Implementation of the Personal Health Environment in Friesland:

Establishing an Effective Promotion Strategy
based on Psychological Theories
and Qualitative Research

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Abstract

The demand for high-quality care in the Netherlands is too high for professional care to handle, resulting in great pressure on healthcare. This demand has partly resulted from a quickly aging population, which is specifically applicable to the province of Friesland. To tackle this challenge novel innovations described as eHealth technologies are needed. In this research one specific innovation, the Personal Health Environment is discussed. This research aims to assess which promotion strategy is needed for the application to function as effectively as possible while focusing on indicators from psychological theories as a foundation. In-depth interviews with future consumers divided into three age groups (18 - 30, 30 - 65, 65+) were conducted and resulted in a final recommendation on a promotion strategy. Results showed that the elderly (65+) were not interested in using eHealth technologies at all and could not be influenced into a different usage behavior. Furthermore, consumers stated effective promotion would need to come from a trustworthy source and should provide information about the Personal Health Environment. Lastly, mouth-to-mouth marketing was proven to be effective. Therefore the final recommendation was to establish an informative handout provided by a trustworthy source within healthcare focusing on the age group 18 to 65 years old.

Keywords: Personal Health Environment, Friesland, eHealth, psychological theories, behavioral models, promotion strategy

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1. Introduction

Healthcare in the Netherlands is facing a great social challenge at the moment. Due to an aging population, the demand for care will be much greater in the near future than what the professional care sector can handle (Schouteten, Veld & Batenburg, 2017). Next to this, an extra burden was placed on primary care. This can be seen in particular within mental health and out-of-hours care (van Weel, Knottnerus & van Schayck, 2020). Not only is the demand for healthcare increasing but it is also expected from the sector to deliver an increasing amount of high-quality care (Schouteten, Veld & Batenburg, 2017).

It is needed for innovation within the healthcare system to keep up with today's society and its needs. Especially in the area of research, Friesland, this challenge is noticeable. The shortages of general practitioners and nurses are already present (Korevaar & Donker, 2019). The healthcare sector is the biggest economic sector in the Northern Netherlands which should be taken into account with decisions around this topic since it includes innovation within the healthcare sector (Projectplan Open Innovatie Call, 2019). Within this shift towards progression, technological innovation is critical. This is why eHealth applications should be stimulated in this area.

One of these applications is the Personal Health Environment (PHE), also called Persoonlijke Gezondheidsomgeving (PGO) in dutch. A PHE allows citizens to manage their health and the care around it themselves with a clear overview and allows them to participate digitally in their care network (Projectplan Open Innovatie Call, 2019). By implementing this application not only the pressure on care providers will decrease but self-reliance and responsibility among citizens concerning their health should increase as well (Projectplan Open Innovatie Call, 2019). Thus, creating a healthier society with a prevention-based healthcare

system. The Kennislab Noordoost Fryslân was appointed to design a promotional strategy for the PHE. This report has been made to offer a recommendation to them.

The overall aim of this research project is to investigate how to promote the implementation of the PHE application as effectively as possible from the perspective of the consumers. The research question for this project is as follows: "Based on psychological research, what should the promotion strategy of the Personal Health Environment be in Friesland to make it as effective as possible?". Since eHealth technologies often are not implemented sustainably because human behavior is not taken into account, psychological research will be done and behavioral models will be used as the foundation of this research. This is being done to establish an effective promotion strategy.

This research question is important since the PHE application must be used as much as possible to successfully help relieve the burden on healthcare. The viewpoint of the consumers is especially important to make sure the application is promoted clearly for the public and well implemented. From this analysis recommendations or improvements will be stated regarding the promotion of the PHE and so increase the effectiveness of the application. It is expected that new findings regarding the promotion of the PHE will be found that had not been taken into consideration in the previous project plan. Furthermore, multiple viewpoints from several age groups on this topic will be established. These will create a clear view of the attitudes and needs towards the PHE application per generation.

This paper will start with addressing existing literature discussing eHealth applications, the research population, the Personal Health Environment, and behavioral theories applicable to the PHE. From this literature review, an in-depth interview was established and conducted. In the next section, the methodology of this study will be explained. Furthermore, the interview results

will be discussed for each age category. Next, the results will be interpreted in the discussion

section and a final recommendation will be created. Finally, the research will be concluded in the

last section.

2. Literature Review

This literature review aims to investigate and assess which indicators of behavior are most suitable to target for individuals to engage in the Personal Health Environment application (PHE). First, the topic of E-health is being discussed. This section also includes an analysis by the Fries Sociaal Planbureau saying how residents of Friesland feel about the use of technology in healthcare. After this, the research population is examined, which is the population of Friesland. Especially the population groups in need of healthcare will be discussed. This research population will be studied regarding their thoughts on the PHE, which is being discussed in the next section. As a foundation of this research, behavioral models will be used. The last section discusses multiple of these models that will be applied to the PHE and integrated into the interview questions.

2.1 E-Health applications

2.1.1 What is eHealth?

Multiple definitions of eHealth have been created over the years. Some of these definitions are broad, yet some may be more specific and focus on a specific area within healthcare. (Emad et al., 2016).

Eysenbach established the following definition:

"eHealth is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology." (Eysenbach, 2001).

This definition has subsequently been revised and questioned recently (Della, 2001; Boogerd et al., 2015). eHealth is an overarching term for many different kinds of technology in health. For example, Electronic health records, Health knowledge management, and Mobile health (m-Health) are applications that can be found within eHealth (Emad et al., 2016). The usefulness of eHealth innovations has often been questioned since there exists a mismatch between the possible benefits and the actual outcomes (van Gemert-Pijnen et al., 2011). Van Gemert-Pijnen et al. (2011), states that a fresh way of thinking about how technology can be used to innovate health care is needed to demonstrate the impact of eHealth technologies more effectively.

2.1.2 Attitudes of Frisians towards technology in healthcare

In November 2019, the Fries Sociaal Planbureau (FSP), conducted research in Friesland answering the following question: How do residents of Fryslân feel about the current and future use of technology in healthcare and welfare, how do they experience the use of this technology and what do they think about it? (Fries Sociaal Planbureau, 2020). Based on this question, a survey was conducted in November 2019 among members of the Panel Fryslân, which was completed by a total of 2845 participants. Out of these participants, 51% were female and 49% were male. The respondents had been divided over the different age categories as follows: 12% were 18-34 years old, 35% were 35-49 years old, 28% were 50-64 years old, and 25% were older than 65 years.

The results showed that more than 60% of the participants believed that eHealth technology could help people with gaining control over one's own health and healthcare. Next to this, more than 55% of the participants believed that eHealth technology could help with a healthier lifestyle. Furthermore, approximately 30% of the participants believed that eHealth technology could help with staff shortages in healthcare (Fries Sociaal Planbureau, 2020). These aspects are also included within the goals of the PHE. The results from the study above indicate that consumers believe this kind of application can be of use.

Whether healthcare technology tools are expected to be needed more in the future depends on how useful these tools are perceived to be. 37% of the participants expected that apps and wearables within healthcare are going to be more necessary in the future (Fries Sociaal Planbureau, 2020). These numbers regarding future use show that applications like the PHE are expected to be needed in the future.

The possibility of data sharing was a cause for concern among the participants. These concerns do not differ between higher and lower educated residents of Friesland (Panel Fryslân, 2020). From the concerns about social contact, it could be concluded that the participants required human contact in healthcare. This means that for the PHE application it is important to elaborate on the topics of privacy and social contact to the consumer. In this way, consumers will be more likely to use the application

Lastly, the participants expected that with more advanced digital applications, the use of these would require a great deal of effort from them. The expected ease of use for most forms is reported to be lower by the low-educated participants and the participants over 65 years old (Fries Sociaal Planbureau, 2020). Thus, within the promotion of the PHE, ease of use is an important factor.

2.2 Research population: the Frisian society

Friesland had a total of 649 957 people with a division of approximately half male and half female by the time of research. 28.5% of the Frisian population were people between 45 and 60 years old, making this the biggest age group in Friesland. Most Frisians were married and had children. Furthermore, most students in Friesland followed a secondary vocational education (mbo-level). Within the working population, most people worked in the sector of commercial services, which includes wholesale, retail, and transport (CBS, 2020).

The research FSP conducted showed that a relatively large number of residents of Friesland already used the internet and social media to find and share information about health and healthcare. Yet, they have had little experience with the use of more advanced technology such as image care, home automation, and robotics. More than a quarter of the Frisians said that they do not use digital tools for care and welfare purposes at all (Fries Sociaal Planbureau, 2020). In general, residents of Fryslân were awaiting the use of technology in healthcare and welfare. Many residents of Fryslân indicated that they saw the added value of technological innovations in care and welfare when they felt a concrete need for it. This has been seen especially in the sphere of curative medical care, safety in the home, and self-management of care. They did expect to need help from professionals or close friends/relatives (Fries Sociaal Planbureau, 2020).

2.2.1 In need of healthcare

A great variety of care technologies are available for people with an intensive care demand. The people who indicated that they had an intensive care demand, remarkably enough, saw less benefit in the use of these aids than people without an intensive care demand. The elderly, who can also be classified as a group in need of care, also see less need for the use of technology within healthcare (Panel Fryslân, 2020).

2.3 The Personal Health Environment

The eHealth application this research is focusing on is the Personal Health Environment (PHE), also called Persoonlijke Gezondheidsomgeving (PGO) in dutch. A PHE allows citizens to manage their health and the care around it themselves with a clear overview and allows them to participate digitally in their care network (Projectplan Open Innovatie Call, 2019). By implementing this application not only the pressure on care providers will decrease but self-reliance and responsibility among citizens concerning their health should increase. Thus, creating a healthier society with a more prevention-based healthcare system.

The PHE is an application in which one can keep track of information about one's health and a possibility to actively work on one's health (MedMij, 2019). The idea is that one can collect and manage medical data, and share it with others. This information can include for instance lab results, medication, and vaccinations (MedMij, 2019). There are some providers of PHE's, although the system is very new. The application in question provides the activities within the app by connecting personal data to data from healthcare providers (Projectplan Open Innovatie Call, 2019).

Friesland can benefit from implementing the PHE and is a fitting region for the application to be implemented. Since there is a good collaboration between care providers in the region, called 'Stichting GERRIT' (GERRIT, 1996). Within this organization a data exchange infrastructure has been established, making this a good basis to work with for this region regarding the PHE. Next to this, the level of ICT skills in the region is high (Hoogsteen & Langebeek, 2018), the regional government is supportive of these initiatives and the region has a sufficient scale to work with.

2.4 Behavioral Theories in eHealth

Numerous eHealth applications and technologies are not successful in implementing sustainable technologies within healthcare (World Health Organization, 2010). The interconnectedness between eHealth technologies, human behavior, and the socio-economic environment is often not taken into account. This is causing the newly implemented eHealth technologies to have a low impact and not being used to their full potential (van Gemert-Pijnen, 2011). Furthermore, eHealth technologies frequently face implementation problems. This often happens as a result of health care professionals who are skeptical of new technologies within their field and do not see the benefits they can deliver (Chaudhry et al., 2007). Lastly, eHealth technologies are known to have a low impact because end-users are facing usability issues (Nijland et al., 2008). It has been proven an application has to correspond with one's daily life for one to keep using it. The use of new technologies is time-consuming and frustrating for the end-users, which results in a low impact of the application on its goals (Nijland, 2011). To realize the full potential of eHealth technologies the social, human, and contextual factors need to be considered, especially when implementing and adopting new technologies (World Health Organization, 2010; Kukafka et al., 2013). This is why it is needed to look at behavioral theories whilst implementing a new eHealth technology.

