Contactless In-Home Monitoring Technology for Home-Based Dementia Care: Perceptions and Acceptance of Informal Caregivers

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Abstract

Background: Providing home care to people with dementia is often perceived as burdensome by informal caregivers. In-home monitoring can reduce the burden on caregivers by allowing them to monitor their care recipients' health and safety from a distance. However, existing in-home monitoring systems are often perceived as invasive, which is why contactless systems are being developed. To ensure that this technology will be accepted by informal caregivers, it is crucial to involve them in the development process.

Objective: This study aimed to examine informal caregivers' perceived benefits and concerns regarding contactless in-home monitoring and their intention to use it in home-based dementia care.

Methods: A cross-sectional quantitative survey was conducted online among informal caregivers of community-dwelling people with dementia and mild cognitive impairment in Germany and the Netherlands (N=85). The survey assessed informal caregivers' perceived benefits and concerns and their intention to use in-home monitoring for different purposes and at different points in time. The data were analysed using descriptive statistics (percentage, median, interquartile range) and inferential statistics (Friedman's test, Wilcoxon signed-rank test, Pearson's correlation).

Results: Descriptive statistics indicate that informal caregivers perceived various benefits of in-home monitoring as relevant (e.g., better self-care surveillance, extended independent living). At the same time, they took a neutral stance towards most potential risks of in-home monitoring (e.g., information overload, privacy). The risk of replacing human contact with technology was perceived as a minor concern. The inferential analyses revealed that informal caregivers' intention to use contactless in-home monitoring was significantly higher for a future declined situation than for the current situation (p = .001). Besides, their intention to use the technology for the detection of urgent situations was significantly higher than for the prediction of risks (p = .003). Moreover, all eight benefits were significantly positively associated with caregivers' intention to use in-home monitoring (p < .001). Except for the concern 'uncertainty of whether to respond to monitoring data', the concerns were significantly negatively correlated with intention ($.001 \leq p \leq .033$).

Conclusion: This study highlights the importance of considering the perceived benefits and concerns of informal caregivers as well as their preferences regarding the purpose of use when it comes to the development and implementation of contactless in-home monitoring technology.

Keywords: Dementia, informal caregivers, in-home monitoring technology, technology acceptance

Contents

Introduction

Due to improved living conditions and medical care, Europe's population is increasingly getting older. While in 2021 around 20% of EU citizens were aged 65 and older (Eurostat, 2022), this age group is expected to account for 29% of the EU's population by 2050 (Eurostat, 2019). As society ages, the prevalence of age-related diseases also increases (Organisation for Economic Co-operation and Development [OECD], 2015). One disease that is strongly correlated with age is dementia, with mild cognitive impairment as a common precursor (OECD, 2015; Petersen et al. 2014). In 2018, around 9.78 million people in Europe were diagnosed with dementia (Georges et al., 2020). By 2050, this number is expected to double (Georges et al., 2020).

Dementia describes a range of symptoms associated with cognitive decline that is caused by various diseases or neurological conditions (Hugo & Ganguli, 2014; World Health Organization [WHO], 1992). Alzheimer's disease is the most common cause and type of dementia (Bruun et al., 2018). Other frequently occurring forms are vascular dementia, frontotemporal dementia, and dementia with Lewy bodies (Bruun et al., 2018). Dementia is typically characterised by a progressive decrease in cognitive functions such as memory, attention, language, and orientation (Hugo & Ganguli, 2014; WHO, 1992). Next to cognitive deficits, people with dementia (PwD) commonly experience changes in mood, motivation, and social behaviour (Dening & Sandilyan, 2015; Hugo & Ganguli, 2014; WHO, 1992). In addition, they are at high risk to fall, wandering from home, developing sleep problems, and suffering from malnutrition and dehydration (Thoma-Lürken et al., 2018). This wide range of symptoms and problems interferes with the ability of PwD to master their everyday activities independently (Hugo & Ganguli, 2014; Thoma-Lürken et al., 2018). As a result, PwD often rely on the care of others (Zwaanswijk et al., 2013).

