytical and therapeutic processes and outcomes. While the focus was primarily on the unconscious and its reflection in the therapeutic relationship during these early years of psychotherapy, the concept evolved with the discipline. Great developments in research on the therapeutic working alliance can be traced to Rogers who dedicated investigations to the facilitative conditions offered by therapists (empathy, genuineness, and unconditional positive regard) (Rogers, Gendlin, Kiesler, & Truax, 1967). Many other scholars have been investigating these nonspecific effects relate that to the treatment relationship, patient satisfaction and therapeutic environment.

The therapeutic alliance, which stands for the relationship between patient and professional, is part of the treatment relationship. The therapeutic alliance is a negotiated and collaborative characteristic of the treatment relationship that enables patients to accept and follow treatment faithfully. This alliance between professional and patient is composed of three aspects; (1) the quality of the bond; (2) agreement on the goals of the treatment; (3) agreement about the tasks to achieve the proposed goals.[2] Within rehabilitation, a positive therapeutic alliance makes patients more satisfied with their treatment. This alliance is also associated with the improvement of pain and disability in patients with chronic diseases. Within psychotherapy, the therapeutic alliance is a central concept in the therapeutic process, and it is seen as an important determinant of treatment outcomes.

The Working Alliance Inventory (WAI) is the most used questionnaire for measuring therapeutic alliance. The WAI has a total of 36 items, the outcomes of this questionnaire are scored on a balanced five-point Likert scale. The WAI was initially developed to capture the perception of the client and the therapist based on three dimensions of Bordin's (1979) therapeutic alliance. Initially it was developed for and studied in outpatient adult settings, but also used in other settings (Florsheim, Shotorbani, Guest-Warnick, Barratt, & Hwang, 2000; Hintikka, Laukkanen, Marttunen, & Lehtonen, 2006), and in other countries (Corbella & Botella, 2004; Guédeney, Fermanian, Curt, & Bifulco, 2005; Soygüt & Uluc, 2009; Vertommen & Vervaeke, 1996).

The short form of the WAI (WAI-S) consists of 12 items. It was developed by selecting the four most important items of Goal, Task and Bond: the three subscales (Tracey & Kokotovic, 1989). The WAI is composed of twelve questions, based on a 5-point scale questions that ranges from seldom to always. Questions of the subscale Goal indicate how well it is perceived that the technology assists with goal setting, the questions of the subscale Task indicate the degree to which it is perceived that the technology supported with staying on task to reach the set goals, and questions of the subscale Bond indicate how much each participant felt a connection with the technology.

Conclusion

Different theories concerning technologies are based on fundamental and classical behavioural models. These theories have been discussed and will make it able to give an answer to the following sub question:

1b. What technological characteristics should a virtual social coach be able to offer according to literature?

The model of Fogg, UTAUT and WAI agree on the fact that it is not only depending on the technology itself if the user will actual be using the technology. For example, Fogg explained that the user needs to be able and motivated to use the technology. Looking at UTAUT, gender, age, experience and voluntariness to use can play a role in this. However, developers of a technology can also take this into account and develop something that is easy to use. Other aspects that could be considered to motivate

the someone to use a technology are triggers, according to Fogg. These triggers can be associated with SI, "the degree to which an individual perceives the important others believe he or she should use the new system" and the behavioural intention of the users.

2.4 Summary

To summarize, this chapter started with explaining the definition and constructs of loneliness. Loneliness is defined as a negative and subjective experience and is divided into two dimensions: social loneliness and emotional loneliness. Loneliness affects both physical and psychological wellbeing. However, this also works the other way around because health and stressful situations have an impact on (experience of) loneliness too. Further, there are many other factors that have an influence on the (experience of) loneliness, of which the amount of social contacts, social activities are important ones.

In 2.2, an answer has been given to the following sub question:
1a. What coaching characteristics should a virtual social coach be able to offer according to literature?
In order to give an answer, two important, fundamental behavioural change models have been explained. Both assume that behavioural change can only take place if someone is motivated to change behaviour. Based on this assumption, it has been explained that people can be motivated because of perceived threat. To understand motivation, the motivational theory of Touré-Tillery and Ayelet Fishbach (2014) has been explained. Further, it has been shown that researchers can determine what components in health technologies are important to motivate people to change behaviour on the basis on these fundamental theories.
In 2.3, an answer has been given to the following sub question:
1b. What technological characteristics should a virtual social coach be able to offer according to literature?
By explaining the model of Fogg, UTAUT and WAI, it is shown that it is not only depending on the technology itself if the user will actual be using the technology. However, there are individual factors that can play a role, developers of a technology can also take these into account and develop something that is easy to use and triggers the user.

Variables

The theoretical framework provides an insight in variables that can be used to measure different aspects in this research. Measuring these variables will provide an insight in the last two sub-questions:
2a. What coaching characteristics should a virtual social coach be able to offer according to users of COUCH?
2b. What technological characteristics should a virtual social coach be able to offer according to users of COUCH?

Motivation

In order to answer question 2a, it is important to measure motivation. For this, the theory of Touré-Tillery and Fishbach will be used. The variables that are focused on process focused motivation are important:

Evaluation	–	The degree to which a goal relevant object is evaluated positively (liking goal relevant objects).	
Experience	–	The presence of positive feelings towards the process (absence of negative feelings towards the process)	
Performance	–	Higher accuracy	(Precision in the tasks)
		Higher amount of work done	(How much has been done?)
		Higher level of achievement	(How well is the task performed?)
Choice	–	Increased selection of objects and actions congruent with the process.	

UTAUT

In order to answer question 2b, it is important to look at technological perspectives and its effects on the behaviour of users. For this, the theory of UTAUT will be used. These variables are:

Performance expectancy	–	Social behaviour is changed
		Attitude towards social behaviour is changed
		Thought Emma was useful
Effort expectancy	–	Usability
Social influence	–	Would recommend Emma
Behavioural intentions	–	Interested in further personal use of social coach
Use behaviour	–	Amount of use

WAI

Further, to answer 2b, WAI will be used. This theory includes the following variables:

Goal – Agreement on therapy tasks
Task – Processes and behaviours
Bond – Interpersonal attachment between patient and therapist (in this case: technology)

3. Methods

3.1 Background Council of Coaches

This study is a part of the project *Council of Coaches*. The Council of Coaches (COUCH) is an Innovation Action funded under the EU Horizon 2020 Framework. The project is running from September 2017 to August 2020 (3 years). Council of Coaches exists of multiple virtual coaches that form a personal council that supports the users in their health and well-being. Individual coaches have their own area of expertise, personality, and style of coaching. By carefully choosing for expertise and characteristics of the coaches and interaction between the coaches, the project develops an attractive desktop version for the users.

The work plan for Council of Coaches defines 7 key Milestones, representing major intermediary achievements of the project. Between milestone 6 and 7, a final demonstration of the project will be executed. This means that within milestone 6, people are recruited to take a place in the final demonstration and make use of the Council of Coaches for four weeks. In milestone 7, the results of the demonstration are analyzed and documented. The final demonstration will take place for four weeks. This means that the recruited participants will make use of the desktop version for four weeks.

The main goal of the coaches is to stimulate the user to live a healthy life. Emma is one of the coaches that tries to approach this from the view that social habits are important to maintain a healthy life. A goal of Emma is to notice the importance of the social network and make the user aware of it. Emma will try to make the user think about and work on his social network. The content of Emma is barely based on previous research. One of the reasons is that there is a lack of research and literature on virtual coaching related to the maintenance of a vital social network.

3.2 Participants

The project of Council of Coaches focusses on older adults, people with Diabetes Mellitus Type 2 and Chronic Pain patients. Within the project, two final demonstrations will take place: focused on older adults; older adults with Diabetes Mellitus Type 2 and Pain patients (55+). This study will only be a part of the first phase of the final demonstration. This means that the sample of participants in this study will consist of older adults and a view older adult with Diabetes Mellitus Type 2 and Pain patients (55+). They have been recruited by an advertisement in the local newspaper (see figure 5). After the people had applied to join the final demonstration, it was checked if they are able to speak and read Dutch, have WI-FI at their homes and were able to read the screen of a smartphone, tablet or computer screen easily. In table 3, the inclusion and exclusion criteria are shown schematically.

Roessingh zoekt Twentse volwassenen die door middel van virtuele coaching aan hun gezondheid willen werken

OLDENZAAL **Het is voor iedereen belangrijk om voldoende te blijven bewegen en goed op onze voeding te letten. Roessingh Research and Development (uit Enschede) heeft in samenwerking met Europese partners een technologie ontwikkeld om middels virtuele coaching volwassenen te ondersteunen bij het hebben van een gezonde levensstijl.**

Deze virtuele coaches richten zich voornamelijk op beweging en voeding. De technologie richt zich op 55-plussers. Om te kijken hoe deze technologie wordt ervaren door deze doelgroep, start er in februari 2020 (eerste fase) en mei 2020 (tweede fase) een onderzoek. Hiervoor zoekt Roessingh Research and Development Twentse volwassenen die mee willen doen aan dit onderzoek en de technologie willen gebruiken. Door mee te doen aan het onderzoek, krijgt u toegang tot deze technologie en een bewegingssensor (Fitbit) gedurende 5-9 weken. Valt u onder deze doelgroep? Dan komt u in aanmerking voor dit onderzoek! Voor meer informatie kunt u contact opnemen met Marian Hurmuz via: m.hurmuz@rrd.nl / 088 087 5771.

Figure 5: Advertisement in local news paper

Table 3: Inclusion and Exclusion criteria

Inclusion criteria:	Exclusion criteria:
• Being over the age of 54; • Able to speak and read Dutch; • Having WI-FI at home; • Able to read the screen of a smartphone, tablet or computer screen easily.	• Not able to speak and read Dutch; • No WI-FI at home; • Not able to read the screen of a smartphone, tablet or computer screen easily.

3.3 Intervention

As mentioned in the chapter: *Background,* this study is a part of the Council of Coaches (COUCH). The evaluation of the social coach, Emma, is executed at the same time as a study that focusses on the user experience with and the use and potential health effects of a fully working Council of Coaches system (Hurmuz, Jansen-Kosterink, op den Akker, & Hermes, 2020). Hurmuz, Jansen-Kosterink, op den Akker and Hermens (2020), provided, during this study a protocol on how this could be measured, and interviews and questionnaires are based on this protocol. Some tools, like the WAI, were chosen to be used by Hurmuz, Jansen-Kosterink, op den Akker and Hermens (2020), and taken over in this current research. So, the investigation of Hurmuz, Jansen-Kosterink, op den Akker and Hermens (2020), and this investigation took place at the same time, the interviews and questionnaires with the participants were conducted at one moment. The questionnaires and interviews can be found in the appendix.

