

THE ROLE OF SMART GLASSES IN HEALTHCARE FOR PATIENT AND CARE PROVIDER WELLBEING

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ABSTRACT [ENG]

Purpose - Smart technologies have seen a strong growth in recent years, with the sky also appearing to be the limit. Smart glasses are one of these technologies. Within this thesis, we examine the influence of these smart glasses on wellbeing in the healthcare sector. This sector already uses many forms of smart technologies, each of them having its own advantages and disadvantages. The central question in this study therefore examines the impact of these smart glasses on the wellbeing of the patient and care provider. Furthermore, the moderators ‘wearer’ and ‘role readiness’ also get their introduction in this research, where we investigate how these variables affect wellbeing.

Design/methodology/approach - We use literature to determine a number of crucial factors for the patient’s and care provider’s wellbeing. These factors are then linked to the basic needs of the self-determination theory and the social exchange theory, after which we draw up the framework. Thereafter, we test this framework and the associated hypotheses using a quantitative study. To do this, we draw up some scenarios from which Dutch-speaking respondents answer a series of questions. Based on the data obtained from this research, we verify the scenario realism, perform a manipulation check and test the hypotheses.

Findings – The introduction of smart glasses has influence on some of the basic needs of the theories used. For the basic needs ‘relatedness’ and ‘relationship’ of the patient we see that smart glasses have a negative impact. Furthermore, smart glasses perform a positive influence on the basic need ‘competence’ of the patient. Among the moderators, it is very noticeable that the glasses impact the wellbeing of the wearer the most. In addition, the study also shows that people with a neutral or high role readiness receive, on average, a greater sense of wellbeing than the group of respondents with a low role readiness.

Value - When introducing smart glasses, managers need to convince patients of the basic aspects ‘relatedness’ and ‘relationship’. In addition, the manager must do his/her best to enhance the role readiness of the actors by explaining the use of it, making the use possible for everyone and making sure that everyone wants to use the glasses. It is also important to give these glasses to the actor with the highest role readiness. This is because the wearer experiences the greatest influence of the smart glasses.

ABSTRACT [NL]

Doel – Slimme technologieën kennen de laatste jaren een sterke opmars, waarbij de sky ook echt de limit lijkt te zijn. De slimme bril is één van deze technologieën. Binnen deze thesis, gaan we de invloed van deze slimme bril op het welzijn in gezondheidssector na. Deze sector gebruikt reeds vele vormen van slimme technologieën, dewelke elk hun eigen voor-en nadelen hebben. De kernvraag in dit onderzoek gaat dan ook de invloed van deze slimme bril op het welzijn van de patiënt en zorgverlener na. Verder kennen de moderators ‘wearer’ en ‘role readiness’ ook hun introductie in dit onderzoek, waarbij we nagaan welke invloed deze variabelen hebben op het welzijn.

Ontwerp/methodologie/aanpak – Aan de hand van literatuur bepalen we voor de patiënt en zorgverlener enkele cruciale factoren voor hun welzijn. Deze factoren koppelen we vervolgens aan de basisnoden van de zelfdeterminatie theory en de sociale uitwisselingstheorie, waarna we het framework opstellen. Dit framework en de bijhorende hypotheses testen we vervolgens aan de hand van een kwantitatief onderzoek. Hiervoor stellen we enkele scenario’s op van waaruit nederlandstalige respondenten een lijst van vragen beantwoorden. Aan de hand van de bekomen data uit dit onderzoek verifiëren we het scenariorealisme, voeren we een manipulatiecheck uit en testen we de hypotheses.

Bevindingen – De introductie van een slimme bril kent slechts een invloed op enkele basisnoden van de gebruikte theorieën. Voor de basisnoden ‘relatedness’ en ‘relationship’ van de patiënt zien we dat de slimme bril een negatieve invloed vertoont. Daarnaast kent de slimme bril een positieve invloed op het basisnood ‘competence’ van de patient. Bij de moderators valt het sterk op dat de drager van de bril de grootste invloed op zijn of haar welzijn ondervindt. Daarnaast toont het onderzoek ook aan dat mensen met een neutrale of hoge role readiness, gemiddeld, een groter welzijnsgevoel bekomen dan de groep respondenten met een lage role readiness.

Waarde – Managers moeten bij de introductie van de slimme bril de patiënten weten te overtuigen van de basisaspecten ‘relatedness’ en ‘relationship’. Daarnaast moet de manager zijn best doen om de role readiness van de actoren te vergoten door het gebruik aan hen uit te leggen, het gebruik voor iedereen mogelijk te maken en ervoor te zorgen dat iedereen de bril wenst te gebruiken. Verder is het belangrijk deze bril toe te eigenen aan de actor met de hoogste role readiness. Dit aangezien de drager de grootste invloed van de bril ondervindt.

FOREWORD

This thesis does not only mark the end of my studies in Business Economics at the University of Ghent, but also the end of my career as a student. I could not have worked this project out alone, so I would like to express my sincere thanks to all those who helped and supported me during this adventure.

First of all, I would like to express my sincere thanks to my promotor Prof. Dr. Verleye and supervisor Dra. Henkens for the opportunity and confidence they have given me in carrying out this dissertation. In addition, their support, guidance and feedback has also ensured that this thesis has been brought to a higher level. A small word of gratitude to them is therefore more than justified here.

Secondly, I would also like to express my thanks to my parents for the opportunity they have given me to start this education and the support I have received from them throughout my career as a student.

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LIST OF USED ABBREVIATIONS

AI	Artificial intelligence
IoT	Internet of Things
SDT	Self-determination theory
SET	Social exchange theory
SP	Smart product
SS	Smart service
VIF	Variance Inflation Factors

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1 Introduction

Over the past few decades, technology has experienced an enormous growth. We are currently in the fourth technological revolution and unlike the previous revolution, which concerned the emergence of computers and digitization, this one is about the combination of developments from different industries. Within this revolution, the Internet of Things (IoT) has an important role to play. The IoT consists of devices with sensors and software, which are connected to the internet and to each other (SBB, 2019). This can be summarized by the term “smartness”, which is the central aspect of the fourth technological revolution. Smartness reflects the intelligence of a product and is measured using four essential characteristics awareness, connectivity, actuation and dynamism (Henkens et al., 2021). These characteristics allow to distinguish between smart and traditional products. These products often offer a service to people, whereby the new technology has to simplify processes and tasks, make them more transparent and more efficient (SBB, 2019). The topic, smart glasses, discussed in this dissertation, has its origins in this fourth revolution and, according to computable expert Ravel (2022), it is one of the five greatest technological expectations for 2022. Ravel expects smart glasses to find their way to the general public and predicts that two-thirds of organisations will integrate smart glasses into their daily operations. These statements by computable expert Ravel and the current technological revolution make this topic a contemporary theme, which is interesting for further investigation.

Smart glasses can be used in many sectors (Rauschnabel, 2018). Within this dissertation, the introduction of smart glasses to the healthcare sector is being investigated, specifically first line medical care such as publicly accessible hospitals, home nursing and home care. The healthcare sector is about providing the necessary care to patients by the care providers, whereby the term care providers refers to the doctors, nurses and volunteers in the healthcare sector. In this sector, the corona pandemic has led to a huge increase in workload, which is causing this sector to be under extreme pressure. In addition, according to Misplon (2020), COVID 19 causes a great change in this healthcare system, which means that the need for smart technology in healthcare is greater than ever. The importance of smartness in this sector is also shown in Figure 1. This figure reflects the evolution of healthcare, in which the evolution evolving toward smart health is clearly shown. According to this figure, we are entering the fourth revolution of healthcare (Health care 4.0). In this revolution the electronic and computable aspect of the care will be replaced by smartness and AI, which must lead to a more personalized care.

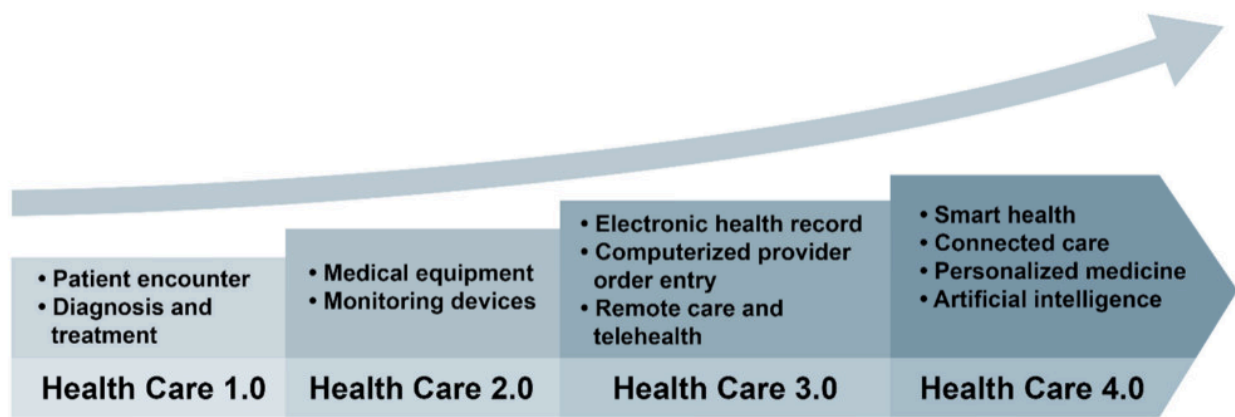


Figure 1: Historical evolution of healthcare (Li & Carayon, 2021)

Smart glasses are already used in healthcare, but there are still only few scientific researches on this, so the impact of this smart technology is not yet fully known. In addition to smart glasses, there are many other forms of smart products, each with their own influences on healthcare. These influences are often product specific and also vary according to the smart product. Therefore, we expect that smart glasses will most likely affect the wellbeing of both the patient and the care provider, but the extent of this influence and whether this influence is a positive or negative one is, as already mentioned, product specific and thus constitutes a big question mark. This forms a gap in our knowledge of smart glasses. Therefore, in this dissertation, we will use a quantitative study to find an answer to the outstanding questions. This research tries to answer the following central research question: *How does the usage of smart glasses affect the wellbeing of patients and care providers, thereby paying attention to the boundary condition?*

By addressing this research question, this research contributes in three ways to the existing literature on smartness. Initially, this research adds to the literature on the wellbeing of the patient and care provider by introducing smart glasses. We determine here, using scenarios, the impact of smart glasses on the wellbeing of the patient and healthcare provider. This wellbeing depends on a number of factors, which means that this research must also assess the determinants of healthcare. As such, this research provides a good understanding of the impact of smart glasses on the wellbeing of the patient and care provider, improving the literature on the wellbeing of the patient and care provider. The research then experimentally checks whether there is a connexion between wearing smart glasses and own wellbeing, thereby contributing to the literature for the user of smartness. Previous literature has already shown that the influence is often product- and sector-specific, and therefore has deviations from smartness to smartness and from sector to sector. This is why we specifically determine the impact for one type of smart product (smart glasses) in one specific sector (healthcare) on the wellbeing of a user within the healthcare sector. This influence

has so far not been fully researched and is thus an addition to the current literature. Furthermore, smart glasses can be worn by both the patient and the care provider, but no matter who is wearing it, the possible effect of smart glasses may differ from actor to actor. In most literature, only one actor was considered, namely the one who uses the smart technology itself. In this research, we will investigate the effect of the smart glasses on both the wearer and the actors who do not wear the glasses but are nevertheless affected by it. This is an innovative addition to the current literature and thus improves the current literature.

The remaining part of this dissertation consists of eight parts. Paragraph two describes the literature study which shows that smart technologies are already present to a limited extent in the healthcare sector. Within this paragraph, various technologies within the healthcare sector are discussed and the most determining factors for the patient's and care provider's wellbeing are identified. In the third part of this dissertation, the research question is thoroughly elaborated, with 'smart glasses' finding their introduction. After constructing the research question, the hypotheses and the conceptual framework can be drawn up in section four. In addition, this section also looks at any mediators and moderators within this research and introduces two well-known theories within the technology. Out of this conceptual framework and the corresponding hypotheses, in section five, the questionnaire can be drawn up to meet the hypotheses. The results obtained from this questionnaire are then reported in the sixth and seventh paragraph. In paragraph eight, the theoretical and managerial implications are drawn up followed by the discussion of the limitations and the advice on future research. After this, the last part ends with a general conclusion.

2 Literature review

The study is based on an analysis of thematic literature. The literature study is a transparent and replicable method, which is seen as a good starting point for answering the research question (UAntwerpen, 2018). The systematic approach in the search for the right literature is of crucial importance and opts for a three-step approach (literature research, selection and analysis). This will be discussed in the next sections.

2.1 Literature search

When searching for a good set of literature, the database of the online platform 'Web of Science', which provides a multidisciplinary search engine for articles (Utrecht University, 2021), was consulted. In order to proceed in a systematic and orderly manner, a search string should be created in the 'Web of Science' that includes core aspects of the topic that is being explored. The core aspects used within this article refer to the notions 'smart', 'services or products', 'wellbeing' and 'healthcare'. For these crucial terms, some synonyms should be used to collect an inclusive set of data. These synonyms were mainly found going through seven specific articles, related to the topic discussed within this dissertation (Abboud et al., 2021; Beverungen et al., 2019; Beverungen et al., 2020; Henkens et al., 2021; Lim & Maglio, 2018; Raff et al., 2020; Wunderlich et al., 2013). The first box in Figure 2 shows the search string used, which leads to 56697 items found.