2.4.1 Behavioral Models

The intention to use preventive eHealth services like the PHE is similar to the intention to engage in health-protective behavior (Koivumäki et al., 2017). This showed theories of health behavior and behavioral models, in general, are helpful when looking at the acceptance and use of preventive eHealth applications. This section discusses multiple behavioral models which are interesting in regards to the implementation of new eHealth technologies. The origin of these models is described in Appendix 8.2 (The Theory of Reasoned Action (TRA) & The Theory of Planned Behavior (TPB)). In a behavioral model, the arrows represent causal relationships. Appendix 8.1 contains the constructs and definitions of aspects within the behavioral models.
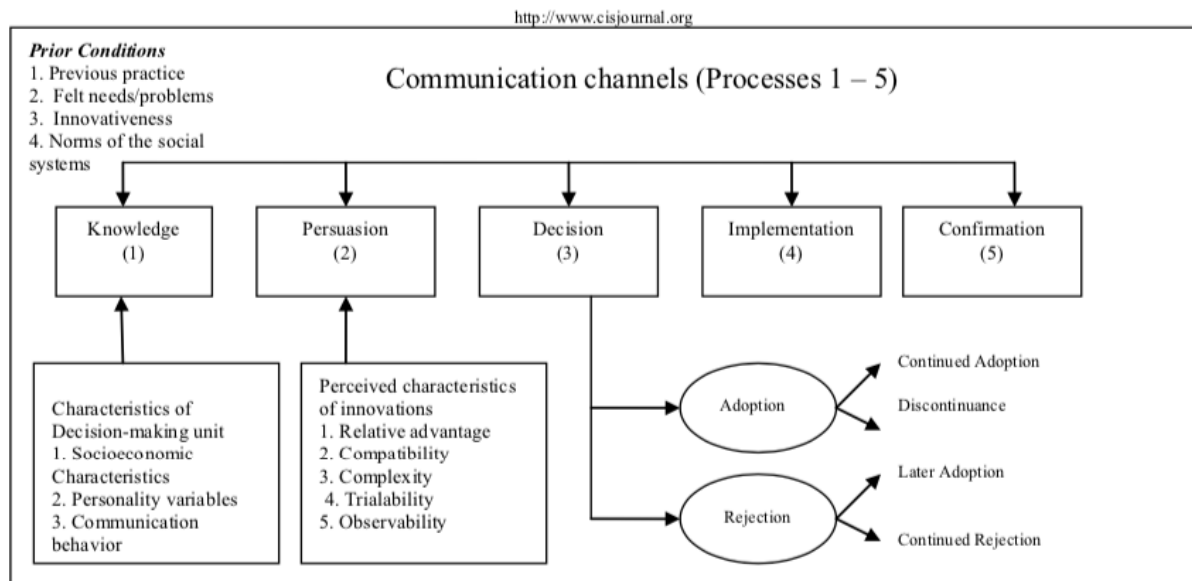
2.4.1.1 The Innovation Diffusion Theory

Fig 3: A model of stages in the Innovation-Decision Process (Rogers 1995)

Figure 3. Innovation-Decision Process, (Rogers, 1995)

According to Rogers, the inventor of the Innovation Diffusion Theory (IDT), the innovation-decision process is the process through which an individual, or another decision-making unit, passes from first (1) knowledge of an innovation, to (2) forming an attitude toward the innovation, to a (3) decision to adopt or reject, to (4) implementation of the new idea, and to (5) confirmation of this decision (Rogers, 1962; Rogers, 1995). This is a sequence of actions and decisions taken over time by an individual or an organization to examine a novel idea and decide whether or not to implement it (Rogers, 1962; Ami-Narth & Williams, 2012).

This behavior is mainly concerned with coping with the inherent uncertainty that comes with selecting a new option for those already available (Rogers, 1962; Rogers, 1995). The Personal Health Environment innovation discussed in this research is also a new technology introduced in a field with other available options, for instance, an online portal of one's general practitioner. According to the IDT, people can be categorized based on how quickly they accept new technologies: Innovators, early adopters, early majority, late majority, and laggards (Ami-Narth & Williams, 2012). Furthermore, the following variables influence an individual's attitude toward an innovation and, eventually, its adoption: relative advantage, compatibility, complexity, trialability, and observability (Rogers, 1995; Ami-Narth & Williams, 2012).

2.4.1.2 The Technology Acceptance Model

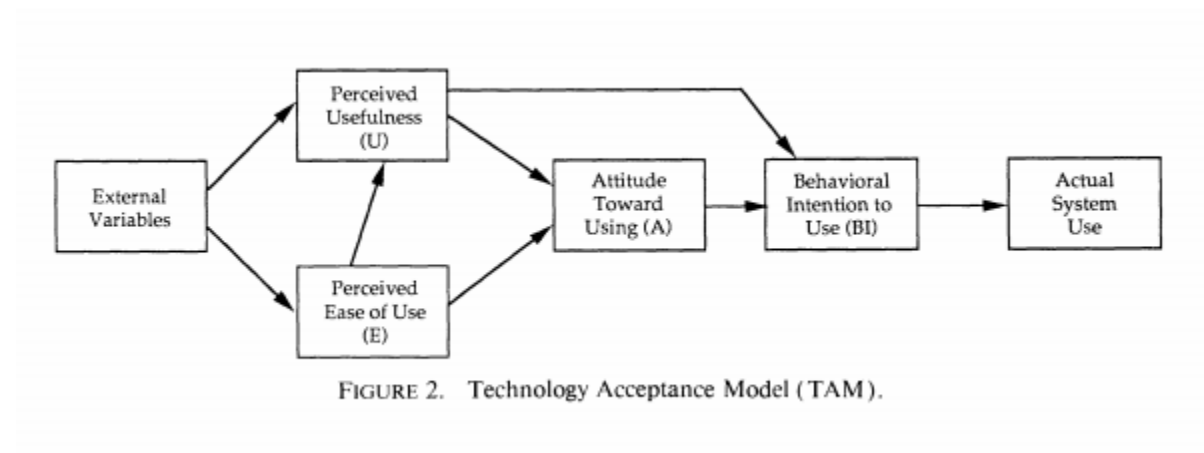FIGURE 2. Technology Acceptance Model (TAM).

Figure 4. Technology Acceptance Model, (Davis et al., 1989)

The Technology Acceptance Model (TAM) was introduced by Davis in 1986 (Davis, 1986; Davis et al., 1989). The TAM is a variant of the Theory of Reasoned Action made by Fishbein designed primarily for simulating user acceptance of information technologies (Davis, 1986; Davis et al., 1989; Fishbein 1967; Ami-Narth & Williams, 2012). The TAM's purpose is to provide a general explanation of the determinants of computer adoption that is capable of understanding user behavior across a wide range of end-user computing technology and user populations while remaining both affordable and theoretically justified (Davis et al., 1989; Ami-Narth & Williams, 2012). The TAM serves as a foundation for tracking the effects of external factors on internal beliefs, attitudes, and intentions (Davis et al, 1989).

The model posits that a potential end-users general attitude toward using a system or innovation is thought to be a primary factor of whether or not one actually uses it (Davis, 1986). The attitude towards using an innovation is a product of two major beliefs: perceived usefulness and perceived ease of use (Davis, 1986; Davis et al., 1989; Ami-Narth & Williams, 2012; Emad et al., 2016). These two specific beliefs are of primary importance for technology acceptance behaviors (Davis et al., 1989). Furthermore, perceived usefulness is influenced by perceived ease of use (Davis, 1986). This is the case since an easy-to-use system will result in higher job performance and thus greater usefulness for the user (Davis, 1986). Perceived usefulness is defined as the subjective likelihood that using an innovation will improve an end-users work performance within an organizational context (Davis et al., 1989; Ami-Narth & Williams, 2012; Emad et al., 2016). The other factor, perceived ease of use, is the degree to which the target innovation is expected to be effort-free by the end-user (Davis et al., 1989; Ami-Narth & Williams, 2012; Emad et al., 2016). In behavioral models, these factors are often associated with attitudes and usage (Davis et al., 1989).

The TAM posits that the actual usage of an innovation is mainly influenced by behavioral intention to use (Davis, 1986; Davis et al., 1989). Additionally, the TAM also states that the behavioral intention to use is influenced by both one's attitude and perceived usefulness. This means that the TAM implies that people make plans to engage in behaviors that have a beneficial impact on them (Davis et al., 1989).
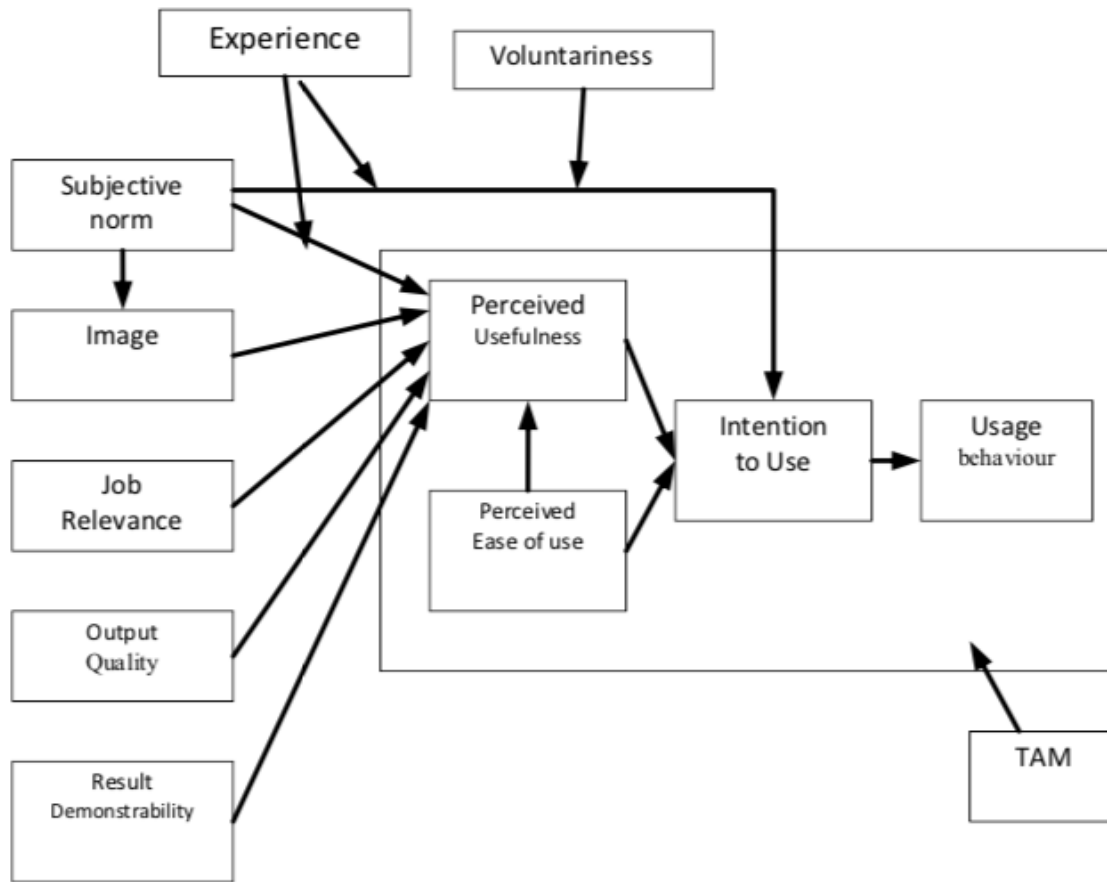
Figure 5. The extended Technology Acceptance Model, (Venkatesh & Davis, 2000)

The TAM was extended by Venkatesh & Davis (2000) (TAM2) and variables from existing behavioral change models were added (Emad et al., 2016; Venkatesh & Davis, 2000). This was done to understand how the impact of these factors alters with increasing end-user experience with the researched innovation, and to include additional critical determinants of the factors perceived usefulness and usage intention (Venkatesh & Davis, 2000). The added factors include societal factors and cognitive instrumental processes that affect perceived usefulness and perceived ease of use (Emad et al., 2016; Venkatesh & Davis, 2000).

