

Master's Programme in Information Networks

# **Promoting health behavior change via online health check and coaching**

Experiences and needs among the unemployed

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**Samuli Käsälä**

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### **Abstract**

Unhealthy behaviors are a significant factor in developing chronic diseases such as cancers and diabetes. Thereby, promoting healthier behaviors plays a key role in improving people's quality of life and reducing the number of premature deaths. One high-risk group for health problems are the unemployed. Therefore, the objective of this study is to gather insights on how digital services could support especially the unemployed in adopting healthier behaviors.

The study was conducted as an exploratory case study about the experiences of Duodecim Star – a digital service package for promoting the adoption of healthier behaviors – among the unemployed. The primary method for data collection were semi-structured interviews (N=10), which were conducted with unemployed people who had used Star online health check and had been offered access to Star online health coaching programs. This study explored the benefits and challenges that the unemployed perceive in Star and the support needs that they have in improving their health behavior.

The benefits of Star online health check were understandability and ease of use, but for people with high knowledge about their health its capability to offer new information seemed limited. The comparison between current life expectancy and potential life expectancy with improved health behaviors seemed to encourage some people to reflect upon their lifestyle choices and consider behavior changes.

Star online health coaching programs did not seem to be very attractive nor engaging among the unemployed, as none of the interviewees continued with the months-long programs past the first week. The main challenges were that the coaching programs lacked personal relevance and motivational support. Thus, in addition to providing general health information, more tailored and interactive support mechanisms seem to be needed.

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**Keywords** Health behavior change, behavior change techniques, online risk calculators, online health coaching

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### Tiivistelmä

Epäterveelliset elämäntavat ovat merkittävä syy monien kroonisten tautien taustalla. Siksi terveellisten elintapojen edistäminen on tärkeää ihmisten elämänlaadun parantamiseksi ja ennen aikaisten kuolemien vähentämiseksi. Tämän tutkimuksen tavoitteena on selvittää, millaista terveyskäyttäytymisen tukea digipalvelut voisivat tarjota erityisesti työttömille, sillä työttömien on todettu kärsivän erilaisista terveysongelmista keskimääräistä enemmän.

Kyseessä on eksploratiivinen tapaustutkimus, jossa selvitettiin työttömien kokemuksia Duodecim Star -digipalvelusta, joka pyrkii edistämään terveellisempiä elämäntapoja. Pääasiallinen data kerättiin haastattelemalla työttömiä (N=10), jotka olivat tehneet Star-terveystarkastuksen sekä saaneet mahdollisuuden Star-terveysvalmennusten hyödyntämiseen. Tutkimuksen tarkoituksena oli selvittää hyötyjä ja haasteita, joita työttömät kokevat Star-palvelun käytössä. Lisäksi tutkimus pyrki ymmärtämään, millaista tukea työttömät tarvitsisivat terveyskäyttäytymisensä parantamiseksi.

Star-terveystarkastuksen hyviä puolia olivat ymmärrettävyys ja helppokäyttöisyys. Hyvin terveydestään perillä oleville henkilöille se ei kuitenkaan vaikuttanut tarjoavan paljonkaan uutta tietoa. Eliniänodotteen sekä paremmilla elintavoilla saavutettavissa olevan eliniänodotteen vertailu vaikutti saavan osan haastatelluista harkitsemaan terveyskäyttäytymisen muutosta.

Star-terveysvalmennuksia työttömät eivät pitäneet kovinkaan houkuttelevina tai innostavina, sillä valmennusten koettiin tarjoavan lähinnä yleistä terveystietoa. Työttömät vaikuttavat kaipaavan henkilökohtaisempaa ohjausta sekä enemmän motivointia käyttäytymismuutokseen.

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**Avainsanat** Terveyskäyttäytymisen muutos, käyttäytymismuutoksen tekniikat, digitaaliset riskilaskurit, digitaalinen terveysvalmennus

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## Preface

What an emotional roller-coaster ride this thesis project has been. Firstly, overcoming the paralyzing fear of getting started and finding excitement in an interesting and meaningful research topic. Approximately six months of drifting in the sea of uncertainty – sometimes finding a sense of direction, at times losing it. Countless times of almost drowning in the swells of self-doubt, anxiety, and despair. Occasional moments of riding the waves of confidence, joy, and inspiration. Eventually, handing in the thesis and thereby docking at the port of graduation. Luckily, I did not have to go through this thesis journey alone. Thus, I would like to thank especially the following people:

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Helsinki, 6 June 2022  
Samuli Känsälä

## **Abbreviations**

BCT	Behavior change technique
CVD	Cardiovascular disease
FBM	Fogg behavior model
HBM	Health belief model
PMT	Protection motivation theory
SDT	Self-determination theory
TTM	Transtheoretical model
WHO	World Health Organization

# 1 Introduction

Noncommunicable diseases such as cardiovascular diseases (CVDs), cancers, diabetes and chronic lung diseases are largely caused by four lifestyle-related risk factors: unhealthy diet, lacking physical activity, tobacco use, and excessive use of alcohol (WHO, 2010). Thereby, steering people's health behavior – i.e., actions affecting their health – in a beneficial direction plays a key role in improving people's quality of life and reducing the number of premature deaths (WHO, 2010). In recent decades, various applications of health information technology have shown vast potential in promoting healthier behaviors (Kreps and Neuhauser, 2010).

Research suggests that intentions to improve one's health behavior stem from awareness and concern of the consequences of one's current health behavior, e.g., risks of developing lifestyle-related diseases. (Sheeran et al., 2014). However, effective health risk communication should not only invoke worry but also emphasize the potential upsides of changing health behavior (Sheeran et al., 2014). To meet these goals, web-based health risk calculators have emerged as a promising tool (Damman et al., 2017; Shefer et al., 2016; Bonner et al., 2021). However, providing understandable risk information that affects people's risk perceptions in the desirable way has proven to be challenging (Damman et al., 2017; Shefer et al., 2016).

Forming mere intentions to improve one's health behavior is not enough, as people often fail to turn intentions into concrete actions – thus, additional support might be needed (Sheeran and Webb, 2016). Addressing this issue, various digital health interventions have been developed with the aim of educating people about healthier behaviors as well as motivating and supporting them in making the health behavior change. However, despite the promises of tailored yet scalable solutions, many efforts of promoting healthier behaviors digitally remain on the superficial level of providing generic health advice (Neuhauser and Kreps, 2010).

The context of this study, a Finnish online service package called Duodecim Star, aims to promote the adoption of healthier behaviors holistically. Firstly, it provides an online health check that calculates the user's life expectancy and risks of developing lifestyle-related diseases. Secondly, based on the health check's results, it recommends online health coaching programs that the user could benefit from. In other words, Star follows the proposed behavior change process outlined in the previous paragraphs: risk communication sparking the intention to change, followed by additional advice and support in the form of coaching programs. A large-scale study by Tornainen-Holm

et al. (2016) showed promising results that the Star intervention led to long-term improvements in both mental and physical health.

Many studies praising the potential of digital health interventions – including the above-mentioned Tornaiinen-Holm’s et al. (2016) – stem from study settings, which have included volunteering participants that are healthier, have higher motivation to self-manage health, and have higher education than the general population (Afshin et al., 2016). Consequently, the groups that are less likely to use digital health interventions tend to be excluded from the studies. However, as Reiners et al. (2019) note, the people who are least likely to use these services would benefit most from using them. Therefore, the full potential benefit of digital health interventions remains often unrealized.

An example of a high-risk group for health problems are the unemployed, as especially long-term unemployment seems to be associated with heightened morbidity and mortality (Herbig et al., 2013; Roelfs et al., 2011). According to Åhs and Westerling (2006), the unemployed are also less likely to use health care services despite a higher perceived need for them than among the average population. Consequently, tailoring better health care services for the unemployed could have a significant positive impact.

Thus far, there is very limited amount of research on how digital health interventions should be tailored to the needs of the unemployed. On the contrary, there is some evidence that unemployment might be a hindering factor as for the efficacy of online self-care interventions (Turnbull et al., 2020; Lawford et al., 2018). As Reiners et al. (2019) conclude, promoting digital equality calls for the personalization of digital health interventions for target groups that may lack economic resources, abilities, or sense of empowerment. Thus, this study aims to gather insights on how digital services could support especially the unemployed in adopting healthier behaviors.

## **1.1 Research objectives and scope**

This study is part of a larger research project (Kuhlberg et al., 2021), which aims to validate Star’s ability to recognize health risks, evaluate its usability and user experience as well as explore its ability to motivate the unemployed to improve their health behavior. This study focuses on the last research objective, exploring how the usage of Star affects personal health perceptions and health behavior among the unemployed. Additionally, this study aims to gather more generalizable understanding about the forms of digital support that the unemployed would find useful in improving their health behavior. Thereby, the research problem is as follows:

*How could an online health check and health coaching motivate and support the unemployed to improve their health behavior?*

The research problem is divided into three distinct research questions:

*RQ1: What kind of benefits and challenges do the unemployed perceive in the online health check?*

*RQ2: What kind of benefits and challenges do the unemployed perceive in the online health coaching?*

*RQ3: What kind of digital support would the unemployed need in improving their health behavior?*

RQ1 and RQ2 explore possible future directions for Star's development that could help in tailoring the service package to fit the needs of the unemployed better. RQ3 complements the first two research questions by exploring experiences of health support that are not directly related to Star. Thereby, it provides insights of health support needs that are not necessarily considered in the current versions of Star health check and Star coaching programs.

This research is conducted as an exploratory case study. The research questions are studied predominantly through semi-structured interviews, conducted with unemployed people who completed Star online health check and were offered access to Star health coaching programs. Additionally, the qualitative interview data is supported with a quantitative questionnaire about the user experience of Star, filled by the unemployed immediately after the health check.

## **1.2 Structure of the study**

This study is divided into eight chapters: Introduction, Literature review, Methodology, three chapters about results (one for each research question), Discussion, and Conclusion.

Chapter 1 presents the background and motivation behind the study. Additionally, it outlines the research scope and objectives.

Chapter 2 presents an overview of existing literature about health behavior change. It discusses various health behavior theories as well as health risk calculators and health interventions as digital tools to facilitate health behavior change.

Chapter 3 provides an overview of Star health check and Star health coaching programs. Additionally, the study setting, research approach, and methodology of the empirical part of this study are explained.

Chapters 4, 5 and 6 present results to RQ1, RQ2 and RQ3. The chapters are structured around themes that emerged from the interviews through thematic analysis.

Chapter 7 summarizes the answers to the research questions and compares the findings to existing literature. Additionally, limitations of the study and potential directions for future research are discussed.

Chapter 8 provides a concise summary of the study's contributions.

## **2 Literature review**

The current understanding of health behavior and the process of health behavior change is encompassed in a multitude of health behavior theories. These theories aim to explain, which factors contribute to health behavior and how these factors relate to each other (Noar and Zimmerman, 2005). Thus, health behavior theories lay the theoretical foundation upon which health information technology aiming to improve people's health behavior should be built. Evidence suggests that interventions based on behavior change theories are more effective than interventions with no reported theoretical basis (Prestwich et al., 2014; Webb et al., 2010).

This chapter discusses how health information technology can encourage people to take actions that are beneficial rather than detrimental to their health. The literature review is structured around the temporal progress of behavior change, which is depicted in, e.g., Prochaska's and Velicer's (1997) transtheoretical model (TTM). Therefore, the TTM will be used as a theoretical framework linking together other health behavior theories that relate to specific phases of the health behavior change.

According to the TTM, health behavior change has five stages: precontemplation, contemplation, preparation, action, and maintenance. The subsequent subchapters discuss various health behavior theories that aim to explain specifically the transition from contemplation to actions. Additionally, the subchapters discuss how online technologies can trigger contemplation of behavior change and support the transition to actions. The final subchapter presents a summarizing model of how online services should facilitate health behavior change.

### **2.1 Risk perceptions' role in health behavior change**

The transtheoretical model (TTM) by Prochaska and Velicer (1997) proposes that the first stage of health behavior change is awareness of the consequences of one's health behavior (i.e., stage of precontemplation). If the consequences of health behavior are perceived as risky and undesirable, these perceptions might lead an intention to change health behavior, (i.e., stage of contemplation). Therefore, from the perspective of preventive health care, it is essential to make people aware of their personal risks of developing lifestyle-related diseases (Damman et al., 2017). This subchapter sheds light on the relationship between health risk perceptions and health behavior. It focuses on two health behavior theories that explicitly include risk perception in their behavioral models: the protection motivation theory (PMT) by Rogers (1975) and the health belief model (HBM) by Rosenstock (1974).

The protection motivation theory (depicted in Figure 1) suggests that the motivation to protect oneself from health risks is comprised of threat appraisal (i.e., perceptions of the potential harm) and coping appraisal (i.e., perceptions of the recommended behavior change to prevent the potential harm) (Prentice-Dunn and Rogers, 1986). The threat appraisal is described as an equation, in which the rewards and potential harm of performing an unhealthy behavior are weighed against each other. The theory divides the conception of potential harm further into two separate components: perceived vulnerability to a health problem and perceived severity of the potential health problem.

In turn, coping appraisal encapsulates the overall conception of the contributing and hindering factors related to making the recommended behavior change (Prentice-Dunn and Rogers, 1986). The contributing factors include response efficacy (i.e., perceived efficacy of the recommended behavior change in preventing the health threat) and self-efficacy (i.e., one's confidence in being able to perform the recommended behavior), whereas hindering factors are labeled as response costs in the PMT.

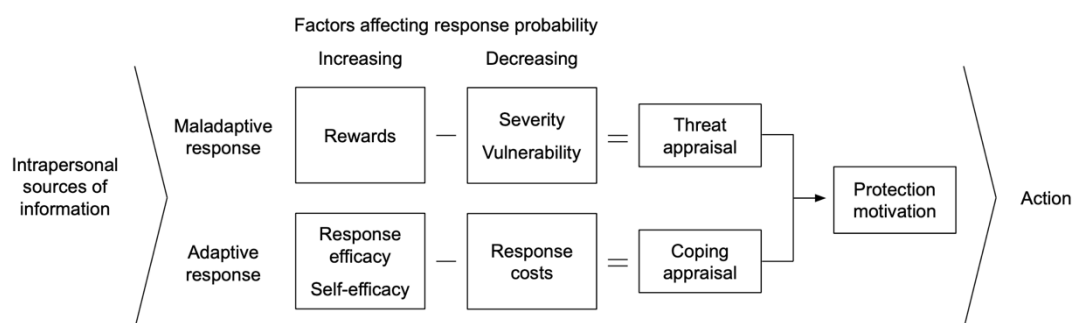


Figure 1. Protection motivation theory (PMT). Adapted version of the scheme used by Prentice-Dunn and Rogers (1986).