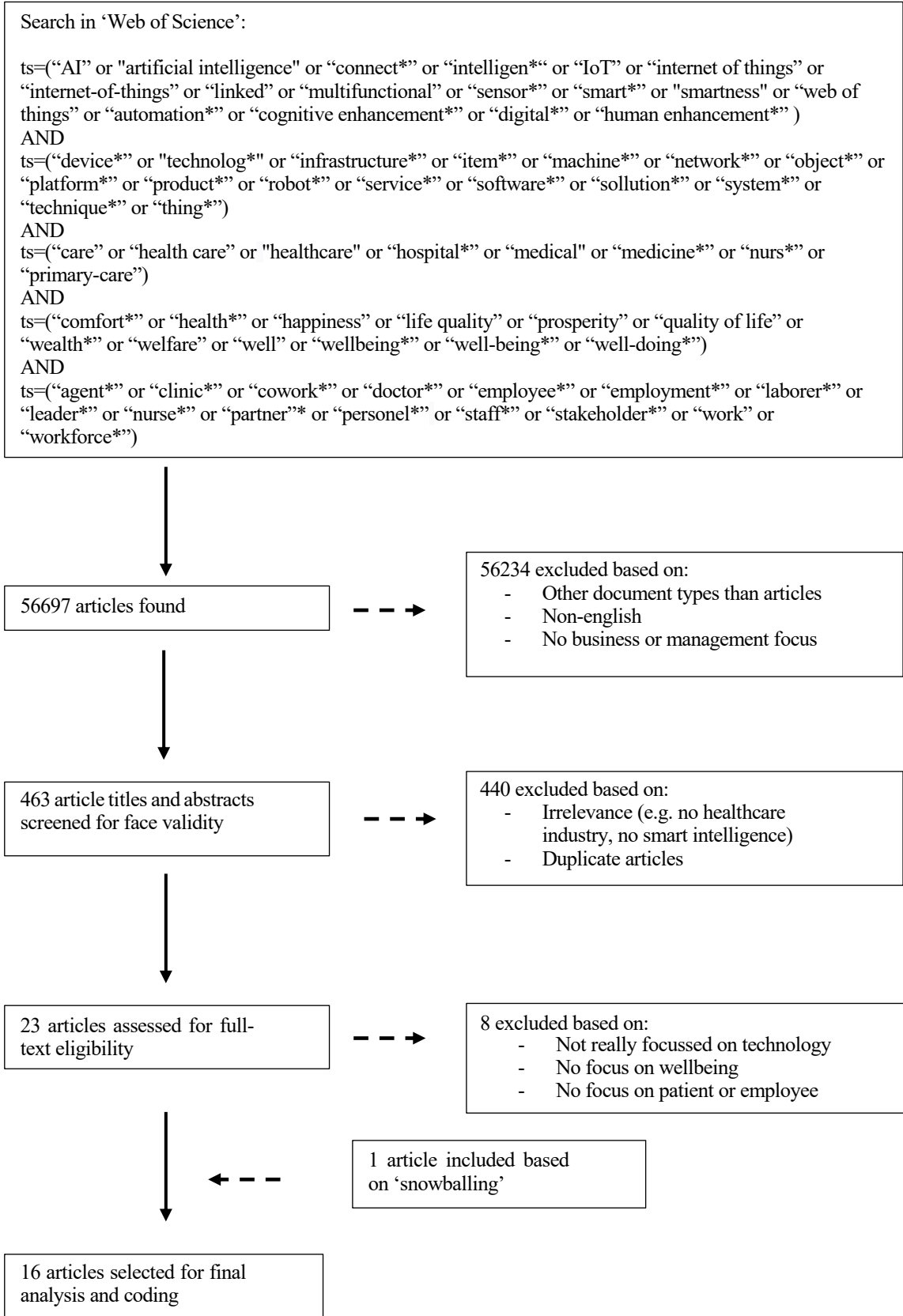


Figure 2: Overview of literature search and selection

2.2 Literature selection

The 56697 articles obtained from the literature search (2.1) were quickly reduced to a set of 463 articles after the introduction of three exclusion criteria:

- Articles as document type
- English language
- Business or management focus

The remaining 463 articles do not all have a link to the covered topic in this dissertation. The exclusion of irrelevant articles is therefore the next step in the search for a good literature base. In order to do this in an efficient and effective manner, each article is checked to see whether it has a good link with the topic to be researched. This is done by reviewing the titles and abstracts of the articles, which corresponds with a face validity analysis¹. In the face validity analysis, 440 articles were removed from our scope due to irrelevance (e.g. no healthcare industry, no smart intelligence) or duplication, leaving only 23 articles.

These 23 articles were then thoroughly examined. Of these articles, eight had no link with the subject and were therefore rejected. In addition, snowballing² adds one extra article, resulting in a final set of 16 articles that form the basis for the literature review as is shown in Figure 2.

2.3 Literature analysis

As discussed in the previous section (2.2), the literature review is based on 16 articles. Within these articles, some distinctions can be made. Some articles deal with smart technologies that are already used in healthcare. These articles can be seen as the basis of this study, since the purpose of this dissertation is to examine what kind of influence smart technologies have on the wellbeing of patients and care providers. In order to provide a clear and more tangible framework for the meaning of 'wellbeing', some of the 16 articles focus on aspects that are important to the patients and/or care providers. A good overview of these aspects makes it possible to determine what smart

¹ Face validity refers to the degree to which an assessment or test subjectively appears to measure the variable or construct that it is supposed to measure. In other words, face validity is when an assessment or test appears to do what it claims to do. (Face Validity: Definition & Examples, 2016)

² Snowballing is finding new, relevant articles that are often used in the bibliography of the previously selected (here 15) articles. (Scriptie Master, 2018)

technology needs to focus on, in order to be considered as favourable by both patient and care provider. Finding common ground between these three findings is therefore crucial in this dissertation. Table 1 provides a brief summary of the articles. This table outlines the goal and the context of the included articles and also mentions the method(s) used within the articles.

Table 1: Overview of the articles' goal, context and method

Author(s)	Goal	Context	Method
Xing et al. (2021)	Develop a barriers model	IoT and AI in China	Quantitative survey Thematic analysis approach
Papa et al. (2020)	Examining the relationship between ICT and the healthcare sector	ICT in the healthcare sector	Empirical investigation/study
Rezaei et al. (2021)	Explore and empirically validate the key indicators of ethical challenges in digital healthcare	Key indicators of ethical challenges in digital healthcare in Iran	Empirical study Delphi method
Balta et al. (2021)	Explore how digitalization of healthcare empowers stakeholders to interact and co-create value	Co-creation of value due to digitalization	Case study
Stefanini et al. (2021)	Provide an insight in the crucial aspects on which patient satisfaction depends	Interaction between patients and provider	Quantitative survey
Laurenza et al. (2017)	Illustrate how digital technologies can influence business process improvements in the healthcare industry	Adoption of digital technologies	Scenario-based approach
Naeem & Ozuem (2021)	Illustrate how social media impacts the engagement and productivity of health professionals	Social media in healthcare	Qualitative research Interviews
McCartney & McCartney (2020)	Develop a good view on the decision-making of integration service robots in healthcare workplaces	Service robots acceptance by customers and care providers	Qualitative research
Hunter-Jones et al. (2020)	Provide a HOPE-framework to enhance the patient experience across all the touchpoints of the healthcare journey	Patient experience during a healthcare journey	Qualitative research
Johansson et al. (2011)	Explore the experience of a nurse with a personal digital assistant	Personal digital assistant in nursing practice	Case study Interview
Ng et al. (2021)	Explore how AI can be used to improve clinical nursing care	AI in healthcare	Qualitative research
Lu. et al. (2018)	Determine if technology substitutes or complements care providers	Substitution or complementation by technology	Quantitative survey
Raposo et al. (2009)	Provide an index of what factors influences the patient satisfaction the most	Satisfaction index in healthcare	Quantitative survey following the SERVQUAL scale
Saravanan & Balasundaram (2013)	Provide an insight in what the system LAMECS is and what it can contribute in the context of healthcare	A system called LAMECS	Qualitative survey Instruction manual
Kong et al. (2019)	Determine the influence of the use of ICT in the healthcare and the acceptance of this technology by patients and nurses/doctors	ICT in healthcare	Quantitative research
Maglio & Spohrer (2008)	Description of what a service is and what a service has as his purpose	Service in general	Conceptual paper

2.3.1 *Smart products and service in healthcare*

The first key concept in this dissertation, and the independent variable, is smart technology in healthcare. More specifically, the use of smart products (SPs) and smart services (SSs) in healthcare. Within healthcare, many forms of SPs and SSs are already applied and discussed in the selected articles. Table 2 presents an overview of the discussed technologies per article and the advantages and disadvantages they have.

In this dissertation, smart products comply with the definition described according to the website of the smart industry. This defines smart products as products that are user-friendly, attractive and digitally connected. The products have built-in intelligence that enables communication with the environment. Furthermore, these products are also customer-specific or even ultra-personalised (Smartindustry, 2020).

A good example in the healthcare industry, is found in Papa et al's (2020) article. This article explains the use of smart healthcare devices and clearly addresses all the aspects of the definition discussed above. Papa et al. reports that the device must provide continuous monitoring, which should be in direct connexion with the care providers (communication). In addition, the monitoring can be specified to the needs of the client and should be comfortable to wear by the patient (customer-specific or ultra-personalised). Smart services rather make use of a smart product and are often linked to it. These are often services that can provide added value to the customer. A good example is given by McCartney and McCartney (2020) who state that AI and big data help us to create and deliver much more value than ever before. In addition, the smart service delivered is linked to a product, here the robot, which makes the smart service possible.

When analysing the articles and Table 2, we can conclude that almost all technologies have both advantages and disadvantages, of which efficiency, lower workload and information are the most common assets. These assets are mentioned in most articles, what shows that they are important factors. According to these articles, the efficiency factor is mainly linked to the follow-up of patients. Due to smartness, it is no longer necessary to monitor all patients 24/7. Technology can fulfil this task, which allows the care providers to focus on patients who are in great danger of death. The lower workload factor can also be a great advantage for similar reasons. The workload is greatly reduced by the not 24/7 monitoring of the patients themselves. However, it is important to note that technology can give nurses more and more responsibilities or make them take over some tasks from more specialised doctors which, according to Naeem et al. (2021), increases the

workload. As a third asset, getting clear and well-kept information is also very crucial. Smart products can bring together all the information about a single patient and thus give a good understanding of the necessary care that needs to be given. According to several articles, technology is better suited to do this than a human being, since this often involves a large amount of very specific information.

The technology covered in this dissertation, smart glasses, fully complies to the definition of smart products. Smart glasses are able to communicate with the patient by providing the necessary information. In addition, the glasses can strongly adapt its tasks to the patient. Think for example about the difference of communication when talking to an adult or a child. In addition, smart glasses have built-in intelligence since they are connected to the internet and other smart products. So, it possesses all the information about the patient and the care provision. It is also important to note that this smart product can be worn by several actors, here the patient or the care provider, which can affect the impact on wellbeing.

Within this dissertation it is further important to look at the advantages that influence the wellbeing of patients and care providers the most. These aspects of wellbeing will be discussed in the next paragraphs.

Table 2: Discussed (dis)advantages in the articles

Author(s)	Technology	Advantages	Disadvantages
Xing et al. (2021)	Wearable medical devices	<ul style="list-style-type: none"> - Efficiency - Collaboration - Lower workload 	<ul style="list-style-type: none"> - Fear of change - Complicated
Papa et al. (2020)	Smart healthcare devices	<ul style="list-style-type: none"> - Efficiency - Lower workload - Continuous monitoring - Cost reduction - Customized content 	
Balta et al. (2021)	Digitalization	<ul style="list-style-type: none"> - Information - More control 	
Stefanini et al. (2021)	Wearable sensors	<ul style="list-style-type: none"> - Continuous monitoring 	
Naeem & Ozuem (2021)	Social media	<ul style="list-style-type: none"> - Collaboration - Coordination - Connection - Engagement - Productivity 	<ul style="list-style-type: none"> - Job overload
McCartney G. & McCartney A. (2020)	Service robots	<ul style="list-style-type: none"> - Efficiency - Lower workload 	<ul style="list-style-type: none"> - Substitution
Johansson et al. (2011)	Personal digital assistants	<ul style="list-style-type: none"> - Efficiency - Confidence - Patient safety - Participation - Access to information 	
Ng et al. (2021)	AI	<ul style="list-style-type: none"> - Efficiency - Lower workload 	
Saravanan & Balasundaram (2013)	Location aware medical care services	<ul style="list-style-type: none"> - Efficiency - Time savings 	
Kong et al. (2019)	ICT	<ul style="list-style-type: none"> - Coordination - Access to information - Access to healthcare providers 	<ul style="list-style-type: none"> - Less interaction
Laurenza et al. (2017)	Digital technologies	<ul style="list-style-type: none"> - Increased safety - Cost savings - Real-time data - Time savings 	<ul style="list-style-type: none"> - Training needed - Privacy issues - Legal issues - Incompetent?

2.3.2 *Patient wellbeing*

Healthcare is about the wellbeing of the patient. A good understanding of the aspects to which the patient attaches great importance is therefore crucial to maximise the patient's wellbeing. This wellbeing is thus an important dependent variable within this study. Various articles, obtained from the literature selection (2.2), give a glimpse into what these aspects specifically are, which are shown in Table 3.

In general, it is striking that the wellbeing of the patient strongly depends on the relationship between him/her and the care provider, but where does smart technology come into play? Especially if we follow the conclusions of Stefanini et al. (2021), Hunter-Jones et al. (2020), Ng et al. (2021) and Raposo et al. (2009), where the importance of the patient-care provider relationship or interaction is mentioned each time. Hunter-Jones et al. (2020) go even one step further and indicate that a shared vision between care provider and patient is the core factor for the patient's wellbeing within his HOPE³ framework. Furthermore, Rezaei et al. (2021) and Stefanini et al. (2021) tell us that behavioural and network factors are the most important variables in the patient's wellbeing, within which the feeling of privacy appears to be the main factor. The introduction of smart technology in healthcare will therefore certainly have to take into account a number of important privacy factors that will strongly influence the patient's wellbeing. The last important aspect for the patient's wellbeing by using smartness in healthcare is the quality of the servicescape⁴. According to Hunter-Jones et al. (2020) and Raposo et al. (2009), the servicescape is also considered important by the patient and can thus positively or negatively influence the assessment of the obtained care. As you can see in Table 3, this analysis gives us three important factors for patient wellbeing, namely patient-care provider relationship/interaction, privacy and the servicescape.

³ HOPE is a framework that represents a hospitaly-based, CEM-driven approach to healthcare provision in which patients and care providers/staff work together to enhance individual patient's experience across all the touchpoints of the healthcare journey (Hunter-Jones et al., 2020)

⁴ A servicescape is composed of numerous elements such as the colour, music, scent, layout and design and is the physical environment of a service organisation where customers experience the service (Lin, 2015)

Table 3: Patient wellbeing factors

Author(s)	Factors
Rezaei et al. (2021)	<ul style="list-style-type: none"> - Behavioural factors - Network factors - Most important aspect is privacy
Balta et al. (2021)	<ul style="list-style-type: none"> - Making their own choices
Stefanini et al. (2021)	<ul style="list-style-type: none"> - Physical contact
Hunter-Jones et al. (2020)	<ul style="list-style-type: none"> - Servicescape - Core aspect: shared vision between patient and care provider
Ng et al. (2021)	<ul style="list-style-type: none"> - Nurse-patient communication
Raposo et al. (2009)	<ul style="list-style-type: none"> - Patient-doctor relationship - Quality of facilities (servicescape) - Interaction with the care providers - Waiting time is less important

2.3.3 Care provider wellbeing

Besides the wellbeing of the patients, discussed in the previous section (2.3.2), the wellbeing of the care providers is also of great importance and thus forms a second dependent variable within this dissertation. Just as in the previous paragraph, a number of articles are used to examine which aspects exert a strong influence on wellbeing, of which Table 4 provides a short summary.