Three factors exist regarding social influence: subjective norm, voluntariness, and image. It was found by Hartwick and Barki (1994) that the subjective norm had a significant effect on

behavior intention when the setting was mandatory but in a voluntary context, it had no effect

(Hartwick & Barki, 1994). Image is described as "the degree to which use of an innovation is

perceived to enhance one's status in one's social system." (Moore & Benbasat, 1991). According

to the TAM2, the subjective norm will have a positive impact on the image (Blau, 1964). The

effect of subjective norm on the image, together with the effect of image on perceived

usefulness, captures this identification effect in TAM2 (Venkatesh & Davis, 2000).

Next to societal factors the TAM 2 takes four cognitive instrumental factors of perceived

usefulness into account: job relevance, output quality, result demonstrability, and perceived ease

of use (Venkatesh & Davis, 2000). The TAM2 proposes that people use a mental analysis to

evaluate the match between important work goals and the consequences of executing the act of

utilizing innovation as a foundation for making decisions regarding the use-performance

contingency and thus perceived usefulness (Venkatesh & Davis, 2000). Job relevance is seen as

an end user's opinion of how suitable the goal system is to his or her job (Venkatesh & Davis,

2000). In the TAM2 job relevance has a direct effect on perceived usefulness. Next to this,

consumers will look at how well the innovation executes the tasks needed, which is referred to as

output quality perceptions (Venkatesh & Davis, 2000; Davis et al., 1992). The perceptions of

output quality have a causal relationship with perceived usefulness (Davis et al., 1992).

Furthermore, according to the TAM2, result demonstrability directly affects perceived usefulness

(Venkatesh & Davis, 2000). Result demonstrability is defined as the tangibility of results of using

the innovation (Moore & Benbasat, 1991). Meaning individuals are more likely to acquire

positive impressions of a system's usefulness if there is a clear correlation between usage and

favorable outcomes. Lastly, the TAM 2 states that perceived ease of use is of direct influence on

perceived usefulness (Davis et al., 1989). This conclusion can be made since the easier a system

is to use, the more likely it is to improve job performance (Venkatesh & Davis, 2000).

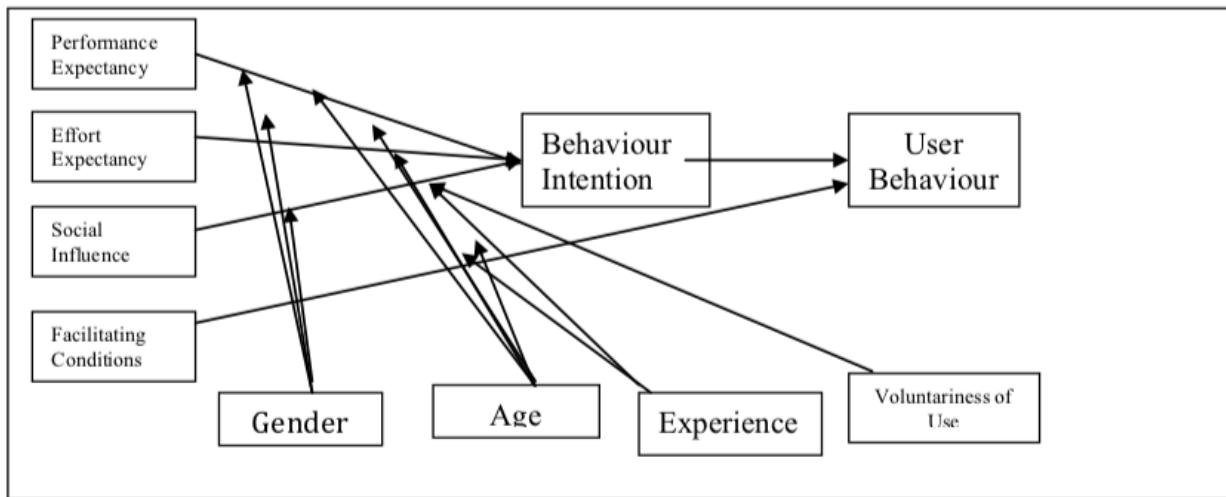**2.4.1.3 The Unified Theory of Acceptance and Use of Technology**

Fig 5: Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

Figure 6. The Unified Theory of Acceptance and Use of Technology, (Venkatesh et al., 2003)

Since a great number of researches had been done on user acceptance of technology and several behavioral models had been established as the ones shown above, researchers encountered difficulties regarding usage of theories in their analyses (Davis et al., 1989; Venkatesh & Davis, 2000). When researchers are presented with a broad number of models to choose from, they feel like they should either "pick and choose" constructs from various models, or choose a "preferred model" and neglect the features of other models (Venkatesh et al., 2003). Thus, Venkatesh et al. found that to get toward a uniform perspective of user acceptance, a review and summary of models and research within the field of user acceptance of new technology were required (Venkatesh et al., 2003). This need resulted in the creation of the Unified Theory of Acceptance and Use of Technology by Venkatesh et al. in 2003 (UTAUT) (Ami-Narh & Williams, 2012; Venkatesh et al., 2003). The UTAUT not only highlights the most

important individual-level indicators that influence technology acceptance, but it also recognizes the variables that could magnify or limit these factors' impacts (Venkatesh & Zhang, 2010).

The UTAUT was created out of the models described above and more: The TRA, TPB, IDT, TAM, and TAM2 (Emad et al., 2016). Next to these models the Motivational Model, the Model of PC Utilization (MPCU), and the Social Cognitive Theory were used (Davis et al., 1992; Thompson et al., 1991; Bandura, 1986; Emad et al., 2016). When formulating the UTAUT seven components showed to be significant direct indicators of behavior intention or user behavior in one or more of the separate models (Venkatesh et al., 2003). Four components are immediate factors of user acceptance and usage behavior, which means they have an essential influence on these indicators (Venkatesh et al., 2003; Emad et al., 2016). These four "core" components are performance expectancy, effort expectancy, social influence, and facilitating conditions, these affect behavioral intention (Venkatesh et al., 2003; Emad et al., 2016). Next to these components, there are four key moderators: gender, age, voluntariness, and experience (Venkatesh et al., 2003; Emad et al., 2016). Equal to the models discussed earlier the UTAUT states that behavioral intention has a significant positive influence on user behavior regarding technology.

First, performance expectancy is referred to as the degree to which a person believes that implementing the innovation will support him or her in improving job performance (Venkatesh et al., 2003). This factor is seen as the strongest predictor of behavioral intention, it is significant in voluntary as well as mandatory contexts (Venkatesh et al., 2003).

The degree of ease connected with the use of the innovation is referred to as effort expectancy. This component is significant in as well as voluntary and mandatory settings. However, effort expectancy is only a significant predictor during the first period of usage and becomes

nonsignificant when the innovation is used for an extended time (Venkatesh et al., 2003; Davis et al., 1989; Agarwal & Prasad, 1997). Concepts focused on effort expectancy are likely to be more significant in the early phases of new behavior, when system difficulties are seen as obstacles to resolve, and to be overtaken by instrumentality constraints later on (Davis et al., 1989; Szajna, 1996). Previous research suggests that factors related to effort expectancy are larger drivers of behavioral intention regarding women and older workers (Venkatesh et al., 2000; Morris & Venkatesh, 2000).

Social influence is defined as the degree to which an end-user perceives that important others believe he or she should use the innovation (Venkatesh et al., 2003). This factor concludes that the way an individual believes others will see them as a result of their use of the innovation influences one's behavior (Venkatesh et al., 2003). Whilst in a voluntary context social influence is not significant, it is significant in a mandatory context. These results could be ascribed to rules in a mandatory setting, which results in social influences having a direct impact on behavioral intention (Venkatesh & Davis, 2000). When researching an innovation in a mandatory setting, social influence is only significant within the early stages of usage (Venkatesh et al., 2003; Venkatesh & Davis, 2000).

The last core component is facilitating conditions. This component is described as the degree to which an end-user believes that an organizational and technical infrastructure exists to assist the usage of the innovation (Venkatesh et al., 2003). This indicator is categorized to include features of the technological and/or organizational environment that are intended to eliminate obstacles for usage (Venkatesh et al., 2003; Taylor & Todd, 1995). If both performance and effort expectancy constructs are included in the research, facilitating conditions are no longer significant in assessing behavioral intention (Venkatesh et al., 2003). Facilitating conditions are

presented as a direct influence on user behavior. As end-users of an innovation discover many options for help and assistance within their organization, the effect of facilitating conditions is predicted to grow with experience. As a result barriers to long-term usage will be removed (Bergeron et al., 1990). Age is an important moderating factor of facilitating conditions. For example, it has been shown that older employees find it more important to receive guidance and support at their workplace (Hall & Mansfield, 1975; Morris & Venkatesh, 2000).

The UTAUT has proven to be a suitable model that reconstructs existing knowledge and serves as a base for studies in the field of technology acceptance (Venkatesh, 2003). By taking the moderators' age, gender, voluntariness, and experience into account the model can be used to identify barriers in the invention and so increase the chances of long-term and sustainable usage behavior. Next to this, it can also prove that these moderators interfere with certain indicators and their connection to usage behavior and intention. By identifying this interference one can make informed decisions about the implementation strategy and take into account difficulties that need to be addressed during the implementation and usage of the innovation. When assessing user acceptance and usage behavior regarding the Personal Health Environment, the UTAUT and the previously reviewed behavioral theories function as the foundation for the questions presented in the interview guide regarding end-users. Furthermore, the model serves as a tool to analyze the results, discuss the findings and draw conclusions. Lastly, the UTAUT is considered whilst developing an effective promotion strategy. As a result, the final recommendation suggesting a promotion strategy consists of a foundation based on theoretical research.

3. Methodology

This research was conducted by performing a combination of a literature review and qualitative field research. The results of the research were analyzed and shaped into a recommendation proposing a promotion strategy for the Personal Health Environment in Friesland.