The health belief model (depicted in Figure 2) has almost the same components as the PMT, although conception of the overall process and phrasings differ to some extent, as Prentice-Dunn and Rogers (1986) note. Similarly to the PMT, in the HBM both perceived susceptibility and severity affect the perception of the health risk (Janz and Becker, 1984). The PMT's response efficacy and response costs have direct counterparts in the HBM as well: perceived benefits and barriers of the recommended action (Prentice-Dunn and Rogers, 1986).

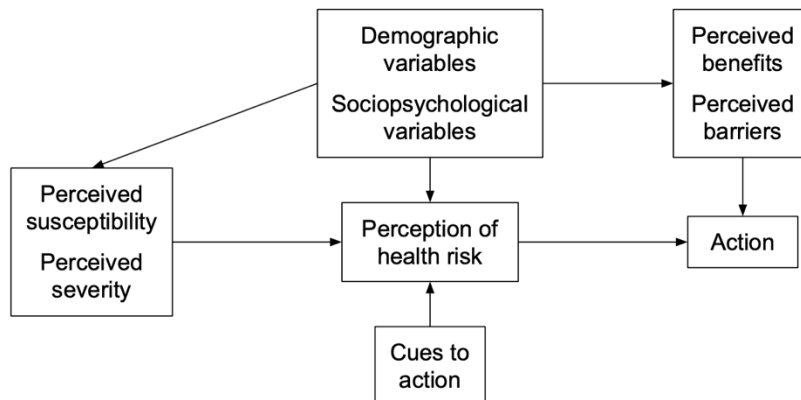


Figure 2. Health belief model (HBM). Adapted version of the scheme used by Janz and Becker (1984).

Despite the many similarities, there are some noticeable differences between the two theories. Unlike the PMT, the HBM includes a component “*cues to action*”, which implies that some kind of a trigger is necessary to initiate the recommended health behavior change (Prentice-Dunn and Rogers, 1986). On the other hand, the PMT suggests that its factors have a direct impact on merely protection motivation, i.e., behavioral intentions (Prentice-Dunn and Rogers, 1986). Another difference is the element of self-efficacy, which is included in the PMT but not in the original version of the HBM (Figure 2). However, the HBM has been adapted over the years and self-efficacy has been added to it at a later stage (Noar, 2004). As Prentice-Dunn and Rogers (1986) argue, a strong self-efficacy should lower the barriers to make the recommended behavior change.

Precisely as the PMT and the HBM propose, existing research suggests that people’s perceptions of the likelihood and severity of their personal health risks are a significant determinant of their health behavior (Brewer et al., 2007; Sheeran et al., 2014). In other words, heightened perceptions of health risks and their severity seem to facilitate changes in both health behavior intentions and in actual health behavior (Sheeran et al., 2014). However, the communication of personalized risk information is challenging because people make sense of risk messages in very different ways depending on their backgrounds and characteristics (Damman et al., 2017).

Both the PMT and the HBM recognize the influence of such factors. In the PMT, the modifying factors are described as intrapersonal sources of information (Prentice-Dunn and Rogers, 1986). In turn, the HBM defines these modifying factors as demographic and sociopsychological variables (Janz

and Becker, 1984). Among these individual characteristics is the ability to make sense of health information and act based on it, which is commonly described with the construct of health literacy (Ratzan and Parker, 2006; Baker, 2006). The exact definitions of health literacy vary but Ratzan and Parker (2006) describe it as *“the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions”*.

## **2.2 Risk communication with risk calculators**

While the previous subchapter focused on the first two stages of the TTM (precontemplation and contemplation) from a theoretical perspective, this subchapter has a more practical approach. According to Prochaska and Velicer (1997), people at the first two stages are not yet ready to engage in programs that support the adoption of healthier behaviors. However, there are other digital solutions than action-based programs that can facilitate health behavior change at the first two stages of the TTM. For example, online risk calculators have emerged as a promising tool to inform people about their health risks and thereby create intention for health behavior change (Damman et al, 2017). This subchapter discusses the empirical findings of how people interpret information provided by health risk calculators and how this risk communication affects their risk perceptions.

Despite the large and rapidly growing number of different disease risk calculators online, the mechanisms determining whether risk communication is translated into better risk understanding remain unclear (Damman et al., 2017). The mechanisms of disease risk interpretation have been researched extensively – especially concerning cardiovascular disease (CVD) risk. This subchapter gives an overview of the current understanding about risk interpretation mechanisms – focusing primarily on CVD risk calculators due to the amount of existing literature on the topic.

As Waldron et al. (2011) explain, communication of cardiovascular risk is particularly challenging for various reasons. Firstly, the vast number of factors determining the cardiovascular risk causes many people to miscomprehend the CVD risk as a whole. Secondly, as CVDs tend to develop insidiously in the course of decades, the level of risk in the absence of symptoms is very intangible and often misperceived.

The risk percentages commonly used in online risk calculators seem to be difficult to understand for many lay people (Damman et al., 2017; Shefer et al., 2016). Damman et al. (2017) discovered that a bar graph displaying the level of cardiometabolic risk between 0 and 100 percent led to considerable undervaluation of risks: even notably heightened risks (12–23%) were

perceived as low due to the result being in the lower part of the graph. The same phenomenon was identified by Shefer et al. (2016) in their testing of a coronary heart disease risk calculator: numerous participants falsely interpreted 50% as some kind of baseline or threshold, which led even alarming risk evaluations to be perceived as normal.

Due to the above-mentioned challenges, many CVD risk calculators have converted the disease probability into a more tangible format: heart age (Bonner et al., 2021). In Shefer's et al. (2016) study, a high heart age seemed to create a stronger emotional response than a large risk percentage. Similarly, Bonner's et al. (2021) meta-analysis of 16 CVD risk calculator studies suggests that heart age may be a superior format to risk percentage in regard to capturing attention and provoking an emotional response for some people.

In addition to the risk percentages, interpretation of other kinds of numerical information seems to cause problems as well (Damman et al., 2017; Shefer et al., 2016). According to Damman et al. (2017), lay people struggled to recall and understand numerical cardiometabolic risk information. The researchers noticed that some people recalled numbers correctly but applied them to the wrong context (e.g., confusing risk percentage with body mass index or time frame of the risk with risk percentage). Similarly, Shefer et al. (2016) observed people misinterpreting numerical data due to neglecting comparative and supporting information, which would have given context and meaning to the numbers. All things considered, both Shefer et al. (2016) and Damman et al. (2017) speculate that presenting multiple formats of risk information simultaneously might lead to confusion and misperceptions, whereas a simpler representation could be more understandable and impactful.

Regardless of the numerical information provided by the risk calculator, people seemed to continue to hold tightly to their existing beliefs and knowledge about diseases (Damman et al., 2017). The absence of physical complaints and not having a family history of a particular disease led people to perceive its risk as more abstract and thereby less severe: e.g., in general, people were more concerned with cancer than with cardiometabolic diseases that they had a very unclear picture of (Damman et al., 2017). The researchers conclude that people seem to perceive new risk information more skeptically if it contradicts their prior knowledge and beliefs.

### **2.3 Risk calculators as triggers for behavior change**

According to the Prochaska's and Velicer's (1997) transtheoretical model (TTM), health behavior change starts with awareness of the health risks caused by current behavior, which then might lead to an intention to change behavior. Thereby, the objective of the risk calculators is not only to inform

people of their personal disease risks and improve their understanding of ways the risks can be reduced – the ultimate goal is to encourage people to start making healthier lifestyle choices (Damman et al., 2017). Due to this dual objective, risk communication should not only raise awareness and concern of the health risks (Sheeran et al., 2014). Instead, the risk communication should additionally emphasize the advantages and efficacy of the recommended health behavior change (Sheeran et al., 2014).

According to Sheeran's et al. (2014) meta-analysis, risk communication's impact on health behavior seems to have four determinants: making people believe they are at risk, making them feel concerned about the threat, making them feel guilty for not taking action and making them believe the severity of the potential harm. Believing to be at risk seemed to have strongest impact on behavioral intentions and actual behavior change. The effect was strengthened especially when combined with heightened concern and heightened perception of the severity. The evidence of guilt as a determinant of intention was weaker than for the other three elements (Sheeran et al., 2014). Overall, these findings strongly support the PMT's and the HBM's descriptions of risk appraisal as a significant determinant of health behavior.

Sheeran et al. (2014) note that risk appraisals appear not to be the only determinant of health behavior – perceptions of the process of modifying behavior (i.e., coping appraisals) matter as well. Thus, the researchers suggest that risk communication should aim to heighten both risk appraisals and coping appraisals in order to boost intention for behavior change as much as possible. According to Sheeran et al. (2014), coping appraisals can be heightened effectively in three ways: strengthening people's faith in the efficacy of the recommended behavior change (i.e., response efficacy), boosting their confidence in making the change (i.e., self-efficacy) and reducing the perceived disadvantages of making the change (i.e., response costs). In other words, all three elements of coping appraisal suggested in the PMT seem to have an impact on health behavior intentions.

Altogether, Sheeran's et. al (2014) meta-analysis seems to prove that determinants of health behavior identified in the HBM and the PMT have an impact on health behavior intentions and actual health behavior – both individually and especially when combined. Additionally, Sheeran's et al. (2014) findings seem to fit well to Fogg's (2009) Fogg behavior model (FBM), which suggests that behavior in general is a product of three determinants: motivation, ability, and triggers. FBM is depicted in Figure 3.

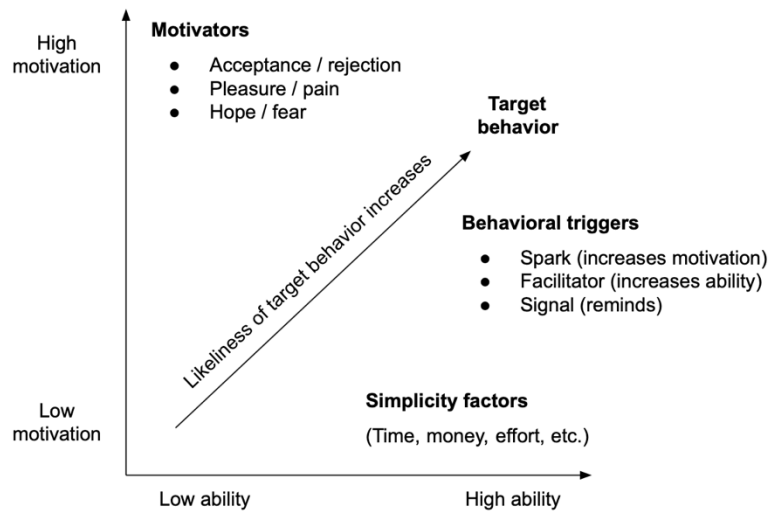


Figure 3. Fogg behavior model (FBM). Adapted version of the scheme used by Fogg (2009).

The basic idea of the FBM is simple: the more motivation and ability there is, the more likely a sufficient trigger causes the desired behavior (Fogg, 2009). A sufficient trigger can encourage target behavior by either sparking motivation, facilitating ability, or by simply acting as a reminder for people that already have adequate motivation and ability (Fogg, 2009). In the context of risk calculators, risk communication is the trigger and healthier lifestyle choices are the target behavior. Applying Sheeran’s et al. (2014) findings to the FBM, it seems that heightening risk appraisal sparks motivation for change primarily through fear, whereas heightening coping appraisal facilitates the perceived ability to change behavior.

Shefer et al. (2016) noticed that many participants in their study made significant changes to their health behavior regardless whether they were concerned about their coronary heart disease risk score. The follow-up interviews revealed that many people were aware of the need for some lifestyle changes (i.e., had some motivation) and had ideas how to implement those changes (i.e., had adequate ability) – thereby, the study was primarily a reminder to take action (Shefer et al., 2016). This observation seems to align with Fogg’s (2009) FBM’s suggestion that people with sufficient motivation and ability do not need the trigger to boost motivation or ability but to act as a mere reminder.

Altogether, the equation between disease risk communication and consequent health behavior change seems complicated. As Damman’s et al. (2017) and Shefer’s et al. (2016) studies show, the mere understanding of risk

information can be challenging if the risk calculator overestimates people's health literacy. Additionally, even if the risk communication is understood correctly, contradictions to prior beliefs and knowledge can prevent the internalization of the health risks (Damman et al., 2017). As the example of heart age shows, a more concrete format of risk communication might make the risk more tangible and thereby cause more worry, but it does not seem to be enough as such to directly motivate lifestyle change (Shefer et al., 2016). According to Bonner's et al. (2021) meta-analysis, there is no clear evidence that that heart age as a more startling risk indicator would motivate lifestyle change any more than an absolute CVD risk percentage. Thus, as Bonner et al. (2021) conclude, risk communication should be supported by other behavior change techniques in order to achieve the eventual goal – changes in lifestyle.

## **2.4 Techniques for promoting health behavior change**

As Sheeran's et al. (2014) meta-analysis highlights, the communication of health risks via risk calculators has a greater impact on health behavior intentions than on actual health behavior. In other words, there is a clear gap between intentions and concrete actions although intention is a strong predictor of behavior (Sheeran and Webb, 2016). Therefore, additional support to further facilitate the health behavior change is often needed.

According to Prochaska and Velicer (1997), the TTM's third stage of behavior change – preparation (i.e., intention to change health behavior in the immediate future) – is the optimal stage to offer health coaching programs for people and make them commit to the goal of improving health behavior. Thereby, this subchapter focuses on the stage of preparation as well as the subsequent stages of action (making the behavior change) and maintenance (sustaining healthy behaviors and preventing relapse). It gives an overview of behavior change techniques (BCTs) that existing research suggests to be effective in promoting health behavior change.