According to Papa et al. (2020), workload in the healthcare sector shows to be the most crucial factor for the wellbeing of care providers. He clearly reports that excessive workload can lead to high levels of stress and thus have a detrimental effect on the health of the care provider. In addition, according to Balta et al. (2021), self-management and self-control are also important for the wellbeing of care providers. Being able to carry out the care themselves is seen as necessary by the care providers in order to achieve satisfaction in carrying out their job activities. Being able to carry out the job activities themselves also brings us to the third aspect of care providers' wellbeing, namely the fear for substitution. Lu et al. (2018) tells us that substitution can lead to the replacement of workers which also prevents them from doing their job. Reducing the fear for this substitution is therefore crucial to achieving wellbeing for the care providers. The literature

study provides in general three aspects that exert an influence on the wellbeing of care providers, namely workload, control/self-management and fear for substitution.

Table 4: Care providers wellbeing factors

Author(s)	Factors
Papa et al. (2020)	- Workload
Balta et al. (2021)	- Self-management - Control
Lu et al. (2018)	- Complementation vs substitution

3 Research question

The literature review provides us a large source of necessary information to better understand the subject of smart glasses. Of course, reviewing what is already known is not the central goal of this dissertation. This dissertation tries, by means of a quantitative study, to formulate an answer to the central research question. Subsequently, some hypotheses can be established. These hypotheses will assist in providing answer to the research question.

3.1 *The core question*

The literature has shown that there are already many forms of smartness applicable within healthcare. Some of these smart technologies use services in the form of an online platform, while others need a smart device or take the form of smart robots. All these forms of smartness have different positive and negative aspects.

In order to be able to conduct a well-founded study, it is unattainable to focus on the total spectrum of smart technologies. This would lead to a result that is too vague and does not provide a good and detailed insight. Therefore, it is essential to select only one form of smart technology and then examine it to the bone. In this dissertation, we opted to do research on a smart product about which there is only limited information available to date. The major goal to be achieved is therefore to contribute to the knowledge-gap about smartness in healthcare.

The smart technology examined in this dissertation is the use of smart glasses. According to Rauschnabel (2018), smart glasses offer users the opportunity to integrate three-dimensional, virtual elements realistically and in real time into their view field. This can range from obtaining necessary information to forming images. Smart glasses clearly have many applications and forms. Just think for example of the glasses worn while watching a 3D film. A clear definition of what is meant by smart glasses, in this dissertation, is therefore of great importance. Smart glasses are defined here as glasses in healthcare that provide clear information to the patient or care provider. Think for example of glasses that a care provider wears during an operation. These smart glasses then indicate exactly what needs to be done and detect problems that occur very quickly. From the patient's point of view, smart glasses can then be worn to provide the necessary information about what exactly is going on, or he/she can follow what the care provider is doing. Furthermore, these glasses can explain to children what is going to happen in an understandable and interactive way in order to reassure them. It is therefore clear that smart glasses can have many applications, but that this research specifically focuses on the informative aspect of these glasses within the

healthcare sector, whereby the glasses can be worn by both the patient and the healthcare provider. The patient and care provider are assigned a different function within healthcare. The patient is the recipient of the care, while the care provider behaves as a provider of care within this context. Depending on who is wearing smart glasses, these glasses will also perform a slightly different function. This makes it very relevant to make a differentiation between the wearer of the glasses (patient or care provider), as we expect different results because of the difference in function, depending on which actor is wearing smart glasses.

With this in mind, the central research question can be defined, which reads as follows: ***How does the usage of smart glasses affect the wellbeing of patients and care providers, thereby paying attention to the boundary condition?*** To investigate this, we use the literature previously explained in Paragraph 2 and summarised in Table 1.

4 Theoretical framework and hypotheses

The purpose of this article is to address the effect of the independent variable (smart glasses) on the dependent variables (wellbeing of the patient and care provider) within healthcare, by using strong and appropriate moderators (wearer and role readiness). In order to tackle this properly, this section discusses the methodology used to test the central research question. This serves as the basis for obtaining a theoretical framework, which will lead to the crucial formation and formulation of the hypotheses. This will be summarized in Figure 3 and Table 5.

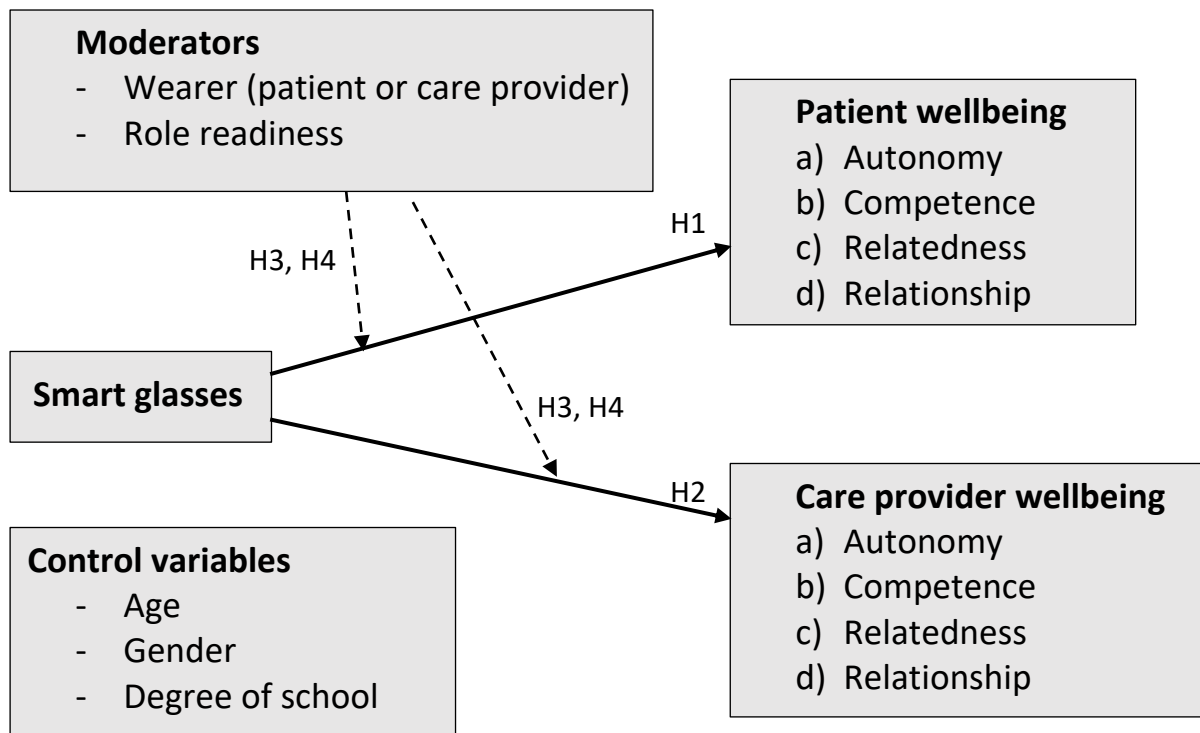


Figure 3: Conceptual framework

Table 5: Hypotheses

Hypotheses based on the self-determination theory	
H1a	Smart glasses have a negative impact on the patient's autonomy
H1b	Smart glasses have a positive impact on the patient's competence
H1c	Smart glasses have a negative impact on the patient's relatedness
H2a	Smart glasses have a negative impact on the care provider's autonomy
H2b	Smart glasses have a negative impact on the care provider's competence
H2c	Smart glasses have no impact on the care provider's relatedness
Hypotheses bases on the social exchange theory	
H1d	Smart glasses have a negative impact on the patient's relationship
H2d	Smart glasses have a positive impact on the care provider's relationship
Hypotheses for the moderator	
H3	The smart glasses have the greatest impact on the wearer's wellbeing
H4a	Higher levels of role readiness strengthen the effect of smart glasses usage on patient's wellbeing
H4b	Higher levels of role readiness strengthen the effect of smart glasses usage on care provider's wellbeing

4.1 Hypotheses

4.1.1 *The effect of smart glasses on the wellbeing*

The self-determination theory (SDT) (Deci & Ryan, 2012) states that human motivation depends on three basic needs, namely autonomy, competence and relatedness. Van den Broeck et al. (2016) even concludes that the needs for autonomy, competence, and relatedness mostly fit the criteria set out for what basic psychological needs represent. According to this theory, people can only achieve wellbeing if it satisfies these three needs. In fact, recent research shows that SDT is highly relevant within healthcare, as SDT is central to autonomous self-regulation and autonomy is considered an ethical mandate for medicine. SDT is, according to Deci and Ryan, highly relevant to healthcare because it is the only theory that has examined autonomy in depth, using empirical methods.

AUTONOMY

Autonomy is the first condition according to the self-determination theory. According to SDT, autonomy refers to the ability to influence your own environment. This is not about being independent of anything or anyone, but about being able to carry out activities yourself and having an influence on what you do (Deci & Ryan, 2012).

For the patient, the factor 'privacy' can be associated with the basic need 'autonomy'. The Van Dale defines privacy as *"the ability to be completely self-sufficient in its own environment"*. This can be strongly linked to the description of the basic need autonomy. Rezaei et al. (2021) and Balta

et al. (2021) clearly agree with this. Rezaei et al. states that privacy is one of the most crucial factors for patient wellbeing and defines privacy as the right of the patient to choose who has access to his personal information. Balta et al. concludes that making own choices is crucial for patient wellbeing. Both articles show a clear link to the description of the basic need autonomy. When using smart glasses, we expect the patient to have a lower sense of autonomy. He/she always has to do what the smart glasses tells him/her to do, so the patient is expected to have less influence on his/her environment. In addition, the patient can no longer decide who has access to his personal information, which is very important according to Rezaei et al. This decision is dependent of the smart glasses. The feeling of privacy is a problem in this situation, which according to Laurenza et al. (2018) is a major disadvantage of smartness (see Table 2)

H1a: Smart glasses have a negative impact on the patient's autonomy

From the point of view of the care provider, the factor 'control/self-management' can be attributed to the basic need 'autonomy'. According to the concept of self-management, the care provider can make decisions themselves, allowing him/her to influence the environment (Balta et al., 2021). According to Balta et al., self-management and control lead to value creation. The use of smart glasses means that the care provider no longer has to give information to the patient and can make fewer decisions. This will reduce the feeling of self-management/control. We assume that the use of smart glasses in healthcare will have a negative impact on the care providers' sense of autonomy.

H2a: Smart glasses have a negative impact on the care provider's autonomy

COMPETENCE

Competence is the second basic need put forward by the SDT. It refers to the extent to which the individual itself indicates that he or she manages a particular task or skill (Deci & Ryan, 2012). Competence leads to motivation because the feeling of having a skill helps to achieve goals.

To examine the influence of 'competence' on the patient's wellbeing, 'competence' should be linked to the factor 'servicescape'. This is, according to Hunter et al. (2020), important for the patient's wellbeing. Smart glasses should be seen as an element of the servicescape, which should ensure that the patient knows what to do. It is essential to frame why the concept of 'servicescape' is linked to the above-mentioned condition of 'competence'. To do this, we introduce a realistic

situation. As a patient, you enter a hospital for an examination. Once in the hospital, you are stressed and this is quickly increased by the fact that you often don't know where to go or what is expected of you. In the hospital there are signs (part of the servicescape) that indicate where the different departments and offices are, but finding the right place is still not easy. In addition, you also have to check in, but this is usually difficult to do. Both problems can be solved very effortlessly by smart glasses. Smart glasses, which are part of the servicescape, can replace the plates by personally guiding you to the right location. It also explains what is expected of you as a patient, so that you are better able to fulfil your tasks. These smart glasses which, within this dissertation, have an informative function and are part of the servicescape, therefore improve the patient's servicescape and competence. This leads to the following hypothesis H1b.

H1b: Smart glasses have a positive impact on the patient's competence

For the care provider, the factor 'control/self-management' is associated with the basic need competence. 'control/self-management' is the same factor as already mentioned in the previous section which explains the basic need autonomy. This factor also has a connexion here, since the feeling of control and self-management makes the care provider feel better about his skills. According to Balta et al. (2021), control and self-management become the essential factors for empowerment of the employees, which determines the wellbeing of the employees (care providers). Smart glasses take over part of the care provider's tasks and report to the care provider what is expected of him/her, which means that the glasses 'direct' the care provider. The care provider does not seem to have full self-determination by using smart glasses. Because of the idea that smart glasses take a part in the care provider's decision-making authority, we expect smart glasses to weaken the feeling of control and self-management. This means that the care provider loses some of his skills to take and implement decisions. The ability to provide the patient with the necessary information also decreases when using smart glasses. This leads to a hypothesis which examines a negative influence of smart glasses on the competence of the care provider.

H2b: Smart glasses have a negative impact on the care provider's competence

RELATEDNESS

The third and last prerequisite of the SDT is ‘relatedness’. According to the theory, ‘relatedness’ refers to the desire for interaction or connexion with others and the feeling of belonging. This can also be seen as the experience of caring for others within the healthcare sector (Deci & Ryan, 2012).

For the patient, ‘patient care provider interaction’ can be linked to this last condition. Note that ‘relatedness’ focuses on the desire for interaction and connexion with others and not on the relationship itself. The relationship itself will be discussed later in this section with the social exchange theory. Several articles, discussed in the literature analysis, show that this interaction is very important for the patient's wellbeing. Stefanini et al. (2021) states that patients prefer communication with a doctor and want to be actively involved in communication with the care providers. In addition, Ng et al. (2021) reports that a patient sees communication with the nurse as an important factor in improving care. In this context, smart glasses have an informative function and will take part in the communication between the patient and the care provider. This leads to a reduction in the interaction between the patient and care provider, which according to Kong et al. (2019) is a major disadvantage of smartness. Therefore, we expect smart glasses to have a negative impact on the ‘relatedness’ for the patient.

H1c: Smart glasses have a negative impact on the patient’s relatedness

For the care provider, the basic need ‘relatedness’ retains a link to the factor ‘fear for substitution’. Substitution of the care providers by smartness, in this case smart glasses, ensures that employees have to do fewer tasks themselves. Lu et al. (2018) argues that the fear of substitution is indeed present in healthcare, but that this substitution highly depends on the specific healthcare sector. In her research, Lu et al. distinguishes between low-end (public) and the high-end (private) nursing. According to her research, the complementary effect of the smartness dominates over the substitution effect in the low-end nursing. The low-end nursing hires additional care providers after introducing a new form of smartness to increase their ability to compete. This in contrast to the high-end nursing, where the introduction of smartness results in significantly increased utilisation of the nursing time accompanied by a relatively low marginal advantage of providing additional quality. Lu et al. therefore states that the staff in this high-end sector, by reducing costs, will decrease with the introduction of smartness. As a result, the substitution effect in the high-end nursing dominates over the complementary effect. In this dissertation, we limit ourselves to the

public sector, about which Lu et al. says that the substitution effect does not dominate there. Within this dissertation, smart glasses have to take on the informative task, but since Lu et al. states that the smartness in a publicly accessible sector does not lead to substitution, we expect that the introduction of smart glasses will not affect the care provider's relatedness.