3.1 Literature review

The literature review was performed using Google Scholar, Smartcat and gathering internal documents provided by the host organization Kennislab Noordoost Fryslân. The literature search included the following keywords: eHealth technologies, promotion, implementation, healthcare, behavioral model, psychological theory & innovations. After the information about the overarching topic was made clear a data analysis by the Fries Sociaal Planbureau was summarized. The data provided information about the attitudes of Frisians towards technological innovations in healthcare. Then, information was gathered about the research population including regional statistics, the level of experience with eHealth technologies, future expectations, and specific information presenting the attitudes of a subgroup of people with an intensive care demand towards technology in healthcare. Next, The Personal Health Environment was explained. A thorough understanding of the PHE application was needed to clearly explain the PHE concept and to design fitting interview questions. Finally, psychological theories were discussed. To clarify the connection between psychological theories and the PHE a literature search was performed on behavioral models and the function they have. An overview of several indicators with the ability to influence behavior was provided throughout the section. All models, the Innovation Diffusion Theory, the Technology Acceptance Model, and the Unified Theory of Acceptance and Use of Technology could be associated with the PHE

application because of their indicators related to technology. These models were selected to be used as the theoretical foundation of the qualitative data collection and assess the final recommendation.

3.2 Interviews

The literature research showed that qualitative methods are crucial for implementation research, as they provided the necessary tool to capture the individual perspectives, the voices of the participants, and their insights regarding the PHE. A semi-structured interview guide approach was used, which included asking questions, probing the participants, and establishing rapport (Appendix 8.2).

The participants involved in the interview regarding potential end-users needed to meet several criteria to participate. The participant had to be based in Friesland and be a long-term resident of the province. Furthermore, three age groups were established (18 - 30, 30 - 65, and 65+) to measure differences and similarities between generations. For each age category, a minimum of three participants was needed to gather reliable information. The participants were recruited through informal networks and reviewed using purpose recruitment to ensure the participant was eligible for this research.

The interview consisted of questions regarding (1) background information, (2) digitization within healthcare, (3) the participants' opinions and recommendations after using a demo of the PHE application, (4) social influence and effectiveness of various promotional strategies, and a couple of (5) closing questions to wrap up the conversation gradually. The interview guide was approved by the Ethics Committee before conducting the interviews. A part of the interviews needed to be conducted online and a part was done in person. During all the

interviews in person, it was ensured the environment was completely sterile and safe. Furthermore, social distancing was taken into account.

All the participants signed a consent form in which they gave their consent to use their answers and confirmed that the data would be used anonymously. This was also stressed before and after the interview. The interviews were recorded by the researcher through their phone or an online meeting program (i.e. GoogleMeet, Zoom) and were conducted as neutral and unbiased as possible. The data of each participant were analyzed, summarized, and gathered in one table with the data of all the participants and was presented in the age groups and as the participant population as a whole. Through this visualization similarities and differences between the participants and the age groups could easily be identified.

The interviews aimed to gain an in-depth understanding of the perception of Frisians toward the implementation of the PHE. Eventually, identifying indicators that positively influence user behavior. Identified indicators that positively influence the implementation and usage of the PHE had been included in the advice deduced from the research for the promotion strategy of the PHE.

Next to in-depth interviews with potential end-users another series of interviews were conducted with experts working in fields related to the PHE. First, Josefine Geiger, an expert on consumer psychology, was questioned about several promotion strategies from the viewpoint of behavioral theories. Furthermore, Chris Borsten from Ivido was interviewed and demonstrated the steps needed to apply for the PHE and how to get the application to work. These interviews provided an excellent opportunity to gather more information from the professional perspective towards the PHE and an informed opinion on the effectiveness of several promotional strategies.

The extra information gained through these interviews was used to form the final

recommendation and to support the findings in the discussion.

4. Results

The results of ten in-depth interviews with future end-users were collected and the findings were summarized in a table according to the indicators outlined in the literature review and the interview guide (Appendix 8.5).

4.1 Background

All the selected participants were located in Friesland. There was a division within the group regarding whether they live in a village or a city, four participants were living in cities and six were living in a village. The interviewees were all between 20 and 82 years old, of which three males and seven females. All participants had different levels of education, varying from the school of higher general secondary education (HAVO) to the university level(WO).

Three age groups were formed. The youngest age group, 18 - 30 years old, included three participants. These participants were all students. The middle-aged group, 30 - 65 years old, included four participants ranging from 34 years old to 55 years old with diverse professions. Lastly, the oldest group existed out of three participants, 65+, who were all retired. No one within the first age group had children. Within the middle-aged group, one participant was pregnant and another had young children at the time of the interview. All the interviewees in the oldest age group reported having grown children.

In the first two groups, the participants' health was described as well next to some minor health issues. The last group reported their health could be better and two older participants reported to have had major health problems in the recent past. Next to some minor improvements, all participants were satisfied with the quality of healthcare in Friesland.

4.2 General and healthcare applications

When looking at the general amount of hours the participants used digital applications a clear trend could be seen. The older the age group was, the lower their amount of usage regarding digital applications. Among the participants who do use digital applications, they were often used to support their daily lives.

It was concluded that the youngest group used digital applications the most. They reported to have used applications daily and for almost every part of their lives (work, education, social life etcetera.). Because of this, all participants had a lot of experience in this field. Within healthcare, they reported using online technologies to make appointments, request repeat prescriptions, and look up information about symptoms. They perceived these applications as more comfortable than existing alternatives and the lack of personal contact lowered the threshold to arrange healthcare necessities. All young participants declared to find general and healthcare applications useful. The absence of waiting lines in contrast to telephone consultation and a lower threshold for making appointments were the main reasons for perceiving online applications as useful. All interviewees believed that these applications in healthcare could have a positive impact on one's health. In general, digital applications and healthcare applications were perceived by this group as easy and little effort is needed to use them. In some cases, an explanation is needed when using applications for the first time. For all young participants, ease of use could influence how often they used an application. Privacy and security within applications were found to be important to this group.

The middle-aged group said to have used digital applications often to arrange aspects within their lives like finances and checking their emails. As they were getting older a sense of reduced connectedness to the newer developments in this field was mentioned and no need to

make use of these. Therefore, this group did have a lot of experience regarding older applications in contrast to newer applications. They did make use of applications within healthcare mainly for making appointments, repeating prescriptions, checking results, and arranging their health insurance. They used these applications since it saved time, one had more freedom to arrange things by themselves and was less dependent on others. Based on these arguments all participants said they found online applications and healthcare applications useful. Surprisingly, they did not expect any positive impact on one's health. Every interviewee in this group described the applications as easy to use. However, this did not influence their usage behavior. The participants noted that even though the applications were voluntary to use, they feel like they are pressured into using them to participate in today's society.

The oldest age group indicated they did not use digital applications next to their email, entertainment, and the news. Thus, they had little experience with digital applications. Within healthcare the interviewees did almost nothing online, they only read their confirmation emails and arranged their health insurance. For this group of participants, it is the case they only used digital applications if they had to. The participants said to be happy as long as they were not pressured into using apps they do not understand. According to them, the existing alternatives should remain possible to use. The opinions about usefulness were divided. The youngest participant within this group found applications useful, especially planning appointments online. Another participant stated to believe they were useful but not for their generation. The last participant posed to not find the applications useful and thought they were impersonal and unnecessary. One participant believed applications could have a positive effect on one's health, the other two participants did not agree with this. All participants stated that they needed help from others when using a new application and thus did not perceive applications as easy to use.

Since they found the old existing alternatives easier (e.g. calling for appointments) they preferred to not use digital applications. All participants said that ease of use did not influence their usage behavior. This group often mentioned that usage of technology could not be evaded because of the time we were living in but were afraid to be excluded from healthcare because of this.

A clear difference in attitudes between the age groups could be seen. Where the younger participants regularly used digital applications and found them easy to use, the older participants rarely used applications and believed these were difficult. The youngest participants believed their usage behavior could be influenced by how easy an application was to use, whilst both older groups did not think this would be the case for them. All groups emphasized that application should remain voluntary.

4.3 The PHE

After the participants experienced the demo of the PHE a clear division of judgments between age groups could be seen.

The complete youngest group would use the PHE if it were available. They would use the PHE with the following intentions: to look into one's files, to monitor one's health, to make appointments, to arrange aspects around medication, to retrieve information, to save time and unnecessary traveling. Especially the possibilities to make appointments, look into files and check one's medication were perceived as useful components within the PHE. The complete group agreed that the PHE was a useful application since multiple caregivers were positioned within one application and it saved time and effort. Next to this, the whole group agreed the PHE was easy to use, one participant stated that "The use of the app speaks for itself". They all believed that the PHE could have a positive impact on one's health. Because one has the opportunity to monitor one's health and the threshold to do something about one's health has

been lowered, this was concluded. They would like to be informed how their data was secured and that there was no economic motive behind the application. One participant recommended making an instruction video for when one uses the PHE for the first time.

Within the middle-aged group, only one participant said they would not use the PHE. The main reason for this was that the participant claimed to rarely have needed healthcare and thus did not need applications like the PHE. The other three participants would have used the PHE with the following intentions: to keep track of their children's health, to make appointments, to have all the information about their pregnancy in one place, and to look into results and files. All participants found the PHE to be useful and easy to use. The opinions on whether the PHE had a positive effect on one's health were divided within the group. Whilst two participants believed the PHE could provide someone with the handles needed to improve their health the other two participants said they would not use the PHE to monitor their health and thus did not believe it had a positive impact on one's health. One participant suggested notifying users when they have a new message in their inbox.

Only the youngest participant in this oldest age group said they would use the PHE, especially with the intention to gain insights into their health, to contact caregivers, and to exchange their data. This interviewee found the PHE relatively easy to use and did not need any help with it. The other two participants would not use the PHE unless there were no other alternatives left. They would not be comfortable and afraid of using the app, regardless of how easy it was made or what was still being changed. They found the PHE complicated and hard to use. There was no specific component they would change to make the application more user-friendly. The whole concept of the PHE was said to be too difficult for them to feel comfortable using it. Even though most of the group would not use the PHE, all the participants

believed the application could have a positive impact on one's health. Next to this, all the participants did perceive the PHE as useful for other generations but not for the elderly in society. A great concern within this group was that elderly could not learn fast enough to keep up with technology anymore.

From these results, it was concluded that the elderly were not comfortable with using the PHE application. It was seen that this attitude towards the PHE could not be changed by altering the application to be more user-friendly. It was the concept of new technology that created a feeling of discomfort towards the application. The other two age groups mostly agreed with each other that the PHE was useful and easy to use. Next to one participant every interviewee in these groups would use the PHE and felt like the application could have useful and positive effects on them or their health.

4.4 Promotion

The results in this section describe the way the PHE should be promoted according to the future end-users and whether they believed their environment would influence them in their attitudes towards the PHE.

The youngest group stated they would recommend the PHE to their friends and families. Meaning mouth to mouth marketing within this generation would work well. All participants also thought they could be influenced by their environment regarding their interest in the PHE and its use. The following promotion strategies were named by this group as effective marketing strategies: information provided by a trustworthy source (e.g. one's general practitioner or pharmacy), a flyer at home, and youtube, television, and radio advertisements. Strategies this group would not be interested in would be street promotion, social media advertising, and promotion addressed by the government.