This research focusses especially on the expectations of a virtual social coach, in this case: Emma. Before the final demonstration took place, four coaching sessions were written in the form of a dialogue between the user and Emma. Each coaching session was going to be available for the users within each week of the final demonstration and would have its own goal. The introduction and first session of Emma were used as introduction for Emma and the importance of a vital social network. The second session was focused on the opportunities to obtain and maintain a vital social network. The third and fourth session were focused on setting goals to obtain and maintain a social network and evaluating these. Unfortunately, only the introduction and first session of Emma were launched before the start of the final demonstration. This meant that the effects of Emma could not be measured, and the focus of this research had to switch to measuring the expectations of a virtual social coach.

However only the introduction and the first session were available to measure the expectations of users of Emma, the context within the research together with Hurmuz, Jansen-Kosterink, op den Akker and Hermens (2020), made it able to see what users liked and disliked of other coaches. If these expectations, related to, for example usability, are applicable for a virtual social coach, these results can be useful for this investigation.

3.4 Data Collection

3.4.1 Interviews

Participants used COUCH for four weeks and were interviewed in the last week of the pilot study after finishing the intervention. Because the participants were interviewed within the context of the research of Hurmuz, Jansen-Kosterink, op den Akker and Hermens (2020), participants were interviewed three different researchers the interviews were done without further special circumstances. They were informed about the aim and procedure of the interview. Participation was anonymous and voluntary with the right to withdraw at any desired time without consequences. All participants signed informed consent and gave consent for recording. The interviews were both conducted at the building of Roessingh Research and Development and via phone calls, due to the COVID-19 virus. The interviews lasted for approximately 30 minutes. All interviews were recorded and transcribed before further analysis. The interview questions can be found in the second appendix.

3.4.2 Questionnaires

Two types of questionnaires were conducted: one before actual using the COUCH, and one after four weeks of using COUCH. Also, for the questionnaires, participation was anonymous and voluntary with the right to withdraw at any desired time without consequences. The participants got the opportunity to fill the questionnaire in at home, in their own time. The survey questions can be found in the appendix.

3.5 Data analysis

The interviews and questionnaires are based on the theory that has been described in chapter 2. The aim of the overall project, COUCH, is to find out what effect the Council of Coaches has on the participants. However, the demonstration only takes place for four weeks, and Emma consists of a scarcity of coaching sessions. To maintain validity of the results, the focus of this study will be on the view of users of COUCH on the use of a virtual social coach, Emma, instead on the actual effect of Emma.

3.5.1 Actual use

In this study, it must be considered that the participants have the free opportunity to use the Emma, or only a part of it. This means in practice that some participants will not even use Emma at all, only make use of the introduction or make use of both the introduction and the coaching session. It may be important to know the extent to which the participants made use of Emma, because it could have an influence on the opinion of the participants about Emma. To find out the extent to which the participants actual made use of Emma, the data of the desktop version will be used and analysed. There will three different user-groups: Non-users, intro-users and full-users.

3.5.2 Interviews

In this study, it is important to understand how far the participants feel motivated to change their social behaviour. Also, it is going to be investigated how people would like to be motivated with a technology. To find out about these aspects, the theory of Touré-Tillery and Ayelet Fishbach (2014) and the UTAUT model will be combined in the interviews.

Motivation

In order to see if Emma has an influence on the motivation of the participants, the theory of Touré-Tillery and Ayelet Fishbach (2014) will be used. As mentioned in the conceptualization, they provided a guideline to help psychologists in measuring it. They divide cognitive, affective, and behavioural measures of motivation. They also distinguish two dimensions of outcome focused motivation and process-focused motivation and emphasize the importance of knowing which kind of dimension you are measuring. Because this evaluative study only takes four weeks, it is expected that the motivation of users will be process focused. Process focused motivation includes the evaluation, experience, performance and choices during the process.

Evaluation	–	The degree to which a goal relevant object is evaluated positively (liking goal relevant objects).	
Experience	–	The presence of positive feelings towards the process (absence of negative feelings towards the process)	
Performance	–	Higher accuracy	(Precision in the tasks)
		Higher amount of work done	(How much has been done?)
		Higher level of achievement	(How well is the task performed?)
Choice	–	Increased selection of objects and actions congruent with the process	

Since this study does not make it able to measure actual effects and goals of Emma, measuring experience of the process is most relevant.

UTAUT

It has been explained that UTAUT consists of the four determinants of behavioural intention and usage of technology: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC) (Venkatesh et al., 2003). Venkatesh et al. (2003) defined PE as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance”. EE is defined as “the degree of ease associated with the use of the system”. SI is defined as “the degree to which an individual perceives the important others believe he or she should use the new system”. FC is

defined as "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system". PE, EE and SI will influence the behavioural intention and therefore indirectly influence the use behaviour. Facilitating conditions will directly influence use behaviour. Below, the determinants of UTAUT have been simply displayed.

Performance expectancy	–	Social behaviour is changed Attitude towards social behaviour is changed Thought Emma was useful
Effort expectancy	–	Usability
Social influence	–	Would recommend Emma
Behavioural intentions	–	Interested in further personal use of social coach
Use behaviour	–	Amount of use

Since this study does not make it able to measure actual effects and goals of Emma, measuring the change of social behaviour is not relevant.

3.5.3 Questionnaires

Demographics

With regard most theories, like the theories about loneliness, motivation and UTAUT, Gender, Age, Educational level, living situation and Occupation can be subjects of interest in this study.
First, gender is a subject of interest, because gender influences the experience of loneliness and the way of coping with it. Also, gender is a moderator that is mentioned in the UTAUT model. Another moderator in UTAUT is age. This variable has both in loneliness as in UTAUT a positive relation with experience of loneliness and not being able to use a technology.

WAI

The highly influential concept of the working alliance by Bordin (1994) will also be used and implemented in the questionnaire. His theory describes the importance of agreement on therapy goals, agreement on therapy tasks and the bond between therapist and client. Tasks refer to the processes and behaviours in psychotherapy sessions that relate to the actual therapeutic work. Therapeutic goals refer to the objectives of the therapy that are endorsed by both therapist and client. According to Bordin (1994) refers the bond to the interpersonal attachment between therapist and patient and should include confidence, acceptance and mutual trust.

Goal – Agreement on therapy tasks
Task – Processes and behaviours
Bond – Interpersonal attachment between patient and therapist (in this case: technology)

Since this study does not make it able to measure actual effects and goals of Emma, only measuring *bond* is most relevant. So, in the case of this investigation, it should be measured if the user of COUCH feels attachment to Emma.

3.5.4 Overview theoretical constructs

In underlying tables, it has been shown which theoretical constructs are used in this study and how they are measured. In table 4, it has been shown that there are 8 different theoretical constructs, these are based on theoretical models. Behind the name of the construct, it has been shortly explained what it means. Unfortunately, the performance, in table 4, cannot be measured in this study. In the session that is available for the participants, there are no goals or sub goals yet, which the participants can work on. Therefore, performance is left out in the lower table. And so, in the measurements.

Table 4: Overview of theoretical constructs		
Theoretical model	Theoretical construct	Description
Motivation	Goal relevant objects	The degree to which goal relevant objects are evaluated positively
Motivation	Experience	The presence of positive feelings towards the process
UTAUT	Behavioural intentions	Interested in further personal use of the coach
UTAUT	Social influence	Would recommend Emma
UTAUT	Usability	User experienced ease of use
Motivation/UTAUT	Performance	Higher accuracy, level and amount of work done
Motivation/UTAUT	Use behaviour	Amount of use
WAI	Bond	Attachment between user and technology

In table 5, it has been shown within which measurement instrument and with what type of question exactly the constructs are going to be measured. Since there is a part of qualitative research, consisting of interviews, it can be that some constructs are spoken of during other questions. It is the task for the researcher to maintain structure in the interviews, but also to find these lost constructs during analyzation of the interviews.

Table 5: Overview of specific measurement instruments			
Sub question	Construct	Measurement type	Specific question
	Demographics	Questionnaire (before use)	1-6
2a	Goal relevant objects	Questionnaire (before use)	16e
		Questionnaire (after use)	16e
		Interview	Questions in evaluation section
	Experience	Questionnaire (after use)	14b
		Interview	Questions in experience section
	Behavioural intentions	Questionnaire (after use)	14a
	Social influence	Interview	advantages disadvantages
2b	Use behaviour	Data from desktop version	-
	Bond	Questionnaire (after use)	13-sociale coach (9-12)

4 Results

This chapter is structured based on the two sub questions that still must be answered. The results are based on the interviews and questionnaires. By using the theory and codebook, the following paragraphs will analyze the answers to both sub questions. First, the general characteristics of the participants will be shown and analyzed. Then, it will be shown how many participants made actual use of Emma. Based on the three different user groups: Full-users, Introduction-users and non-users, further analysis will be done of the interview and questionnaire results.

4.1 General information participants

4.1.1 Demographic characteristics of the participants

In table 6, the general characteristics of the participants are displayed.

Table 6: Demographic characteristics

Variable and category	Study Sample Data (N=25)
Gender	
• Men	32% (8)
• Women	68% (17)
Age	Mean: 66.5 SD: 7.5
Educational level	
• Preparatory secondary vocational education	24% (6)
• Higher general secondary education, pre- university education	32% (8)
• Higher vocational education, university	44% (11)
Living situation	
• Alone	24% (6)
• Married/living together	76% (19)
Occupation	
• Employed;	28% (7)
• Volunteer, caregiver;	16% (4)
• Retired;	52% (13)
• Other	4% (1)

Regarding the gender, males constituted the 32% of the sample while females outnumbered females accounting for the 68% of participants. Comparing the user data with the real data, the distribution of the sample in terms of gender is not very similar to the Dutch adulthood. In the age group of adults between 50 and 60 years, males are even with a larger population than women.
The average age of participants is 66.5 and most of them affirm to be retired (52%). This is consistent with the fact that Dutch citizens can normally retire with 67 years in most cases.