H2c: Smart glasses have no impact on the care provider's relatedness

The second theory, the social exchange theory, is based on the idea that a relationship between two people is established through a process of cost-benefit analysis. This analysis considers whether a relationship is worth maintaining based on mathematics and logic rather than emotional measures (Ferm & Thaichon, 2021). In this dissertation, we focus on an interpersonal relationship instead of the cost-benefit relationship. This makes it important to 'translate' the cost-benefit relationship to a more interpersonal one. The cost-benefit relationship should therefore be seen, here, as the consideration of the advantages and disadvantages of the social connexion or affiliation between the patient and the care provider (interpersonal relationship).

RELATIONSHIP

As already mentioned, this is not the same as the SDT's basic need 'relatedness'. The 'relatedness'-condition refers to the desire for interaction with the patient or care provider, while the social exchange theory (SET) focuses more on the relationship between these two actors. This social exchange theory can thus be linked to the important factor 'patient-care provider relationship' for patient wellbeing. Raposo et al. (2009) confirms the importance of this relationship for the patient and quotes that *"the most important positive effects on satisfaction are the ones linked to the patient/doctor relationship, the quality of the facilities and the interaction with administrative staff"* (Raposo et al., 2009, p. 85). Within this dissertation, smart glasses incorporate the informative part of the service experience. This ensures that the patient can obtain the necessary information through smart glasses, and thus to a lesser extent communicates with the care providers. We expect this reduction in direct communication between the patient and the care provider to lead to a decrease in the relationship between these two actors. As a result, we suspect that smart glasses will have a negative impact on the relationship between the patient and the care provider.

H1d: Smart glasses have a negative impact on the patient's relationship

Smart glasses relieve the care providers of the informative part of their duties. This leads to lower workload and greater efficiency which, according to Saravanan and Balasundaram (2013), Xing et al. (2021), Papa et al. (2020) and Ng et al. (2021), are important advantages of smartness. Smart glasses thus realise a greater interpersonal relationship. As mentioned, the SET states that the process of advantages and disadvantages (cost-benefit) forms the basis for a relationship between two people. Smart glasses are able to increase this process by reducing working pressure and increasing efficiency. As a result, we expect that the use of smart glasses will have a positive impact on the care provider’s relationship.

H2d: Smart glasses have a positive impact on the care provider’s relationship

To have an overview of the linkages between the theories and the factors for wellbeing, Table 6 has been added. This table forms the basis of what has been discussed in this paragraph.

Table 6: SDT/SET and wellbeing factors

Wellbeing	Patient wellbeing factors	Care provider wellbeing factors
Autonomy	Privacy	Control/ self-management
Competence	Servicescape	Control/ self-management
Relatedness	Patient-care provider interaction	Fear for substitution
Relationship	Patient-care provider relationship	Workload and efficiency

4.1.2 Boundary conditions

In this dissertation we want to investigate the influence of smart glasses on the patient's and care provider’s wellbeing, as well as the influence of two boundary conditions. The boundary conditions which will be investigated here are the two moderators of this study, namely the ‘wearer of the glasses’ and the ‘role readiness’. We expect these boundary conditions to influence the effect of smart glasses on the wellbeing of the patients and care providers. In this paragraph, the hypotheses will be drawn up based on the expected influences. For the reason why these moderators are included in the study, we refer back to Paragraph 3.1, where this has already been discussed.

WEARER

Smart glasses are not a smart product that can only be assigned to one actor. Both the patient and the care provider can use this form of smart technology. Depending on the person wearing these smart glasses, the influence of these glasses may differ on the wellbeing of both actors. The wearer of the glasses thus may have an explanatory power and thus forms the first moderator of the relationship. The differences can be visible on all four factors for wellbeing (autonomy, competence, relatedness and relationship), but here it is only the total sense of wellbeing that is being investigated and not the individual influences on the different factors.

Smart glasses have an influence on the actors. We expect that the actor wearing smart glasses will be influenced the most. This actor must do exactly what the smart glasses orders him or her to do and is thus most influenced by the glasses. This leads us to suspect that we can see an influence on all the factors of the carrier's wellbeing. The other actor, which does not wear the smart glasses, will also be affected by this smart technology. For this actor, we expect this influence to be less present.

H3: The smart glasses have the greatest impact on the wearer's wellbeing

ROLE READINESS

Role readiness is about an individual's ability to take up his or her task. To have a good role readiness, an actor must meet three aspects. First, it is important that the actor knows what to do and what is expected of him/her. This ensures that the actor does a better job in taking up his role. In addition, it should also be possible for the actor to take on this role. Think of a person who is visually impaired in this context. This person may meet the first aspect and know what is expected of him/her, but if he cannot observe the information obtained by smart glasses, the role readiness will not be considered positive. Finally, the actor must also want to uphold this role. Some people may be reluctant to use smart glasses. This has a negative effect on the role readiness, as this person does not want to make any effort to know and fulfil the expectations or even does not generally take on this role. These three aspects are clearly linked together and therefore, in order to obtain a good role readiness, all of them must be answered positively. (Dong & Sivakumar, 2017)

If the role readiness increases, the patient is better able to take up his or her task and this will increase his or her wellbeing (Traynor, 2020). It is therefore important that the wearer of the

glasses knows what to do when he/she is given the smart glasses. If this is not the case, the wearer may use smart glasses in an incorrect manner which will reduce the effect of these glasses on wellbeing. In addition, the ignorance about these glasses will cause extra stress which will have an adverse effect on wellbeing. The role readiness, like the wearer, shows an explanatory strength of the relationship between smart glasses and the patient's and care provider's wellbeing, which makes it seen as a second moderator of the relationship discussed. This leads to the following hypotheses:

H4a: Higher levels of role readiness strengthen the effect of smart glasses usage on patient's wellbeing

H4b: Higher levels of role readiness strengthen the effect of smart glasses usage on care provider's wellbeing

4.1 Control variables

The last variables to be specified for the preparation of the quantitative study are the control variables. These are variables we keep constant within this research. We are not interested in these variables in this study, but they should be kept constant since they can influence the outcome. For example, think of the variable 'age'. According to Kong et al. (2019), younger people have grown up with smartness and see it as a necessity in their lives, while for the older generation, smartness may be seen as something superfluous. Thus, this variable can clearly influence the outcome of the study, but since the influence of age on smartness is not the purpose of this study, we consider this variable as constant and therefore do not take it into account. In other words, we assume that age has no influence on the results of the study.

5 Methodology

5.1 *Research construction*

The questionnaire (Appendix 1 and 2) tries to answer the hypotheses in Table 5. To do this, respondents should review a scenario (Table 7). Then, with the scenario in mind, the respondents had to rate some statements on a 7-point Likert scale (De Pelsmacker & Van Kenhove, 2019), with a value of 1 representing “not at all satisfied” and a value of 7 representing “completely satisfied”. In addition, the demographic data of the respondents was also requested at the end.

First, to measure the realism of the scenario, we used the scales of Dabholkar and Bagozzi (2002) and Van Vaerenbergh et al. (2013). Second, the observed role readiness was measured by applying the scales of Mishra (2018) and Vaishnavi et al. (2019). Then, the autonomy aspect was determined by using modified scales from Park and Searcy (2012), Bentwich et al. (2017) and Brien et al. (2012). Next, we used the scales of Mikkonen et al. (2018), Salminen et al. (2021) and Töllli et al. (2017) for determining the competence of the actors. Fifth we measured the relatedness by appealing to the scales of Brien et al. (2012) and Eriksson and Boman (2018). Finally, the factor relationship was measured with the scales of Gremler et al. (2020), Dibble et al. (2012), Shiri et al. (2014) and Falter and Hadwich (2020). These scales and the scenarios can be found in respectively Appendix 1 and Table 7 and were translated into Dutch for the understanding of the Dutch-speaking respondents.

5.2 *Scenarios*

To determine the impact of smart glasses on the patient’s and care provider's wellbeing, a quantitative study was used, taking six scenarios into account. As already mentioned, these scenarios were translated into Dutch for the comprehensibility of our Dutch-speaking respondents (Table 7). The first and fourth scenario were based on a situation without smart glasses in healthcare. These scenarios served as control scenarios. The other four scenarios all made use of smart glasses. The difference between these scenarios was the position of the respondent (patient or care provider) within the care experience and the actor who wears the glasses. By combining the different variables, there were four scenarios possible. In the survey, one scenario was randomly assigned to each respondent.

Table 7: Scenario's

Introductie		Technologie wordt als maar meer toegepast in ons dagelijkse leven. Aan de hand van enkele scenarios onderzoeken we de invloed van de slimme bril op de patiënt en zorgverlener. Hierbij neemt de slimme bril telkens een connectiviteitsfunctie aan, waardoor de slimme bril verantwoordelijk is voor de communicatie naar de patiënt of zorgverlener. Ik zou u dan ook vriendelijk willen vragen om het scenario grondig te lezen en het standpunt van de persoon in kwestie in te nemen.
Scenario 1	Wie ben jij	Patiënt
	Wie draagt de slimme bril	/
	Situatieschets	U hebt een ernstige wonde opgelopen die door een zorgverlener, via thuiszorg , moet worden verzorgd. Bij het bezoek informeert u de zorgverlener over uw klachten. Vervolgens deelt de zorgverlener u mee wat er zal gebeuren en bekijkt hij/zij de wonde. Bij het bekijken van de wonde ziet de zorgverlener dat deze zeer ernstig is, waardoor er een expert wordt gecontacteerd. Het contacteren van de expert gebeurt aan de hand van een smartphone , waarbij de wonde gefilmd wordt. Hierdoor kan de expert de wonde grondig onderzoeken, specifieke medicatie voorschrijven en de nodige zorg uitleggen aan de zorgverlener. Met deze uitleg kan de zorgverlener bij de volgende consultaties zelf de nodige zorg toedienen.
Scenario 2	Wie ben jij	Patiënt
	Wie draagt de slimme bril	Patiënt
	Situatieschets	U hebt een ernstige wonde opgelopen die door een zorgverlener, via thuiszorg , moet worden verzorgd. Bij het bezoek informeert u de zorgverlener over uw klachten. Vervolgens krijgt u een slimme bril toegewezen , dewelke u informeert over wat er zal gebeuren. Tijdens deze uitleg bekijkt de zorgverlener de wonde, waarbij hij/zij ziet dat deze zeer ernstig is. Door de ernst van de wonde wordt er, met behulp van de slimme bril, een expert gecontacteerd. Deze slimme bril is voorzien van een camera en microfoon. Hierdoor kan de expert de wonde grondig onderzoeken, specifieke medicatie voorschrijven en de nodige zorg uitleggen aan de zorgverlener. Met deze uitleg kan de zorgverlener bij de volgende consultaties zelf de nodige zorg toedienen.
Scenario 3	Wie ben jij	Patiënt
	Wie draagt de slimme bril	Zorgverlener
	Situatieschets	U hebt een ernstige wonde opgelopen die door een zorgverlener, via thuiszorg , moet worden verzorgd. Bij het bezoek draagt de zorgverlener een slimme bril , dewelke de zorgverlener informeert over uw klachten. Vervolgens deelt de zorgverlener u mee wat er zal gebeuren en bekijkt hij/zij de wonde. Bij het bekijken van de wonde ziet de zorgverlener dat deze zeer ernstig is. Door de ernst van de wonde wordt er, met behulp van de slimme bril, een expert gecontacteerd. Deze slimme bril is voorzien van een camera en microfoon. Hierdoor kan de expert de wonde grondig onderzoeken, specifieke medicatie voorschrijven en de nodige zorg uitleggen aan de zorgverlener. Met deze uitleg kan de zorgverlener bij de volgende consultaties zelf de nodige zorg toedienen.
Scenario 4	Wie ben jij	Zorgverlener
	Wie draagt de slimme bril	/
	Situatieschets	U moet als zorgverlener, via thuiszorg , een ernstige wonde verzorgen. Bij het bezoek informeert de patiënt u over zijn/haar klachten. Vervolgens deelt u de patiënt mee wat er zal gebeuren en bekijk je de wonde. Bij het bekijken van de wonde zie je dat deze zeer ernstig is, waardoor er een expert wordt gecontacteerd. Het contacteren van de expert gebeurt aan de hand van een smartphone , waarbij de wonde gefilmd wordt. Hierdoor kan de expert de wonde grondig onderzoeken, specifieke medicatie voorschrijven en jou de nodige zorg uitleggen. Met deze uitleg kan je bij de volgende consultaties zelf de nodige zorg toedienen.

Scenario 5	Wie ben jij	Zorgverlener
	Wie draagt de slimme bril	Patiënt
	Situatieschets	U moet als zorgverlener, via thuiszorg , een ernstige wonde verzorgen. Bij het bezoek informeert de patiënt u over zijn/haar klachten. Vervolgens geeft u een slimme bril aan de patiënt , dewelke de patiënt informeert over wat er zal gebeuren. Tijdens deze uitleg bekijk je de wonde, waarbij je ziet dat deze zeer ernstig is. Door de ernst van de wonde wordt er, met behulp van de slimme bril, een expert gecontacteerd. Deze slimme bril is voorzien van een camera en microfoon. Hierdoor kan de expert de wonde grondig onderzoeken, specifieke medicatie voorschrijven en jou de nodige zorg uitleggen. Met deze uitleg kan je bij de volgende consultaties zelf de nodige zorg toedienen.
Scenario 6	Wie ben jij	Zorgverlener
	Wie draagt de slimme bril	Zorgverlener
	Situatieschets	U moet als zorgverlener, via thuiszorg , een ernstige wonde verzorgen. Bij het bezoek draag je een slimme bril , dewelke jou informeert over de klachten van de patiënt. Vervolgens deel je de patiënt mee wat er zal gebeuren en bekijk je de wonde. Bij het bekijken van de wonde ziet de zorgverlener dat deze zeer ernstig is. Door de ernst van de wonde wordt er, met behulp van de slimme bril, een expert gecontacteerd. Deze slimme bril is voorzien van een camera en microfoon. Hierdoor kan de expert de wonde grondig onderzoeken, specifieke medicatie voorschrijven en jou de nodige zorg uitleggen. Met deze uitleg kan je bij de volgende consultaties zelf de nodige zorg toedienen.