For the middle-aged group, all the participants would recommend the PHE to family and friends. The opinions on environmental influence within this group were divided. Two interviewees within the group believed they would be influenced by their environment. The other two participants did not think they would be influenced by their environment. One of them expected the influence would be the other way around. He/she would first use the PHE themselves and then recommend the PHE to others, especially people that could use it. Effective promotion strategies for this group would be promotion from their general practitioners, pharmacies or other trustworthy sources, television and radio advertisements, the use of role models, and providing information. According to the interviewees flyers, social media advertising, posters, and commercial promotion strategies would not be effective.

From the last group, only the youngest interviewee would recommend the PHE to their family and friends and believed he/she could be influenced by his/her environment. The other two participants declared they would not be influenced by their environments or recommend the PHE to others. Strategies that would get their attention would be the provision of information by a trustworthy source, television and radio advertising, and advertisements through the government. Ineffective strategies included street promotion and flyers delivered at home.

A difference between the age groups was concluded regarding the influence of their environment. Similarities could be seen in the responses on effective promotion strategies. All the groups agreed that a trustworthy source should be used during the promotion, especially when providing information. Furthermore, television and radio advertisements were seen as attention-grabbing. Social media advertising, street promotion, and commercial promotion were named as ineffective strategies.

5. Discussion

A recurring observation regarding the results from the future end-users is that there is a gap between the oldest age group and the two youngest age groups regarding most components within the interview. The elderly do not seem to be interested in digital applications and the PHE, not because there are specific things wrong with them but because the overall concept is difficult to use and intimidating to them (Iancu & Iancu, 2020). This was also seen in the questionnaire performed by Panel Fryslân (Panel Fryslân, 2020). All the participants in the older generation indicated that they are not comfortable using technologies and do not perceive themselves as skilled in this, this image was confirmed by a study performed by van Jaarsveld in 2020 (van Jaarsveld, 2020). This results in a preconceived negative attitude towards the PHE and digital applications in general. The attitude towards technology is a big indicator of their behavioral intention and thus their usage behavior, which can also be seen in the Technology Acceptance Model (Davis et al., 1989). Out of the results, it can be concluded that this attitude cannot be influenced by changing the perceived ease of use, effort expectancy, performance expectancy, or perceived usefulness of these participants. When the TAM or UTAUT cannot be correctly followed, like in this case, it means the behavior of the subject can not be influenced (Davis et al., 1989; Venkatesh et al., 2003). This means there is no need or interest for digital applications in healthcare or the PHE from the side of the elderly, this was also found by Herrmann et al. in 2020 (Hermann et al., 2020). However, the two younger groups indicated they are likely to use the PHE and digital applications and reported to find these useful and easy to use. This finding was also seen by Lwin et al. during their study on eHealth literacy in China (Lwin et al., 2020). This gives us the conclusion that to get as many people to get interested in the PHE as possible the two younger age groups, 18 - 30 and 30 - 65, should be the target population within the

promotion strategy. This conclusion was confirmed by an expert on consumer behavior Josefine Geiger. She advised aiming for people used to technology and applications, which include the younger two age groups in case of the PHE. Next to this, she said it would be best to aim at the broader part of society, which is also applicable to this concluded target population.

Regarding the promotion strategy, the groups agree with each other on which kind of strategy would be effective or ineffective. The most effective strategies that were found are information provision from a trusted source, preferably the general practitioner or pharmacy, and television and radio marketing with a neutral tone (e.g. the local or national news channels). One of the most important factors according to the end-users is to not come over as commercial but as a serious initiative. What should not be included in the strategy according to the end-users is promotion on the street, physical promotion like posters and flyers delivered at home, or social media advertising.

The final recommendation for an effective promotion strategy for the Personal Health Application is to create an informational flyer in collaboration with healthcare facilitators aimed at the ages 18-65. Open innovation and collaboration with other parties were found to be a highly effective strategy by former research (Dahlander & Wallin, 2020). The information provided would come from a trustworthy source and provide the user with information to interest them in the PHE. According to PHE inventor and director Chris Borsten from Ivido, it is crucial to include information on the application process of the PHE on the flyer. This informs the end-users about how to install the PHE and which steps they need to follow within this process. Next to this, it emphasizes how secure the PHE is and that one's data is stored safely since these steps include thorough user authentication. Also according to Josefine Geiger showing transparency and security of data is important to attract consumers. Furthermore, Geiger advised

the convenience of the application should be stressed on the brochure. The flyer should include understandable language and possibly symbols to prevent the exclusion of low-literate individuals or the elderly. For an example of an effective flyer for the PHE I refer to Appendix 8.6.

5.2 Limitations & Recommendations for Further Research

However, this study had several limitations. First, not all of the interviews could be conducted in person. The cause of this was de Covid-19 pandemic. This made it difficult to establish rapport with the participants and make them fully comfortable when participating in the interview. Another effect of the pandemic is that the participant recruitment was more challenging than normal, which might have resulted in other participants than expected. Second, the total participant group of potential end-users included a number of ten people. This translated to three or four participants for each age group. For a more finetuned outcome, it is advised to research these age groups with a bigger number of participants in the future. Furthermore, there was no variance in ethnicity/race within the participant group. To see if there would be differences between ethnicities it is recommended for further research to look into this topic. Lastly, most participants within the group were located in the northern part of Friesland. This means the overall outcome might not be a fully accurate representation for the whole province of Friesland. Whether effective promotion strategies differ between regions within Friesland could be a future research question as well. Another question that could be relevant to research for the development of eHealth technologies is which needs elderly have at this point in time regarding technologies in healthcare.

6. Conclusion

To conclude, this study has aimed to assess which promotion strategy is needed for the PHE application to function as effectively as possible, while focusing on indicators from psychological theories as a foundation. Using interviews as a qualitative analysis method, it was found that the elderly had no aspiration to use the PHE even if it was made more user-friendly. This resulted in the conclusion to target the age group 18 to 65 years old in the promotion strategy. Furthermore, promotion strategies that would be effective for the target population had been identified. The final recommendation proposed to create a handout for possible end-users distributed by trustworthy sources within healthcare, which should include information about the application process and emphasize the ease of use of the PHE. Since little former research existed on the PHE and promotion strategies on eHealth, this study provides novel and valuable insights on attitudes towards digitization of healthcare, specifically within Friesland. Therefore, this paper could form the foundation of the PHE promotion strategy in the future and provide information to other researchers within the field of eHealth.

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8. Appendix

8.1 Behavioral theories: constructs and definitions

TABLE 4.1. TRA, TPB, and IBM Constructs and Definitions.

	Construct	Definition	Measure
	Behavioral Intention	Perceived likelihood of performing the behavior	Bipolar unlikely-likely scale; scored −3 to +3
Attitude	*Experiential Attitude (Affect)* Direct Measure:	Overall affective evaluation of the behavior	Semantic differential scales: for example, pleasant-unpleasant; enjoyable-unenjoyable
	Indirect Measure: Behavioral belief	Belief that behavioral performance is associated with certain positive or negative feelings	Bipolar unlikely-likely scale; scored −3 to +3
	Instrumental Attitude Direct Measure:	Overall evaluation of the behavior	Semantic differential scales: for example, good-bad; wise-foolish
	Indirect Measure: Behavioral belief	Belief that behavioral performance is associated with certain attributes or outcomes	Bipolar unlikely-likely scale; scored −3 to +3
	Evaluation	Value attached to a behavioral outcome or attribute	Bipolar bad-good scale; scored −3 to +3
Perceived Norm	*Subjective (Injunctive) Norm* Direct Measure:	Belief about whether most people approve or disapprove of the behavior	Bipolar disagree-agree scale; scored −3 to +3
	Indirect Measure: Normative belief	Belief about whether each referent approves or disapproves of the behavior	Bipolar disagree-agree scale; scored −3 to +3
	Motivation to comply	Motivation to do what each referent thinks	Unipolar unlikely-likely scale; scored 1 to 7
	Descriptive Norm Direct Measure:	Belief about whether most people perform the behavior	Bipolar disagree-agree scale; scored −3 to +3
	Indirect Measure: Normative belief	Belief about whether each referent performs the behavior	Bipolar disagree-agree scale; scored −3 to +3

TABLE 4.1. TRA, TPB, and IBM Constructs and Definitions, Cont'd.

	Construct	Definition	Measure
Personal Agency	*Perceived Behavioral Control*		
	Direct Measure:	Overall measure of perceived control over the behavior	Semantic differential scales: for example, under my control–not under my control; easy-difficult
	Indirect Measure:		
	Control belief	Perceived likelihood of occurrence of each facilitating or constraining condition	Unlikely-likely scale; scored –3 to +3 or 1 to 7
	Perceived power	Perceived effect of each condition in making behavioral performance difficult or easy	Bipolar difficult-easy scale; scored –3 to +3
	Self-Efficacy		
	Direct Measure:	Overall measure of ability to perform behavior	Certain I could not–certain I could scale for overall behavior; scored –3 to +3 or 1 to 7
	Indirect Measure: Self-efficacy belief	Perceived ability to overcome each facilitating or constraining condition	Certain I could not–certain I could scale; scored –3 to +3 or 1 to 7

Note: TRA/TPB constructs are shaded.

Figure ?: Behavioral models constructs and definitions (Montaño & Kasprzyk, 2015).

8.2 The foundation of behavioral models

The foundations of many behavioral models are based on the Theory of Reasoned Action (TRA)(Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (TPB)(Ajzen, 1985).
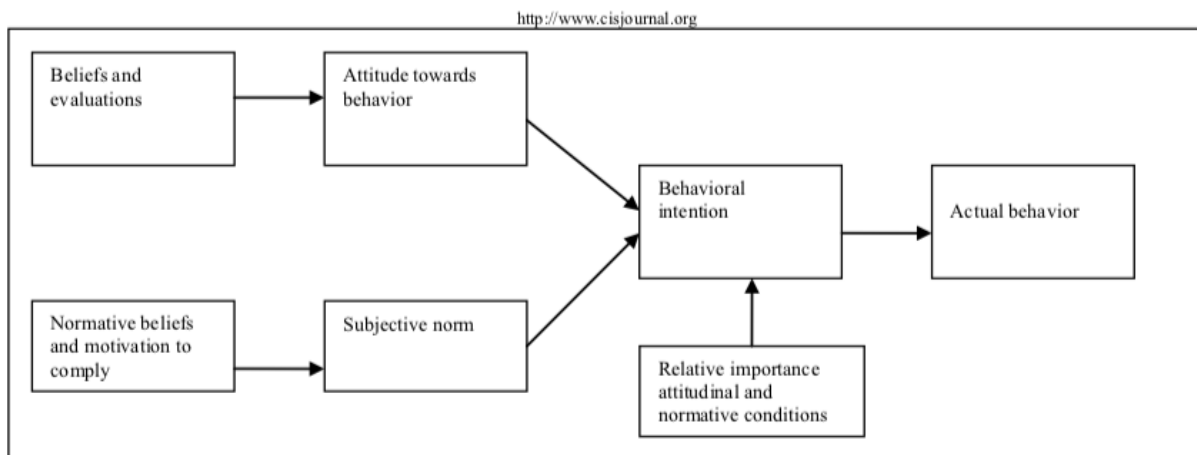
8.2.1 The Theory of Reasoned Action

Fig 1: Theory of Reasoned Action (Ajzen & Fishbein, 1980)

Figure 1: The Theory of Reasoned Action, (Ajzen & Fishbein, 1980)

The TRA is a social psychology model that focuses on the factors that influence consciously intended behaviors (Ajzen & Fishbein, 1980). The TRA theorizes that a person's ability to perform a specific activity is defined by his or her behavioral intention to do the act. This makes behavioral intention a measure of the degree of one's intention to carry out a specific action (Fishbein & Ajzen, 1975; Ajzen, 1985). Behavioral intention is based on the person's attitude and subjective norm towards the activity that needs to be done (Davis et al., 1989).