For what concerns education, it was surprising that most participants showed a high educational level, 44% of graduated people. These figures can partially be explained by the fact that mostly highly educated people are aware of the importance of a healthy lifestyle. Besides, the people were required to be a bit capable with technologies, which restricts participants to older adults that already have a greater tendency to use technology than the average older adult.

Instead of asking for the marital status, we considered to be more interesting to understand if the participants are living together with someone, because nowadays unmarried cohabitation is considered an alternative to marriage and sometimes a variety of marriage. As reported above, most participants live with their partner/family.

4.1.2 Actual use Emma

While the 25 older adults were signed in to make use of the project, it did not mean directly that they all made use of Emma of even the Council of Coaches. To be able to know if the participants made use of Emma, will give an insight in who knows what Emma really implies in this project. The participants were able to make use of two sessions of the coach: its introduction and the first session. In table 7, it is shown that 18 of 25 participants went through the introduction of Emma and 12 people made use of the first session. So, 7 participants did not use Emma at all, and 6 participants made only use of the introduction. The data on actual use is shown in the table.

Table 7: actual use social coach

	Introduction	Session 1		Introduction	Session 1
1	Yes	Yes	14	No	No
2	Yes	Yes	15	Yes	No
3	No	No	16	Yes	No
4	Yes	No	17	Yes	Yes
5	Yes	Yes	18	No	No
6	Yes	Yes	19	Yes	No
7	Yes	No	20	Yes	Yes
8	No	No	21	Yes	Yes
9	No	No	22	Yes	Yes
10	No	No	23	Yes	No
11	No	No	24	Yes	Yes
12	Yes	Yes	25	Yes	Yes
13	Yes	Yes		18/25	12/25

In further analysis of the results, the three different groups will be used: 1: None-users (7). 2: Introduction-users (6) and 3: Full users (12).

4.2 Coaching characteristics

In this chapter, an answer will be given to the following sub question:
2a. What coaching characteristics should a virtual social coach be able to offer according to users of COUCH?
To find an answer to this question, the used interview codes are the following: Goal relevant objects, Effect coach, Experience process, Social influence (reasons personal use, reasons for others to use) and Recommendations. All of these, except for the last, are defined as either positive, neutral or negative.

4.2.1 Characteristics

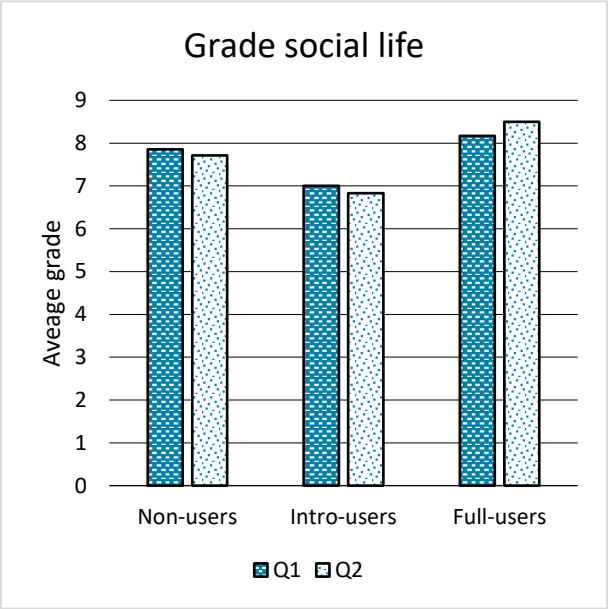
Goal relevant objects

It has been stated that the level of motivation of the individual is higher goal if goal relevant objects are evaluated positively. In this case, it means that there is a chance that the participant could have more motivation to perform social activities, if the participant has positive associations with social networking and there is an absence of loneliness. This has been tested in the questionnaire and in the interview.

Questionnaire

In the questionnaire, before use and after use, the participants were asked to rate their social life on a scale of 1 to 10. The non-users and intro-users gave their social life a lower rating in the second questionnaire than in the first questionnaire. Full-users was the only group that gave the social life a higher rating in the second questionnaire. The analyzed groups are too small to compare significant differences. The rating has been visualized figure 6.

Figure 6: Rating social life



Interviews

During the interview, several different questions are asked to indicate if the participants have positive experiences with social networking and loneliness. The key points of interest were if the participants never feel lonely, are satisfied with their social network and if they like to have social contacts.
Most participants were speaking positively (20/25) about their social life. Only five people made negative statements about feeling lonely, and/or their social network and/or social networking.

The five participants that made negative statements about their social life were: P4, P2, P9, P23 and P17. Of these participants, only one participant was a non-user of Emma (P9), the other four participants were equally divided into intro-users (P4, P23) and full-users (P2, P17). These participants generally made small statements that suggested that they were not completely satisfied with their social network. However, it was also clear that they are not completely lonely or always feel lonely. For example, one of the participants claimed not to be satisfied of his social network. One other, who made only use of the introduction, claimed that he did not like to be active with social networking. Further, one participant stated to feel lonely at some moments because of existential reasons. This means in this situation that this person had begun to believe less in his religion and was trying to find something to fill that 'hole' with. The other 20 participants mostly gave their social network a high rate and had no experience of loneliness.

Experience process

Grade Emma

After using Council of Coaches, the participants were asked to give Emma a grade. The precise question was: "Wat voor rapportcijfer geeft u aan sociale coach (Emma Li)?". The participants could give Emma a grade ranging from 1 to 10 (low to high). The results of this question are distributed using the three different groups: 1: None-users. 2: Intro-users and 3: Full-users.

Figure 7: Rating Emma

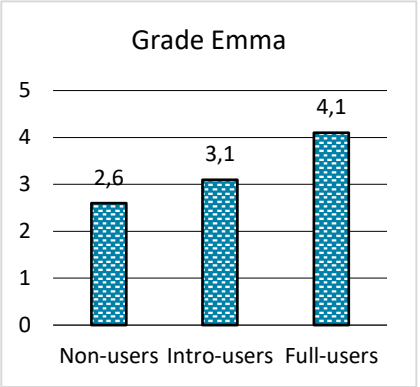


Table 8: Grade social coach

	N		Mean	Std. Deviation	Std. Error Mean
Full-users	12	T0	8,6667	0,93744	0,27061
		T1	8,5000	1,16775	0,33710
Intro-users	6	T0	7,0000	1,89737	0,77460
		T1	6,8333	2,22860	0,90982
Non-users	7	T0	7,8571	1,06904	0,40406
		T1	7,7143	1,11270	0,42056

The group that made use of both the introduction as the first session rated Emma the highest: a 4,1. However, on a scale of 10, this is still not quite high. Although, the opinion of the participants that used both sessions is most valuable, since these participants know what they are talking about.

Interview

The results of the interview are related to the results of the grading question within the questionnaire: The code 'experience of process' was used 111 times during this study of which 83 times defined negatively, 18 times neutral and 10 times positively. This indicates that 74.77% of the statements about the experience of the process was negative.

When looking at specific statements that could be defined positively or negatively, four subjects were often mentioned: No content; No specific coaching; Childish; Not personally; Conversations. In table 9, the subjects are ordered by looking at who said something about it (Non-users, Intro-users or Full-users) and if the statements were positive or negative. The opinion of non-users is based on the experience they had during use of the other coaches within the Council of Coaches.

Table 9: Overview experience

	Non-users		Intro-users		Full-users		Total	
	-	+	-	+	-	+	-	+
No content			6		6		12	
No specific coaching	2		3		7		12	
Not personally	2		3		2		7	
Conversations /Childish	4		5		5	1	14	1

As shown, most criticism is about the fact that there was no content in the coaching sessions of Emma and that there was no specific coaching. To substantiate what the different subjects precisely mean, it is explained here, based on statements of the participants:

No content

1. "The content is much too meager. Let me say that every time I have questions about the content on the part that is the program and no character can answer them." (P22, full-user).
2. "When I click on a character, the text appears very slowly and then there is almost nothing in terms of content. And then I get to see a recipe at the cook. Yes very nice, but otherwise it is deafeningly quiet." (P24, full-user)

No specific coaching

1. "Well, you can't go into depth again. They are her questions and what she says, you would like to respond to that in a different way, but that is not possible. Then you think: I'm stuck with her approach and that's it." (P2, full-user).

2. “I then tried to get something from one of those counselors, then it was still the same and it was a bit open book tips that were there. And it is not interactive. And he is not going to respond to the question that I have of course specifically.” (P1, full-user)

Conversations/Childish

1. “I don't have to make friends with that coach person. I don't need that kind of social contact. I am not looking for that personal relationship either.” (P1, full-user)
2. “At first I thought the question was very childish, that I really thought: Gosh, it seems like I am a small child or something. Well, a bit childish, but that could be me, because that's how I experienced it.” (P15, intro-user)

Not personally

1. “But I got stuck with a few coaches every time. The information provided by the coaches was not personal at all.” (P15, intro-user)
2. “If I can change something like that, I would prefer that such a coach who is in my laptop or tablet, that he is a bit more personal and knows my situation.” (P20, full-user)

Social influence

Most participants see especially reasons for other people to use Emma, instead of reasons to use Emma themselves. The distribution of statements has been displayed in table 10. If someone has a ‘negative’ statement within the code ‘reasons to use Emma’, it means that this participant does not see an actual reason to use Emma himself. If someone has a ‘positive’ statement within the code ‘reasons for others to use Emma’, it means that this participant does see actual reasons for others to use Emma. As shown, these are also the combinations that are most common in this investigation, related to the social influence.

Table 10: Overview social influence

	Negative	Neutral	Positive
Reasons to use Emma	31	19	9
Reasons for others to use Emma	4	12	17

When looking at specific statements why people state that they will not be using Emma themselves, these are three typical ones:

1. “Around social I was like, well, I have no problems with that now. That's all fine, so I don't have to use it.” (P10, non-user)
2. If the content is good, there is no reason not to use it. For many people, it can be quite a useful tool. (P16, intro-user)

When looking at specific statements why people state that there are reasons for other people to use Emma, these are three typical ones:

1. “I can imagine that if you have fewer social contacts and you have a little more trouble with it yourself, you might get tips and tricks from such a coach, which can help you to say something more stable. could be part of the formation of those contacts. I can imagine something about that.” (P18, non-user)
2. “If the content is good, there is no reason not to use it. For many people, it can be quite a useful tool.” (P16, intro-user)
3. “Well, I think for people who find it difficult to socialize, it could be helpful. Because it feels safe... so, in that way, that they just feel a helping hand to do something. Because I also know people who find it difficult to make social contacts. Then it can feel very safe, yes.” (P1, full-user)

Recommendations

20 of the participants gave specific recommendations about how they would prefer to be coached by a virtual coach. However, the question was asked in an open way, people agreed mostly about four different subjects about how they prefer to be coached. Namely: personalized coaching (14 participants), more specific tips and an easier way to find them (13 participants), less conversations, more to the point (9 participants), results-oriented (12 participants).