5.3 Pilottest

The format of the questionnaire depended on a few requirements. Selecting the most accurate variables was the first demand and is assessed in a pilot test. These variables should then be clearly formulated so that the general public could easily comprehend the questions. A clear formulation was crucial for a truthful response to the subject under investigation. Furthermore, these questions should also be placed in a logical sequence and the questionnaire should be properly laid out (De Pelsmacker & Van Kenhove, 2019).

A preliminary draft must be created before the questionnaire was sent to the general public. This design was then reviewed by six people who had no prior knowledge of this subject. This review of the questions was followed and timed, so that any errors, ambiguities or omissions could be identified. This phase thus provided error correction and fine-tuning clarity.

This pilot test revealed some questions that were unclear to respondents. These questions were then reformulated so that, at the end, everything was clearly understood. In addition, the structure was slightly modified, and all the scenarios were written out more concisely. This pilot test was crucial as it was an important step in the creation of a questionnaire that is understandable to the respondents.

5.4 Pre-test

The pre-test provided a ‘manipulation’ and ‘realism’ check where it also looks into to the quality of the used scales (De Pelsmacker & Van Kenhove, 2019). These scales, discussed in section 5.1 and Appendix 1, determined the result of the measurement, which required a check of these scales to ensure that they correctly measure the investigated variable. Furthermore, the scenarios, rewritten after the pilottest and discussed in Paragraph 5.2, would be submitted to 21 respondents during the pre-test, where these respondents had to indicate to what extent these scenarios appeared to be realistic. This was done using a validated scale including three items such as *'can this happen in real life?'*. For a more in-depth look into these questions, please refer back to Appendix 1.

In addition to the control of scenario realism, the pre-test also provided a manipulation check, reassuring that the respondents responded correctly to the manipulative variables⁵. In this manipulation check, we verify if the respondent, after reading the scenarios, are able to answer the questions who they are and who is wearing the glasses correctly. Furthermore, the internal correlation was tested using the Cronbach's alpha.

This pre-test clarified that the scenarios appeared to be realistic. On the other hand, the Cronbach's alpha, within certain variables, showed us some values lower than the limit value of 0,6 (De Pelsmacker & Van Kenhove, 2019). To solve this problem and thus to increase the Cronbach's alpha, the scales ‘Role_Readiness_2’ and ‘Relatedness_2’ were modified. Furthermore, the manipulation check also showed some errors. During this manipulation check, some respondents responded incorrectly to the questions *'who are you in this scenario?'* and *'who wears the glasses?'*. To correct this error, we asked the respondent to tick *'I have read this scenario thoroughly'* at the end of the scenario. In addition, a timer was added to the scenario to verify whether the respondent took his or her time to thoroughly read this scenario. After carrying out this adjustment, the scenarios and scales could be used in the final questionnaire, assuming that the scenarios and scales will show ‘correct’ results.

⁵ The manipulative variables are the position in the scenario (patient or care provider) and the wearer of the smart glasses (patient, care provider or no smart glasses)

6 Analysis

The analysis of the data obtained from the questionnaire used the statistical analysis program SPSS. This program enables the quick and easy generation of some statistical tests. This analysis was only possible after we prepared and checked the data in a statistically correct manner.

6.1 Data collection and sample characteristics

In total, 263 respondents participated in this survey. The attention of the respondents was checked by asking them to indicate '*fully agree*' somewhere in the middle of the questionnaire. Furthermore, we also checked whether all respondents answered correctly to the moderation questions (who am I? and who wears the glasses?). All respondents who did not respond correctly to these questions were removed. In the end, 138 respondents remained, from whom we thoroughly reviewed and reported the results. After eliminating these respondents, as can be seen in Table 8, the scenarios were not equally distributed. Since we achieved at least 20 responses for all scenarios, we decided to continue working with the data. Furthermore, we were sure that the current data contained reliable responses. The respondents of this questionnaire were divided: 60 women, 77 men and one person who defined themselves as nonbinary. The age of the responders varied between 18 and 64 years with an average of 28,49 years and a standard deviation of 10,943 years. 100% had a minimum secondary degree, of which even 87% had a higher education or university degree.

Table 8: Descriptive statistics

	Categories*	Frequencies	Percentage (%)	Mean	Median
Age	18-25	100	72,5	28,49	24
	26-35	15	10,9		
	36-45	4	2,9		
	46-55	11	8,0		
	55<	8	5,8		
Gender	Men	77	55,8		
	Women	60	43,5		
	X	1	0,7		
Degree of school	Secondary	18	13,0		
	school	41	29,7		
	Higher	79	57,2		
	education University				
Role readiness*	Low	10	7,2	4,05	4,11
	Neutral	77	55,8		
	High	51	37,0		

Note: * Low: $X \leq 2,33$, Neutral: $2,33 < X < 4,67$, High: $4,67 \leq X$

6.2 Scenario realism

The respondents were asked to imagine themselves in the pre-defined scenarios. Then, the respondents had to indicate whether these scenarios seemed realistic. This control on the scenario realism was done using three scales from Dabholkar and Bagozzi (2002) and Van Vaerenbergh et al. (2013). After this analysis, for the scenario realism, we obtained respectively the following averages and standard deviations: $M1 = 4,90$; $M2 = 4,80$; $M3 = 4,83$; $M4 = 5,12$; $M5 = 5,32$; $M6 = 5,20$; $SD1 = 1,26$; $SD2 = 1,41$; $SD3 = 1,17$; $SD4 = 1,00$; $SD5 = 1,09$ and $SD6 = 1,17$. In order to check whether these scenarios were considered realistic, a one-Sample T test, see Table 9, was used to verify that all scenarios were significantly higher than the average (3,5). This test led to the conclusion that the average values obtained for all scenarios were significantly higher than an average of 3,5, This enabled us to consider the scenarios as realistic (Dabholkar & Bagozzi, 2002; Van Vaerenbergh et al., 2013).

Table 9: Scenario realism

	Frequency	Mean	Standard deviation	One-Sample T-test	
				T-value	P-value
Scenario 1	20	4,90	1,26	4,962	0,00*
Scenario 2	20	4,80	1,41	4,130	0,00*
Scenario 3	26	4,83	1,17	5,806	0,00*
Scenario 4	20	5,12	1,00	7,195	0,00*
Scenario 5	23	5,32	1,09	8,008	0,00*
Scenario 6	29	5,20	1,17	7,780	0,00*

Note: *p < 0,05, **p < 0,01

6.3 Data preparation

Before we could evaluate the obtained data in a statistically correct way, the data was first thoroughly reviewed and prepared. The preparation phase started with determining the category (metric⁶ or categoric⁷) for each variable. Then we drew up frequency tables to check whether there were any ‘missing values’. Within the questionnaire, the attentiveness of the respondents was also checked by having them indicate the answer ‘*fully agree*’ in a random part of the questionnaire. The results of the respondents who didn’t reply to question correctly, were deleted.

Furthermore, all scales, from Appendix 1, should be drawn up in the same way, with ‘totally agree’ showing a positive influence and ‘totally disagree’ indicating a negative influence. If this is not the case with one or more variables, they must be recoded. To ensure that all scales metted this condition, we recoded all components of intrusiveness (non_intrusiveness) and the sixth to ninth component of role readiness (role_readiness_6, role_readiness_7, role_readiness_8, role_readiness_9).

6.4 Quality control

Quality control required a reliability and validity analysis. Because of this, the quality control started with a check on the convergent correlation of all the scales. To do this, we used the criteria of Kaiser-Meyer-Olkin (KMO), which states that the Cronbach's alpha of the analyses must be between the limit values of 0,6 and 0,99 (De Pelsmacker & Van Kenhove, 2019). For all the scales, except for the role readiness of the patient (0,568), we became a good or excellent Cronbach’s

⁶ Metric variable: variable consisting of an interval or ratio (De Pelsmacker & Van Kenhove, 2019)

⁷ Categoric variable: variable consisting of a nominal or ordinal scale (De Pelsmacker & Van Kenhove, 2019).

alpha. To meet the strict criteria of KMO, we needed to remove the factor ‘role_readiness_7’ from both the smartphone and the smart glasses. All these results are tabulated in Appendix 3.1.

Furthermore, we also focused on the multicollinearity of the scales. This check on multicollinearity examined the extent to which variables correlate with each other. If there is too much correlation between two variables, the reliability of the results decreases. The collinearity could be checked by verifying the Variance Inflation Factors (VIF) and the correlation matrices.

First, we analysed the VIF of all independent variables. As can be seen in Appendix 3.2 the VIF of our independent variables were between 1,752 and 2,175, which was clearly lower than the limit value 10 and the stricter threshold of 3,33 (De Pelsmacker & Van Kenhove, 2019). Second, when looking at the correlation matrix (Table 10), we saw that there are significant correlations between some variables. The strongest correlation could be found between the relatedness and relationship variables and displays a value of 0,505. Even though this value referred to a very strong relationship between these two, it did not show any sign of abnormal correlation. The high value could be explained by the fact that when the relationship brings you satisfaction, you will rather experience a higher feeling of interaction/relatedness. Both are very closely linked, which was already explained in Paragraph 4.1.1. Furthermore, we also noticed that there were some other variables who correlate strongly with each other, but all of them can overall be explained by the fact that they all measure the same dependent variable ‘wellbeing’ and to some extent always exert an influence on each other.

In summary, we can say that the results show small signs of multicollinearity. In addition, the correlation matrix also showed us that there are some interrelationships between the variables. To ‘bypass small characters of multicollinearity in the rest of the result analysis’, which is a major issue, we must use centralised data in what follows (De Pelsmacker & Van Kenhove, 2019).

Table 10: Correlation matrix

	1.	2.	3.	4.	5.
1. Autonomy	1				
2. Competence	0,492**	1			
3. Relatedness	0,364**	0,311**	1		
4. Relationship	0,316**	0,460**	0,505**	1	
5. Role readiness	0,220**	0,329**	0,386**	0,424**	1

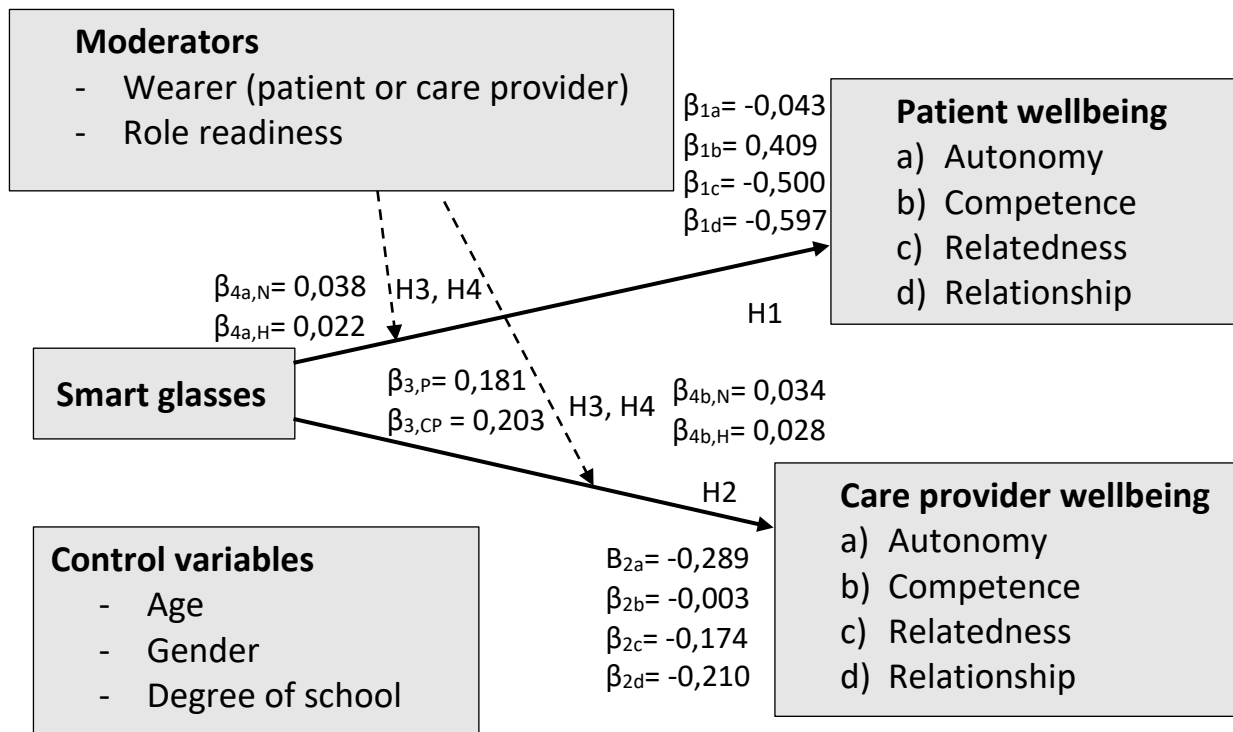
Note: *p < 0,05, **p < 0,01

Furthermore, we investigated whether the quantitative variables were normally distributed. The variables could also show a ‘skewed distribution’ if they had more values on one side than on the other. This provision was crucial for further analysis as a ‘screwed distribution’ could only use a limited number of descriptive statistics (De Pelsmacker & Van Kenhove, 2019). When analysing all the variables in SPSS, we found a skewness value of absolute maximum -0,748 (Appendix 3.4), indicating a slight accumulation of the values to the left side of the distribution, since a perfectly normal distribution contains a skewness value of zero (Chen, 2021). In addition to checking the skewness, a check on the ‘kurtosis’ was also necessary. The kurtosis reflected the flatness of the distribution and should again assume a value of zero in the case of a perfectly normal distribution (De Pelsmacker & Van Kenhove, 2019). Our results showed a kurtosis value of up to 1,116 for the relationship of the care provider (Appendix 3.4), which reflected a strongly peaked distribution. As Çiftçi (2018) states that there are no ‘hard limit values’ for the skewness and kurtosis, we adopted, as in Çiftçi’s investigation, the limit values -2 and 2 as representative. Since all values were within the set limits, we could regard these dates as normally distributed.

7 Findings

In this section, the hypotheses were statistically tested. As already mentioned in Paragraphs 6.3 and 6.4, a hypothesis could only be applied in a statistically correct manner if the data was prepared and subjected to a quality control. After carrying out this check, we used statistical analyses to assess the hypotheses, where we, as recommended by De Pelsmacker and Van Kenhove (2019), used statistical significance limit values of 95% ($p=0,05$) and 90% ($p=0,1$).