The attitude towards behavior can be referred to as a person's positive or negative feelings about engaging in a specific activity (Fishbein & Ajzen, 1975; Ajzen, 1985). A person's attitude toward an action, according to TRA, is defined by his or her salient beliefs about the consequences of executing the action multiplied by the evaluation of those consequences (Davis

et al., 1989). The individuals' subjective probability that engaging in a certain action will result in a consequence are defined as beliefs (Fishbein & Ajzen, 1975). Evaluations can be defined as the value attached to a consequence or behavioral outcome (Montaño & Kasprzyk, 2015).

The person's opinion that most people who are significant to him think he should or should not conduct the action in question is referred to as a subjective norm (Fishbein & Ajzen, 1975). According to TRA, a person's subjective norm is determined by a multiplicative function of his or her normative beliefs and motivation to meet these expectations (Idem, 1975). Normative beliefs can be explained as the belief about whether each individual referent or group approves or disapproves of the behavior (Montaño & Kasprzyk, 2015).

Since the TRA is a broad model, it does not describe the beliefs that underpin a specific behavior. It is needed for researchers to firstly identify the beliefs that are salient for aspects regarding the action that is being looked into (Davis et al., 1989). Research suggests to evoke five to nine salient beliefs by conducting free-response interviews with a cross-section of the target population. With this they advise utilizing "modal" salient beliefs for the targeted population, which are derived from the beliefs that are seen the most frequently from a representative sample within the population (Fishbein & Ajzen, 1975 ; Ajzen & Fishbein, 1980).

It is particularly helpful to know from the standpoint of information systems, that the TRA argues that any additional factors that influence behavior do so only indirectly by changing attitudes, subjective norms, or their relative weights (Davis et al., 1989). Thus, the category Fishbein and Ajzen refer to as external factors includes variables like system design characteristics, user characteristics, task characteristics, nature of the development or implementation process, political influences, organizational structure, and more (Ajzen & Fishbein, 1975). This means that TRA affects user behavior by mediating the effects of

uncontrollable environmental variables and controllable interventions (Davis, 1989). The TRA

has been widely implemented in a range of topic areas, while also generating a lot of theoretical

study aimed at comprehending the theory's limitations, testing important assumptions, and

examining potential modifications and extensions (Davis, 1989 ; Saltzer, 1981).
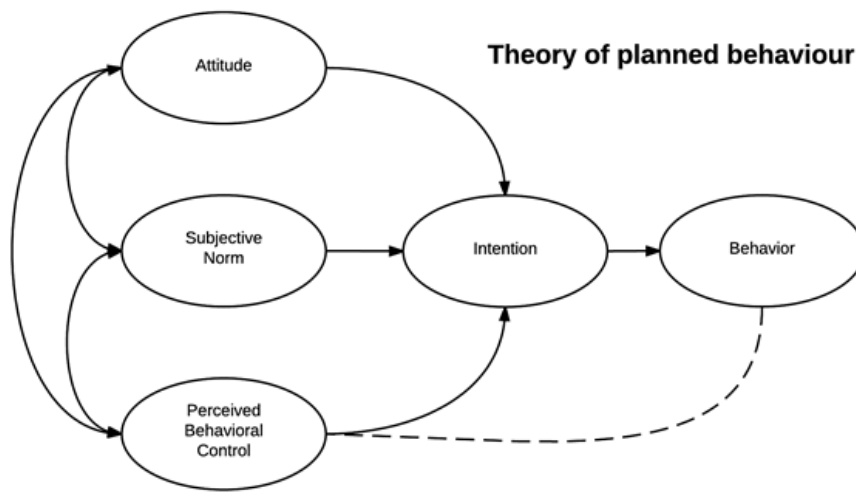
8.2.2 The Theory of Planned Behavior

Figure 2: The Theory of Planned Behavior, (Ajzen, 1991)

The theory of planned behavior is an extension of the theory of reasoned action (Ajzen & Fishbein, 1980 ; Fishbein & Ajzen, 1975). This was done to account for the limits of the original model when dealing with behaviors over which people have only partial volitional control (Ajzen, 1991). The intention to perform a specific action or behavior is also a central factor in the TPB. Intentions are thought to capture the motivating variables that impact a behavior; they are indicators of how hard someone is willing to try, and how much work they plan to put in to complete the behavior. The model keeps to the rule: "the stronger the desire to engage in an action, the more likely it will be carried out". This is only applicable if the individual in question can decide at will to engage or not engage in the certain behavior or action (Ajzen, 1991).

A different aspect that can be seen in the TPB in comparison to the TRA is perceived behavioral control. The significance of actual behavioral control is self-evident: a person's resources and opportunities must, to a certain point, determine the possibility of behavioral success (Ajzen, 1991). Instead of looking into actual behavior the TPB takes perceived

behavioral control into account and its effect on intentions and actions. Perceived behavioral control is included in the model as an exogenous aspect which has both a direct and indirect effect on behavior via intentions (Madden et al., 1992).

The indirect effect is based on the premise that behavioral intentions are motivated by implications of perceived behavioral control. The intention of one to perform a behavior may be low because one believes that they have a low grade of control over the performance of the behavior, mostly this is caused by a lack of essential resources. This can happen even if the individual's attitudes and subjective norms are in favor of performing the behavior (Idem, 1992). The structural link from perceived behavioral control to intentions reflects the motivational influence of control on behavior through intentions. The motivational influence of control on behavior through intentions is shown in the structural relationship between perceived behavioral control and intentions (Ajzen, 1991 ; Madden et al., 1992). This link can only be made if the measures of intention and perceived behavior correspond to or are compatible with the action that is being put into the model (Ajzen & Fishbein, 1977 ; Ajzen, 1991).

Since perceived behavioral control is often used as a substitute for actual control a person has over taking part in a certain action it can be seen as a direct path to the behavioral outcome (Ajzen, 1991 ; Madden et al., 1992). This connection is not always applicable since it depends on the behavior that is being researched. Whether perceived control can fill in for actual control depends on the accuracy of perceptions of the specific action (Ajzen, 1991). For instance, when one does not have a lot of information about a behavior or action, perceived control can not be used instead of actual control.

The models above serve as a base for more specific behavioral models, among those the Innovation Diffusion Theory including the Innovation-Decision Process is relevant to the

implementation of eHealth technologies (Rogers, 1995 ; Rogers, 1962 ; Ami-Narh & Williams, 2012).

8.3 Interview guide and consent form: English

8.3.1 Consent form

Interview 1: Future consumers of the personal health environment application/Frisian inhabitants
Consent form

No. of interviewee: ___   Date:__/__/__

Hereby I give consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason. I understand that total anonymity is ensured and give my consent.

Signature interviewee   Signature interviewer

_____   _____

8.3.2 Interview guide

Questions before the start of the interview:

- Are you older than 18?
- Do you give permission for audio-recording?
- Do you understand your right to withdraw at any time, during the interview and afterwards?
- After all the information given above, do you give consent for this interview?
- Do you have any questions before we begin?

Background information/opening questions:

No. of interview: ___

Age:

Education (last finished):

Occupation:

Living area:

- Follow up: How long have you lived here? How long are you expecting to live here?

Children: yes/no

Introductory questions:

- How would you describe your own health in general?

- How do you perceive the overall quality of healthcare in Friesland?

    - Probes: Waiting times, distance, costs

Part 1: Questions regarding digitization/digital applications:

Usage behavior:

- How often do you use digital devices and tools that do or support certain things in your everyday life?
    - Probes: examples of digital devices and tools
    - Probes: Google, financial means, social life
- Do you use digital applications related to healthcare or your own health?
    - Follow up: If yes, which applications do you use?
    - Probes: Support for diet, planning appointments, gaining information, look up symptoms
- Does the distance of your healthcare providers play a role in your use of healthcare applications?
- What kind of applications would you use or not use?
    - Probes: Apps, websites, privacy, governmental

Intention to use:

- With what intention do you use these health applications?

Perceived usefulness:

- Do you believe these digital applications have a positive effect for you and/or your health?
- Would you describe these applications as useful, why?
    - follow up: Do they give you the result you were looking for?
- Do you need eHealth applications for your occupation/job?
- How do you feel about the digitization of healthcare?
    - Probes: Positive/negative, happy, angry.
- Is it necessary for healthcare to digitalize?

Perceived ease of use:

- If yes, are these applications easy for you to use?

- Do you **experience** these applications as time consuming?

- Does the ease of use of an application have influence on how often or if you use the application?

- Which aspects do you find important within a healthcare application?

    - Probes: easy in use, storage size (mb's), privacy, not too complicated, clearness, **voluntariness**

Part 2: Questions regarding the personal health environment application:

Usage behavior:

- What are your main thoughts about the personal health environment application?

    - Probes: easy in use, clear, useful

- Would you use a personal health environment? Why or why not?

    - Probes: convenience, familiarization

- How would you describe your experience with the personal health environment application demo?

    - Probes: positive/negative, understandability, clearness

Intention to use:

- If you would use the personal health environment, with which intention would you use it/when would you use it?

- Would you download the personal health environment application when it is available?

    - If yes: why? What makes the personal health environment attractive for you?

    - If no: why not? What could be done differently within the personal health environment to make it attractive for you?

Perceived usefulness:

- Do you think the personal health environment application is useful? Why?
- Do you believe the implementation of the personal health environment will positively impact you or your health? Why or why not?
    - Probes: overview, being in control
- What aspects are important for you in order to use the personal health environment?
    - Rephrase: What is needed within the personal health environment for you?

Perceived Ease of Use:

- Did you find it easy or difficult to use the personal health environment? What made this easy or difficult?
- What would you change about the application to make it easier to use?

Part 3: Questions regarding the influence of others and promotion of the personal health environment:

Environment:

- Would you recommend the personal health environment to your family/friends?
    - Do you believe your environment could influence you regarding the downloading and use of the personal health environment?
        - Probes: work environment, neighbors, people in your environment with health issues, children
    - Do you believe that people close to you (for example, your children, family or close friends) could influence you regarding the downloading and use of the personal health environment?

Promotion:

- Do you believe that if information would be provided to you about the personal health environment, you would consider downloading it? Why yes/no?
    - Probes: flyer, helpdesk, clearness of provided information, understandability, reasons behind the application.
- Would you consider downloading and using the personal health environment if you would come across promotional material about it? (for example, flyers, posters, advertisements)
    - Follow up: Which kind of promotional material regarding the personal health environment would draw your attention?
    - Probes: flyers, posters, advertisements, commercials, social media, online or physical promotion

Closing questions:

- What is necessary regarding promotion or other aspects for you to consider downloading the personal health environment?
- What are your hopes for the future, regarding eHealth applications/applications regarding healthcare?

- Do you have any further questions or remarks?

Before I end this interview, I want to stress once more that full anonymity and confidentiality is ensured. Thank you for participating in this interview.