In addition to merely presenting techniques for health behavior change, this chapter reflects on the techniques through the lens of the self-determination theory (SDT) by Ryan and Deci (2000). The SDT suggests that turning intentions into actions and maintaining the behavior changes in the long-term is facilitated by the satisfaction of three basic psychological needs (Ryan and Deci, 2000). These three needs are autonomy (feeling empowered and having freedom of will), competence (feeling capable and in control), and relatedness (feeling valued and connected to others).

In their meta-analysis of 74 studies of SDT-based health interventions, Gillison et al. (2019) created a taxonomy of 18 techniques for health behavior

change (depicted in Table 1) and explored the effectiveness of these techniques. The researchers conclude that simply increasing the number of techniques does not seem to lead to stronger outcomes – instead, the techniques act in synergy. However, on the contrary, Webb’s et al. (2010) meta-analysis of 85 internet-based health interventions suggests that a larger number of behavior change techniques would be associated with greater efficacy of the intervention.

Gillison et al. (2019) made some interesting observations on how individual BCTs contribute to the satisfaction of psychological needs. For example, for autonomous motivation, use of non-controlling language and providing rationale for the health behavior change were strengthening factors (Gillison et al., 2019). Conversely, providing structure for the process of change and information about consequences of health behaviors seemed to undermine autonomous motivation (Gillison et al., 2019). Facilitation of group interaction and peer-to-peer activities seemed to have a positive effect on relatedness but a negative effect on the sense of individual competence (Gillison et al., 2019).

Other researchers have created very similar taxonomies of BCTs than Gillison et al. (2019). For example, Abraham and Michie (2008) have composed a list of 26 BCTs, which largely overlaps with Gillison’s et al. (2019) taxonomy. Abraham’s and Michie’s (2008) list includes techniques supporting autonomy (e.g., prompting intention formation, goal setting, and reflection of behavioral goals), competence (e.g., tailoring task difficulty, prompting barrier identification, and providing information and feedback) as well as relatedness (e.g., encouraging seeking of social support). However, in contrast to Gillison’s et al. (2019) taxonomy, Abraham’s and Michie’s (2008) list includes general support techniques such as helping with stress and time management regarding the health behavior change. Webb’s et al. (2010) meta-analysis suggests that these general support mechanisms, such as helping with stress management, are associated with greater intervention efficacy.

Table 1. SDT behavior change techniques to promote the satisfaction of psychological needs (Gillison et al., 2019).

<b>Behavior change technique</b>	<b>Description of technique</b>	<b>Targeted psychological need</b>
Choice	Give participant choices and options	Autonomy
Acknowledge participant's perspective	Recognize participant's perspective and challenges	Autonomy
Provide a rationale	Provide information about the consequences on health	Autonomy
Use of non-controlling language	Emphasize participant's right to choose	Autonomy
Intrinsic goal orientation	Encourage identification of intrinsic goals	Autonomy
Structure	Provide support for initiating and planning the actions	Autonomy
Emphasize responsibility	Encourage participant to take leadership and make decisions	Autonomy
Explore reasons	Encourage reflection of reasons for changing behavior	Autonomy
Motivational interviewing	Give social and emotional support	Autonomy
Task climate	Match goals with participant's own standards	Competence
Provide optimal challenge	Tailor task difficulty to participant's abilities	Competence
Provide informational feedback	Provide personal rather than general feedback	Competence
Provide information	Provide relevant information to participant's situation	Competence
Barrier identification	Encourage identification of barriers to changing behavior	Competence
Provide support and encouragement	Provide general support and encouragement	Competence
Involvement	Build rapport and provide emotional support	Relatedness
Encourage social support seeking	Encourage seeking of social support	Relatedness
Group co-operation	Encourage involvement in peer-to-peer activities	Relatedness

According to the SDT, health behaviors – as well as other behaviors – can be motivated either intrinsically or extrinsically (Ryan and Deci, 2000). Intrinsically motivated behaviors do not require any self-regulation as they are inherently enjoyable (Ryan and Deci, 2000). However, if health behaviors are not inherently satisfactory, they require extrinsic motivation and some form of regulation. The regulation can be external (e.g., regulation through external rewards or punishments) or internal (e.g., self-regulation supporting the fulfillment of personal values and needs).

Interestingly, Abraham and Michie (2008) propose the provision of contingent rewards as a BCT, whereas Ryan’s and Deci’s (2000) SDT suggests that emphasizing external sources of motivation with performance-based rewards would undermine the goal of creating long-term behavioral changes. Ng’s et al. (2012) meta-analysis supports Ryan’s and Deci’s (2000) argumentation, suggesting that promoting autonomous (i.e., internal rather than external) forms of regulation increases the chances that the motivation to maintain the health behavior changes is sustained in the long term.

## **2.5 Design considerations for online health interventions**

While the previous subchapter presented different health behavior change techniques, this chapter discusses how those techniques should be implemented as design features in online health interventions. The goal of the discussed design considerations is to increase the attractiveness and persuasiveness of the interventions. After all, if the interventions are not engaging, the users are likely to abandon them and consequently unlikely to succeed in changing their health behavior.

According to Morrison (2015), at least the aspects of tailoring, self-management, and social support should be considered when designing online health interventions. Morrison (2015) argues that tailoring is a desirable design goal as it aims to increase the perceived personal relevance of the intervention. At the simplest level, tailoring could mean addressing the user by name, whereas a more complex approach could be adapting the intervention content algorithmically according to users’ characteristics. However, tailoring is not a question of the more, the better, as excessive or poorly tailored content might lead to lower perceived credibility of the intervention (Oenema et al., 2005).

Regarding self-management, Morrison (2015) recommends many of the same features as Gillison et al. (2019) in their list of behavior change techniques (BCTs). The recommendations include providing a rationale for behavior change, providing a list of challenging yet achievable goals that the users can choose from, and providing tailored feedback that is positive and

enhances the sense of self-efficacy. However, Morrison (2015) points out that these objectives are not as simple to implement as they might seem. For example, excessive encouraging feedback might become an external source of motivation and thereby undermine autonomous motivation as proposed by the self-determination theory (Ryan and Deci, 2000). Similarly, freedom of choice regarding goal setting might support autonomous motivation for some people but be troublesome for others who wish for more rigorous guidance.

Thirdly, Morrison (2015) touches upon the aspect of social support in online health interventions. Morrison (2015) argues that the need for social support is very dependent on the person's demographic characteristics, health problem's characteristics as well as the stage of the behavior change. Social support within an intervention can be useful when the users lack peer support outside the intervention or when the health problem is stigmatized (Morrison, 2015). On the other hand, inadequately designed social support features can lead to conflicts, guilt for inactive participation, or stress due to lack of reciprocity (Morrison, 2015). As Gillison et al. (2019) note, promoting relatedness excessively via social support features can impact one's individual sense of competence negatively.

All things considered, Morrison's (2015) recommendations seem to emphasize that successful design regarding tailoring, self-management and social support requires thorough understanding of the intervention's target population and its characteristics. Moreover, Morrison's (2015) recommendations seem to align with Gillison's et al. (2019) conclusion that the synergistic whole of BCTs is more important than the number of techniques applied in interventions.

## **2.6 Model for digitally facilitating health behavior change**

This subchapter presents a model that summarizes the whole literature review (Figure 4). Firstly, the model describes the different stages of health behavior change and patient-related factors affecting the process throughout. Secondly, it depicts how health behavior change can be facilitated at the different stages of the process. Thirdly, the model gives design propositions for how online risk calculators can effectively ignite the intention to change health behavior and how online interventions can further support health behavior change.

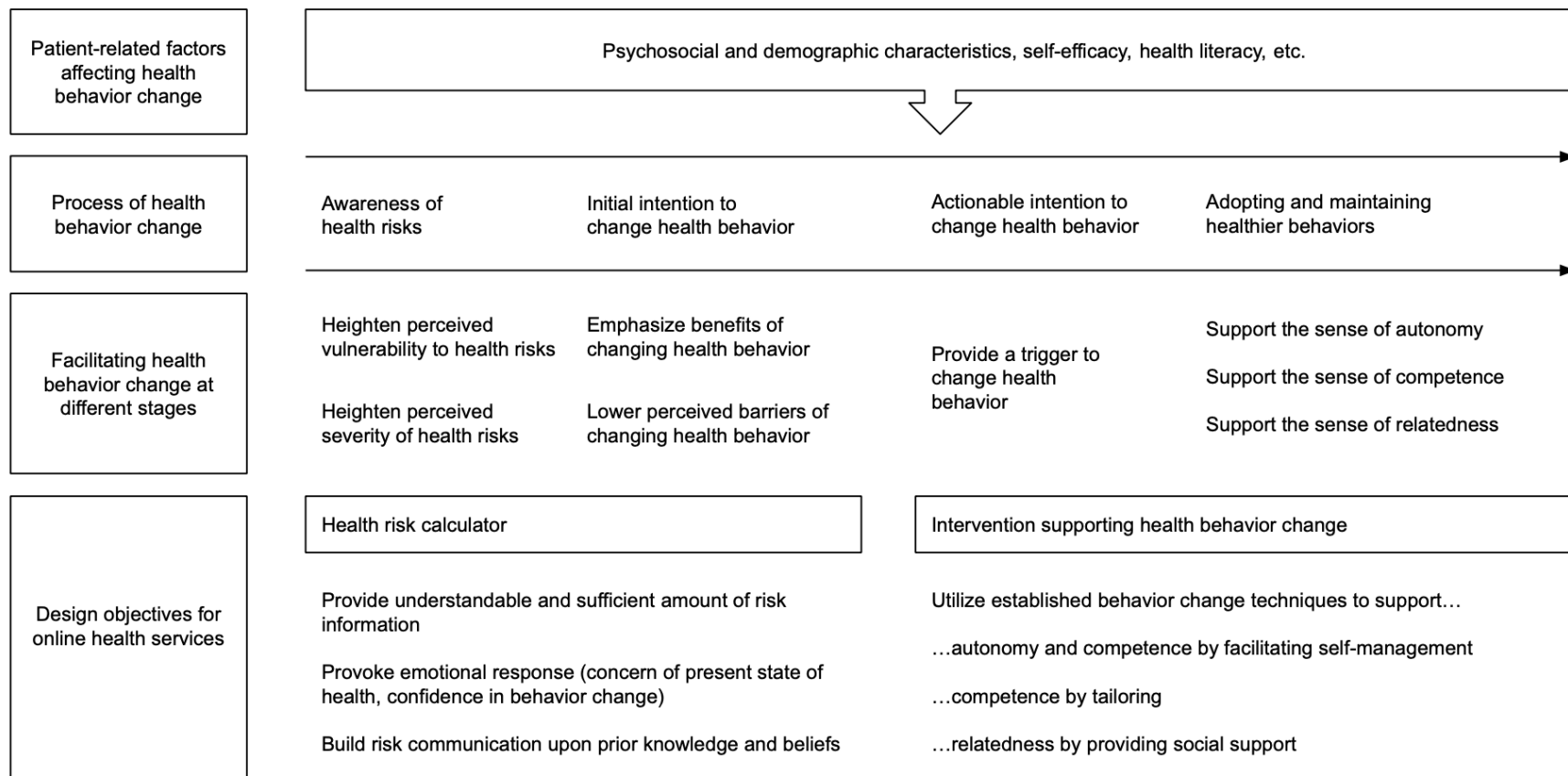


Figure 4. A model depicting how health behavior change can be facilitated with online health risk calculators and online health interventions at different stages

The model combines elements of the health behavior theories discussed in previous subchapters. The patient-related factors affecting health behavior change are included in the model as modifying background variables similarly as in the protection motivation theory (PMT) by Rogers (1975) and the health belief model (HBM) by Rosenstock (1974). The process of health behavior change is represented as a set of distinct phases as in the transtheoretical model (TTM) by Prochaska and Velicer (1997). The facilitating mechanisms in the contemplative stages of behavior change are adopted from the PMT and the HBM. The model's trigger for action is similar as behavioral triggers in the Fogg behavioral model (FBM) by Fogg (2009) and "*cues to action*" in the HBM. Lastly, the model's strategies for supporting the adoption and sustenance of healthier behaviors are supporting autonomy, competence, and relatedness as in the self-determination theory (SDT) by Ryan and Deci (2000)

The design objectives for online health risk calculators and online health interventions stem from existing literature discussed in previous subchapters. In order to heighten both perceived vulnerability to health risks and perceived severity of health risks, risk calculators should provide risk information that is understandable and simple enough (Damman et al., 2017; Shefer et al., 2016). In addition to raising awareness of the health risks, risk calculators should cause concern of the health risks in order to ignite an intention to change health behavior (Sheeran et al., 2014). Moreover, risk calculators should build confidence in making the behavior change and convince that the behavior change is worth making (Sheeran et al., 2014). Lastly, risk calculators' communication should be tailored according to the patient-related factors such as prior knowledge and beliefs. (Damman et al., 2017).

For online health interventions supporting health behavior change, the design decisions depend largely on the topic of intervention (Morrison, 2015). However, generally, the interventions should support the basic psychological needs for autonomy, competence and relatedness (Gillison et al., 2019). Based on Morrison's (2015) design recommendations, features facilitating self-management would answer to the needs for autonomy and competence. In turn, tailoring could strengthen the sense of competence in particular (Morrison, 2015). The need for relatedness should be fulfilled with appropriate social support – either within the intervention or by encouraging seeking or social support elsewhere, as Morrison (2015) suggests. The more detailed techniques for facilitating self-management, tailoring intervention content and providing social support are presented in subchapter 2.4 (Table 1).

### **3 Methodology**

This study was conducted as a qualitative and exploratory single-case study. The studied phenomenon was promoting health behavior change via online health check and coaching, case system being Duodecim Star and the focus group being the unemployed. The data was collected through ten semi-structured interviews with unemployed people, who had done Star online health check and were offered access to Star online health coaching programs. Additionally, a quantitative questionnaire about the user experience of Star health check was used as a secondary source of data.