Figure 4 and Table 11 summarise the results obtained from the analysis, which will be discussed, in more detail, in the rest of this paragraph.



Note: * N= Neutral role readiness, H= High role readiness

** P= Patient, CP= Care Provider

Figure 4: Conceptual framework - Findings

Table 11: Hypotheses - Results

Hypothesis	Results
H1a: Smart glasses have a negative impact on the patient's autonomy	Not supported
H1b: Smart glasses have a positive impact on the patient's competence	Partly supported
H1c: Smart glasses have a negative impact on the patient's relatedness	Partly supported
H1d: Smart glasses have a negative impact on the patient's relationship	Supported
H2a: Smart glasses have a negative impact on the care provider's autonomy	Not supported
H2b: Smart glasses have a negative impact on the care provider's competence	Not supported
H2c: Smart glasses have no impact on the care provider's relatedness	Supported
H2d: Smart glasses have a positive impact on the care provider's relationship	Not supported
H3: The smart glasses have the greatest impact on the wearer's wellbeing	Supported
H4a: Higher levels of role readiness strengthen the effect of smart glasses usage on patient's wellbeing	Partly supported
H4b: Higher levels of role readiness strengthen the effect of smart glasses usage on care provider's wellbeing	Partly supported

Note: Supported: $p < 0,05$; partly supported: $0,5 < p < 0,1$; not supported: $p > 0,1$

7.1 Patient's wellbeing

To test the hypotheses, the results on the scales for the variables autonomy, competence, relatedness and relationship of scenarios 2 and 3 were brought together and compared to those of the first control scenario (scenario 1). By using a linear regression analysis (Mortelmans, 2007), we checked whether the hypotheses in Tables 5 and 11 are statistically significant ($p < 0,05$ or $p < 0,1$) or not. After examining this static significance, we also needed to check whether the direction (positive or negative) of the hypotheses corresponds to the direction according to the test. To do this, we looked at the accompanying beta-values (β). It is only when both the p-value results were lower than significance limit and the direction obtained from the beta-values corresponded to the ones of the hypotheses that we could view the hypotheses as statistically correct within a confidence interval of 95% ($p < 0,05$) or 90% ($p < 0,1$).

The results obtained are summarised in the tables below (Tables 12-15). Here we saw that for the variable relationship we getted a p-value lower than 0,05. In addition, for this variable, we saw that the direction obtained from the beta-value of the statistical test corresponds to the one of the hypothesis. This beta shows us that the use of a smart glass decreases the feeling of relationship with 0,597 points (β_{1d}). Therefore, we could conclude that hypothesis H1d is supported with a p-value of 0,05. For the other hypotheses H1b and H1c, we see that the patient competence and relatedness show significance with a p-value of 0,1. Furthermore, for both hypotheses H1b and H1c, the direction of the data corresponds with the direction as predicted in the hypotheses. According to this study, the use of a smart glass would increase the patient's competence with

0,409 (β_{1b}) and decrease the feeling of the patient's relatedness with 0,500 points (β_{1c}), within a significance level of 90%. These results let us to conclude that all hypotheses are supported, except for the hypothesis H1a. This hypothesis shows a p-value of 0,864, which is clearly higher than the limit values. The patient's autonomy would decrease with 0,043 points (β_{1a}) by the introduction of the smart glass, but according to this analysis, this hypothesis is not supported.

Table 12: Results patient autonomy

Patient autonomy	Model 1		Model 2		
	Beta (β)	p-value	Beta (β)	p-value	
Control variables					
Age	26-35	,150	,620	,145	,635
	36-45	-,147	,869	-,169	,853
	46-55	-,356	,603	-,376	,591
	55<	-,456	,474	-,445	,491
Gender	Women	,341	,137	,346	,138
Degree of school	Higher education	,540	,116	,526	,141
	University	,099	,753	,094	,770
Independent variable					
Smart glasses	With smart glasses			-,043	,864
Explanatory Values	R square	,113		,114	
	Adjusted R square	,006		-,011	
	R square change	,113	,402	0,000	,864

Note: *p < 0,05, **p < 0,01

Table 13: Results patient competence

Patient competence	Model 1		Model 2		
	Beta (β)	p-value	Beta (β)	p-value	
Control variables					
Age	26-35	,235	,402	,276	,317
	36-45	,692	,403	,897	,274
	46-55	-,451	,477	-,259	,680
	55<	,454	,441	,346	,551
Gender	Women	,099	,636	,049	,813
Degree of school	Higher education	,290	,358	,430	,180
	University	-,186	,526	-,133	,645
Independent variable					
Smart glasses	With smart glasses			,409	,073**
Explanatory Values	R square	,126		,175	
	Adjusted R square	,021		,059	
	R square change	,126	,319	,048	,073**

Note: *p < 0,05, **p < 0,01

Table 14: Results patient relatedness

Patient relatedness		Model 1		Model 2	
		Beta (β)	p-value	Beta (β)	p-value
Control variables					
Age	26-35	,298	,411	,246	,490
	36-45	-,164	,878	-,415	,695
	46-55	-,464	,571	-,698	,393
	55<	,886	,246	1,018	,178
Gender	Women	-,141	,603	-,080	,767
Degree of school	Higher education	-,441	,280	-,612	,141
	University	-,557	,143	-,622	,099**
Independent variable					
Smart glasses	With smart glasses			-,500	,090**
Explanatory Values	R square	,088		,133	
	Adjusted R square	-,022		,012	
	R square change	,088	,591	,045	,090**

Note: *p < 0,05, **p < 0,01

Table 15: Results patient relationship

Patient relationship		Model 1		Model 2	
		Beta (β)	p-value	Beta (β)	p-value
Control variables					
Age	26-35	,380	,363	,319	,437
	36-45	,456	,710	,156	,898
	46-55	-,652	,489	-,931	,322
	55<	1,182	,180	1,340	,124
Gender	Women	-,044	,888	,029	,924
Degree of school	Higher education	-,717	,130	-,921	,056**
	University	-,607	,166	-,694	,115
Independent variable					
Smart glasses	With smart glasses			-,597	,049*
Explanatory Values	R square	,096		,144	
	Adjusted R square	-,013		,024	
	R square change	,096	,529	,048	,049*

Note: *p < 0,05, **p < 0,01

7.2 Care provider's wellbeing

For testing the hypotheses that determine the impact of using smart glasses on the care provider's wellbeing, analogous tests as discussed in the previous Paragraph 6.5.1 were performed. The only difference here was that we were bringing together the results of scenarios 5 and 6 and comparing them to the results of the second control scenario (scenario 4).

The results obtained are summarised in the tables below (Tables 16-19). These results showed that all variables had a p-value higher than the limit values of 0,05 and 0,1. Consequently, only hypothesis H2c, where we expected no difference between the scenarios, showed statistical significance with a p-value of 0,05. The other hypotheses (H2a, H2b and H2d) must therefore be rejected. Therefore, we can say that the introduction of smart glasses does not impact the depending variables of care provider wellbeing significantly. This does not mean that the introduction does not have an influence on the variables. The analysis definitely shows us, by viewing the beta-values ($\beta_{2a} = -0,289$, $\beta_{2b} = -0,003$, $\beta_{2c} = -0,174$, $\beta_{2d} = -0,210$), a decrease in all variables for care provider wellbeing. It just means that the influence of the smart glass is not strong enough to see this decrease as statistically significant.

Table 16: Results care provider autonomy

Care provider autonomy		Model 1		Model 2	
		Beta (β)	p-value	Beta (β)	p-value
Control variables					
Age	26-35	-,274	,441	-,247	,484
	36-45	-,752	,179	-,687	,217
	46-55	-,155	,589	-,151	,597
	55<	,030	,931	,058	,866
Gender	Women	-,085	,637	-,062	,729
	X	-,267	,774	-,218	,813
Degree of school	Higher education	-,077	,825	-,089	,796
	University	-,716	,031*	-,765	,021*
Independent variable					
Smart glasses	With smart glasses			-,289	,147
Explanatory Values	R square	,189		,216	
	Adjusted R square	,086		,103	
	R square change	,189	,087**	,027	,147

Note: *p < 0,05, **p < 0,01

Table 17: Results care provider competence

Care provider competence		Model 1		Model 2	
		Beta (β)	p-value	Beta (β)	p-value
Control variables					
Age	26-35	-1,388	,000*	-1,388	,000*
	36-45	,130	,831	,131	,832
	46-55	,437	,169	,437	,172
	55<	,354	,357	,354	,361
Gender	Women	-,284	,153	-,283	,158
	X	-,039	,970	-,038	,971
Degree of school	Higher education	-,205	,590	-,205	,593
	University	-,975	,008*	-,976	,009*
Independent variable					
Smart glasses	With smart glasses			-,003	,990
Explanatory Values	R square	,356		,356	
	Adjusted R square	,274		,263	
	R square change	,356	,000*	,000	,990

Note: *p < 0,05, **p < 0,01

Table 18: Results care provider relatedness

Care provider relatedness		Model 1		Model 2	
		Beta (β)	p-value	Beta (β)	p-value
Control variables					
Age	26-35	-,128	,755	-,112	,786
	36-45	,580	,370	,620	,342
	46-55	-,166	,618	-,163	,625
	55<	-,292	,472	-,275	,500
Gender	Women	,035	,865	,049	,815
	X	-,774	,474	-,744	,492
Degree of school	Higher education	,104	,795	,097	,810
	University	-,088	,817	-,118	,758
Independent variable					
Smart glasses	With smart glasses			-,174	,453
Explanatory Values	R square	,042		,051	
	Adjusted R square	-,080			,453
	R square change	,042	,945	,009	,453

Note: *p < 0,05, **p < 0,01

Table 19: Results care provider relationship

Care provider relationship		Model 1		Model 2	
		Beta (β)	p-value	Beta (β)	p-value
Control variables					
Age	26-35	-,314	,508	-,294	,537
	36-45	-,252	,734	-,204	,785
	46-55	,430	,265	,433	,263
	55<	,597	,203	,618	,190
Gender	Women	-,191	,426	-,174	,470
	X	,747	,548	,782	,531
Degree of school	Higher education	,542	,244	,533	,254
	University	,075	,863	,039	,929
Independent variable					
Smart glasses	With smart glasses			-,210	,433
Explanatory Values	R square	,121		,130	
	Adjusted R square	,009		,003	
	R square change	,121	,386	,009	,433

Note: *p < 0,05, **p < 0,01

7.3 Boundary conditions

7.3.1 Wearer

The next hypothesis we were examining, is hypothesis H3. This hypothesis checks whether the wellbeing of the actors improves if they wear the glasses themselves. We compared the scenarios in which the person wears the glasses him-or herself (scenarios 2 and 6) with the scenarios in which this is not the case (scenarios 3 and 5), again using a linear regression analysis (Mortelmans, 2007).

By obtaining a p-value smaller than 0,05 and seeing a positive relationship in the self-bearing of the smart glasses, we could conclude that hypothesis H3 which states that smart glasses have the greatest impact on the wearer's wellbeing was supported (see Table 20) and therefore could not be rejected. This result was found in the scenarios of both the patient and the care provider. With regard to the patient, he/she will obtain a wellbeing of 0,181 points ($\beta_{3,P}$) higher if he/she wears the glasses themselves. This value is statistically significant according to the significance level of 95%. The same conclusion can be made for the wellbeing of the care provider, where the feeling of wellbeing increases with 0,203 points ($\beta_{3,CP}$) when the care provider wears the glasses him-/herself.

Table 20: Results moderators patient

Patient wellbeing		Model 1		Model 2		Model 3		Model 4	
		Beta (β)	p-value	Beta (β)	p-value	Beta (β)	p-value	Beta (β)	p-value
Control variables									
Age	26-35	,056	,877	-,001	,787	-,001	,795	-,001	,846
	36-45	,041	,441	-,008	,343	-,008	,340	-,009	,332
	46-55	-,640	,465	,011	,311	,011	,335	,010	,361
	55<	,399	,513	-,007	,400	-,007	,422	-,006	,484
Gender	Women	,292	,245	-,003	,406	-,003	,421	-,003	,457
Degree of school	Higher education	-,386	,312	,000	,997	,000	1,000	,000	,980
	University	-,441	,177	,005	,259	,005	,267	,005	,263
Wellbeing factors									
Autonomy				,359	,000*	,359	,000*	,359	,000*
Competence				,200	,000*	,200	,000*	,200	,000*
Relatedness				,183	,000*	,183	,000*	,183	,000*
Relationship				,262	,000*	,262	,000*	,262	,000*
Moderators									
Wearer	Actor wears the smart glasses					,181	,046*	,179	,049*
Role readiness***	Neutral							,038	,019*
	High							,022	,085**
Explanatory Values	R square	,098		1,000		1,000		1,000	
	Adjusted R square	-,041		1,000		1,000		1,000	
	R square change	,098	,645	,902	,000*	,000	,046*	,000	,023*

Note: *p < 0,05, **p < 0,01

Note: *** Low: $X \leq 2,33$, Neutral: $2,33 < X < 4,67$, High: $4,67 \leq X$

7.3.2 *Role readiness*

For the analysis of hypotheses 4a and 4b we made three categories within the role readiness (low, neutral and high). To make these categories, the 7-point Linkert scale was divided into three equally broad groups (Low: $X \leq 2,33$, Neutral: $2,33 < X < 4,67$, High: $4,67 \leq X$). Then, using a linear regression analysis (Mortelmans, 2007), we checked whether a higher degree of role readiness resulted in a higher sense of wellbeing for the patient and the care provider.

We conclude for both hypothesis H4a and H4b, using the linear regression analysis as shown in Table 21, that there was a statistically significant difference in wellbeing between the three categories of role readiness. This test showed that, for both the H4a and H4b hypothesis, there was a statistically significant difference in wellbeing between the groups with a low and neutral role readiness ($p < 0,05$). The patients with a neutral role readiness scored, on average, 0,038 points ($\beta_{4a,N}$) higher on the variable 'wellbeing' than the patients with a low role readiness. For the group of respondents with a high role readiness, the results show a significant ($p < 0,1$) influence on wellbeing. This group has a wellbeing, which is on average 0,022 points ($\beta_{4a,H}$) higher than the group with a low role readiness. Furthermore, the care providers show analogous results to those of the patients. The group care providers with a neutral role readiness scores on average 0,034 points ($\beta_{4b,N}$) higher on their wellbeing than the group with a low role readiness with a p-value of 0,05. Also, for the group care providers with a high role readiness we see a significant result with a p-value of 0,1. The wellbeing of this group is, according to this analysis, 0,028 points ($\beta_{4b,H}$) higher than the group with a low role readiness.