When looking at specific statements how people state they prefer to be coached by a virtual coach, here are two or three quotes per subject. As mentioned in the methodology, this research took place within the context of an investigation of multiple virtual coaches. In the case of usability and regular coaching, some recommendations can be based on the opinion of another coach in the Council of Coaches (Hurmuz, Jansen-Kosterink, op den Akker and Hermens, 2020).

Personalized coaching/triggers

1. "for example, if I indicate that I run 5 km every day. That at a certain point he says to me: Well run 5.5 km next week. In this way." (P14, non-user)
2. "He must first ask, what do you do in daily life, and then coach me. That's how I see it." (P12, full-user)
3. "Yes, a bit more personal, I think. I can't describe it like that, but that you get a little more of a push in the back, a big stick, a bit more pushed." "Dan moet je wel inderdaad een seintje krijgen van he, denk je er nog wel aan vandaag." (P17, full-user)

More specific tips and an easier way to find them

1. "I believe that people need handy tips and tricks that will help them to have a more balanced life and make it easier to go to someone else and do something together with someone else." (P18, non-user)
2. "You could also hang a roll menu under Olivia and so you can tick I am looking for a program to exercise more, or with the social coach of uh, how, that you will get a roll menu that you can click on come on with ideas to expand my social circle." (P4, intro-user)
3. "For example, it did not say: the weather is nice, do you want to go outside this week. Or that something might have already arisen because of Corona: with activities that might still be possible now. And there is none." (P1, full-user)

Less conversations/More to the point

1. "Then you would like to ask the question directly and get the answer, without all kinds of duties and social talk and you name it." (P10, non-user)
2. "Then come up with actual information, I must consult that coach every day, because that helps me. And that is not in any of them. For me. For me. That may not be the case for other participants. There will probably be people who will find it useful." (P23, intro-user)

Goal-oriented

1. "I think, maybe at the front I would split into… What goals you have for moving. That can be a sporting goal, but that can also be a walk every morning, I know a lot. You would be very specific and focused on time and possibilities..." (P18, non-user)
2. "I think we agreed together that we would set a goal of what we wanted to achieve per week in number of steps. So that was a good thing, because you consciously decide for yourself what you want to achieve at least per week. And then the Fitbit is the control you have on that. So, I really liked that." (P1, full-user)

3. “I expected to be accompanied, with a big stick, like: “hey, how much did you walk today, what did you do, how is it going?”, and that's not going to happen.” (P21, full-user)

Social coaching

There was a scarcity in feedback from participants on the questions how they would prefer to be coached on especially their social life. However, a view people mentioned that they would like to be coached on fining balance in their social life and being able to be coached about existential purposes.

Balance in social life

Three participants mentioned that it is sometimes hard to find a balance in social life, because they have a hard time with indicating their boundaries (to others).

1. “But then the tension with me is whether I have the right to give priority to my personal issues over hers and that is difficult.”.
2. “And I am looking for where my limits are, because I do not have that clear for myself. In principle I am a hard worker, so that means that I work a lot of hours and then cross borders again in one go.”.

In conversation with these participants, it emerges that they want to be able to communicate about their boundaries, so they do not have the feeling that they will cross them unnecessary.

Existential

Within several interviews, people indicate that they feel that there is a difference between feeling lonely and being lonely. One of the participants explains to feel some type of loneliness or emptiness because she stopped with engaging in her religion. She herself calls it an existential problem:
“But what I say, the piece of meaning, that is something that is a kind of need. But that cannot be solved by such a coach, I think. It's inherent to getting older. Thinking about meaningful things and you should have more of a philosophy club for that. Or maybe you have to find out something yourself, by reading it and going to beautiful things. It's more of an existential problem, to put it seriously. But the coach could only say at what kind of clubs you can...”

4.2.2 Summary

Actual use

25 older adults were signed in to make use of the project, but they did not all make use of Emma. 12 participants made use of the first session; 6 participants made only use of the introduction and 7 participants did not use Emma at all.

Goal relevant objects

Most participants gave their social life a relatively high grade and explained in the interviews that they were quite satisfied about their social life. What is quite striking, is that the groups of non-users and intro-users gave their social life a lower grade in the last questionnaire, while the group of full-users gave their social life a higher grade in the second questionnaire.

Experience process

On a scale of 10, Emma got relatively low ratings. The highest rating, however, came from the group that has seen most of Emma. Namely a 4,2. These low ratings connect to the results from the interviews, while people reacted not satisfied either in these conversations. Most criticism was about the fact that there was a scarcity in content; a lack of personal and specific coaching and that people seemed not to be satisfied with the conversations with the coaches that were aften called ‘childish’.

Social influence

Most participants see especially reasons for other people to use Emma, instead of reasons to use Emma themselves. This connects to the results from the section of goal relevant objects which explains that people do not feel motivated to be coached on something that they do not need to be coached on.

Recommendations

Looking at the complaints that arise from the experience of the process, the recommendations about virtual coaching are not that surprising. Namely: personalized coaching, more specific tips and an easier way to find them, less conversations, more to the point and results-oriented. There were two recommendations specifically about social coaching: to pay attention to a balance in social life and to pay attention to some Existentialism.

4.3 Technological characteristics

In this chapter, an answer will be given to the following sub question:
2b. What technological characteristics should a virtual social coach be able to offer according to users of COUCH?
To find an answer to this question, the used interview codes are usability, recommendations and the WAI.

4.3.1 Characteristics

Usability

Non-users

For the seven people that did not use Emma at all, the main reason was because they did not think that Council of Coaches was an easy technology. Most of them experienced technical problems (5/7). The technical problems were most of the time not easy to define for the investigators. It could be that the tablet or laptop that was used was too slow or consisted of a wrong internet browser. Another technical hick-up that was mentioned, which influenced the usability negatively, was having a hard time with logging in (3/7). All the participants had got a long log-in name- and password. Because not all the participants were able to save the account on their device, it took the participants most often a lot of time to log-in. A third reason that was given for a negative experience of the technical process was that participants thought the desktop version was too slow functioning (2/7).

Intro-users

There were six people that made use of the introduction of Emma but did not make use of the first session of Emma. These participants did not really experience technical problems while in the desktop version. However, most of them mentioned the same problem with logging in as the group of non-users (4/6). Further, it was only mentioned by a small part of this group that the technology worked too slow (2/6).

Full-users

The group that used both the introduction as well as the first session of Emma was biggest, it consists of 12 people. Half of them stated that the system was very easy in use (6), mostly because it is a very clear system (3/6). However, two of the twelve people mentioned that the system was maybe too easy, or simple. However, this kind of user experience is more interesting to discuss when it comes to the way people want to be coached. That is why that subject has been dealt with in the chapter of coaching characteristics.
Only four of the twelve full-users had problems with logging in, this can be because the rest had saved their data in their devices. This, however, is not proven in this study. Not only when it comes to the

problems of logging-in, this group was experiencing least problems with a slow working technology. Only two of twelve mentioned that they thought that Council of Coaches was functioning too slowly.

Recommendations

When looking at the recommendations of the participants, related to technological characteristics, most of the reactions are predictable: logging-in should become easier and the technology should be faster. However, most participants are not only speaking of 'fast' and 'slow' as in loading the program. It turns out that most participants think that the usability within the program should be faster too. For example, the participants recommend filter options, concrete information and more personalized questions, so that they can get the information they need more quickly instead of going through long conversations and needing to search through the system to get new information.

WAI

Perception of health coaching was assessed via the Working Alliance Inventory, Short version (WAI -S). The goal section score indicates how well Emma assisted with goal setting, the task section score indicates the degree to which Emma supported each participant with staying on task to reach set goals, and the bond section score indicates how much of a connection each participant felt with Emma. The results are, again, divided in three groups: 1) None-users. 2) Intro-users and 3) Full-users and visualized in table 11. Each subscale reaches from 1 to 5 with 1 standing for seldom and 5 for always.

Table 11: WAI

Non-users				Intro-users				Full-users		
WAI-SR scale	Mean	SD		WAI-SR scale	Mean	SD		WAI-SR scale	Mean	SD
WAI_task	1,2	0,4		WAI_task	1,1	0,3		WAI_task	1,4	0,5
WAI_bond	1,2	0,4		WAI_bond	1,5	0,9		WAI_bond	1,8	1,0
WAI_goal	1,2	0,4		WAI_goal	1,2	0,4		WAI_goal	1,6	0,7
WAI_total	1,2	0,4		WAI_total	1,3	0,4		WAI_total	1,6	0,7

4.3.2 Conclusion

Usability

When looking at the usability, it mainly turned out that the participants thought that the system was too slow and that it was not easy to log in. However, there was a group that experienced no problems with both issues and there were people that had only problems with either the slow system or logging in.

Recommendations

The recommendations connect to the problems that the participants experienced: the participants recommend a system that works faster and has an easier way to log in. Next to the recommendation to have a system that loads faster, the participants also recommended to have shorter pathways within the system, so you can go faster through it.

WAI

In relation to the other results, it is quite logical that the WAI has such low scores on all three aspects: Goal, Bond and Task, in all three groups. In the full-use group, the WAI scores are a little higher than the others. Because there were only two sessions (intro and first session) available in COUCH, bond was most relevant to measure in this research. Bond scores highest in the three user groups. However, an 1,2 or 1,8 is still not very high on a scale of 5. This means that the users did not feel a lot of attachment to the social coach, Emma.

5. Discussion

5.1 Interpretation of results

The aim of this study was to investigate what a virtual social coach should be able to offer to maintain a vital social network for older adults. Existing literature shows that is a lack of solutions addressing the social network in the domain of health technologies. In addition, the effects and consequences of these technologies have not yet been investigated. Based on user tests with this desktop version, and by analysing the results of the survey and interview data, several insights arise from this study.