8.4 Interview gids en toestemmingsformulier: Nederlands

8.4.1 toestemmingsformulier
Interview 1: Toekomstige consumenten van de persoonlijke gezondheidsomgeving

Toestemmingsformulier

Participant nummer: ___   Datum:__/__/__

Hierbij geef ik toestemming om deel te nemen aan dit onderzoek en begrijp ik dat ik kan weigeren vragen te beantwoorden en dat ik mij op elk ogenblik uit het onderzoek kan terugtrekken, zonder dat ik daarvoor een reden moet opgeven. Ik begrijp dat volledige anonimiteit gewaarborgd is en geef hiervoor mijn toestemming.

 Handtekening ondervraagde _____

8.4.2 Interview gids

Vragen voor het begin van het interview:

- Bent u ouder dan 18?

- Geeft u toestemming voor geluidsopname?

- Begrijpt u dat u het recht hebt om u op elk moment, tijdens en na het interview, terug te trekken?

- Geeft u, na alle informatie hierboven, toestemming voor dit interview?

- Heeft u nog vragen voor we beginnen?

Achtergrondinformatie/openende vragen:

Participant nummer: ___

Leeftijd:

Onderwijs (laatst afgemaakt):

Beroep:

Woonplaats:

     - Follow up: Hoe lang woont u hier al? Hoe lang denkt u hier te blijven wonen?

Kinderen:

Inleidende vragen:

- Hoe zou u uw eigen gezondheid in het algemeen omschrijven?

- Hoe beoordeelt u de algemene kwaliteit van de gezondheidszorg in Friesland?

     - Probes: Wachttijden, afstand, kosten

Vragen over digitalisering/digitale toepassingen:

Gebruiksgedrag:

- Hoe vaak maakt u gebruik van digitale apparaten en hulpmiddelen die bepaalde dingen in uw dagelijks leven doen of ondersteunen? Welke?

> - Probes: voorbeelden van digitale apparaten en hulpmiddelen, Google, financiële middelen, sociaal leven

- Maakt u gebruik van digitale toepassingen in verband met gezondheidszorg of uw eigen gezondheid, welke?

> - Probes: Ondersteuning bij dieet, afspraken plannen, informatie inwinnen, symptomen opzoeken

- Speelt de afstand tot uw zorgverleners een rol bij uw gebruik van eHealth applicaties?

- Wat voor soort toepassingen zou u wel of niet gebruiken?

> - Probes: Apps, websites, privacy, overheid

Intentie om te gebruiken:

- Met welke intentie gebruikt u deze gezondheidstoepassingen?

- Wanneer gebruikt u deze applicaties?

Waargenomen bruikbaarheid:

- Zou u deze toepassingen als nuttig omschrijven, waarom?

- Denkt u dat deze digitale toepassingen een positief effect hebben op u en/of uw gezondheid?

- Geven ze u het gewenste resultaat?

- Hebt u eHealth-toepassingen nodig voor uw beroep/functie?

 - Wat vindt u van de digitalisering van de gezondheidszorg?

> Probes: Positief/negatief, blij, boos.

- Is het nodig dat de gezondheidszorg digitaliseert?

Waargenomen gebruiksgemak:

- Zijn deze toepassingen voor u gemakkelijk te gebruiken?

- Vindt u deze toepassingen tijdrovend?

- Heeft het gebruiksgemak van een toepassing invloed op hoe vaak of of u de toepassing gebruikt?

- Welke aspecten vindt u belangrijk in een toepassing voor de gezondheidszorg?

> Probes: gemakkelijk in gebruik, opslagruimte (mb's), privacy, niet te ingewikkeld, duidelijkheid, vrijwilligheid

Vragen over het gebruik van de persoonlijke gezondheidsomgeving applicatie:

Gebruiksgedrag:

- Wat zijn uw eerste gedachten over de persoonlijke gezondheidsomgeving?

     Probes: gemakkelijk in gebruik, duidelijk, nuttig

- Zou u een persoonlijke gezondheidsomgeving gebruiken? Waarom of waarom niet?

     Probes: gemak, gewenning

Intentie om te gebruiken:

- Als u de persoonlijke gezondheidsomgeving zou gebruiken, met welke intentie zou u die dan gebruiken/wanneer zou u die gebruiken?

- Zou u de applicatie voor de persoonlijke gezondheidsomgeving downloaden wanneer die beschikbaar is?
    - Zo ja: waarom? Wat maakt de persoonlijke gezondheidsomgeving voor u aantrekkelijk?

    - Zo nee: waarom niet? Wat kan er binnen de persoonlijke gezondheidsomgeving anders worden gedaan om deze voor u aantrekkelijk te maken?

Waargenomen bruikbaarheid:

- Denkt u dat de persoonlijke gezondheidsomgeving applicatie nuttig is? Waarom?

- Denkt u dat de invoering van de persoonlijke gezondheidsomgeving een positief effect
op u of uw gezondheid zal hebben? Waarom wel of waarom niet?

                   Probes: overzicht, in controle zijn

- Welke aspecten zijn voor u belangrijk om de persoonlijke gezondheidsomgeving te gebruiken?

              Herformuleren: Wat is er nodig binnen de persoonlijke gezondheidsomgeving voor u?

Waargenomen gebruiksgemak:

- Vond u het gemakkelijk of moeilijk om de persoonlijke gezondheidsomgeving te gebruiken?
Wat maakte dit gemakkelijk of moeilijk?

- Wat zou u veranderen aan de applicatie om hem gebruiksvriendelijker te maken?

Vragen over de invloed van anderen en de promotie van de persoonlijke gezondheidsomgeving:

Omgeving:

 - Zou u de persoonlijke gezondheidsomgeving aanbevelen aan uw familie/vrienden?

- Denkt u dat uw omgeving u zou kunnen beïnvloeden wat betreft het downloaden en het gebruik van de persoonlijke gezondheidsomgeving?

Probes: werkomgeving, buren, mensen in uw omgeving met gezondheidsproblemen, kinderen

Promotie:

- Denkt u dat als u informatie zou worden verstrekt over de persoonlijke gezondheidsomgeving, u zou overwegen die te downloaden? Waarom ja/nee?

- Probes: flyer, helpdesk, duidelijkheid van de verstrekte informatie, begrijpelijkheid, redenen achter de aanvraag.

- Zou u overwegen de persoonlijke gezondheidsomgeving te downloaden en te gebruiken als u er promotiemateriaal over zou tegenkomen? (bijvoorbeeld flyers, posters, advertenties)

- Follow-up: Welk soort promotiemateriaal met betrekking tot de persoonlijke gezondheidsomgeving zou uw aandacht trekken?

- Probes: flyers, posters, advertenties, reclamespots, sociale media, online of fysieke promotie

Afsluitende vragen:

- Wat is er nodig op het gebied van promotie of verbetering wat u zou overtuigen bij het downloaden van de persoonlijke gezondheidsomgeving?

- Wat zijn uw verwachtingen voor de toekomst, wat betreft eHealth- toepassingen/toepassingen in de gezondheidszorg?

- Heeft u nog vragen of opmerkingen?

Voor ik dit interview beëindig, wil ik nogmaals benadrukken dat volledige anonimiteit en vertrouwelijkheid gewaarborgd zijn. Ik dank u voor uw deelname aan dit interview.

8.5 Summary of results

Behavioral indicator	18 - 30	30 - 65	65+	All participants
Background information				
Age	20 (2 participants), 21	34 (2 participants), 38 & 55	66, 76 & 82	Age span: 20 - 82 20. 21, 34, 38, 55,66, 76 & 82.
Gender	2 female, 1 male	3 female, 1 male	2 female, 1 male	7 female, 3 male The participant group includes more females in general and more females in comparison to men in every age group.
Education (last finished)	HAVO: 1 participant VWO: 2 participants	HBO: 3 participants WO: 1 participant	Not applicable	Most of the participants had finished a high level of education.
Profession	All the participants are HBO-level students and all have a side job next to their studies.	Very diverse: Student & health insurance company, landscape engineer for the government, creative design & legal support	All participants are retired. Before that they worked in healthcare, retail and for the government.	In the youngest and eldest age group all participants have the same occupation at the moment: student or retired. The middle-aged group has diverse professions, one participant studies next to their job.
Village/City of Residence	City: 2 participants both from Leeuwarden	City: 2 participants both from Leeuwarden	Village: All participants reported to live in a village. Ferwert	For the first two age groups participants were living in villages

| | Village: 1 participant both living in Ferwert | Village: 2 participants, both located in the north of Friesland. Stiens, Ferwert. | and de Knype. | as well as cities.

Within the oldest age group everyone lives in a village. |
|---|---|---|---|---|
| Children | All participants reported to have no children. | No children: 3 participants (of which one pregnant)

children: 1 participant | All participants reported to have children. | No children: 6 participants said to have no children.

Children:

4 participants said to have children, only one has young children. |
| Description of own health | All participants said they were in good health. Although one said to be under treatment for back pains and another participant has asthma. | All participants declared their health was good in general, no big health issues. One participant is pregnant. | One participant says to feel healthy. The other two state that their health is fine but could definitely be better. These two participants had a heavy illness in the recent past. | In general the participants said to be in good health. Within the oldest age group some participants stated their health could be better. |
| Rating the quality of healthcare in Friesland | They rate the quality good overall. Some points of criticism were the shortage of general practitioners and the effects the shortage has on the quality. | All participants said to be very satisfied overall.

Improvements that were mentioned: Shorter waiting times and referrals could be done more efficient | All participants said the quality was overall good, no criticism was given. One participant said to be happy about the quality of care they receive at home | The quality of healthcare in Friesland is found to be satisfactory overall. The shortage in general practitioners and referrals were stated as points of improvement. |
| **Part 1: Digitization and technology in healthcare** | | | | |
| Perceived usefulness | All participants declared to find online applications and healthcare applications | All participants said they find online applications and healthcare applications | The opinions about usefulness are divided. One participant says to find it useful, especially | The first two age groups all found digital applications useful. |

	useful. Reasons were: no waiting lines, lower threshold and no need to give a reason for your appointment.	useful. Reasons were: Easy, fast, relieves pressure on healthcare, more freedom for users, less dependency.	planning appointments online. Another participant states to believe it is useful but not for this generation. The last participant states to not find the applications useful. Thinks it is impersonal and unnecessary.	Within the older age group opinions were divided.
Performance expectancy	Until now the participants see how these applications can be of advantage for the users and can positively affect one's health.	Most of the participants said they do not see how these applications could have a positive effect on one's health. One participant stated it might motivate one to work on their health. The participants did say they think these applications can improve and make things within healthcare easier for the user.	One participant believes the apps have a positive influence on health since the threshold is lower and there are no travelling restrictions. The other two participants do not believe that the apps have a positive influence on one's health. But believe they might be useful for others within society.	The first age group thinks applications can have a positive influence on one's help. The whole second age group does not believe this. The oldest age group shows a division. A clear difference between the age groups can be observed.
Perceived ease of use	In general digital applications and healthcare applications are perceived as easy. In some cases some explanation is needed when used for the first time. For all participants ease of use can	All participants said the applications are easy to use. Even though the apps are perceived as easy the participants did not believe this aspect influences their usage behavior	All participants state that they need help from others when using a new application they are not familiar with. Especially in the beginning things are difficult to use. Since they find the old ways easier they prefer to not	The first two age groups all think of applications as easy to use. However only the first group thinks this can influence how often they would use an application. The oldest age group describes

| | influence how often they use an application. | regarding these apps. | use digital applications.