The first subchapter provides an overview of the services and features included in the case system, Star. Additionally, it summarizes previous research concerning Star. The second subchapter describes the study setting, i.e., how this study was conducted as a part of Kuhlberg's et al. (2021) larger research project about Star. The third subchapter explains the research approach, whereas the fourth subchapter presents the processes of collecting and analyzing the interview data.

#### **3.1 Star health check and coaching**

The case system of this study is a Finnish online health service package, Star, developed by Duodecim Publishing Company Ltd (Duodecim, 2021). Star's service package is essentially a flow of services designed to promote the adoption of healthier behaviors. Firstly, the user completes a questionnaire-based online health check. Secondly, the user receives a health assessment as well as recommendations for health behavior changes that could help the user to decrease risks of developing chronic diseases and to gain more healthy life years. Thirdly, Star offers online health coaching programs as a support for making the recommended health behavior changes. As an extra step, the user can later redo the health check and see whether their state of health has improved.

Star online health check consists of 41 questions, which are divided into seven categories (Table 2). Out of the 41 questions, only five are obligatory to answer: age, gender, height, weight and whether one has been diagnosed with coronary artery disease (Duodecim, 2021). The result of the health check is a comprehensive report, which has three parts. Firstly, the report provides estimated risks of developing four chronic diseases: coronary artery disease, stroke, diabetes, and dementia. Secondly, the report provides an estimation of the user's healthy life years and total life expectancy. As a comparison, the report also provides an estimate of potential healthy life years and life expectancy, which could be achieved with a healthier lifestyle. Thirdly, the health

report describes how well the user takes care of different areas of health with three categories: red (recommending immediate changes), yellow (recommending some changes) and green (no changes recommended). According to Duodecim (2022), Star disregards some health risk factors such as high salt usage, consumption of red meat, drug abuse and risky sexual behavior due to insufficient evidence of their impact on life expectancy.

Table 2. Contents of Star online health check questionnaire.

<b>Category</b>	<b>No. of questions</b>
Basic information (e.g., age, height, weight)	6
Health information (e.g., cholesterol, blood pressure)	16
Alcohol and tobacco	3
Nutrition	4
Exercise and leisure time	2
Sleep, stress, mental wellbeing, and working ability	8
Family and relationship	2

Based on the health check's results, Star recommends online health coaching programs for the areas of health, in which improvements are needed. The users can subscribe to the programs by simply typing in their email address. Currently, there are a total of nine coaching programs available in Star (Table 3). The coaching content is delivered via weekly emails. The programs' length varies from 8 to 26 weeks, depending on the topic.

Table 3. Currently available Star coaching programs and their lengths.

<b>Coaching program</b>	<b>Length (weeks)</b>
Reducing alcohol consumption	26
Smoking cessation	22
Relieving daily frustration	16
Strengthening mental wellbeing	8
Exercise	12
Weight management	17
Better interaction in a family with children	9
Healthy nutrition	17
Sleep	9

According to Barak et al. (2009), self-guided and web-based health interventions such as Star coaching programs can be either educational or therapeutic. Educational interventions provide access to information, aiming to improve users' knowledge, understanding and awareness. They utilize none or very little behavioral change techniques or other therapeutic features. On the contrary, therapeutic interventions focus primarily on creating emotional, cognitive, and behavioral change (Barak et al., 2009).

As for Star, some of the coaching programs seem to have a predominantly therapeutic approach (e.g., reducing alcohol consumption and smoking cessation), whereas several programs have a strong educational emphasis (e.g., healthy nutrition and exercise). According to Torniainen-Holm et al. (2016), Star coaching programs are based on health education, solution-focused therapy, positive psychology, and cognitive behavioral therapy. In addition to differences in the programs' general approaches, the use of multimedia varies significantly within the programs as well. Some of the coaching programs have mainly static content (text and some images), whereas some programs also utilize external links, dynamic graphics, and videos.

Previous research of Star suggest that its coaching programs are effective in supporting health behavior change and thereby improving people's health. A large-scale study by Torniainen-Holm et al. (2016) showed that following Star coaching programs led to improvements in both psychological and physical health, which were attenuated yet still observable in the 2-year follow-up. However, from over 40 000 people who started the coaching programs,

only 27% continued to the 2-month follow-up and 15% to the 2-year follow-up.

In another study, Lehto et al. (2013) explored people's perceptions of Star and found potential reasons that may lead to high attrition rates as in Toriainen-Holm's et al. (2016) study. Firstly, the users were somewhat disappointed with the generality and non-tailored nature of the health advice provided in the coaching. Secondly, people had difficulties in fitting the coaching into their daily lives – especially in case of irregularities such as illnesses or holidays. On the other hand, Star received praise for its credibility, which Lehto et al. (2013) suggest stemming from institutional trust in Duodecim. Although Star has been further developed over the years, the general importance of the above-mentioned factors still holds.

### **3.2 Study setting**

As previously mentioned, this study was conducted as a part of Kuhlberg's et al. (2021) larger Star-focused research project, which has three main research objectives. Firstly, it aims to validate Star's ability to recognize health risks. Secondly, it aims to evaluate the usability and user experience of Star. Thirdly, it explores Star's ability to motivate and support health behavior change, which is the focus of this study. Additionally, Kuhlberg's et al. (2021) second study objective is considered in this study, as Star's user experience and usability are probable factors when assessing the system's ability to motivate and support health behavior change. While Kuhlberg et al. (2021) study utilization of Star from multiple perspectives – the system, health care, the public health nurses and the unemployed – this study focuses solely on the perspective of the unemployed. The flow of Kuhlberg's et al. (2021) research project and the scope of this study within it are depicted in Figure 5.

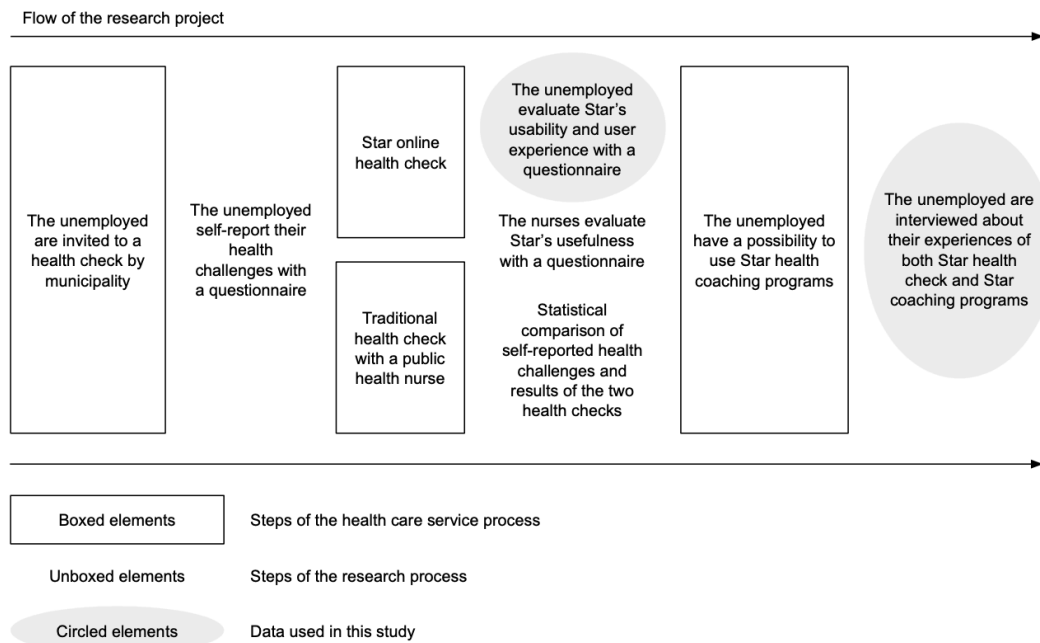


Figure 5. The scope of this study depicted within the flow of the larger research project (Kuhlberg et al., 2021).

The participants in the research project were unemployed people of 18–70 years of age, as this is the age bracket for which Star can provide most reliable life expectancies (Duodecim, 2022). The municipalities (in this case, Espoo and Tampere) were responsible for recruiting the participants, as they are obliged by law to offer health counselling for their residents – including people who are not covered by occupational or student health care (Finnish Health Care Act, 2010). Therefore, the Star research was conducted as part of the municipalities’ health checks that aim to maintain and improve the working ability of the unemployed.

The unemployed who volunteered to participate in the research project went through the process depicted in Figure 5. Firstly, they filled out a questionnaire, evaluating their own health challenges. Secondly, they underwent both Star online health check and the traditional health check conducted by a public health nurse. The order of the two health checks was changed regularly to balance the impact of the first check on the experience of the second one (Kuhlberg et al., 2021). Lastly, the unemployed had a chance to subscribe to Star health coaching programs recommended by Star health check. The decision whether to subscribe to the programs and whether to follow them was voluntary.

The process from the perspectives of research and data gathering is also depicted in Figure 5. The first research objective (i.e., validating Star’s ability to recognize health risks) was studied by statistically comparing the self-reported health challenges to the results of the two health checks. The second research objective (i.e., usability and user experience of Star) was studied with questionnaires through perspectives of both the nurses and the unemployed. The nurses’ questionnaire focused on the usefulness of Star from a health care perspective, whereas the questionnaire for the unemployed focused more on the usability and user experience of the system. Lastly, the third research objective (i.e., Star’s ability to motivate and support health behavior change) was met with follow-up interviews, which constituted the empirical part of this thesis study.

### **3.3 Research approach**

The empirical part of this study was conducted as a case study, which, according to Yin (2018), is a suitable research approach for answering questions of “*how*” and “*why*”. As the research problem in this study is “*How could an online health check and health coaching motivate and support the unemployed to improve their health behavior?*”, Yin’s (2018) recommendations support the selection of case study as the research approach. Additionally, Yin (2018) suggests that case studies are suitable for situations, in which the studied phenomenon and its context are not distinguishable. As the researched phenomenon in this study is the promotion of health behavior change via online health check and coaching among the unemployed, the utilization of these digital health services is inherently inseparable from the real-life context – i.e., people’s perceptions of their health and their life situation in general.

This study focuses on a single case system, Star, and is thereby a single-case study. The single-case approach was chosen due to practical reasons. Firstly, the resources for this study were limited. Secondly, there are no equivalent services in the Finnish market that are designed to promote healthier behaviors via a combination of an online health check and online health coaching programs. Although Omaolo provides a similar service, it is based on the same Duodecim’s calculation formulas as Star (Omaolo, 2022). Therefore, comparing the two services is not sensible for the purposes of this study.

The focus group of the study are the unemployed. The reason for focusing on a single user group is that prior research has identified the unemployed as a critical user group in the context of health services: they are a high-risk group for health problems, and they have more difficulties in utilizing health information technology in comparison to the average population (Herbig et al., 2013; Roelfs et al., 2011; Turnbull et al., 2020; Lawford et al., 2018).

Therefore, this study aims to deepen the understanding of challenges that might be characteristic to this particular user group. As Yin (2018) points out, focusing on a “*critical case*” supports the choice a single focus group – although comparison across different groups could provide more compelling and robust evidence.

The research approach of this study is qualitative. As Pope and Mays (1995) note, in the field of health care, quantitative research can provide answers to questions such as whether a treatment is clinically effective. However, understanding the reasons why people do or do not comply with treatments requires qualitative research (Pope and Mays, 1995). As this study explores the reasons why online health services succeed or fail in motivating and supporting behavior change, a qualitative research approach is the most suitable.

The study is of exploratory nature as there is a very limited amount of research on how online health checks and coaching should be tailored for the user group of unemployed. As Yin (2018) suggests, an exploratory strategy is suitable when there is little existing knowledge about the research topic. Due to the qualitative and exploratory approach, semi-structured interviews were used as the main method for data collection. Additionally, a quantitative questionnaire from Kuhlberg’s et al. (2021) Star research project was used as a supporting source of data to increase validity of the findings. Thereby, with multiple sources of evidence, the results can be triangulated as Yin (2018) recommends being done in case studies.

### **3.4 Interviews**

This chapter discusses how the interview data was collected and analyzed. Firstly, the processes of planning and conducting the interviews are explained. Secondly, the characteristics of the interviewees are described. Thirdly, the stages of the of thematic data analysis process are presented.

#### **Data collection**

For this study, semi-structured interviews were chosen as the method for collecting data. As Rowley (2012) suggests, interviews are a suitable method for gathering in-depth insights of people’s attitudes, experiences and behavior – which is the purpose of this study. The semi-structured form was chosen to support flexibility regarding topics for discussion and, on the other hand, ensure some level of comparability across the interviews.

The interviewees were recruited among the participants of Kuhlberg’s et al. (2021) Star research project. The sample was determined by voluntariness: each participant was asked after the online health check, whether they were

willing to participate in a follow-up interview. The size of the interviewee sample was predetermined to ten people due to the limited resources available for this study. The interviews were conducted between the 3<sup>rd</sup> of December and the 28<sup>th</sup> of January, 1–2 months after the health checks. The length of the interviews varied between 12 and 43 minutes, average duration being approximately 28 minutes. Every interview was audio-recorded using Audacity and transcribed. Additionally, each interviewee was given an audiobook gift card as a reward for participation. The timeline of organizing and conducting the interviews is depicted in Figure 6.

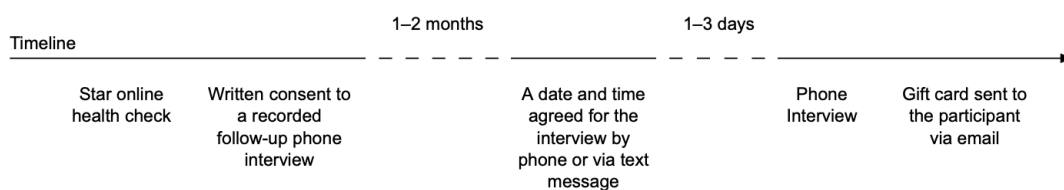


Figure 6. The process of organizing and conducting the interviews.