Home-Based Dementia Care

In several European countries, including Germany and the Netherlands, a great number of care-dependent PwD are cared for in their own homes (OECD, 2015). Home-based care is increasingly becoming necessary and commonplace since the capacity of residential care cannot keep up with the growing number of people in need of care (OECD, 2015; Zwaanswijk et al., 2013). Besides, home-based care is often preferred by PwD as it allows them to maintain part of their independence and stay in their familiar home environment for as long as possible (OECD, 2015). In many cases, home care for PwD is provided by informal caregivers (Bremer et al., 2015;

Michalowsky et al., 2016). Informal caregivers are people from the care recipients' social network (e.g., spouse, children, friends) who support the care-dependent person voluntarily and free of charge (Baji, 2019). While caregivers who care for their spouses with dementia mostly live with the care recipients and are therefore continuously available to provide care, other relatives or friends usually live in separate homes and visit the care recipients to take care of them (Miranda-Castillo et al., 2010).

Even though the provision of informal dementia care can have benefits for informal caregivers such as personal growth, it poses great challenges to them (Gottschalk et al., 2021). Among other things, informal caregivers have to monitor and assist PwD with activities of daily living, evaluate and manage the care recipients' behaviour and health, and make decisions about their care, often without having the necessary knowledge and experience (Chiao et al., 2015; de Vugt & Verhey, 2013). Trying to manage all these challenges is often perceived as burdensome by informal caregivers as they spend a great deal of time on caregiving tasks and commonly experience stress, frustration or emotional exhaustion (Chiao et al., 2015; de Vugt & Verhey, 2013; Gérain & Zech, 2021; Sörensen & Conwell, 2011). Informal caregivers' perceived burden may also manifest itself in psychiatric symptoms, including depression and anxiety (Collins & Kishita, 2020; de Vugt & Verhey, 2013). In addition, informal caregivers are at risk of social isolation since the high workload associated with caregiving leave limited time for leisure or social activities (Brodaty & Donkin, 2009). These diverse negative consequences can reduce the quality of life of informal caregivers and heighten the chance that care recipients have to move to nursing homes (Madara Marasinghe, 2016).

Technology Supporting Informal Dementia Care

To reduce the negative impact on informal caregivers and delay the transition to care institutions, it is crucial to support informal caregivers of community-dwelling PwD (de Vugt & Verhey, 2013). To this end, eHealth technologies offer promising solutions (Christie et al., 2018). One prominent example of eHealth that can assist dementia care is in-home monitoring (Sharma et al., 2021). Building on human activity recognition, in-home monitoring technology can continuously and remotely provide informal caregivers with information about the lifestyle, health and safety of their care recipients (Sharma et al., 2021; Wrede et al., 2021). This information can give informal caregivers an increased sense of control and peace of mind, which may lower their

perceived burden (Vermeer et al., 2019; Zwierenberg et al., 2018). Currently, the most common types of in-home monitoring technology are (1) wearable systems such as smartwatches and mobile phones, and (2) vision-based systems such as surveillance cameras (Sharma et al., 2021). However, despite the valuable and easily interpretable information these in-home monitoring systems provide, they are criticised for their obtrusiveness (Klein Brinke & Meratnia, 2019; Oguntala et al., 2013). While wearables are obtrusive because PwD need to remember to carry them along, cameras are obtrusive in the sense that they invade users' privacy (Klein Brinke & Meratnia, 2019; Oguntala et al., 2013).

For this reason, there is increasing interest in the development of contactless in-home monitoring systems, which are considered unobtrusive as they do not require the active involvement of PwD (Sharma et al., 2021; Wrede et al., 2021). This type of technology intends to use ambient sensors that are attached to objects of daily use or positioned in a central location of the house (Hussain et al., 2019; Uddin et al., 2018). With the help of artificial intelligence and deep-learning algorithms, the sensors could recognise recurring activities of the care recipients, and based on this, detect changes in activity patterns (Klein Brinke & Meratnia, 2019; Uddin et al., 2018). The monitoring data collected by the system could be assessed by the caregivers from a distance via a digital platform (Wrede et al., 2021; Zwierenberg et al., 2018). Besides, caregivers could be alarmed in case the system recognises no activity for a longer period or major deviations from the care recipient's usual activity patterns (Moyle, 2019; Wrede et al., 2021). In this way, contactless in-home monitoring could serve various purposes once it is implemented. For instance, informal caregivers could use the technology to detect and prevent falls, monitor self-care behaviours or recognise cognitive and physical decline of PwD (Uddin et al., 2018; Wrede et al., 2021).