All participants said that ease of use does not have an influence on their usage behavior. | the applications as difficult and say they need help with these from others. |
|---|---|---|---|---|
| Effort expectancy | Believe they can easily use digital applications. Over all they experience little effort goes into using digital applications. | For this group the amount of effort depends on the kind of application and how novel its system is. If the application would have a usage system they are familiar with they do not expect a lot of effort goes into using this app. On the other hand if the app uses a completely new format they expect to need some time and effort to get used to it. | Expect that any digital application needs a lot of effort from their side for them to use it. | A clear division in age groups can be seen. The first age group expects to put in little effort when using an app, for the second group it depends and for the oldest group it was found they expect to put in a lot of effort. |
| Facilitating conditions | Believe that facilitating conditions are in place. Infrastructures of applications are often clear and helpful for instance. | Do not have a specific opinion on facilitating conditions, believe that there is a good infrastructure within apps but do not specifically think this helps them with the usage. | Do not believe there are a lot of effective facilitating conditions for their age group within applications. The infrastructure/format of applications is often too difficult and it's hard to remember how to use the app. | For the oldest group the facilitating conditions are often not good enough. The other groups think the facilitating conditions are fine. |
| Experience | Since digital | This group does | Next to simple | It can be observed |

	applications are being used regularly every day by this group they all have a lot of experience in this field.	have a lot of experience regarding early developed applications. But newer applications are often less used within this group.	gaming applications and older applications like email this group does not have a lot of experience within this field. Their experience with applications can be described as confusing and difficult.	that experience increases the younger the age group.
Voluntariness	Believe use of apps is voluntary since there are still other alternatives to use. But do agree that it does not make it easy for people who do not want to use apps.	They use applications regularly, but they do believe they cannot go without them anymore. Even though it is voluntary it does not feel like it.	Are happy as long as they are not pressured into using apps they do not understand and alternatives remain.	All groups stated that in theory using applications is voluntary, but in reality it is hard to use the alternatives.
Intention to use	Applications are found to be more accessible then the alternatives (e.g. calling for an appointment). The participants also felt more comfortable using digital applications instead because there is less personal contact, which makes them less uncomfortable to make appointments.	Using the applications saves time, one has more freedom to arrange things and is less dependent on others.	For this group of participants it is the case they only use digital applications if they really need to.	The youngest groups has the intention to use apps so they feel more comfortable arranging things. For the middle group it is more about the freedom gained. The oldest group only uses the application if they need to.
Usage behavior	All participants use digital applications on a daily basis. They do this for	These participants often said to use digital applications mainly to follow	The participants said to not use digital applications a lot next to their email,	The older the age group the lower their usage of digital applications is.

	financial means, work, social aspects, school and more. Within healthcare: appointments, repeating prescriptions and looking up symptoms online	the news, check emails and arrange their banking. It has been said because they are getting older they feel less connection to the new developments in this field. Within healthcare: Making appointments, repeating prescriptions, checking results/procedures, health insurance	entertainment (games) and the news. Within healthcare: Almost nothing, only confirmation emails and health insurance.	
Noteworthy information	Privacy and security are found to be important to this group.	It was mentioned participants did not trust the applications regarding data security. It was also said these applications are not very accessible to elderly.	This group often mentioned that usage of technology cannot be evaded because of the time we are living in. Next to this clearness is important to them within applications.	Privacy and accessibility for elderly were mentioned regularly by all groups.

Part 2: The Personal Health Environment

Perceived usefulness	All participants said they find the PHE useful. Reasons: easy to find information, multiple caregivers on one app, saves time and effort.	All participants found the PHE useful. Reasons: All providers in one app, overview of one's own health, keeping track of children's health and is also useful for healthcare facilitators.	One participant said they found the PHE useful. Reasons: Provides accessibility to healthcare, useful for healthcare facilitators. The other two participants believe the PHE is useful for other generations and	Most of the participants perceived the PHE as useful. Not only for them as users but also for the healthcare facilitators. Two participants, both from the oldest age group, did not perceive the PHE as useful.

			healthcare facilitators but do not find it useful for themselves.	
Performance expectancy	All participants believe the PHE can have a positive effect on one's health. Reasons: ability to monitor your health, lowers threshold, easy to find information, having control and overview over your own health	Two participants believe the PHE can have a positive effect on one's health. Reasons: Would personally not use it to monitor one's own health. Two participants do think that the PHE could have a positive effect on one's health. Reasons: Can give one handles to improve one's health.	The participants believe the PHE can have a positive effect on one's health. Reasons: It is easier to contact healthcare facilitators, calling can be a barrier, lower threshold.	Most participants believed the PHE could have a positive effect on one's health. Only two participants, both from the middle-aged group, believed it would not have influence on one's health.
Perceived ease of use	All participants found the PHE application easy in use. It was found clear and the text and symbols were mentioned. One participant said how to use the app speaks for itself.	All participants stated that the PHE was easy to use. Confusion is prevented since there is not too much text and symbols give clear messages. The design is described to be clear and accessible	One participant, the youngest of this group, found the PHE easy to use. Could use it without any help. The other two participants perceived the PHE as complicated. They found the concept too difficult and do not see how this app is easier for users than other existing methods.	The first groups and one participant from the oldest group said they found the PHE easy to use. The two oldest participants found the PHE complicated and said they found the existing alternatives easier, like calling.
Effort expectancy	Every participant expects to need	All participants think they would	Two participants think it will take	Only the oldest two participants

	little effort when using the PHE.	need to put in little effort whilst using the PHE.	them a lot of effort to use the PHE. One participant thinks the PHE will cost little effort compared to other applications.	said they expect to need a lot of help with the PHE and put in a lot of effort.
Facilitating conditions	Important facilities within PHE: Making appointments, files, pregnancy, medication. Not necessary: Inbox	Important facilities within PHE: Making appointments, files, medication. Not necessary: Pregnancy and photo's could be under the files/results tab	Important facilities within PHE: Files, making appointments, sharing data	Important facilities within PHE: Making appointments, files, medication, data sharing, pregnancy Not necessary: Inbox, pregnancy and photos could be positioned under the files/results tab.
Voluntariness	All participants found the usage of the PHE should be voluntary.	All participants found the usage of the PHE should be voluntary.	All participants found the usage of the PHE should be voluntary.	All participants found the usage of the PHE should be voluntary.
Intention to use	The participants stated to use the PHE with the following intentions: Looking into one's files, notes from the doctor, making appointments, medication, information, to save time and unnecessary traveling. Monitor one's own health.	The participants stated to use the PHE with the following intentions: Making appointments, information about pregnancy, looking into results, keep track of children's health.	The participants stated to use the PHE with the following intentions: Insight in one's own data, contacting caregivers, data exchange	The most named intentions were: Looking into one's own data, making appointments and check medication.
Usage behavior	All participants stated they would use the PHE.	Three participants would use the PHE. One person	Only the youngest participant in this age group would	Most of the participants said that they would

		would not use it, they would barely use it since they almost never need healthcare.	use the PHE. The other two participants would only use the PHE if there were no other alternatives. They would not be comfortable and afraid of using the app in any case, regardless of how easy it is made or what is still being changed.	use the PHE when it is made public. One participant in the middle-aged group would not use the PHE because they are almost never in need of healthcare. The two oldest participants would not use the PHE, no matter what would be made easier or changed.
Noteworthy information	Making sure data is secure. Would want to make sure there is no economic motive behind the app. Instruction video on how the app works.	Notification when there are new messages in one's inbox Some loose tiles like pregnancy could fall under results/files.	Elderly cannot learn fast enough to keep up with technology anymore.	
Part 3: Implementation and promotion strategies				
Influencing others	All participants would recommend the PHE to family/friends.	All participants would recommend the PHE to family/friends. One would only do this after good experiences by themselves.	Only the youngest participant of this group would recommend the PHE to family/friends. The other two participants would not recommend the PHE to others.	Next to the two oldest participants, everyone would recommend the PHE to their family.
Environmental and social influence	All participants think they could be influenced by their environment	Two participants believe they could be influenced by their environment	One participant would be influenced by the environment	The participants' answers are divided about the influence of their

	regarding the interest and use of the PHE.	regarding the PHE. The two other participants do not think they would be influenced by their environment. One of them expects it to be the other way around, would first use it themselves and then recommend the PHE to others, especially people that could really use it.	regarding the PHE. The other two participants declared they would not be influenced by their environments.	environments. The complete youngest age group believe they could be influenced by their environment.
Promotion: effective strategy	Information from a trustworthy source, flyer at home, youtube advertisements, television, radio advertisement	Promotion from doctor or pharmacy, trustworthy source, television advertisement, carefully approach people, radio advertisement, information, usage of role models	Information, neutral promotion like the news, television, radio, trustworthy source, through the government	The most effective promotion strategies seem to be: Information from trustworthy sources (the general practitioner or pharmacy for instance), use of role models, television and radio advertisements
Promotion: ineffective strategy	Social media, the internet, should not come from the government, street promotion	No flyers, social media, posters, nothing commercial	Street promotion, flyers delivered at home	The least effective promotion strategies seem to be: Street promotion, social media and flyers delivered at home
Closing questions				
Future expectations regarding eHealth	More data digitized, saves space and makes	Participants expect a switch to more personal	A participant thinks eHealth will still continue	Most of the participants believe eHealth

technologies	sure data is stored well. It is not needed to digitize things for the elderly, they should be able to keep using the old ways. Not progression, but change.	contact in the future, especially regarding mental health. They think digitization will not go a lot further since the old alternatives, like calling, still need to remain available. It does not need to go further than apps. See digitization as an addition not a replacement.	improving. Is still a bit hesitant about this because of the unknown, but also sees eHealth is effective. Another participant is afraid that things will soon be too complicated for her to use. Calling for appointments should stay the norm. Technologies will keep improving, will be difficult for elderly	technologies will continue improving. The eldest group feels uncomfortable with this idea of eHealth taking over and are afraid they will be excluded from healthcare since it will be too complicated for them to manage. In general participants believe eHealth technologies should be an addition to the system not a replacement.
Additional information and remarks	One participant mentioned that maybe there should be an option to change the color of the application. Promotion needs to come from a serious stakeholder, not commercially oriented. Show the benefits of the PHE in the promotion.	No additional remarks.	Within healthcare, everything should be as easy as possible. It could also be a bit more inclusive, now that everything is digitizing and the elderly can't keep up, it feels like the elderly are being excluded in a certain way.	

Table 1. Summary of in-depth interview answers per indicator category retrieved from potential end-users. The results are displayed for each age category separate and for the participant population altogether.

8.6 Informative handout concept

Front page

Kennislab Noordoost Fryslân

DE PERSOONLIJKE GEZONDHEIDSOMGEVING: DE APP VOOR JOU!

Wat is een PGO?

Een PGO is een omgeving van jouzelf, waarin je de gegevens van al je zorgverleners eenvoudig kunt verzamelen, beheren en delen.

Ervaar het gemak!

Binnen de PGO kunt je afspraken inplannen, herhaalrecepten aanvragen, al je medische gegevens ophalen, zelfmetingen delen en meer!

Bezoek de website voor meer informatie:
https://www.medmij.nl/pgo/

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