The interviews were structured around four themes that were derived from the research questions. Firstly, opinions and experiences of Star health check were discussed (RQ1). Second topic of discussion was opinions and experiences of Star health coaching programs (RQ2). Thirdly, the interviewees were asked to talk about their prior or current experiences of health behavior change (RQ3). Lastly, the interviewees’ needs and wishes for digital health support services were discussed (RQ3). The more detailed structure of the interviews is presented in Appendix A. Prior to the actual interviews, the structure was piloted with a research colleague who had tried out Star health coaching programs. Often referred to as internal testing, the above-described piloting method is a common strategy for clarifying ambiguous and leading interview questions (Kallio et al., 2016).

### Interviewee sample

The interviewees’ age group, gender, level of education and length of unemployment at the time of the health check are presented in Table 2. The average age of the ten interviewees was 42. The interviewees’ ages ranged from young adults (less than 30 years) to seniors (at least 60 years). However, 50% of the interviewees were in the age group of 30–39 years – causing other generations to have significantly less representation. The interviewee sample included six males and four females.

Altogether, 80% of the ten interviewees reported that their educational level was upper secondary education, whereas 20% of the interviewees had a university degree or equivalent. The length of the current unemployment period varied significantly among the interviewees. At the time of the health check, 30% of the interviewees had been unemployed for less than a year, whereas for 30% of the interviewees the unemployment had lasted more than two years.

Table 4. Interviewees' (IV) background information.

	<b>Age</b>	<b>Gender</b>	<b>Educational level</b>	<b>Years of unemployment</b>
<b>IV 1</b>	20–29	Male	Vocational	< 1
<b>IV 2</b>	60–69	Female	Vocational	1–2
<b>IV 3</b>	30–39	Male	Vocational	> 5
<b>IV 4</b>	40–49	Male	Master's or equivalent	1–2
<b>IV 5</b>	30–39	Male	Vocational	< 1
<b>IV 6</b>	30–39	Female	Vocational	2–5
<b>IV 7</b>	50–59	Male	Upper secondary	1–2
<b>IV 8</b>	30–39	Female	Bachelor's or equivalent	2–5
<b>IV 9</b>	50–59	Female	Upper secondary	1–2*
<b>IV 10</b>	30–39	Male	Upper secondary	< 1

\*part-time unemployment

## Data analysis

The interviews were analyzed thematically. As Braun and Clarke (2006) explain, thematic analysis is a method for finding patterns of themes (i.e., meanings) in qualitative data and thereby a suitable approach for this case study. The data analysis process of this study is based on the six phases of thematic analysis proposed by Braun and Clarke (2006): familiarizing oneself with the data, generating initial codes, searching for themes, reviewing themes, defining themes and producing the report. The data analysis process of this study is depicted in Figure 7.

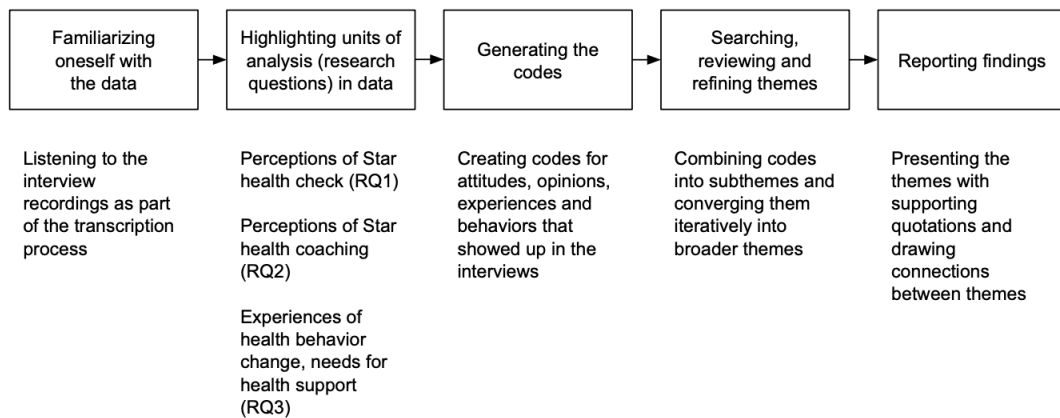


Figure 7. The process of analyzing the interview data. Based on Braun’s and Clarke’s (2006) six phases of thematic analysis.

The first step of the thematic analysis is familiarizing oneself with the data (Braun and Clarke, 2006). In this study, this was done by transcribing all ten interviews. As Braun and Clarke (2006) point out, doing the transcriptions oneself gives the researcher a thorough understanding of the data instead of being only a mechanical process of documentation. After transcribing the interviews, the data was organized into three units of analysis according to the three research questions. After this phase, the initial codes were generated with an inductive approach. As Braun and Clarke (2006) define it, inductive coding is driven by data and not some theoretical framework. Clarifying the units of analysis beforehand helped in placing the codes in the right context (e.g., whether code “credible” was related to Star health check or Star coaching programs).

The third, fourth and fifth phases of thematic analysis are searching, reviewing, and defining of themes. For the search of themes, a method suggested by Braun and Clarke (2006) was used: writing codes on post-it notes and organizing them in groups, i.e., themes. Thereby, an initial thematic map was formed. As for RQ1, identifying emerging themes as either benefits or challenges of the Star health check proved to be challenging. Many of the themes (e.g., comprehensiveness and credibility) were perceived as benefits by some interviewees and as challenges by other interviewees. Moreover, several individual codes did not fit in any of the themes. Therefore, additional thematic groups were created (e.g., proposed purposes for use for Star health check and implications of Star health check on health perception).

Regarding RQ2, a different kind of challenge emerged during the data analysis. As only four of the ten interviewees had subscribed to the Star coaching programs, there was a lack of data and thereby an inadequate number of

codes to form broader themes of benefits and challenges from. Thus, the codes concerning RQ2 were divided somewhat straightforwardly into two groups: one encompassing codes related to subscribing to Star coaching programs, another encompassing codes about following the coaching programs.

As for RQ3, the interviewees had vastly varying needs and wishes for health support. To provide a categorization for the themes, they were organized into three groups according to a theoretical model, Fogg's (2009) Fogg behavior model: ways and facilitating motivation, support mechanisms for strengthening ability, and behavioral triggers. A summary of the finalized themes is presented in Table 5, which also provides the structure for the final phase of thematic analysis, reporting the findings. Chapter 5 presents results for RQ1, chapter 6 focuses on RQ2, and chapter 7 on RQ3.

Table 5. Themes that emerged through the thematic analysis process.

<b>RQ1: What kind of benefits and challenges do the unemployed perceive in the online health check?</b>	<b>RQ2: What kind of benefits and challenges do the unemployed perceive in the online health coaching?</b>	<b>RQ3: What kind of digital support would the unemployed need in improving their health behavior?</b>
Usability and usefulness	Subscribing to the coaching programs	Health knowledge (strengthening abilities)
Comprehensiveness		
Credibility	Following the coaching programs	Building routines (strengthening abilities)
Advantages and disadvantages over traditional health check		Monitoring progress (facilitating motivation)
Proposed purposes for use		Peer support (facilitating motivation)
Implications on health perception		Triggering behavior change

## 4 Perceptions of the online health check

This chapter provides answers to the first research question, which is as follows:

*RQ1: What kind of benefits and challenges do the unemployed perceive in the online health check?*

The general perception of Star online health check was moderately positive, but the opinions varied significantly among the interviewees. Seven interviewees had close to neutral views, whereas one interviewee had distinctively negative views and two interviewees particularly positive views. This conception is supported by data from the questionnaire, which the interviewed participants filled immediately after the online health check.

The first subchapter presents interviewees' perceptions of Star online health check's usability and usefulness, which were gathered with the above-mentioned questionnaire. The subsequent subchapters present thoughts and opinions that the interviewees brought up during the semi-structured interviews. The results are structured around five themes that emerged through the thematic analysis: Star online health check's comprehensiveness, its credibility, its advantages and disadvantages over a traditional health check, its proposed purposes for use, and its implications on the users' personal health perception.

### **Usability and usefulness**

The general perception of the online health check was moderately favorable, as the interviewees' likert scale assessments of the health check in Table 3 show. On a scale of 1–10, the interviewees' average score for the likeliness of recommending the virtual health check to others was 7,7. Altogether, 90% of the interviewees gave a score of 6 or higher implying at least a cautious recommendation. What is more, three interviewees stated to be very likely to recommend the service by giving a maximum score of 10. In an open-ended question, several interviewed participants emphasized the ease of use and concreteness as reasons why they would be willing to recommend the service.

In terms of usability, the online health check was perceived well. On a likert scale of 1 (completely disagree) to 5 (completely agree), the users reported relatively unanimously the online health check to be easy (average score of 4,8) and not frustrating (average score of 1,2) to use. Furthermore, 70% of the interviewees reported to have found the online health check useful for themselves, whereas 20% regarded the virtual health check as not useful. The average score for perceived usefulness was 3,8, i.e., positive to some degree.

The users' perception of information value provided by the online health check was incoherent. In total, 50% of the interviewees reported to have gained new knowledge about their current health situation, whereas 30% stated to have learned nothing new. Similarly, 50% of the interviewees agreed that the virtual health check had provided new information about how they can affect their health or about how they can get help with managing their health, whereas 30% disagreed with these statements.

Table 6. Interviewees' (IV) answers to the likert scale questionnaire regarding the online health check (OHC).

Perceptions of the online health check (OHC) on a 5-point likert scale (1 = completely disagree, 5 = completely agree)							How likely could you recommend this service to your acquaintances? (1 = very unlikely, 10 = very likely)
The OHC is easy to use	The OHC is frustrating to use	The OHC and it's report were useful for me	The OHC's report gave me new information about my health	The OHC's report gave me new information about how I can affect my health	The OHC's report gave me new information about how I could get help with managing my health		
IV 1	5	1	4	3	3	3	9
IV 2	5	1	5	5	5	5	10
IV 3	5	1	4	5	5	5	8
IV 4	4	2	2	1	1	1	2
IV 5	4	1	4	3	3	2	6
IV 6	5	1	4	4	4	4	8
IV 7	5	1	5	4	4	4	8
IV 8	5	1	2	2	1	1	10
IV 9	5	1	5	5	5	5	10
IV 10	5	2	3	2	2	3	6
	M = 4,8	M = 1,2	M = 3,8	M = 3,4	M = 3,3	M = 3,3	M = 7,7

## **Comprehensiveness**

The interviewees' perceptions of the online health check's capability to assess their state of their health varied significantly. Three interviewees seemed to praise the health check for its comprehensiveness, whereas four interviewees seemed to feel that it was too superficial.

*"I think [the online health check] was very comprehensive. I was surprised that it was so extensive." (Interview 2)*

*"My remembrance is that the big picture [of the online health check] was quite reduced. It doesn't go very deep into things." (Interview 5)*

*"[My] first impression was that it's incomplete, a total work in progress." (Interview 4)*

One interviewee felt that in addition to general superficiality, the online health check completely neglected some important aspects of health regarding diet and social wellbeing.

*"There was this question about how frequently you eat fish. But there was no question about eating meat . . . The questionnaire doesn't consider if you eat ten kilograms of red meat per week. There were a horrendous number of such loopholes." (Interview 4)*

*"I think the survey neglected the psychosocial aspect completely, the psychological aspect and especially the social aspect . . . Of course, it is easier for a computer to interpret quantitative data, such as eating fish: yes or no. Or once a week, twice a week. But the qualitative aspect is so much more important to a person's overall health." (Interview 4)*

## **Credibility**

The interviewee no. 4 who perceived the online health check lacking and incomprehensive, perceived it also as not credible, for various reasons. Firstly, the interviewee felt confused that the health check provided a precise life expectancy despite many the questions being left unanswered. As mentioned before in chapter 3, only five out of 41 questions in the online health check are mandatory to answer: age, gender, height, weight and whether one has been diagnosed with coronary artery disease.

*"There were questions about blood test result or something. I did not know what to answer, I did not have those numbers . . . Nevertheless, I got the results even though I left those fields completely unanswered . . . The way I*

*see it, the whole thing is pointless if you leave out such basic information.” (Interview 4)*

Secondly, the interviewee no. 4 doubted the average user’s ability assess one’s health behavior objectively and realistically. In other words, the interviewee suspected that many people would give overly optimistic answers in the online health check and thereby undermine the credibility of the results. Furthermore, the interviewee argued that the formulation of the multiple-choice questions emphasized too glaringly the “right” and “wrong” answers, urging the users to choose the “right” option instead of the most descriptive one.

*“People tend to lie to themselves a little. If you can get a good result [by lying], people will do it. Especially if nobody is monitoring the online health check and the user knows that someone else will check the results, I would not trust anyone’s answers. Or especially answers of those who have health issues.” (Interview 4)*

*“When you see the questions and the multiple-choice answer options, a person with common sense can immediately see, which one is the right and which one is the wrong answer.” (Interview 4)*

Another interviewee touched upon the same issue but had a different perspective. The interviewee argued that being honest and open about one’s current situation in a health check – whether it is an online health check or a traditional appointment with a public health nurse – is a prerequisite for identifying problems, accepting them and getting help. The interviewee did not think that the online health check would be inherently less credible than a traditional health check conducted by a public health nurse.

*“If you want to improve your health . . . the first thing you must do is to admit the problem and be honest about it. I think only then you can start to heal . . . Surely there are some people that are not completely honest and don’t fully reveal how bad their situation is. It may well be so. But you can also lie to the public health nurse, or to yourself.” (Interview 9)*

### **Advantages and disadvantages over traditional health check**

The interviewees were asked to compare their experiences of the online health check and the traditional health check. The opinions were divided: five interviewees seemed to prefer the traditional health check over the virtual one, two interviewees vice versa. Three of the interviewees did not clearly raise one health check above the other regarding the overall experience or usefulness.

There were two interviewees that clearly perceived the online health as superior to the traditional health check. The first interviewee felt that the online health check was more informative than the discussion with the public health nurse. The second interviewee preferred the online health check due to convenience and “*hygiene*”, i.e., the possibility of avoiding the discomfort of being judged in an in-person health check.