To investigate what a virtual social coach should be able to offer to maintain a vital social network for older adults, the following research questions were formulated:

What should a virtual social coach be able to offer to maintain a vital social network for older adults?

To give answer to the main question, the answers to the four different sub questions will be analyzed and compared:

1a. What coaching characteristics should a virtual social coach be able to offer according to literature?

1b. What technological characteristics should a virtual social coach be able to offer according to literature?

2a. What coaching characteristics should a virtual social coach be able to offer according to users of COUCH?

2b. What technological characteristics should a virtual social coach be able to offer according to users of COUCH?

Coaching Characteristics

The theory on motivation clarifies that people only feel motivated if they experience a risk on physical and psychological wellbeing. This means that people will only feel motivated to work on their social life if they feel that they are (going to be) lonely. In practice, this is also what the results show: in general, the participants gave their social life a relatively high rate, which resulted in the feeling that they do not need to work on their social life, with a virtual social coach. So, the participants, in general, did not feel the necessity to use Emma themselves. However, many reasons (17) were given about other people that could be in need of Emma. This could be an indication that the participants could be likely to use Emma if they were in the position of the other people that could be in need of Emma. Further, a positive experience of the process is important to be motivated to do something. This was, unfortunately, not the case in this study. Most people had a negative experience of the process and rated Emma with a very low grade.

Based on framework of Lentferink and colleagues (2017), the participants will feel motivated by setting short term, personalized goals; getting praise messages, reminders, suggestions and feedback and by being able to track and observe progress. The results from the case study look very similar to this framework. Namely, there is a need for personalized coaching, more specific tips and an easier way to find them, less conversations, more to the point and results-oriented coaching. There were two recommendations specifically about social coaching: to pay attention to a balance in social life and to pay attention to some existentialism.

So, looking at behavioural and coaching characteristics, this study shows that motivation is a very important key factor in the use behaviour of the participants. In this case, motivation is depended on the necessity that people feel to change their behaviour and the experience of the process. When looking at the experience, the participants seem to have a preference to be coached in an effective, efficient and goal-oriented way. This could be established by integrating much more specific content with personal and goal-oriented sessions. The rather long and *childish* conversations could be left out and traded for targeted selection menus.

Technological Characteristics

As stated in the conceptual framework and literature review, there is a grey area between the coaching characteristics and technological characteristics. Also, in analysing the results, finding a specific distribution has been a challenge. While the UTAUT model has been mentioned in the theoretical chapter about the technological characteristics, some constructs of UTAUT have already been explained in the previous section, answering the question about coaching characteristics.

What is clear about the specific technological aspect, is that developers of a technology should take different aspects about the users into account and develop something that is easy to use for the target group. In this case, the model of Fogg, WAI and UTAUT agree on the fact that it motivate people to use the technology. This could be done by making sure that the user feels motivated to use the technology (with, for example triggers), has the feeling that it is easy to use the technology and that it, indeed, is easy to use. Most thresholds must be as low as possible.

This case study shows that, based on WAI, the council of coaches is rated very low. In addition, the participants have a lot of complaints about the usability. The recommendations that come forth out of these complaints are relatable to the expectations that arise from the theoretical framework. For example, the users see it as a very high threshold that logging in and loading cost a lot of time. This has been for some participants a reason to stop using the desktop version actively. Furthermore, they want a platform that triggers them to act. So, looking at technological aspects, the system mostly should be faster, easier to use and have short and concrete pathways.

5.2 Strengths and limitations

5.2.1 Strengths

Stakeholder involvement

Stakeholder involvement is one of the big strengths of this study. In the usability test, the main stakeholders, users, had the opportunity to give their opinion and voice any criticism or concern they might have. Without the involvement of the older adults as end-users, their preferences with regards to the prototype would not have been considered. However, only involving the older adults can lead to a less practical intervention. This is because caregivers, indirectly will also be stakeholders of such a technology.

Combination of qualitative and quantitative data

Another strength of this study is the combination of qualitative and quantitative data. Especially the opportunity to have an insight in the actual use of the participants gave some extra insight. When the participants were interviewed, they did not always recall whether they had been using the social coach and how long they did it. Some participants explained that they did not use the social coach at all, while they went through all of the sessions and some participants were talking about the social coach as if they knew everything, while they did not use the social coach at all.
Additionally, the survey gave exact grades about the social life and social coach. The interview outcomes added to that because these provided more qualitative and subjective data about the opinion of the participants. The opportunity to ask further during the interview, provided more precise data.

5.2.2 Limitations

Scarcity of content

Now that the final demonstration was already started, and the participants were going to be interviewed, it turned out that there was a scarcity of content of Emma and other virtual coaches. The people that should have added the coaching sessions in the desktop version were not able to add the sessions on time. This meant in practice that there were only two coaching sessions of Emma available for the participants. Both sessions were very shallow and provided a scarcity of new information. This limitation is to be found directly in the results of this study, because participants complaint a lot about the scarcity of content. According to the theory, this could have been of high influence on experience during the process, and so on motivation to use the technology. This is also to be found in the results: participants that used no sessions of Emma rated Emma with the lowest grade; participants that only used the introduction rated Emma a bit higher and participants that used the introduction and the first session rated Emma the highest. So, it can be predicted that the (motivation and experience of) participants should be less affected by the lack of contents if there were more sessions available.

Negative experience COUCH

The scarcity of content resulted in a very negative experience of the process by the participants. However, there was attention for expectation management within the investigation, the participants still seem to have high expectations of the technology. These high expectations also had a negative effect on the experience of the process. It should, however, be considered that this is an evaluative study of a developing technology. In addition, there were many complaints about usability and low speed of COUCH. Although, the usability of COUCH is a factor that has been investigated thoroughly in the previous years of this project (Broekhuis, 2018). An explanation for the bad comments about usability could be that participants, thus, could have been rooted from the high expectations about the technology.

Sample and selection

Another limitation of this study is that the included participants might have had a more positive attitude towards health technologies than the target population because they voluntarily signed up to participate. It is more likely that patients participate in a research which you are personally interested in. This is also known as self-selection bias.

Regarding the gender, males constituted the 32% of the sample while females outnumbered females accounting for the 68% of participants. Comparing the user data with the real data, the distribution of the sample in terms of gender is not very similar to the Dutch adulthood. In the age group of adults between 50 and 60 years, males are even with a larger population than women. However, from the age group of 60 and older, females are with a larger group. For the group 60+ females are with 54% in the Netherlands. So, females are indeed a larger part of the population when it comes to older adults, because of higher mortality rates of men. However, in this study, the number of women is overrepresented.

Questionnaire and interviews

The questionnaire and interviews were based on previous research and models. Since there is a scarcity in knowledge about virtual coaching, especially related to social coaching, this could have affected the data that is collected. The interviews are conducted based on the literature review of this study and should have conducted theoretical foundations for the research question and methodology. However, prior research studies that are relevant to this study are limited. This resulted in a research methodology that was developed based on mixed studies that were considered important.

The interview questions were based on the methodology and was designed to be very open. The open construction of the interview created the possibility for the researcher to ask further on specific statements and signals of the participant. However, three different researchers have interviewed some of the participants, of whom two of them are not highly educated in qualitative research and interviewing. This means that there is the possibility that some opportunities to ask further and react on signals of participants have been missed.
Further, the questions of the questionnaire were already agreed on without taking this study into account. This means that the questionnaire only provided the possibility to pick questions that were very likely to use for this study, instead of using specific, self-conducted questions.

COVID-19

Another limitation of this study that should be mentioned, is the context in which it was performed. The COVID-19 pandemic influenced this study in two different ways. First, the COVID-19 pandemic had an impact on the personal situation of the researcher and the situation on the university and research office. Further, the pandemic caused that only a part of the interviews could have been done face to face, while the other part of the interviews needed to be done during a phone call. This could have influenced the loss of opportunities to react on signals of the participants during the interviews. Lastly, this study was with older adults and about social contacts. The group of older adults is a vulnerable one, during this pandemic. Several statements were made about the negative effect of COVID-19 on the opportunity to be active in the social network.

5.3 Recommendations

5.3.1 Practical implications

The findings of this study are relevant when designing a technology for older adults or to improve an existing technology for older adults. Several practical recommendations can be made when designing a virtual social coach for older users.

Motivation, theory of perceived threat

The results show that all the participants did not have a drive to be (more) active in their social networks. The reason is that most participants rated their social life with a high grade, and so did not feel a perceived threat of becoming lonely. Because the participants did not feel very motivated to be more active in their social networks than before the start of the final demonstration, there was also less motivation to make use of the virtual social coach. A recommendation here could be that a new target group exists of participants that feel more need to be more active within their social networks. This could raise motivation to use the technology (Venkatesh et al., 2003).

Quantity of content

Looking at behavioural and coaching characteristics, this study shows that motivation and a positive experience of the process is a very important key factor in the use behaviour of the participants. In this case, motivation is depended on the necessity that people feel to change their behaviour and the experience of the process. As stated, the scarcity of content had a negative influence on the experience of the participants, which resulted in negative statements and a lack of motivation to use the technology. As shown, the more sessions were used by the participants, the higher the participants rated the technology. This could be a practical lesson for further test cases. However, there was not even a goal-oriented approach in the introduction and first session, the users of these sessions had a more positive experience than participants that did not made use of these sessions. So, more content will result in a better experience and thus, more motivation to use a technology.

Personalized goals

When looking at the recommendations that were given by the participants, the participants seem to have a preference to be coached in an effective, efficient and goal-oriented way. This could be established by integrating much more specific content with personal and goal-oriented sessions. An example here, is that the users preferred to be coached by the physical coach, Olivia, because she established and tracked personal goals, using a Fitbit. While it is hard to track social activities with such technologies, developers should be a bit creative to make this able. The use of a diary of daily (social) activities could make this able, just to name an example. The user could share the names of friends and family and safe his/her favourite activities. A combination of activities and social contacts could provide an agenda in which the coach helps to set personal goals.

Specific, targeted content

Further, feedback was given about the rather childish conversations with Emma. However, COUCH have been doing research about the recommended content for virtual coaches, there seems to be a little gap between the results of their earlier research the content that was established in this desktop version. For example, earlier research showed that a platform with multiple virtual coaches could have some benefits. Like the opportunity to show complexities and conflicts of a health issue to users by providing social conversational interaction within the group of virtual coaches about the health topic (Kantharaju, et al., 2019, July).