Table 21: Results moderators care provider

Care provider wellbeing		Model 1		Model 2		Model 3		Model 4	
		Beta (β)	p-value	Beta (β)	p-value	Beta (β)	p-value	Beta (β)	p-value
Control variables									
Age	26-35	-,502	,168	-,009	,220	-,009	,219	-,008	,227
	36-45	-,304	,547	,006	,561	,006	,543	,007	,453
	46-55	-,069	,815	,009	,105	,008	,148	,007	,185
	55<	-,059	,866	-,005	,491	-,004	,523	-,006	,353
Gender	Women	-,092	,626	-,006	,113	-,006	,111	-,005	,132
	X	,132	,873	-,012	,429	-,012	,447	-,016	,291
Degree of school	Higher education	,154	,651	-,002	,754	-,003	,645	,001	,920
	University	-,556	,093**	-,007	,287	-,007	,258	-,002	,738
Wellbeing factors									
Autonomy				,366	,000*	,366	,000*	,366	,000*
Competence				,193	,000*	,193	,000*	,196	,000*
Relatedness				,176	,000*	,176	,000*	,175	,000*
Relationship				,268	,000*	,268	,000*	,266	,000*
Moderators									
Wearer	Actor wears the smart glasses					,203	,043*	,201	,044*
Role readiness***	Neutral							,034	,023*
	High							,028	,074**
Explanatory Values	R square	,229		1,000		1,000		1,000	
	Adjusted R square	,086		1,000		1,000		1,000	
	R square change	,229	,154	,771	,000*	,000	,043*	,000	,027*

Note: *p < 0,05, **p < 0,01

Note: *** Low: X ≤ 2,33, Neutral: 2,33 < X < 4,67, High: 4,67 ≤ X

7.4 Control variables

The control variables exert influences on the wellbeing. These influences are not the focus of our study but must be controlled. Nevertheless, these variables showed a statistic significant influence in some of our previous analyses. This significant influence is mostly present in the control variable ‘degree of school’. These results can be seen in previous Tables 20 and 21.

First of all, the degree of school performed a poorly significant influence on the patient’s feeling of relationship. According to this study, the patients with a diploma higher education have a 0,921 points lower feeling of relationship than the patients with a diploma secondary school. Second, the autonomy of care providers with a university diploma is 0,039 point higher than the autonomy of care providers with a secondary diploma. This phenomenon is also retrievable in the care providers competence, where university graduates show to be 0,976 points less competent than graduates of the secondary school. Furthermore, for the care provider’s competence, we also notice that respondents in the group of 26-35 years old show to be 1,388 points less competent than the group of 18-25 years old respondents.

8 Discussion

8.1 Theoretical implications

As predicted, the use of smart glasses reduces the patient's feeling of 'relationship'. This finding is in line with that of Raposo et al. (2009) in which he states, among other things, that "*the most important positive effects on satisfaction are the ones linked to the patient/doctor relationship*" (Raposo et al., 2009, p. 85). Since smart glasses can only use a 'over the internet' contact with the doctor, this reduces the personal aspect of that contact. This explains the reduction of the relational feeling for the patient. In addition, the introduction of smart glasses also reduces the relatedness aspect of the patients. This finding is in line with the notions of Stefanini et al. (2021), Ng et al. (2021) and Kong et al. (2019). This can be explained by the fact that smart glasses provide information that was previously given by the caregiver. Smart glasses 'insert themselves between' the patient and the care provider, what reduces the interaction between these actors. Furthermore, the patient's competence will increase by the introduction of smart glasses. This can clearly be explained by the fact that smart glasses possess a lot of information, which it can transmit to the patient to mitigate his/her unawareness. For the care provider it is confirmed again that, after inserting smart glasses, there is no effect on the feeling of relatedness of the care provider. This is in line with the findings of Lu et al. (2018), where they expect no influence on substitution (relatedness) in the low-end nursing.

In addition, our findings show that the introduction of smart glasses does not affect the autonomy of both the patient and care provider. There is also no impact on the 'competence' and 'relationship' aspect of the care provider. These findings clearly go against our expectations. One explanation for this could be that respondents had to rely on imaginary scenarios and thereby lost their 'grip' on the situation. This can lead to errors in their responses, whereby their actual behaviour was not fully reflected correctly. In addition, these results may also be influenced by the fact that young people, in particular, participated in this research. This group has grown up with technology and smartness. Therefore, its use is often exaggerated. For this group, it would consequently not be odd to have diminished the negative expectations of using smart glasses. Another explanation may be that some actors find the use of smart glasses in this situation easy and thus encourage the use of it.

Furthermore, our test supports the expectation that the wearer will experience the greatest influence of smart glasses. This is also a logical consequence as the wearer is directly connected to the smart glasses and so immediately experience its influence. For the role readiness, we see similar results for the patients and care providers. The analysis indicates a strong difference in wellbeing between the groups 'low' and 'neutral', where a neutral role readiness leads to a higher wellbeing. Therefore, this finding is consistent with Traynor's study (2020), which states that a higher role readiness corresponds to an actor who is better able to take up his task. Within this study, this task refers to the correct use of smart glasses. The correct use of these glasses makes it possible to experience all the benefits of this type of smartness. Furthermore, we also have to emphasise that the role readiness does not fully meet the expectations because of the fact that a high role readiness would lead to a lower wellbeing, for both the patient and care provider, than a neutral role readiness. It is hard to find a good clarification for this result. The only declaration that comes to mind is the conclusion of Leung and Chen (2019), which states that a higher readiness leads to higher expectations.

8.2 Managerial implications

This research provides a good foundation for managerial advice. Even though the use of smart glasses only has limited influence on several dependent variables of wellbeing, this research can contribute to the proper implementation of these glasses within the healthcare sector.

First of all, the use of these glasses is certainly recommended as only two variables for the patient (patient's relatedness and relationship) show a negative effect. These negative findings can certainly weight up to the positive impact on the patient's competence and the ease that these glasses bring. This does not mean that the manager does not has to convince the patient of the relatedness and relationship aspects of the glasses. For example, these problems can be solved by having an initial face-to-face conversation with the doctor and using the glasses only at a subsequent consultation. In this way, the patient has physically seen the doctor, which can certainly promote both, the relatedness and relationship.

In addition, the manager must be aware that the wearer of the glasses faces the greatest influence on its wellbeing. The manager therefore must check the extent of the patient's and care provider's role readiness, before using these glasses. According to this study, a neutral role readiness increases wellbeing. Since the glasses primarily affect the wellbeing of the wearer, it should be

chosen, in order to maximise the effect on wellbeing, to give the glasses to the person with a neutral role readiness.

Last but not least, the manager should think about how to promote the sense of role readiness among the patient and care provider. This can be achieved by giving each actor good instructions on how to wear and use the glasses and convince him/her to use them. In addition, the manager must also be able to make the use of these smart glasses possible for everyone. Think of people who are visually impaired. On the contrary, the actor's role readiness may not be too high, because of the small decrease in wellbeing between actors with a neutral and high role readiness.

8.3 Limitations and future research directions

This study acquires new information about the impact of smart glasses on wellbeing in healthcare. This study has some limitations which provide guidelines for future research. Firstly, the research uses scenarios because smart glasses are not yet strongly commercialised in the healthcare sector. Even though a scenario-based research provides a good solution, the limits for gaining accurate insights in the term role-readiness and the wellbeing variables, are still present. In further research concerning this topic, the use of an alternative research design, such as field studies or interviews with some actors, is certainly recommended. Secondly, this study focused only on respondents from one country (Belgium). Further research can be extended to a larger audience or to other countries, looking at both more technologically advanced and technologically poorer countries, as important implications can be found here as well. Thirdly, this research only concerns the informative part of smart glasses. A smart glass may contain several functions, such as following-up on operations, detection of problems, etc. Further research can examine these other functions of smart glasses and investigate the effect of these on wellbeing. Fourthly, this research looks not only into one function but also focusses on a particular sector, namely healthcare. According to Ravel (2022), smart glasses can find an application in many sectors, with the introduction of smart glasses even appearing to be booming. Smart glasses can maybe find a good function in the education sector, such that everyone can learn on its own pace or in the overall industry where it can control critical pieces. For these sectors, a study of the influence of smart glasses can therefore be very interesting. Fifthly, no mediator was found in this dissertation for the influence of smart glasses on wellbeing. Further research can focus on this aspect, which will fill up the existing gap. Sixthly, the questionnaire was completed by friends, family and acquaintances. In addition, the questionnaire was placed on forums where students exchange their questionnaires. As a result, respondents are mainly in the 18-25 age group. Further research can focus more on other age

groups. Furthermore, these glasses can also provide a playful way of explaining information to children, but because the questionnaire could only be completed by adults, this was not one of the possibilities within this dissertation. Finally, this research uses the self-determination theory and the social exchange theory to find the determining factors for wellbeing. According to this study, an influence of smart glasses on these factors also ensures an impact on wellbeing. Future research can support the results obtained within this dissertation by examining the influence of smart glasses on wellbeing, using other theories.

9 Conclusion

When introducing smart glasses, they only have a negative impact on the patient's relatedness and relationship. Furthermore, also a positive influence is remarkable on the patient's competence. For all other variables, there is no significant influence. This does not mean that there is no influence at all, but that this influence is not strong enough to accept the hypothesis. In addition, the first moderator, wearer, shows that the wearer of the smart glasses is affected the most by the smart glasses. Therefore, it is certainly needed to think carefully about who we allow to wear the smart glasses. The second moderator, role readiness, indicates that actors with a high degree of role readiness show a greater sense of wellbeing than actors with a low role readiness. Finally, the control variable 'degree of school' is shown to impact several dependent variables of the patient's and care provider's wellbeing.

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APPENDICES

Appendix 1: Scales and translation

	English	Dutch	Source(s)
Scenario realism			
1.	What is described in this scenario could also happen in real life	Wat in dit scenario wordt beschreven kan ook in het echte leven gebeuren	Dabholkar & Bagozzi (2002) Van Vaerenbergh et al. (2013)
2.	This scenario seems realistic	Dit scenario lijkt realistisch	
3.	I had no difficulty imagining myself in the situation	Ik had er geen moeite mee mezelf in de situatie voor te stellen	
Wearer			
	Who wears the glasses? (patient or care provider)?	Wie draagt de bril (patiënt of zorgverlener)? Afhankelijk van het scenario	
Role readiness smart glasses			
1.	The smart glasses make me more productive	De slimme bril maakt mij productiever	Mishra (2018) Vaishnavi et al. (2019)
2.	In my circle of friends, I was at the first to acquire a smartphone	In mijn vriendenkring was ik bij de eerste die een smartphone verwierf	
3.	The smart glasses give me more freedom	De slimme bril geeft mij meer vrijheid	
4.	I will explain the use of a smart glasses to other people	Ik zal het gebruik van een slimme bril aan anderen uitleggen	
5.	I keep up with the latest developments regarding smart glasses	Ik blijf op de hoogte van de nieuwste ontwikkelingen rond een slimme bril	
6.	People will be too dependent on smart glasses	Mensen zullen te afhankelijk zijn van een slimme bril	
7.	Too much use of a smart glasses distracts people to a point that is harmful	Te veel gebruik van een slimme bril leidt mensen af naar een punt dat schadelijk is	
8.	The smart glasses are not designed for use by ordinary people	De slimme bril is niet ontworpen voor gebruik door gewone mensen	
9.	Support by smart glasses is not helpful because they don't explain things in terms, I understand	Ondersteuning door de slimme bril is niet nuttig omdat ze dingen niet uitleggen in termen die ik begrijp	

Role readiness smartphone			
1.	The smartphone makes me more productive	De <i>smartphone</i> maakt mij productiever	Mishra (2018)
2.	In my circle of friends, I will be at the first to acquire a smartphone	In mijn vriendenkring zal ik bij de eerste zijn die een slim bril verwerft	Vaishnavi et al. (2019)
3.	The smartphone gives me more freedom	De <i>smartphone</i> geeft mij meer vrijheid	
4.	I will explain the use of a smartphone to other people	Ik zal het gebruik van een <i>smartphone</i> aan anderen uitleggen	
5.	I keep up with the latest developments regarding a smartphone	Ik blijf op de hoogte van de nieuwste ontwikkelingen rond een <i>smartphone</i>	
6.	People are too dependent on a smartphone	Mensen zijn te afhankelijk van een <i>smartphone</i>	
7.	Too much use of a smartphone distracts people to a point that is harmful	Te veel gebruik van een <i>smartphone</i> leidt mensen af naar een punt dat schadelijk is	
8.	The smart glasses are not designed for use by ordinary people	De <i>smartphone</i> is niet ontworpen voor gebruik door gewone mensen	
9.	Support by a smartphone is not helpful because they don't explain things in terms, I understand	Ondersteuning door de <i>smartphone</i> is niet nuttig omdat ze dingen niet uitleggen in termen die ik begrijp	
Patient's wellbeing			
Autonomy			
	This care provision would ...	Deze zorgverlening zou ...	
1.	... respect my privacy	... mijn privacy respecteren	Park & Searcy (2012)
2.	... not disclose my info	... mijn info niet vrijgeven	Bentwich et al. (2017)
3.	... respect my will	... mijn wil respecteren	Brien et al. (2012)
4.	... provide me the necessary explanation	... mij de nodige uitleg geven	
5.	... encourage my independence	... mijn onafhankelijkheid aanmoedigen	
6.	... not influence me	... mij niet beïnvloeden	
7.	... not determine how I do something	... niet bepalen hoe ik iets doe	
8.	... not impact my own decisions	... mijn eigen beslissingen niet beïnvloeden	
9.	... allow me to make decisions	... mij toelaten beslissingen te nemen	
10.	... allow me to take on responsibilities	... mij toelaten verantwoordelijkheden op te nemen	
11.	... let me execute my tasks in my own way	... mij mijn taken op mijn eigen manier laten uitvoeren	
Competence			
	This care provision would ...	Deze zorgverlening zou ...	
1.	... improve my skills	... mijn vaardigheden verbeteren	Mikkonen et al. (2018)
2.	... improve my knowledge	... mijn kennis verbeteren	Salminen et al. (2021)
3.	... improve my attitudes	... mijn houding verbeteren	Tölli et al. (2017)
4.	... guide me towards self-direction	... me naar zelfsturing leiden	
5.	... help me with decision-making	... me helpen bij het nemen van beslissingen	
6.	... improve my confidence	... mijn vertrouwen verbeteren	