*“I felt that the [traditional] health check was quite superficial. I think that the online health check offered almost better information than chatting with the nurse. Pretty basic stuff [in the traditional health check] . . . Nothing special, like the health education in junior high school: try to sleep more and eat better.” (Interview 1)*

*“I think the online [health check] is better, at least for me. I had a slightly high threshold to go to the health check arranged for the long-term unemployed. I mean, it's a little embarrassing, or at least not nice, that you're labelled to a certain group . . . I certainly think that the online [health check] is more hygienic . . . I would 95 percent prefer the online [health check] or a phone call over a personal visit.” (Interview 9)*

Five of the interviewees seemed to have preferred the traditional health check over the online one. The reasons were similar in all cases: the in-person discussion with the public health nurse enabled more personalized and constructive feedback.

*“When you're doing [the online health check] on a computer, you don't get a straight answer to anything. It's a machine that gives some strange answers. With an actual person you can talk about the stuff.” (Interview 3)*

*“The discussion with the public health nurse was constructive. The questionnaire can't replace that.” (Interview 4)*

Furthermore, two interviewees brought up that the traditional health check led to further medical help – unlike the online health check.

*“Yes, actually [the traditional health check] was [more useful]. I got a phone appointment to a doctor.” (Interview 6)*

*“I got advice on what kind of medical consultation to seek after the health check. What doctor appointments to book, and so on.” (Interview 10)*

## **Proposed purposes for use**

There were three interviewees that questioned the online health check's usefulness as such – either to themselves or to individuals in general. Despite of this, they brought up speculatively a few ways, in which they think the online health check could be utilized. Firstly, two interviewees mentioned the possibility of screening larger populations with the online health check – due to its practically infinite scalability.

*“It felt like a useful tool to screen basic health behavior. It doesn't necessarily apply to [my] own personal situation or individual situations if there are other problems than these kinds of things. So, I kind of understand that it can be used well to screen large populations and the most typical things.” (Interview 8)*

*“[The online health check] could work with screening large populations, entire generations, for example in military service. You could get statistical probabilities. But for a single person, the [online] examination as such doesn't tell anything.” (Interview 4)*

Secondly, several interviewees argued that the online health check could be used as an initial phase prior to the traditional health check with a public health nurse.

*“This could be a really good basis for pre-employment medical examination or something, giving the information in advance for the person checking my health.” (Interview 8)*

*“The online [health check] could be before the doctor appointment. The doctor could then spend less time with filling out forms and focus on discussion and treatment, focus on those things that require a human eye and communication.” (Interview 10)*

## **Implications on health perception**

The interviewees' reactions to the online health check's report were mostly neutral and dispassionate. Approximately half of the interviewees seemed to feel that there was nothing new or particularly surprising in their online health reports. Additionally, most of the interviewees did not name any concrete benefits resulting from doing the online health check – even when specifically asked about it. This observation is somewhat contradictory to the questionnaire, in which a clear majority, 70% of the interviewees, deemed the health check useful for themselves (Table 1).

*“I actually feel that [the online health check] didn't tell me anything that I didn't already know.” (Interview 4)*

*“I didn't see any particular benefits. I was just curious to try out [the online health check].” (Interview 7)*

*“I don't remember [the results], I guess they were quite average. It didn't surprise me or anything.” (Interview 10)*

Two interviewees elaborated more on the reasons why the online health check did not provide any new or surprising information. They explained to have chronic health issues and thereby have learned or been forced to considerably pay attention to their state of health and health behavior.

*“I have measured myself with Moodmetric, Oura and in other ways . . . Many things that were asked [in the online health check], I have already thought about a lot and have tried to improve them in my life.” (Interview 8)*

*“There wasn't anything surprising [in the online health check]. I pay quite a lot of attention to my health generally and . . . I'm somewhat aware of my health situation.” (Interview 5)*

However, not all interviewees perceived the online health check's results as expected and unsurprising. Two of the interviewees were remarkably positively surprised by the report's life expectancy and the results in general. The same two interviewees gave the best possible assessments in the questionnaire for the usability and usefulness of the online health check (Table 2). Moreover, they both reported in the questionnaire that they would very likely recommend the online health check to others (Table 2).

There were also two interviewees, who seemed to be somewhat negatively surprised by the online health check's results. However, the potential increase in life expectancy that could be achieved by improving health behavior was perceived as encouraging information. As one interviewee reflected: realizing one's unsatisfactory state of health may not feel pleasant, but it can foster motivation to improve the current situation.

*“The life expectancy was a little awakening . . . In a negative way . . . But after all, it's positive that it awakened [me]. I don't remember the exact life expectancy, but there was potential to gain about ten more life years. It was like, wow, ok...” (Interview 1)*

*“I don't remember [the life expectancy]. There was this part, how changing health behavior would affect the life expectancy. It came to my mind that I could, or should, change my lifestyle habits.” (Interview 7)*

## 5 Perceptions of the online health coaching

This chapter provides answers to the second research question, which is as follows:

*RQ2: What kind of benefits and challenges do the unemployed perceive in the online health coaching?*

Based on Star health check, all interviewees had some areas of life, in which they could improve their health behavior. Consequently, all the interviewees were recommended at least some Star coaching program. However, only 40% had subscribed to one or more programs. Despite the decision to subscribe to the coaching, none of these four participants had continued with the months-long programs past the first week. Two of the subscribers seemed to have given up with the programs completely, whereas other two interviewees had saved the coaching emails into a separate folder to be looked at in the future.

As none of the interviewees had followed Star coaching programs past the first week, this chapter focuses predominantly on the challenges that drove the participants away from the coaching. Firstly, the chapter discusses the reasons that led the interviewees to subscribe or – as in most cases – not to subscribe to the coaching programs in the first place. Secondly, it sheds light on the reasons why the interviewees who subscribed to the coaching programs did not remain engaged and committed.

### **Subscribing to the coaching programs**

For many interviewees, it was difficult to retrospectively elaborate on the reasons why they decided to subscribe or not to subscribe to the online health coaching programs. For example, three interviewees had no clear memory of any coaching programs attached to the online health check's report. Therefore, it is ambiguous whether not subscribing to the coaching was a conscious decision or a consequence of not realizing the existence of the coaching programs.

The decision to subscribe to the online coaching programs seemed to be dependent on the experience of the online health check: those who perceived the health check as most useful were the ones subscribing to the coaching programs. Similarly, the interviewee no. 4 who strongly criticized the online health check, seemed to be fundamentally against the online coaching programs as well. In general, the interviewee believed most of the products related to health and wellbeing to be “*scamming of the gullible*”.

*“[The coaching program] sounded somehow grotesque, already its name. I almost threw up a little . . . It was wrapped up as this lovely life-changing process, the whole title was that kind of wellbeing gibberish.” (Interview 4)*

On the contrary, another interviewee who subscribed to several programs specifically mentioned credibility as one of the most significant benefits of Duodecim’s coaching programs.

*“The advantage is that it's made by Duodecim or some authority, it makes it more appealing. Not any internet site, the internet is full of all kinds of information, especially related to health and diet. A solid package that's based on scientific information.” (Interview 10)*

Interestingly, the low threshold of subscribing came up in the interviews as a reason for both trying out and skipping the coaching programs. One interviewee was reluctant to start the coaching, knowing that committing to it would be difficult.

*“I have a problem with committing to these kinds of online things. I knew I might have followed along for a while, but it doesn't work for me . . . I would have dropped it.” (Interview 8)*

On the other hand, another interviewee perceived it positive that there were no strings attached to the subscribing decision.

*“I understood that it's an email that does not oblige you to do anything, so I chose [to subscribe]. I thought I would give it a go, even though I anticipated that I wouldn't necessarily use them.” (Interview 10)*

The overwhelmingly most common reason for not subscribing was the perception that the coaching programs would not be beneficial. As two of the interviewees explained, they did not believe in the coaching programs’ capability to offer any new or useful health information.

*“Generally, I'm not interested in those kinds of [coaching programs]. These are things that I have already familiarized myself with . . . If I have needed some piece of information, I have looked it up somewhere.” (Interview 5)*

*“I feel [the coaching] would have been pointless for me, because I've done and I'm still doing a lot about those things . . . I assumed that the content [of the coaching programs] wouldn't offer anything new.” (Interview 8)*

One interviewee deemed the coaching programs unnecessary due to having confidence in changing health behavior independently, without outside help.

*“Maybe the coaching programs aren't necessary because I can lose weight myself. I can do that. If it becomes harder and harder, I can seek out coaching. If I need that help.” (Interview 3)*

### **Following the coaching programs**

Out of the four interviewees that subscribed to the coaching programs, three explained that they had glanced only at the first weekly emails and not looked at the later messages due to loss of interest. One interviewee had not read the emails but did save them for later. The interviewee had planned to follow the programs sometime in the future due to difficulties in their current life situation. Additionally, another interviewee had similarly saved the coaching emails for a potential later use, after initially losing interest. However, the two interviewees that reported to have saved the coaching emails did not seem particularly confident about their plans of reopening the materials in the future.

*“I know that starting [the programs] right away would be smart . . . I just haven't had the energy . . . I have a poor concentration; I always think that I will look at [the programs] when I have a proper moment. The moment hasn't come yet.” (Interview 2)*

*“[The coaching emails] are there [in their own folder]. Waiting for the moment . . . I just haven't gotten it done. But maybe sometime in the future.” (Interview 7)*

The reasons for discontinuing the programs related to both the medium of delivery as well as the actual content. The first barrier seemed to be that email as a medium of delivery did not necessarily incentivize the users to take action regarding the coaching.

*“I haven't done [the coaching programs]. [The messages] have gotten pretty much buried in the email flooding.” (Interview 1)*

*“[The coaching messages] are out of sight, out of mind.” (Interview 7)*

Additionally, the format in which the coaching content was delivered, received critique from one interviewee. He would have preferred recorded lectures or other kind of audio format over the text-heavy slideshows.

*“In recent years, audiobooks have been the best way for me to get information . . . Podcasts as well . . . You can do something at the same time, like clean and listen . . . I would definitely be more likely to open a link where I*

*could listen to someone else talking instead of reading myself.” (Interview 1)*

Moreover, the interviewees seemed to be unsatisfied with the content of the coaching materials. Two interviewees experienced the emails more as general health guidelines rather than coaching programs that would personally guide and motivate them.

*“I don't know how those online things differ from searching information online by yourself . . . Those coaching programs give the whole package at once and tell you what you should do . . . They are missing the coaching perspective, how you can integrate [the habits] into your everyday life . . . You can't just suddenly start a healthy life. You have to take it step by step.” (Interview 1)*

*“Maybe the impression, the reason that drove me away and killed my interest, was that [the coaching program] seemed just like an info package, a general info package. Same information that the internet is full of.” (Interview 10)*

## 6 Needs for health behavior change support

As the previous chapters focused specifically on interviewees' experiences of Star online health check and Star online health coaching, this chapter has a broader perspective. It aims to provide more general understanding of what kind of support for improving health behavior the unemployed would find meaningful and useful. Star health coaching was used as basis for the conversations with the three interviewees who had tried it out. With the other seven interviewees the discussions were predominantly based on interviewees' prior experiences of managing their health and their current needs for health support. Thereby, this chapter provides answers to the third research question, which is as follows:

*RQ3: What kind of digital support would the unemployed need in improving their health behavior?*

This chapter is structured around themes that emerged from the interviews. These themes are grouped into three categories representing the three behavioral factors of the Fogg behavior model (Fogg, 2009): ability, motivation and triggers. The first subchapter discusses ways of supporting the individuals' ability to improve their health, whereas the second subchapter focuses on motivational support factors. The third subchapter discusses triggers, i.e., mechanisms that might prompt people to take better care of their health.

### 6.1 Strengthening abilities

Acquiring health knowledge seemed to be the most important way of improving the ability to manage one's health among the interviewees. Additionally, some interviewees seemed to desire advice and support on building routines around healthier habits.

#### Health knowledge

The need and desire for health knowledge was brought up by numerous interviewees but the channels for seeking information varied considerably. One interviewee would have preferred individual guidance from health care professionals on improving health instead of general guidelines, as provided by Star coaching programs.

*"I feel like I would have needed more detailed information [than in the Star coaching programs]. A real expert to talk with, about exercising or diet."  
(Interview 1)*

On the contrary, two interviewees with chronic and complicated health issues had less pleasant experiences of advice given by health care professionals. One interviewee reported to have found help to a dietary health issue with a special diet that the modern health care does not officially acknowledge.

*“My attitude is that I respect advice given by health care professionals and I’m willing to try out their recommendations. However, I also gather information elsewhere because I know that they don’t present you all the options.” (Interview 5)*

Another interviewee felt that the public health care had failed to recognize the root causes of their mental health issues and that their own personal research had been more useful.

*“The public health care hasn’t been very useful for me. I’ve been rather alone with this. I’ve had to take responsibility and do research myself. . . . I feel like some things would’ve not been discovered if I hadn’t been active myself.” (Anonymized)*

On the other hand, the two above-mentioned interviewees reported to have found experiential knowledge particularly useful for themselves. The first interviewee had experiences of gathering knowledge and inspiration from a peer community via social media.

*“These Facebook groups do not only provide information based on scientific research but also practical experiences from real people. Health issues are of course very personal but it’s inspiring when someone tells that they tried out some protocol, diet or food supplement that you can then try out. . . . This kind of information inspires you to experiment with things.” (Interview 5)*

The interviewee acknowledged the potential credibility issue with health information shared via social media but did not perceive it as a significant problem. However, this might have been due to the interviewee’s seemingly good health literacy.

*“In the [Facebook] groups people have sincere motivation because they are no financial incentives. They are not trying to sell anything. . . . I think it increases the credibility. But of course, in digital world you have to be critical about everything, because many things there are suspicious or untrue.” (Interview 5)*

The other interviewee dreamt of a service that would combine experiential knowledge from peers and expert knowledge provided by health care

professionals. This would potentially solve the credibility issue if the experiential knowledge would be verified by health care professionals.

*“[A service] that would combine experiential knowledge and information from experts with various backgrounds . . . It could enable drawing connections between symptoms and their root causes, that's what I've been trying to do myself.” (Anonymized)*

Both of these interviewees emphasized the importance of interactivity regarding experiential knowledge.