In this version of COUCH, conversations like these were not integrated yet. The conversations between the virtual social coach, Emma, and the user were about shoes, pets and sports. Recommendations of users show that it is not a bad thing to have small talk like this, but that specific coaching is preferred. For example: the virtual social coach could be talking about walking the dog, but it is more desirable if there is a tip attached to, stating that the user could be walking the dog together with someone else.

Usability

It was already stated that the participants' expectations regarding the technology were quite high. This resulted in some disappointment among the participants while using the technology. Since usability is a very important factor to motivate people feel motivated to use technologies, this should have been of high quality in the eyes of the participants. However, the participants sometimes complaint about the low speed of the desktop version and problems with logging-in. Next to these two problems, no other usability problems were mentioned, which indirectly means that the rest of the tool was easy to use. Especially the easy pathways within the desktop version and buttons with clear explanations were appreciated. This also adds to literature which states that it is recommended to design a technology that provides a threshold that is as low as possible and very easy to use. Speed of the system, triggers and short and specific pathways are key in this. These results agree with the practical implications that Lentferink and colleagues imply. To coach the users effective, efficient and in a goal-goal oriented way, Lentferink and colleagues suggest setting short-term goals to eventually reach long-term goals; provide feedback based on how well the user changed behaviour and self-tracking to observe progress toward defined goal; personalization of goals and praise messages and reminders and suggestion (Lentferink et al., 2017).

5.3.2 Further study

Recommendations and practical implications in designing a virtual social coach have already brought some feedback forward that could also be used in further research. One outcome that was already brought forward in the theoretical framework is the suggestion that more research should be conducted in health technologies. Especially when speaking about a technology that should be motivating older adults to change behaviour. Looking at this study, there are some things that could be considered in further research. For example, when evaluating a technology like this, it can be helpful to use one that is very attractive and easy to use. So, more content in a fast and specific program could already be helpful in getting different results.

Motivation for social coaching and technologies

Further, research about virtual social coaching even scarcer. In this study, people signed up to participate who rated their social life quite high. For further research, it could be interesting to approach a group that has a smaller social network and/or experience more loneliness. In addition, the participants in this study, probably, were interested in such a health technology. So, including people that are less interested in health technologies with a scarcity of social contacts could also be interesting in further research.

Quantity of content

In the section of practical implications, it was already mentioned that more content would have resulted in a more positive experience of the process by the user. This positive experience would have led to more motivation to use the technology. A factor that could be very crucial in further research, since this could lead to more feedback on the contents instead of experience of the technology.

Easiness of technology

As shown, the participants sometimes complaint about the low speed of the desktop version and problems with logging-in. These problems could have been related to the devices that the participants used and the fact that people had a very complicated account-name and password. It should be considered during further research that the population of older adults is not the most technical one. Therefore, these people should be guided during the process and use of the technology. For example, it could have been that the device of participant was not updated to its later version, which resulted in the low speed. In addition, some participants did not know that there is a possibility within the internet browser to save the username and password of COUCH. By providing more guidance at these moments, such problems can be tackled in future research, resulting in a more positive experience in the process, and so, more motivation by the participants to use the technology.

COVID-19

Further, this study has been a part of a master thesis, which means that there is a scarcity in time and tools. However, for such a personal subject as health and loneliness, it could be helpful to investigate the technology with caregivers and researchers that have more experience with qualitative research. In addition, it can be valuable if time is invested in drafting a framework that is pointed at the development and measurement of a virtual social coach. Especially, the COVID-19 Pandemic forces a lot of older adults to stay at home and have fewer social contacts. Since this pandemic still impacts society, people should know older adults have more chance to get socially isolated. This is because these people have less accessibility and knowledge about technologies and consist of the most vulnerable population.

6. Appendix

Appendix 1: References

Adam, E. K., Hawkley, L. C., Kudielka, B. M., & Cacioppo, J. T. (2006). Day-to-day dynamics of experience: Cortisol associations in a population-based sample of older adults. Proceedings of the National Academy of Science of the United States of America, 103, 17058-17063.

Alpass, F. M., & Neville, S. (2003). Loneliness, health and depression in older males. Aging Mental Health, 7(3), 212-216. doi: 10.1080/1360786031000101193

Arslantaş, H., Adana, F., Abacigil Ergin, F., Kayar, D., & Acar, G. (2015). Loneliness in elderly people, associated factors and its correlation with quality of life: A field study from Western Turkey. Iranian Journal of Public Health, 44(1), 43-50

Asbjørnsen, R. A., Smedsrød, M. L., Nes, L. S., Wentzel, J., Varsi, C., Hjelmesæth, J., & van Gemert-Pijnen, J. E. (2019). Persuasive system design principles and behaviour change techniques to stimulate motivation and adherence in electronic health interventions to support weight loss maintenance: Scoping review. Journal of medical internet research, 21(6), e14265.

Bargh, J. A., McKenna, K. Y. A., & Fitzsimons, G. M. (2002). Can You See the Real Me? Activation and Expression of the "True Self" on the Internet. Journal of Social Issues, 58(1), 33–48. https://doi.org/10.1111/1540-4560.00247

Berkman, Lisa F., and S. Leonard Syme. 1979. "Social Networks, Host Resistance and Mortality: A Nine-year Follow-up Study of Alameda County Residents." American Journal of Epidemiology 109(2):186-204

Bordin, E. S. (1979). The generalizability of the psychoanalytic concept of the working alliance. Psychotherapy: Theory, research & practice, 16(3), 252.

Broekhuis, M. (2018) "Context in designing and evaluation usability in eHealth technology for older adults", in Proceedings of the NordiCHI2018 Doctoral Consortium, Oslo, Norway.

Cacioppo, J. T., Hawkley, L. C., Crawford, L. E., Ernst, J. M., Burleson, M. H., Kowalewski, R. B., et al. (2002). Loneliness and health: potential mechanisms. Psychosomatic Medicine, 64(3), 407-417.

Cacioppo, J. T., Hawkley, L. C., & Thisted, R. A. (2010). Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. Psychology and Aging, 25(2), 453-463.

Chau, P. Y. (1996). An empirical assessment of a modified technology acceptance model. Journal of management information systems, 13(2), 185-204.

Cole, S. W., Hawkley, L. C., Arevalo, J. M., & Cacioppo, J. T. (2011). Transcript origin analysis identifies antigen presenting cells as primary targets of socially regulated leukocyte gene expression. Proceedings of the National Academy of Sciences, 108, 3080-3085.

Council-of-coaches.eu

Council-of-coaches.eu/beta

Corbella, S., & Botella, L. (2004). Psychometric properties of the Spanish version of the Working Alliance Theory of Change Inventory (WATOCI). Psicothema, 16(4), 702–705.

Courneya, K. S., & Hellsten, L. A. (2001). Cancer prevention as a source of exercise motivation: An experimental test using protection motivation theory. Psychology, Health & Medicine, 6(1), 59-64.

Coyle, C. E., & Dugan, E. (2012). Social isolation, loneliness and health among older adults. Journal of Aging Health, 24(8), 1346-1363. doi: 10.1177/0898264312460275

Dahlberg, L., & McKee, K. J. (2013). Correlates of social and emotional loneliness in older people: evidence from an English community study. Aging & Mental Health, 18(4), 504–514. https://doi.org/10.1080/13607863.2013.856863

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.

Denney, J. T. (2010). "Family and Household Formations and Suicide in the United States." Journal of Marriage and Family 72:202–13.

Drageset, J., Kirkevold, M., & Espehaug, B. (2011). Loneliness and social support among nursing home residents without cognitive impairment: A questionnairesurvey. International Journal of Nursing Studies, 48, 611–619.

Drageset, J., Eide, G. E., Kirkevold, M., & Ranhoff, A. H. (2012). Emotional loneliness is associated with mortality among mentally intact nursing home residents with and without cancer: A five-year follow-up study. Journal of Clinical Nursing, 22, 106–114. doi: 10.1111/j.1365-2702.2012.04209.x

Dykstra, P.A., de Jong, J., Gierveld, J. (1999). Differential indicators of loneliness among elderly. The importance of type of partner relationship, partner history, health, socio-economic status and social relations. Tijdschrift voor Gerontologie en Geriatric 30, 212–225.

Ellison, C. G., & Levin, J. S. (1998). The religion-health connection: Evidence, theory, and future directions. Health Education & Behaviour, 25(6), 700-720.

Florsheim, P., Shotorbani, S., Guest-Warnick, G., Barratt, T., & Hwang, W. C. (2000). Role of the working alliance in the treatment of delinquent boys in community-based programs. Journal of clinical child psychology, 29(1), 94-107.

Fogg, B. J. (2009, April). A behaviour model for persuasive design. In Proceedings of the 4th international Conference on Persuasive Technology (pp. 1-7).

Freud, S. (1927). Feticismo. *Opere di Sigmund Freud*, *10*.

George, C., Whitehouse, D., & Duquenoy, P. (2012). eHealth: legal, ethical and governance challenges. Springer Science & Business Media.

Golden, J., Conroy, R. M., Bruce, I., Denihan, A., Greene, E., Kirby, M., & Lawlor, B. A. (2009). Loneliness, social support networks, mood and wellbeing in community-dwelling elderly. International Journal of Geriatric Psychiatry, 24(7), 694-700. doi: 10.1002/gps.2181

Guédeney, N., Fermanian, J., Curt, F., & Bifulco, A. (2005). Testing the Working Alliance Inventory (WAI) in a French primary care setting. Social Psychiatry and Psychiatric Epidemiology, 40(10), 844–852.
Hair, H. J. (2005). Outcomes for children and adolescents after residential treatment: A review of research from 1993 to 2003. Journal of Child and Family Studies, 14(4), 551–575.

Hintikka, U., Laukkanen, E., Marttunen, M., & Lehtonen, J. (2006). Good working alliance and psychotherapy are associated with positive changes in cognitive performance among adolescent psychiatric inpatients. Bulletin of the Menninger Clinic, 70(4), 316-335.