Relatedness			
	Within this care provision, ...	Binnen deze zorgverlening, ...	
1.	... I would feel understood by my care providers	... zou ik me begrepen voelen door mijn zorgverleners	Brien et al. (2012)
2.	... I would feel heard by my care providers	... zou ik me gehoord voelen door mijn zorgverleners	Eriksson & Boman (2018)
3.	... I would feel as though I can trust my care providers	... zou ik het gevoel hebben dat ik mijn zorgverleners kan vertrouwen	
4.	... I would feel I am a friend of my care providers	... zou ik voelen dat ik een vriend ben van mijn zorgverleners	
5.	... my care provider would care about me	... zou mijn zorgverleners zich zorgen maken om mij	
6.	... I would get along with my care providers	... zou ik overeenkomen met mijn zorgverleners	
Relationship			
	Within this care provision, ...	Binnen deze zorgverlening, ...	
1.	... I would experience a personal relationship with my care provider	... zou ik een persoonlijke band met mijn zorgverlener ervaren	Gremler et al. (2020)
2.	... I would experience a close connexion with my care provider	... zou ik een sterke connectie met mijn zorgverlener ervaren	Dibble et al. (2012)
3.	... I would experience a close relationship with my care provider	... zou ik een hechte relatie met mijn zorgverlener ervaren	Shiri et al. (2014)
4.	... the quality of contact with my care provider would be good	... zou de kwaliteit van het contact met mijn zorgverlener goed zijn	Falter & Hadwich (2020)
5.	... the contact with my care provider would be normal	... zou het contact met mijn zorgverlener normaal zijn	
6.	... I would feel comfortable with my care provider	... zou ik mij op mijn gemak voelen bij mijn zorgverlener	
7.	... I would trust my care provider	... zou ik mijn zorgverlener vertrouwen	
8.	... I would be treated fairly	... zou ik eerlijk behandeld worden	
Care provider's wellbeing			
Autonomy			
	This care provision would ...	Deze zorgverlening zou ...	
1.	... respect my privacy	... mijn privacy respecteren	Park & Searcy (2012)
2.	... not disclose my info	... mijn info niet vrijgeven	Bentwich et al. (2017)
3.	... respect my will	... mijn wil respecteren	Brien et al. (2012)
4.	... provide me the necessary explanation	... mij de nodige uitleg geven	
5.	... encourage my independence	... mijn onafhankelijkheid aanmoedigen	
6.	... not influence me	... mij niet beïnvloeden	
7.	... not determine how I do something	... niet bepalen hoe ik iets doe	
8.	... not impact my own decisions	... mijn eigen beslissingen niet beïnvloeden	
9.	... allow me to make decisions	... mij toelaten beslissingen te nemen	
10.	... allow me to take on responsibilities	... mij toelaten verantwoordelijkheden op te nemen	
11.	... let me execute my tasks in my own way	... mij mijn taken op mijn eigen manier laten uitvoeren	

Competence			
	This care provision would ...	Deze zorgverlening zou ...	
1.	... improve my skills	... mijn vaardigheden verbeteren	Mikkonen et al. (2018)
2.	... improve my knowledge	... mijn kennis verbeteren	Salminen et al. (2021)
3.	... improve my attitudes	... mijn houding verbeteren	Tölli et al. (2017)
4.	... guide me towards self-direction	... me naar zelfsturing leiden	
5.	... help me with decision-making	... me helpen bij het nemen van beslissingen	
6.	... improve my confidence	... mijn vertrouwen verbeteren	
Relatedness			
	Within this care provision, ...	Binnen deze zorgverlening, ...	
1.	... I would feel understood by my patients	... zou ik me begrepen voelen door mijn patiënten	Brien et al. (2012)
2.	... I would feel heard by my patients	... zou ik me gehoord voelen door mijn patiënten	Eriksson & Boman (2018)
3.	... I would feel as though I can trust my patients	... zou ik het gevoel hebben dat ik mijn patiënten kan vertrouwen	
4.	... I would feel I am a friend of my patients	... zou ik voelen dat ik een vriend ben van mijn patiënten	
5.	... my patients would care about me	... zouden mijn patiënten zich zorgen maken om mij	
6.	... I would get along with my patients	... zou ik overeenkomen met mijn patiënten	
Relationship			
	Within this care provision, ...	Binnen deze zorgverlening, ...	
1.	... I would experience a personal relationship with my patients	... zou ik een persoonlijke band met mijn patiënten ervaren	Gremler & Gwinner (2020)
2.	... I would experience a close connexion with my patients	... zou ik een sterke connectie met mijn patiënten ervaren	Dibble et al. (2012)
3.	... I would experience a close relationship with my patients	... zou ik een hechte relatie met mijn patiënten ervaren	Shiri et al. (2014)
4.	... the quality of contact with my patients would be good	... zou de kwaliteit van het contact met mijn patiënten goed zijn	Falter & Hadwich (2020)
5.	... the contact with my patients would be normal	... zou het contact met mijn patiënten normaal zijn	
6.	... I would feel comfortable with my patients	... zou ik mij op mijn gemak voelen bij mijn patiënten	
7.	... I would trust my patients	... zou ik mijn patiënten vertrouwen	
8.	... I would be treated fairly	... zou ik eerlijk behandeld worden	
Age			
	What is your age?	Wat is uw leeftijd?	
Gender			
	What is your sex?	Wat is uw geslacht?	
Degree of school			
	What is your highest diploma obtained?	Wat is uw hoogste behaalde diploma?	

Appendix 2: Questionnaire

Beste respondent

Ik ben Robin en ik studeer bedrijfseconomie aan de UGent.

In het kader van mijn masterproef onderzoek ik de invloed van een slimme bril op het welzijn van de patiënt en zorgverlener binnen de gezondheidszorg. Om hierover een goed zicht te krijgen zou ik u vriendelijk willen vragen deze vragenlijst in te vullen. Het invullen van de vragenlijst zou 5-10 minuten in beslag nemen en maakt gebruik van een scenario.

Door op de onderstaande blauwe pijl te klikken, bevestigt u akkoord te gaan dat:

- u 18 jaar of ouder bent
- u de bovenstaande informatie hebt doorgenomen
- u beseft deel te nemen aan een wetenschappelijk onderzoek, waarbij uw resultaten op een anonieme manier verwerkt zullen worden
- u toestemming geeft aan de onderzoekers om de resultaten op anonieme wijze te bewaren, te verwerken en te rapporteren
- u op de hoogte bent van de mogelijkheid om de deelname aan het onderzoek op ieder moment stop te zetten en deze eventueel later te hervatten zonder consequenties
- u het doel van de vragenlijst begrijpt

Dit onderzoek wordt afgenomen door Robin Meheus, Drs. Bieke Henkens en Prof. Dr. Katrien Verleye. Mocht u nog verdere vragen of opmerkingen hebben over dit onderzoek, neem dan gerust contact op met mij via Robin.Meheus@UGent.be

Alvast bedankt voor uw deelname.

Robin Meheus
Masterstudent Bedrijfseconomie

Contactinformatie hoofdonderzoeker
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Katrien.Verleye@UGent.be

Gaat u akkoord met het bovenstaande?

Indien u akkoord gaat wordt het scenario op de volgende pagina beschreven.

- Ik ga akkoord
- Ik ga niet akkoord

In het kader van dit scenario, in welke mate bent u akkoord met onderstaande stellingen?
(patiënt en zorgverlener⁸)

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
Wat in dit scenario wordt beschreven kan ook in het echte leven gebeuren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dit scenario lijkt realistisch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik had er geen moeite mee mezelf in de situatie voor te stellen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

MODERATOR

Wie ben jij in het scenario?
(patiënt en zorgverlener)

- Patiënt
- Zorgverlener

Wie draag de slimme bril in dit scenario?
(patiënt en zorgverlener)

- Patiënt
- Zorgverlener
- Er is geen slimme bril

⁸ Sommige vragen zijn anders geformuleerd afhankelijk van welke moderator de respondent in het scenario is. Hierdoor wordt, tussen haakjes, telkens vermeld welke vragen voor welke moderator van toepassing zijn.

In welke mate bent u akkoord met onderstaande stellingen?
(patiënt en zorgvelener)

Opm: Deze vraag wordt enkel gesteld aan de respondenten met scenario's 1 en 4, dewelke geen gebruik maken van een slimme bril

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
De smartphone maakt mij productiever	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In mijn vriendenkring was ik bij de eerste die een smartphone verwierf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De smartphone geeft mij meer vrijheid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zal het gebruik van een smartphone aan anderen uitleggen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik blijf op de hoogte van de nieuwste ontwikkelingen rond een smartphone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mensen zijn te afhankelijk van een smartphone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Te veel gebruik van een smartphone leidt mensen af naar een punt dat schadelijk is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De smartphone is niet ontworpen voor gebruik door gewone mensen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ondersteuning door de smartphone is niet nuttig omdat ze dingen niet uitleggen in termen die ik begrijp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

OF

In welke mate bent u akkoord met onderstaande stellingen?
(patiënt en zorgverlener)

Opm: Deze vraag wordt enkel gesteld aan de respondenten met scenario's 2, 3, 5 en 6, dewelke gebruik maken van een slimme bril

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
De slimme bril maakt mij productiever	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In mijn vriendenkring zal ik bij de eerste zijn die een slim bril verwerft	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De slimme bril geeft mij meer vrijheid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zal het gebruik van een slim bril aan anderen uitleggen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik blijf op de hoogte van de nieuwste ontwikkelingen rond een slimme bril	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mensen zullen te afhankelijk zijn van een slimme bril	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Te veel gebruik van een slimme bril leidt mensen af naar een punt dat schadelijk is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De slimme bril is niet ontworpen voor gebruik door gewone mensen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ondersteuning door de slimme bril is niet nuttig omdat ze dingen niet uitleggen in termen die ik begrijp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In het kader van dit scenario, in welke mate bent u akkoord met onderstaande stellingen?
 Deze zorgverlening zou ...
 (patiënt en zorgverlener)

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
... mijn privacy respecteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mijn info niet vrijgeven	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mijn wil respecteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mij de nodige uitleg geven	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mijn onafhankelijkheid aanmoedigen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mij niet beïnvloeden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... niet bepalen hoe ik iets doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mijn eigen beslissingen niet beïnvloeden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mij toelaten beslissingen te nemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mij toelaten verantwoordelijkheden op te nemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mij mijn taken op mijn eigen manier laten uitvoeren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In het kader van dit scenario, in welke mate bent u akkoord met onderstaande stellingen?
 Deze zorgverlening zou ...
 (patiënt en zorgverlener)

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
... mijn vaardigheden verbeteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mijn kennis verbeteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mijn houding verbeteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... me naar zelfsturing leiden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... duidt hier helemaal akkoord aan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... me helpen bij het nemen van beslissingen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... mijn vertrouwen verbeteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In het kader van dit scenario, in welke mate bent u akkoord met onderstaande stellingen?
 Binnen deze zorgverlening, ...
 (patiënt)

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
... zou ik me begrepen voelen door mijn zorgverlener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik me gehoord voelen door mijn zorgverlener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik het gevoel hebben dat ik mijn zorgverlener kan vertrouwen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik voelen dat ik een vriend ben van mijn zorgverlener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou mijn zorgverlener zich zorgen maken om mij	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik overeenkomen met mijn zorgverlener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

OF

In het kader van dit scenario, in welke mate bent u akkoord met onderstaande stellingen?
Binnen deze zorgverlening, ...
(zorgverlener)

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
... zou ik me begrepen voelen door mijn patiënten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik me gehoord voelen door mijn patiënten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik het gevoel hebben dat ik mijn patiënten kan vertrouwen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik voelen dat ik een vriend ben van mijn patiënten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zouden mijn patiënten zich zorgen maken om mij	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik overeenkomen met mijn patiënten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In het kader van dit scenario, in welke mate bent u akkoord met onderstaande stellingen?
 Binnen deze zorgverlening, ...
 (patiënt)

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
... zou ik een persoonlijke band met mijn zorgverlener ervaren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik een sterke connectie met mijn zorgverlener ervaren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik een hechte relatie met mijn zorgverlener ervaren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou de kwaliteit van het contact met mijn zorgverlener goed zijn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou het contact met mijn zorgverlener normaal zijn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik mij op mijn gemak voelen bij mijn zorgverlener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik mijn zorgverlener vertrouwen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik eerlijk behandeld worden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

OF

In het kader van dit scenario, in welke mate bent u akkoord met onderstaande stellingen?
 Binnen deze zorgverlening, ...
 (zorgverlener)

	Helemaal niet akkoord (1)	Niet akkoord (2)	Eerder niet akkoord (3)	Neutraal (4)	Eerder akkoord (5)	Akkoord (6)	Helemaal akkoord (7)
... zou ik een persoonlijke band met mijn patiënten ervaren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik een sterke connectie met mijn patiënten ervaren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik een hechte relatie met mijn patiënten ervaren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou de kwaliteit van het contact met mijn patiënten goed zijn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou het contact met mijn patiënten normaal zijn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik mij op mijn gemak voelen bij mijn patiënten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik mijn patiënten vertrouwen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... zou ik eerlijk behandeld worden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Leeftijd Wat is uw leeftijd?
 (patiënt en zorgverlener)

▼ 18 ... 100

Geslacht Wat is uw geslacht?
 (patiënt en zorgverlener)

- Man
- Vrouw
- X

Diploma Wat is uw hoogst behaalde diploma?
(patiënt en zorgverlener)

- Geen diploma
- Lagere school
- Middelbare school
- Hoge school
- Universiteit
- Doctoraat
- Ander

Appendix 3: Results quality control
Appendix 3.1: Cronbach's alpha

Scale	Cronbach's alpha
Scenario realism	0,780
Role readiness SP	0,647** (0,568)
Role readiness SG	0,601** (0,604)
Autonomy P	0,874
Autonomy CP	0,834
Competence P	0,790
Competence CP	0,851
Relatedness P	0,879
Relatedness CP	0,782
Relationship P	0,932
Relationship CP	0,904

*Note: SP= smartphone, SG= smart glasses, P=patient, CP= care provider

** After removing scale 'Role_Readiness_7'

Appendix 3.2: Variance Inflation Factors (VIF)

Scale	VIF
Autonomy	1,752
Competence	1,851
Relatedness	2,330
Relationship	1,999
Role readiness	2,175

Appendix 3.3: Skewness and kurtosis

Scale	Skewness	Kurtosis
Scenario realism	-0,748	0,814
Role readiness SP	0,166	-0,807
Role readiness SG	-0,561	0,553
Autonomy P	-0,214	-0,691
Autonomy CP	-0,025	0,101
Competence P	-0,270	-0,509
Competence CP	-0,280	0,374
Relatedness P	-0,318	0,137
Relatedness CP	0,124	0,434
Relationship P	-0,279	-0,111
Relationship CP	-0,301	1,116