*“I think interactivity is essential. For some people the story itself might be enough at the time but some others may need deeper research. If you're not familiar with some thing or phenomenon, you need to dig deeper and have the possibility to ask.” (Interview 5)*

*“[The service] could have the possibility to ask questions from both the peers and the experts. That would be lovely.” (Anonymized)*

Additionally, the same interviewee brought up an idea that online health coaching could take neuropsychiatric disorders such as ADHD and autistic spectrum disorders better into account.

*“If we could identify earlier whether you have a nepsy brain or not . . . Many clients of health services and services for substance abusers are nepsy people. Not everyone of course, but there could be some nepsy screening. It's very common, it's been estimated that 5–7% of people could have ADHD.” (Anonymized)*

The interviewee emphasized that health coaching related to especially stress and tiredness should include information about neuropsychiatric disorders and sensory defensiveness – as they might be the root causes for poor life management and unhealthy lifestyle choices.

### **Building routines**

Based on the interviews, it seems evident many of the unemployed need more than just health knowledge to change their health behavior. Specifically, there seemed to be a need for instructions and guidance on how to apply the acquired knowledge into everyday life and build routines.

One interviewee regarded regularity and integrating the healthy habits into daily life as the most significant hurdle in improving health behavior.

*“Regularity has always been difficult for me. [I] have noticed that [doing] small changes [works] . . . I have started exercising regularly and developed breakfast as a routine. These have been significant things for me.” (Interview 1)*

Thus, from a health coaching program he desired foremost guidance on how to make healthy choices a routine – not only what those health choices are.

*“For me, doing small changes at a time works best . . . I don't know how persistent [giving all the info what you should do at once] is. For me it's about doing one reasonable choice and adding to that little by little.” (Interview 1)*

Two interviewees discussed reminders as a coaching functionality that could potentially facilitate building habits. However, the opinions were divided. One interviewee deemed it a good idea to get reminders in order to keep up with healthy routines throughout the day.

*“I work on a computer, sitting all day. If I received an email that for example, do five pushups. I could do that, definitely. It wouldn't hurt at all.” (Interview 9)*

On the contrary, another interviewee perceived reminders related to an online health coaching as too invasive and thereby negative.

*“[Reminders] feel like pressuring . . . I would just delete them . . . After a minute I would have forgotten the whole thing.” (Interview 7)*

## **6.2 Facilitating motivation**

The interviewees had various ideas on what would help them to commit to a health coaching program or motivate them to improve their health behavior in general. The most important motivational support factors seemed to be peer support and tracking personal improvement, e.g., in the course of a coaching program.

### **Monitoring progress**

Documenting one's progress in the course of the health coaching was discussed by two interviewees as a potential motivational boost. One interviewee contemplated that monitoring progress could increase commitment to a coaching program.

*“Basically, you could track your exercising with Excel . . . I just simply never manage to commit to it. When you get an email reminder, you could fill in your own calendar what you did during the past week . . . I think a simple tracking system could spark the motivation, help in developing routines and thereby foster motivation.” (Interview 10)*

However, another interviewee took a more cautious approach to documenting progress, pondering that some encouragement might be beneficial but the borderline between the feelings of positive push or negative pressure is vague.

*“In theory, it would be good to have some kind of tracking. However, I know myself well and I know I would just feel pressured.” (Interview 2)*

### **Peer support**

As mentioned in the previous subchapter, peers can be a useful source of experiential knowledge. Additionally, they can foster motivation by providing emotional support. Two of the interviewees underlined the inspirational aspect of experiential knowledge, explaining that it increases motivation and fosters hope that they can overcome their personal health challenges as others have.

*“The main aspect for me is to have stories about how things had improved, how a challenge was overcome. Information as pure data can be useful at a practical level but it might not be mentally inspiring. Stories lift people and are memorable . . . People have a good narrative memory. Stories tend to stick.” (Interview 5)*

*“I have a subscription to a magazine, which often has those stories [from people]. I think I also have some book that has stories about burnouts and other things . . . You get a lot of information and support that you're not alone.” (Anonymized)*

Additionally, two interviewees discussed interactive online peer support as a potential motivator. They presented the idea of forming a community around the health coaching program by having group meetings online or tracking each other's progress together.

*“You could add some online coaching to the programs, something like Skype . . . You could join a group and get together once a month maybe.” (Interview 1)*

*“[The coaching] could be like a course with other people involved, live. A simple implementation could be that friends use the same Excel sheet to track their activity throughout the week, whether they exercised or how their diet was. In the group you would have the feeling that you are not alone and that everything doesn't fall on your own shoulders.” (Interview 10)*

### **6.3 Triggering behavior change**

In his Fogg Behavior Model (FBM), Fogg (2009) describes triggers as calls to action that encourage people to perform a particular behavior at a specific time. Applying FBM to the context of Star, the online health check should trigger the users to pay more attention to their health and to subscribe to the online coaching programs.

In the case of three interviewees, it seems that the health check appointment clearly triggered them to pay more attention to their health behavior – not only after the health check but prior to it as well. As one interviewee explained, the mere awareness of the upcoming health check spurred him to make healthier everyday choices. Moreover, the motivation to put effort into health continued after the appointment as well.

*“Due to the doctor appointment and the online health check, I have paid more attention to [health-related] things. When there is an upcoming health check or a doctor appointment, you tend to put effort into [your health]. After the health check I have thought about these things, tried to exercise more and so on.” (Interview 10)*

The same phenomenon seems to apply to two other interviewees as well, as they reported to have started changes towards a healthier lifestyle already before their health check appointments.

*“I've tried to eat regularly and adequately. Also, I've been going to the gym quite regularly for several months. For a longer period of time, I've had always the same breakfast in the morning, which is a big change for me.” (Interview 1)*

*“I had already started to change my lifestyle a little . . . I had paid attention to [eating regularly] before the health check and lost some weight . . . Also, I had exercised quite a lot, but now I started doing it more regularly.” (Interview 2)*

For these three interviewees, it seems that the awareness of an upcoming health check had been a motivational trigger, which Fogg (2009) describes

as a spark. Notably, all these three interviewees were among the four interviewees that subscribed to the Star coaching programs.

As one interviewee explicitly speculated, a follow-up health check might help to maintain the motivation sparked by the initial health check. The interviewee reflected that a follow-up could encourage people to improve their health at the present and not to procrastinate.

*“I think [a follow-up health check] would urge people to take action, not leaving them all alone. I know that it would push me. On the other hand, there shouldn't be any sanctions for inactivity . . . No deadlines or red circles blinking in the email.” (Interview 2)*

## 7 Discussion

The chapter discusses the themes that emerged from the interviews and compares these insights to existing literature. The first three subchapters summarize the results for each research question separately:

*RQ1: What kind of benefits and challenges do the unemployed perceive in the online health check?*

*RQ2: What kind of benefits and challenges do the unemployed perceive in the online health coaching?*

*RQ3: What kind of digital support would the unemployed need in improving their health behavior?*

In the last subchapter, the limitations of this study as well as potential directions for future research are discussed.

### 7.1 Benefits and challenges of the online health check

This subchapter focuses on the first research question, summarizing the benefits and challenges that the unemployed perceived in Star online health check. Additionally, recommendations for improving Star health check are contemplated.

The most apparent benefits of the Star online health check seem to be its usability and understandability, as all ten interviewees perceived the health check as easy and not frustrating to use. The information provided in Star's health report was deemed understandable, but the perceptions of the value of this information varied to a large degree. Three interviewees seemed to praise the health check for its all-encompassing nature, whereas four interviewees criticized it for superficiality. In other words, it seems that the Star health report manages to outline a big picture of the user's state of health but does not necessarily produce that many individually valuable insights.

On the contrary, discussions with the public health nurses (i.e., traditional health checks) were generally deemed personally relevant and helpful in determining concrete next steps to improve wellbeing (e.g., getting an appointment to a doctor). Based on these observations, it seems that Star health check could be valuable as a general screening before a traditional health check if the person has very specific health concerns. Conversely, for people with mostly general health concerns – which Star is able to assess – the online health check could be valuable as such.

As the model for digitally facilitating health behavior change (Figure 4) suggests, health risk calculators should provide risk information that builds upon prior knowledge and beliefs of the user. Based on the interviews, this seems to be a significant challenge in Star. For persons with seemingly higher health literacy, the health check report seemed to provide too much general health information and too little personally relevant observations. Moreover, interviewees with high health literacy seemed to be disappointed with the shallow nature of interpretations that the health report provided based on the questionnaire answers. In other words, the health report was perceived as mere summary of the answers instead of an interpretative description of the user's state of health. However, for people with seemingly lower health literacy and less knowledge about their health, the depth of risk information appeared to be somewhat sufficient, as they reported to have gotten understandable, new, and useful information.

Another challenge was that the users did not know the numerical values asked in the health check (e.g., blood pressure and cholesterol levels). Among some interviewees, the inability to fill in the above-mentioned values led to questioning the reliability of the health risk evaluations. Conversely, interviewees who were able to fill in this data seemed to trust the results more and thereby take the behavioral recommendations more seriously. Star does provide an explanation that in case of missing numerical values, population averages are utilized in the calculations instead – however, accessing this information requires clicking a small “i” icon, which the users might easily not notice.

Health behavior theories such as the protection motivation theory and the health belief model suggest that risk calculators should aim at two goals to trigger health behavior change: causing worry about the downsides of the current unhealthy behaviors and building trust in the upsides of adopting healthier behaviors (Rogers, 1975; Rosenstock, 1974). Based on the interviews, most of the unemployed seemed unsurprised and thereby not particularly worried about the consequences of their unhealthy behaviors described in the Star health report.

However, some interviewees reported to have been surprised by the results – especially by the comparison between current life expectancy and life expectancy that could be achievable with a healthier lifestyle. In turn, other elements of the health report such as disease risks depicted on risk meter scales did not seem to be particularly startling or memorable. This observation supports Bonner's et al. (2021) meta-analysis results, which conclude that a concrete form of risk estimation (e.g., age) seems to provoke a stronger emotional response than a more abstract representation (e.g., disease risk percentages).

The life expectancy in the Star health report caused both negative (lower than expected) and positive (higher than expected) surprises among the interviewees. Interestingly, in both cases, the emotion of surprise seemed to be associated with intended efforts to adopt or maintain healthy behaviors. In other words, concern about the health risks did not seem to be the sole trigger for behavioral intentions. Instead, it seems that the causalities that Star managed to draw between health behavior and life expectancy might have encouraged the interviewees to either maintain or change their health behaviors.

As the interviewees' perceptions of Star online health check were so divided, providing univocal recommendations for further development is challenging. The experience of the online health check seemed to depend mostly on various contextual factors such as level of health literacy, health support needs in the current life situation, and personal preferences. Thus, this case study simply emphasizes the need for tailoring the service itself or the context of utilizing the service according to characteristics of different kinds of users.

## **7.2 Benefits and challenges of the online health coaching**

This subchapter follows a similar structure as the previous subchapter. It summarizes the results for the second research question, i.e., benefits and challenges that the unemployed perceived in Star online health coaching. Additionally, it discusses recommendations for tailoring Star online coaching programs better for the unemployed.

The apparent conclusion from the interviews is that Star coaching programs were not perceived very attractive nor engaging among the unemployed. The online health report recommended health coaching to all ten interviewees, yet only four people decided to subscribe to at least one of the available coaching programs. From these four subscribers, nobody continued with the months-long coaching programs past the first week. Thus, the insights from this case study focus more on the first impressions of the coaching programs instead of how they provide support and motivation in the long term.

The reasoning behind whether to subscribe to Star coaching programs varied among the interviewees. Generally, it seemed that if the interviewee had not perceived the online health check as useful, the coaching programs were not perceived attractive either – leading to a decision not to subscribe. Several interviewees explained that they are already addressing the health challenges that the coaching programs could have provided support with. As Prochaska's and Velicer's (1997) transtheoretical model suggests, online health interventions should be offered at a point, when the person has formed an intention to change health behavior but is yet to take action. Thus, this seems

to be a challenge of targeting and timing, not necessarily an issue of how the coaching programs are presented to the users of Star.

Among the interviewees, there were a few people for whom the health check had clearly increased the intention to change health behavior but who still decided not to subscribe to the coaching programs. The interviewees explained that they did not want outside support, despite acknowledging a need for behavior change and seemingly wanting to take action. In the background, there appeared to be reasons such as fear of being controlled, general reluctance to accept outside help, and aspirations to manage on one's own. These seem like challenges that could be potentially alleviated by presenting the coaching programs using approachable language.

There were a few attributes of Star that encouraged some of the unemployed to subscribe to the coaching programs. Firstly, institutional trust in the developer of the programs, Duodecim, seemed to be an incentive. Secondly, the simplicity of the subscription process, simply typing in one's email address, seemed to be an encouraging factor. However, there were also completely opposite perceptions. For example, the low threshold for subscribing was seen also as a weakness because it was not perceived as a proper commitment. Additionally, one interviewee perceived health coaching to be "*scamming of the gullible*" in general – even when offered by Duodecim. These contradicting experiences underline how differently people make sense of the same aspects of the service due to their personal attitudes and beliefs.

As none of the four subscribers continued with Star health coaching programs past the first week, subsequent discussion focuses solely on the challenges related to the use of the programs. One apparent barrier for utilizing the coaching materials was the difficulty of getting started, which could be a result of several factors. Firstly, two interviewees had postponed starting of the coaching, seemingly imagining that waiting for a proper moment would increase the chances of success. However, the pitfall of this strategy – saving the coaching emails for later use – is that the sufficient trigger for actually starting never emerges. One potential solution could be to incorporate some kind of trigger into the intervention itself.

Secondly, email as a form of delivery did not seem to incentivize getting started either, as two interviewees described the coaching messages to be "*buried in the email flooding*" and "*out of sight, out of mind*". These observations imply that there is a clear gap between merely receiving the emails and actually familiarizing oneself with them, which should be narrowed down. Gillison et al. (2019) suggest that online health interventions should support the user's autonomy, e.g., by encouraging the identification of intrinsic goals and reasons for behavior change, using non-controlling language,

giving the user choices and options, and encouraging the user to take leadership and make decisions. The presumption is that creating intrinsic motivation for the health behavior change would increase commitment. For example, the users could be offered an option to steer their focus to aspects of health challenges that they need most support with. However, the above-mentioned techniques seem to presume that the user is willing to actively participate in the planning process instead of merely following predetermined instructions.