Holwerda, T., Deeg, D., Beekman, A., van Tilburg, T., Stek, M., Jonker, C., & Schoevers, R. (2012). Feelings of loneliness, but not social isolation, predict dementia onset: Results from the Amsterdam Study of the Elderly (AMSTEL). Journal of neurology, neurosurgery, and psychiatry.

Holwerda, T. J., Van Tilburg, T. G., Deeg, D. J. H., Schutter, N., Van, R., Dekker, J., Stek, M. L., Beekman, A. T. F., & Schoevers, R. A. (2016). Impact of loneliness and depression on mortality: Results from the longitudinal ageing study Amsterdam. The British Journal of Psychiatry, 1(8). doi: 10.1192/bjp.bp.115.168005

Honigh-de Vlaming, R., Haveman-Nies, A., Bos-Oude Groeniger, I., de Groot, L., &Veer, P. (2014). Determinants of trends in loneliness among Dutch older people over the period 2005-2010. Journal of Aging Health, 26(3), 422-440. doi: 10.1177/0898264313518066

Hull, C. L. (1943). Principles of behaviour (Vol. 422). New York: Appleton-century-crofts.

Hurmuz, M. Z., 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 Research Protocols, 9(4), e16641.

Kankanhalli, A., Shin, J., & Oh, H. (2019). Mobile-based interventions for dietary behaviour change and health outcomes: scoping review. JMIR mHealth and uHealth, 7(1), e11312.

Kantharaju, R. B., Pease, A., Reidsma, D., Pelachaud, C., Snaith, M., Bruijnes, M., ... & Heylen, D. (2019, July). Integrating argumentation with social conversation between multiple virtual coaches. In Proceedings of the 19th ACM International Conference on Intelligent Virtual Agents (pp. 203-205).

Kobayashi, K. M., Cloutier-Fisher, D., & Roth, M. (2009). Making meaningful connections: A profile of social isolation and health among older adults in small town and small city, British Columbia. Journal of Aging & Health, 21(2), 374-397.

Lentferink, A. J., Oldenhuis, H. K., de Groot, M., Polstra, L., Velthuijsen, H., & van Gemert-Pijnen, J. E. (2017). Key components in eHealth interventions combining self-tracking and persuasive eCoaching to promote a healthier lifestyle: a scoping review. Journal of medical Internet research, 19(8), e277.

Locher, J. L., Ritchie, C. S., Roth, D. L., Baker, P. S., Bodner, E. V., & Allman, R. M. (2005). Social isolation, support, and capital and nutritional risk in an older sample: ethnic and gender differences. Social Science & Medicine, 60(4), 747–761. https://doi.org/10.1016/j.socscimed.2004.06.023

Locke, E. A., & Schattke, K. (2018). Intrinsic and extrinsic motivation: Time for expansion and clarification. Motivation Science.
Losada, A., Márquez-González, M., García-Ortiz, L., Gómez-Marcos, M. A., Fernández-Fernández, V., & Rodríguez-Sánchez, E. (2012). Loneliness and mental health in a representative sample of community-dwelling Spanish older adults. Journal of Psychology, 146(3), 277-292. doi:10.1080/00223980.2011.582523

Luanaigh, C. O., & Lawlor, B. A. (2008). Loneliness and the health of older people. International Journal of Geriatric Psychiatry, 23(12), 1213-1221. doi: 10.1002/gps.2054

Luo, Y., Hawkley, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. Social Science and Medicine, 74(6), 907-914. doi: 10.1016/j.socscimed.2011.11.028

Lyons, E. J., Lewis, Z. H., Mayrsohn, B. G., & Rowland, J. L. (2014). Behaviour change techniques implemented in electronic lifestyle activity monitors: a systematic content analysis. *Journal of medical Internet research*, *16*(8), e192.

McLean, S., Protti, D., & Sheikh, A. (2011). Telehealthcare for long term conditions. Bmj, 342, d120.

Mullins, L.C., Elston, C.H., Gutkowski, S.M., 1996. Social determinants of loneliness among older Americans. Gen. Soc. Gen. Psychol. Monogr. 122, 453–473.

Musick, Marc A., James S. House, and David R. Williams. 2004. “Attendance at Religious Services and Mortality in a National Sample.” Journal of Health and Social Behaviour 45:198–213.

Noguchi, F., Nakashima, Y., Morimoto, Y., 1998. Loneliness and dementia in the elderly living in the home. Kurume Igakkaizassi 61, 123–131 in Japanese.

Ouderenfonds. (2019). Bijna helft ouderen in Nederland eenzaam. Retrieved at June 24, 2020. From: https://www.ouderenfonds.nl/activiteiten/eenzaamheid

Prieto-Flores, M. E., Forjaz, M. J., Fernandez-Mayoralas, G., Rojo-Perez, F., & Martinez-Martin, P. (2011). Factors associated with loneliness of noninstitutionalized and institutionalized older adults. Journal of Aging Health, 23(1), 177-194. doi: 10.1177/0898264310382658

Reed, S. B., Crespo, C. J., Harvey, W., & Andersen, R. E. (2011). Social isolation and physical inactivity in older US adults: Results from the third national health and nutrition examination survey. European Journal of Sport Science, 11(5), 347-353. doi: 10.1080/17461391.2010.521585

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change1. The journal of psychology, 91(1), 93-114.

Rogers, C. R., Gendlin, E. T., Kiesler, D. J., & Truax, C. (1967). The therapeutic relationship and its impact: A study of psychotherapy with schizophrenics. Madison: Univer.

Rokach, A., Matalon, R., Rokach, B., & Safarov, A. (2007). The effects of gender and marital status on loneliness of the aged. Social Behaviour and Personality: An International Journal, 35(2), 243–254. https://doi.org/10.2224/sbp.2007.35.2.243

Rosenstock, I. M. (1974). Historical origins of the health belief model. Health education monographs, 2(4), 328-335.

Schwarzer, R. (2001). Social-cognitive factors in changing health-related behaviours. Current directions in psychological science, 10(2), 47-51.

Shankar, A., McMunn, A., Banks, J., & Steptoe, A. (2011). Loneliness, social isolation,and behavioural and biological health indicators in older adults. Health Psychology, 30(4), 377-385. doi: 10.1037/a0022826

Skinner, B. F. (2019). The behaviour of organisms: An experimental analysis. BF Skinner Foundation.

Soygu¨t, G., & Uluc, S. (2009). Psychometric properties of the Turkish working alliance inventory-observer form. Tu¨rk Psikiyatri Dergisi, 20(4), 367–375.

Sum, S., Mathews, Mark. R., Pourghasem, M., & Hughes, I. (2008). Internet Technology and Social Capital:How the Internet Affects Seniors' Social Capital and Wellbeing. Journal of ComputerMediated Communication, 14(1), 202–220. https://doi.org/10.1111/j.1083-6101.2008.01437.x

Theeke, L. A. (2010). Sociodemographic and health-related risks for loneliness and outcome differences by loneliness status in a sample of U.S. older adults. Research in Gerontological Nursing, 3(2), 113-125. doi: 10.3928/19404921-20091103-99

Thorndike, E. L. (1970). Animal intelligence: Experimental studies. Transaction Publishers.

Touré-Tillery, M., & Fishbach, A. (2014). How to measure motivation: A guide for the experimental social psychologist. Social and Personality Psychology Compass, 8(7), 328-341.

Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the Working Alliance Inventory. Journal of Consulting and Clinical Psychology, 1(3), 207–210.

Umberson, D., & Karas Montez, J. (2010). Social relationships and health: A flashpoint for health policy. Journal of health and social behaviour, 51(1_suppl), S54-S66.

Union, I. (2014). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A new skills agenda for europe. Brussels.

Van Beljouw, I. M., Van Exel, E., De Jong Gierveld, J., Comijs, H. C., Heerings, M., Stek, M. L., & van Marwijk, H. W. (2014). "Being all alone makes me sad": loneliness in older adults with depressive symptoms. International Psychogeriatrics, 1-11. doi: 10.1017/S1041610214000581

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management science, 46(2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

Vertommen, G., & Vervaeke, H. (1996). De Werkalliantievragenlijst. Gedragstherapie, 29, 139–144.

Volksgezondheidenzorg. (2016). Eenzaamheid Cijfers & Context. Retrieved at June 24, 2020. From: https://www.volksgezondheidenzorg.info/onderwerp/eenzaamheid/cijferscontext/huidigesituatie#!node-eenzaamheid-naar-leeftijd

Waite, L. J. (1995). Does marriage matter?. Demography, 32(4), 483-507.

Walton, C.G., Shultz, C.M., Beck, C.M., Walls, R.C., 1991. Psychological correlates of loneliness in the older adult. Arch. Psychiatr. Nurs. 5, 165–170.

Weinstein, N. D. (2000). Perceived probability, perceived severity, and health-protective behaviour. Health Psychology, 19(1), 65.

Weiss, R. 1973. Loneliness: The Experience of Social and Emotional Loneliness. MIT Press, Cambridge, Massachusetts.

Weiss, R. 1989. Reflections on the present state of loneliness research. In Hojat, M. and Crandell, R. (eds), Loneliness: Theory, Research and Applications. Sage, London, 1–16.

Yang, K., & Victor, C. (2011). Age and loneliness in 25 European nations. Ageing & Society, 31(8), 1368-1388.

Appendix 2: Interview questions

Interview vragen Marian	
Adviezen eigen professionals	Heeft u in de afgelopen 5 weken adviezen gehad vanuit uw eigen zorgprofessionals omtrent bewegen en eten? • Ja → wat voor adviezen dan?