An additional challenge in the coaching programs was that they were perceived as mere packages of health information. In other words, the interviewees perceived the programs as guidelines of what to do instead of instructions of how to go about things (i.e., how to integrate healthier habits into daily routines step by step). As Gillison et al. (2019) suggest, provided information should be relevant to the user's situation and acknowledge the user's personal perspective and challenges. The lack of personal relevance seemed apparent, as the interviewees who subscribed to the health coaching perceived essentially no difference between reading Star coaching materials and searching information online.

In addition to the content, the format in which the coaching materials are provided should be considered. One interviewee would have preferred an audio format over reading text-heavy slides – a format that most of the Star coaching programs use. As several interviewees reported to have concentration issues, listening to, e.g., short lectures or podcasts could be a more convenient way of learning about health than sitting down and studying slides. Obviously, this is a question of preference. Thus, optimally, the users would have the option to choose the way of learning that suits them best.

### **7.3 Tailoring online health coaching for the unemployed**

This subchapter answers to the third research question, summarizing the needs for health behavior support that the interviewees brought up during the interviews. Based on existing literature, the subchapter contemplates whether these needs might be particularly characteristic to the unemployed. Additionally, the subchapter reflects on how Star coaching programs answer to these needs currently and how Star could be improved to meet these needs better.

One recurring theme in the interviews was the difficulty of starting behavior changes as discussed in the previous subchapter. The challenges seemed to relate to commitment, regularity and building routines. Several interviewees suggested that an online health intervention should support the making of small healthy choices in everyday life. However, opinions of suitable means

varied. For example, behavioral reminders (e.g., a notification suggesting a lunch break exercise) were perceived both as positively encouraging and as negatively controlling. One possibility could be to provide a choice whether the user wants to receive some kind of notifications or reminders. As Gillison et al. (2019) propose, the user's sense of autonomy can be supported by giving options regarding the intervention.

To increase commitment to the health behavior change, some interviewees discussed the importance of monitoring progress. However, it seemed that creating and following a method for tracking oneself was perceived as burdensome. Thus, the intervention could provide some way of documenting the activities and observations. Furthermore, documentation within the intervention could then provide the possibility for personalized feedback – a technique that should support the user's sense of competence (Gillison et al., 2019). Similarly to reminders, the documentation of progress should not be compulsory, as some people might perceive it as pressuring. Some Star coaching programs (e.g., smoking cessation and reducing alcohol consumption) do encourage the documentation of one's goals and feelings but this technique could be utilized more in other programs as well.

Discussing their past experiences of health behavior change, the interviewees emphasized the importance of peer support. As Thoits (2011) describes, social support from peers can have several benefits: it can provide coping encouragement, information and advice, validation for worries and feelings in general, and inspirational hope. The value of all these aspects of social support were discussed in the interviews.

Firstly, two interviewees brought up the idea of implementing the health coaching as a course, where other people are also involved. Thus, monitoring progress together or having remote discussions could provide coping encouragement. Additionally, doing the coaching together with other people could potentially help to overcome the hurdle of getting started, as the coaching would be scheduled for a specific time slot.

Secondly, peer support could be a valuable source of information and advice in the form of experiential knowledge. Many interviewees seemed to emphasize the need for interactive and social learning. As one interviewee explained, a service with the possibility to ask questions from both health care professionals and peers would be ideal. Currently, the Star coaching programs do not seem to utilize experiences of peers within the coaching programs. However, as Gillison et al. (2019) suggest, online health interventions should consider the psychological need for relatedness in some way. For example, Star coaching programs could include experiences of other users to give concrete examples of what kind of benefits the service can offer.

The interviewees seemed to emphasize peer support also as a source of inspirational hope and validation for feelings and concerns. As mentioned in the interviews, “*information as pure data might not be mentally inspiring*”, unlike uplifting and memorable stories. One interviewee also explained how reading stories of other people’s experiences creates the feeling that one is not alone.

As none of the unemployed continued with Star coaching programs past the first week, the usefulness or lack of social support provided by Star is difficult to evaluate. Only some of the programs such as the ones for smoking cessation and reducing alcohol consumption seem to explicitly suggest seeking of social support – a behavior change technique included in Gillison’s et al. (2019) list. This observation seems to align with Morrison’s (2015) recommendation that social support is especially valuable when there is social stigma related to the health challenge. No experiential knowledge nor experiences of other users seem to be utilized in any of the Star programs.

According to Morrison (2015), social support within an intervention can be useful when the user lacks social support outside of the intervention. Based on this case study, it is difficult to evaluate the quality and amount of social support that the interviewed unemployed receive in their lives. A common conception is that unemployment would be associated with social isolation, but recent research does not necessarily support this claim. According to Rözer et al. (2020), unemployment seems to cause changes in strength and size of social networks, but the claim that the unemployment would be associated with the decrease of social support seems unfounded. Similarly, Galie’s (1999) study conducted in the European Union seems to disprove the claim that unemployment would undercut social networks. Thereby, the unemployed do not seem to lack social support outside the health interventions statistically any more than other sociodemographic groups.

Based on the interviews, it seems that the group of unemployed might have particular difficulties in getting started with the coaching programs and committing to them, which could relate to procrastination and concentration problems. Due to the small size of the interview sample and lack of possibility for comparison, this conclusion is highly speculative. However, existing research suggests that unemployment is associated with higher prevalence of attention deficit hyperactivity disorder, i.e., ADHD (de Zwaan et al., 2012).

Thus, considering the attention deficits could help in tailoring Star online health check and coaching better for the unemployed. For example, the information could be provided in a more condensed form. Additionally, Morrison (2015) argues that particularly strong support needs would also advocate for the inclusion of social support features in health interventions.

Information about neuropsychiatric disorders could be provided to the users, e.g., in coaching programs related to mental wellbeing.

## **7.4 Limitations and future research**

This subchapter discusses some of the limitations that the study has regarding research design, sampling, and methodology. Based on these limitations, the reliability and validity of this study are contemplated. Lastly, potential directions for future studies are considered.

### **Limitations of the study**

The quality of a case study can be evaluated on four metrics: internal validity, construct validity, external validity, and reliability (Yin, 2018). As this study is exploratory and does not seek to make causal statements, internal validity is not a concern. Thus, only the latter three metrics are discussed.

According to Yin (2018), construct validity refers to the suitability and reasoning of chosen operational measures for the studied phenomenon, which in this study was health behavior change. As the aim was to explore the motivations and intentions for behavior change instead of measuring the concrete behavior change as objectively as possible, semi-structured interviewing was a suitable method for data collection. Additionally, the interpretations made from the interviews were validated by comparing them to the results of the quantitative questionnaire. As Yin (2018) suggests, construct validity can be increased by using multiple sources of evidence.

External validity describes the extent, to which the study's results are generalizable (Yin, 2018). Due to the single-case study design, there are significant barriers to making confident generalizations. As the studied phenomenon, i.e., health behavior change, is produced by the interaction between the system (Star) and the users (the unemployed), it is ambiguous whether the different user groups would experience the same benefits and challenges with the same system. Conversely, it is speculative whether the unemployed would experience similar benefits and challenges in using a different service. Thus, the conclusions of this study rely on analytical generalization – as in case studies in general (Yin, 2018).

A significant factor in the generalizability of the findings is the representativeness of the sample – especially in this study as the sample was relatively small. As shown in Table 4, the interviewee sample was somewhat heterogeneous at least in terms of age, gender, level of education and length of unemployment. Additionally, the perceptions of Star were diverse, as the interviewees' experiences ranged from remarkably positive to particularly

negative. However, these two extremities might be overemphasized in the findings, as interviewees who had stronger attitudes towards Star elaborated on the experiences more than interviewees with more neutral perceptions. Other biases may relate to the selection of the sample. It might be that more sociable persons were more inclined to participate in the follow-up interviews, leading to more positive perceptions about social support in health behavior change.

Reliability refers to the level of confidence that conducting the same study again would yield similar results and conclusions (Yin, 2018). Thus, the reliability can be increased by documenting all steps of the research process carefully (Yin, 2018). Therefore, the study context, research approach as well as methods for data collection and analysis are described in detail in chapter 3. One major challenge regarding reliability is that the themes of focus varied significantly among the interviews. Consequently, some of the interviews could be described as unstructured rather than semi-structured, which poses challenges to the replication of the study.

One major limitation of the study relates to the timing of the interviews. The reason for conducting the interviews 1–2 months rather than weeks after the health check was the assumption that the unemployed would have more time to utilize Star health coaching programs. Thereby, the interviews could have provided more reliable insights whether the use of Star had changed their motivations, intentions, or actual health behavior in the long term. However, as none of the unemployed had engaged with the coaching programs, the timespan between using Star and conducting the interviews was unnecessarily long. Consequently, the interviewees were not able to describe their experiences and feelings as vividly. As a concrete example, some of the interviewees did not even have a clear memory of whether they had subscribed to the coaching programs or not.

### **Directions for future research**

As discussed in the previous subchapter, the single-case design and the exploratory nature of this study are reflected in the limited generalizability of the findings. Based on this study, the ways in which an online risk calculator and online health coaching programs could support the unemployed in improving their health behavior are rather enlightened guesses than validated recommendations. However, the study provides many potential directions for future research.

The need for tailoring online risk calculators and online health interventions according to the users' characteristics is well known in existing research (Damman et al., 2017; Morrison, 2015). This study further emphasizes this

conception, as the interviewed unemployed had vastly heterogeneous perceptions of Star and support needs for improving health behavior. Therefore, future studies should continue exploring how the digital health services should be tailored for the unemployed as well as for other user groups.

An important aspect of tailoring is the context of use. This study implies that the Star health check and coaching might not provide strong enough motivation and support for health behavior change among the unemployed as such. Thereby, exploring how Star could be incorporated into other health care services is a potential topic for future research, to which Kuhlberg's et al. (2021) ongoing research might also provide more insights.

The differences between individual Star coaching programs are not considered in this study due to the scarcity of evidence. The sample size was small and only a minority of the interviewees actually engaged with the coaching programs. Thus, future studies could focus on either individual coaching programs or groups of programs that are similar to one another (e.g., smoking cessation and reducing alcohol consumption). As Morrison (2015) acknowledges, the support needs depend largely on the nature of the health challenge among other factors.

## 8 Conclusion

The aim of this study is encapsulated in the research problem, which is formulated as follows:

*How could an online health check and health coaching motivate and support the unemployed to improve their health behavior?*

To answer this question, an exploratory single-case study of Duodecim Star – an online health service package designed to promote the adoption of healthier behaviors – was conducted. Ten unemployed people were interviewed about their experiences of using Star to explore the benefits and challenges that the unemployed perceive in the services. Thereby, understanding of the needs that the unemployed have in improving their health behavior was gained. Based on this understanding, suggestions were given for how online health checks and health coaching could be designed better for the unemployed.

The study shows that the unemployed are a very heterogenous group with varying and even contradictory preferences regarding health behavior support. Thus, a one-size-fits-all solution for promoting healthier behaviors among the unemployed is unlikely to produce sufficient results. Instead, the services should be tailored according to the characteristics of the users and be flexible so that the users have options for how to use the services.

Star online health check seemed to provide an understandable and comprehensive but somewhat superficial picture of the users' state of health for the unemployed. The perceived usefulness of this kind of presentation seemed to depend on the person's needs and prior health knowledge. The traditional health check seemed to complement the online health check well by providing an opportunity for more personal discussions and help for those who needed them. The most startling part of the health report was the comparison between current life expectancy and the life expectancy that could be achieved with healthier behaviors. It seemed to concretize the impact of lifestyle choices on health and thereby foster intentions for health behavior change.

The attractiveness of Star online health coaching programs seemed to depend on the experience of the Star health check. Those who perceived the health check as useful, believed that the coaching programs could be valuable as well and subscribed to them. However, the unemployed had major difficulties in getting started with the programs. The reasons seemed to relate to both characteristics of the users as well as to weaknesses of Star. Altogether,

it seemed evident that the Star failed in getting the unemployed engaged and committed to the health coaching programs.

Based on this study, it seems that the concentration problems and difficulties of getting started might be characteristic to the group of unemployed. As Star coaching programs are mostly based on text and images, some people might have difficulties in sitting down and taking the time to study the materials. Thus, offering alternative formats of information could be considered. For example, some people might experience listening (e.g., to lectures, podcasts or audiobooks) as a more effortless way to learn than reading.

The interviews suggest that Star coaching programs do not adequately recognize the user's perspective and challenges, which leads easily to loss of interest due to the lack of personal relevance. Some interviewees suggested that support with initiating the actions (e.g., reminders and notifications) and monitoring progress could help in getting started and maintaining motivation. However, the efficacy of the above-mentioned features is highly speculative as they are based on propositions rather than experiences of the interviewees.

Additionally, the interviewees seemed to emphasize the value of peer support in their prior or current efforts to change their health behavior. Thus, increasing the social dimension in Star coaching could enhance the sense of relatedness and increase engagement to the programs. Potential features, which were proposed as useful by the interviewees, include inspirational stories, communities around the courses, and possibility for online discussions.

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## **Appendix A: Interview structure**

### Theme 1: Star online health check

- What kind of thoughts and feelings did the online health check evoke?
- How did you react to the results (e.g., life expectancy and chronic disease risk evaluations)?
- How did the results from the online health check change your perception of your own health?
- How was the online health check in comparison to the traditional health check with the public health nurse?

### Theme 2: Star online health coaching

- Did you subscribe to any of the health coaching programs? Why (not)?
- If yes, how have you experienced the use of coaching programs?
- If yes, what kind of challenges related to the coaching programs have you experienced?
- If yes, what kind of benefits related to the coaching programs have you experienced?

### Theme 3: Health behavior change

- Have you made any lifestyle changes after the health check (or previously in your life)?
- If yes, how was your experience of trying to adopt healthier habits?
- How do you see your health behavior in the immediate future?

### Theme 4: Health support needs

- What kind of a digital service would support you in making healthier lifestyle choices?
- What kind of other support would help you in making healthier lifestyle choices?