Drop-outs (alleen voor mensen die gestopt zijn)	Waarom bent u gestopt met het gebruiken van Council of Coaches?
	• Ik wil redenen achterhalen:
	  • Motivatie (motiveerde me niet genoeg)
	  • Onmacht (ziekte)
	  • Tijd
	  • Technologie (werkte niet goed, sloom, saai)

Voordelen Nadelen COUCH	Zou u Council of Coaches aanraden aan anderen? • Ja: Waarom wel? Kunt u een voorbeeld geven? • Nee: Waarom niet? Kunt u een voorbeeld geven? • Heeft u nog andere voor- of nadelen ervaren?
Reden gebruiken	Wat is voor u de belangrijkste reden om Council of Coaches te gebruiken?
Reden niet gebruiken	Wat is voor u de belangrijkste reden om Council of Coaches **niet** te gebruiken?
Interview vragen Silke	
Leukste coach	Welke coach vond u het leukst? • Waarom? (Door coaching domein, inhoud, karakter coach, uiterlijk coach) • Welke karaktereigenschappen had de coach volgens u/hoe kwam de coach op u over? (Vriendelijk, betrouwbaar, expertise) • Wat vond u van het uiterlijk van deze coach?
Minst leukste coach	Welke coach vond u het minst leuk? • Waarom? (Door coaching domein, inhoud, karakter coach, uiterlijk coach) • Welke karaktereigenschappen had de coach volgens u/hoe kwam de coach op u over? (Vriendelijk, betrouwbaar, expertise) • Wat vond u van het uiterlijk van deze coach?
Overig	Zijn er nog andere aspecten die u graag wilt melden over het uiterlijk of de karakters van de coaches?
Gebruiksgemak	Vond u de technologie makkelijk in gebruik?
Interview vragen Katrien	
User experience/ coach experience	Wat was de belangrijkste reden dat u een gesprek begon met Olivia?
	Kunt u zich nog herinneren wat u met Olivia besproken hebt? Wat vond u daarvan?
	Wat heeft voor u de coaching door Olivia opgeleverd? Kunt u hiervan een voorbeeld geven?

	Heeft u met Olivia een stappendoel gemaakt?
	• Ja:
	  ○ Hoe heeft u dat ervaren?
	  ○ Wat dit doel haalbaar?
	• Nee:
	  ○ Waarom niet

	Wilde u meer gaan bewegen door Olivia?
	  ○ Waarom wel? Kunt u een voorbeeld geven?
	  ○ Waarom niet? Kunt u een voorbeeld geven?

	Hebt u de tips van Olivia gelezen?
	• Ja/Nee:
	  ○ Wat vond u ervan?
	• Ja:
	  ○ Welke tips heeft u echt wat aan gehad?
	  ○ Welke tips heeft u niets aan gehad?
	  ○ Welke tips waren voor u niet duidelijk?

	Bent u meer gaan bewegen door Olivia?
	• Ja:
	  ○ Wat heeft u veranderd? Kunt u een voorbeeld geven?
	• Nee:
	  ○ Waarom niet? Kunt u uitleggen waarom?

Recommendations /improvements	Wat zou u willen veranderen aan Olivia? ▪ Uiterlijk ▪ Inhoud: doelen/tips
	Naar aanleiding van het gebruik van Olivia, hoe zou u het liefst fysiek gecoacht willen worden?
Interview vragen Ellis	
Evaluation	In hoeverre ervaart u weleens eenzame momenten? En op een schaal van 1 tot 10? ○ Hoe vaak ○ Vindt u dit vaak? ○ Wat vindt u hiervan?
	○ Met hoeveel mensen hebt u wekelijks contact? ○ Met hoeveel mensen hebt u dagelijks contact? ○ Wat voor dingen doet u als u met anderen afspreekt?

	○ Bent u tevreden met het aantal mensen waar u dagelijks of wekelijks contact mee hebt?
	○ Zou u graag vaker met anderen af willen spreken?
	○ Hoe belangrijk vindt u het om regelmatig met anderen af te spreken?
	  ○ En op een schaal van 1 tot 10?
	○ Hoe leuk vindt u het om regelmatig met anderen af te spreken?
	  ○ En op een schaal van 1 tot 10?
	○ Wat zouden redenen voor u kunnen zijn om geen contact met anderen te zoeken? (Expliciet redenen vanuit deze persoon)
	○ Als we het over een technologie als deze hebben, hoe zou zo'n technologie kunnen helpen om ervoor kunnen zorgen om het contact met anderen makkelijker/minder eng/leuker te maken?

	Hebt u gebruik gemaakt van de sociale coach? • Nee: Verder naar aanbevelingen

Experience	• Ja:
	  ○ Wat kunt u zich nog herinneren van de sociale coach?
	  ▪ Waarom
	  ○ Wat vond u leuk?
	  ▪ Waarom
	  ○ Wat vond u minder leuk?
	  ▪ Waarom

	• Weet u nog wat u gedaan hebt met de sociale coach? • Wat vond u van de doelen die u opgesteld heeft met de coach? • Wat vond u ervan om te werken aan deze doelen?

	○ En op een schaal van 1 tot 10?
Choice	○ Op wat voor manier hebt u gekozen om aan de doelen te werken? ○ Welke bewuste keuzes hebt u gemaakt die passen bij de doelen? ○ Als u denkt aan het opzoeken van meer contact met anderen, aan wat voor doelen zou u dan nog meer gewerkt willen hebben?
Performance	○ Hoe hebt u de doelen proberen te behalen? ○ Hoe nauwkeurig was u om de doelen te kunnen behalen? (Vond u het belangrijk om de doelen uit te werken zoals u ze opgesteld had?) ○ Hoe snel bent u steeds aan de slag gegaan om doelen te behalen? ○ Hoeveel doelen hebt u gesteld? ▪ Hebt u alleen aan de doelen gewerkt die u met de coach opgesteld hebt, of bent u ook met meerdere doelen bezig geweest? ○ Hebt u het gevoel dat u ook echt meer bent gaan ondernemen met anderen?
Evaluation (2)	○ Weet u waarom het belangrijk is om regelmatig dingen te ondernemen met anderen? ○ Hoe is uw manier hoe u hier over dacht veranderd tijdens het gebruik van COUCH?
Aanbevelingen (Experience (2)) Evaluation	○ Wat vindt u van de sociale coach? ○ Wat vindt u goed van de coach? ○ Wat vindt u minder goed? ○ Wat zou u graag willen veranderen als we dingen aan zouden passen? ○ Hoe had de app het nog meer leuker kunnen maken voor u (motiveren) om meer te doen met anderen?

Appendix 3: questionnaire couch (before use)

Demografieken

1. Wat is uw deelnemersnummer (staat op de achterkant van de handleiding)?

   ---

2. Wat is uw geslacht?
   - ☐ Man
   - ☐ Vrouw

3. Wat is uw leeftijd?

   …… jaar

4. Wat is uw hoogst genoten opleiding?
   - ☐ Lagere school
   - ☐ Lbo, mavo, vmbo
   - ☐ Mbo, havo, vwo
   - ☐ Hbo, wo

5. Wat is uw status?
   - ☐ Alleenstaand
   - ☐ Getrouwd/samenwonend
   - ☐ Samenwonend met mantelzorger
   - ☐ Anders

6. Welke van de volgende categorieën beschrijft uw werkstatus het best?
   - ☐ Werkzaam in loondienst
   - ☐ Werkzaam als vrijwilliger/mantelzorger
   - ☐ Gepensioneerd
   - ☐ Werkzoekende
   - ☐ Anders

16. *Hieronder zullen een aantal vragen volgen over positieve gezondheid. Omcirkel bij elke vraag het cijfer dat het best bij uw gezondheid past. Op een schaal van 1 (laag) tot 10 (hoog).*

---

e. Wat vindt u van uw sociale leven? Heeft u genoeg vrienden? Heeft u anderen om leuke dingen mee toe doen? Krijgt u hulp als u dat nodig heeft? En heeft u het gevoel ergens thuis te horen?

1	2	3	4	5	6	7	8	9	10

Appendix 4: questionnaire couch (after use)

7. Wat is uw deelnemersnummer (staat op de achterkant van de handleiding)?

   ---

10. *Hieronder zullen een aantal vragen volgen over positieve gezondheid. Omcirkel bij elke vraag het cijfer dat het best bij uw gezondheid past. Op een schaal van 1 (laag) tot 10 (hoog).*

---

e. Wat vindt u van uw sociale leven? Heeft u genoeg vrienden? Heeft u anderen om leuke dingen mee toe doen? Krijgt u hulp als u dat nodig heeft? En heeft u het gevoel ergens thuis te horen?

1	2	3	4	5	6	7	8	9	10

Gebruikerservaring

11. *Hieronder krijgt u stellingen die gaan over uw gebruikerservaring met COUCH. Omcirkel voor elke stelling het antwoord wat het best aan uw ervaring voldoet.*

Geschiktheid van de coaches

13. *De volgende stellingen geven een omschrijving over de wijze waarop u kunt denken of voelen omtrent de relatie met drie coaches: de fysieke coach, de voedingscoach en de sociale coach. Geef voor elk van de volgende stellingen per coach aan in hoeverre u het hier mee eens bent.*

	Sociale coach (Emma)
1. Een resultaat van het communiceren met de coach is dat het voor mij duidelijker is geworden hoe ik zou kunnen veranderen.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
2. Wat ik doe door de coach, geeft mij een nieuwe kijk op mijn probleem.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
3. Ik geloof dat de coach mij aardig vindt.	☐ Altijd

	☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
4. De coach en ik werken samen bij het bepalen van de doelstellingen.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
5. De coach en ik respecteren elkaar.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
6. De coach en ik werken naar de doelstellingen toe die we beiden goedkeurden.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
7. Ik voel dat de coach mij apprecieert.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
8. De coach en ik zijn het eens over wat voor mij belangrijk is om aan te werken.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
9. Ik voel dat de coach om mij geeft, zelfs wanneer ik dingen doe die hij/zij niet goedkeurt.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
10. Ik voel dat de dingen die ik via/met de coach doe, mij zullen helpen om de veranderingen die ik wil, te bereiken.	☐ Altijd ☐ Zeer vaak

	☐ Vaak ☐ Soms ☐ Nooit
11. De coach en ik hebben ons een goed begrip gevormd van het soort veranderingen die goed zouden zijn voor mij.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit
12. Ik geloof dat de manier waarop de coach en ik aan mijn probleem werken, de juiste is.	☐ Altijd ☐ Zeer vaak ☐ Vaak ☐ Soms ☐ Nooit

14. Geef voor elke coach aan of u gebruik heeft gemaakt van deze coach, of u nog langer gebruik wilt maken van deze coach (wanneer mogelijk), en wat voor rapportcijfer u de coach geeft.
    a. Heeft u gebruik gemaakt van de sociale coach (Emma Li)?

        ☐ Ja
        ☐ Nee

    b. Wanneer mogelijk, zou u dan nog langer gebruik willen maken van de sociale coach (Emma Li)?
        ☐ Ja
        ☐ Nee

    c. Wat voor rapportcijfer geeft u aan sociale coach (Emma Li)?

1 2 3 4 5 6 7 8 9 10