Acceptance towards Contactless In-Home Monitoring

Despite their potential, the implementation of eHealth technologies, including technology supporting dementia care, often proves to be difficult (van Gemert-Pijnen et al., 2018). One major obstacle to the successful adoption and diffusion of these technologies is user acceptance (Claes et al., 2015; Jaschinski, 2018; Jaschinski et al., 2021). Acceptance relates to the users' judgement about "if, how and when they would use the technology" (van Gemert-Pijnen et al., 2018, p.272). To research a successful implementation, it is therefore essential to understand if and why users

accept or reject the technology and to take this understanding into account when developing and implementing the technology (Jaschinski, 2018). Thus, potential users need to be involved in the development and implementation process of the technology – an approach known as human-centred design (van Gemert-Pijnen et al., 2018). For the development of contactless in-home monitoring, this means that the perspective of PwD and their caregivers need to be incorporated as they are the main target groups of monitoring technology for home-based dementia care (Jaschinski, 2018). While attention has already been given to the perspectives and acceptance of healthy older people as potential future users, there is not yet sufficient research about informal caregivers' acceptance towards contactless in-home monitoring (Wrede et al., 2021)

A common approach to understanding users' acceptance towards a new technology is to draw on theories and models such as the Technology Acceptance Model (TAM) or the Unified Theory of Acceptance and Use of Technology (UTAUT) (Peek et al., 2014). According to the TAM, perceived usefulness and perceived ease of use determine whether a user intends to use the technology (Davis, 1989). The UTAUT builds on this theory, but defines two additional acceptance factors, namely, social influence and facilitating conditions (Venkatesh et al., 2003). Even though these models were initially developed to explain the acceptance of information technology (Davis, 1989; Venkatesh et al., 2003), they were found to be successful in explaining people's acceptance towards various eHealth technologies (Harst et al., 2019). Nevertheless, solely relying on these models to understand informal caregivers' acceptance towards contactless in-home monitoring risks overlooking other relevant acceptance factors since the models are neither tailored to in-home monitoring technology nor to the context of home-based dementia care (Jaschinsksi, 2018). Besides, TAM and UTAUT do not provide sufficient information about the reasons underlying technology acceptance that would be necessary to inform the design of the technology (Dai et al., 2020; Jaschinsksi, 2018). Apart from that, the models do not take into account that a technology has several functions and that users' perceptions and acceptance may differ depending on the purpose for which the technology is used (Salovaara & Tamminen, 2009).

In line with the criticism, previous research demonstrated that the factors proposed by common technology acceptance models are not the only predictors of older adults' acceptance towards in-home monitoring technology (Claes et al., 2015; Peek et al., 2014). For instance, Claes et al. (2015) and Peek et al. (2014) found that older people's perceived benefits (e.g., increased safety) and concerns (e.g., privacy issues) regarding in-home monitoring determined whether they

accept the technology or not. A recent qualitative study (Wrede et al., 2021) revealed that informal caregivers also expect various benefits and barriers regarding contactless in-home monitoring systems that probably affect their acceptance towards this technology. For example, informal caregivers expected that in-home monitoring could improve the self-care surveillance of the care recipient and enable the prevention of health risks (Wrede et al., 2021). On the other hand, they expected that the use of contactless in-home monitoring could threaten the care recipient's privacy or diminish human contact (Wrede et al., 2021). While the findings by Wrede et al. (2021) provide valuable insights into the perspective of informal caregivers, they are based on the responses of a small number of people. However, for the technology to become widely accepted, the perceptions of the broader caregiving community need to be considered, raising the need for large-scale quantitative studies (Wrede et al., 2021). Besides, it is not yet clear whether the various benefits and concerns perceived by informal caregivers indeed relate to their acceptance towards the technology. In the study by Claes et al. (2015), not all benefits and concerns perceived by older people automatically translated into technology (non-)acceptance, suggesting that different benefits and concerns may be of varying importance for the development and design of contactless in-home monitoring.

Apart from that, technology models such as TAM and UTAUT may not be sufficient to explain informal caregivers' acceptance towards contactless in-home monitoring because, as previously mentioned, they do not account for differences in perceptions and acceptance between technology purposes (Salovaara & Tamminen, 2009). In the context of contactless in-home monitoring technology, differentiating between purposes may however be necessary since Wrede et al. (2021) found that different monitoring goals were not all equally relevant to informal caregivers. For example, using in-home monitoring to detect and prevent falls was considered useful by all interviewed informal caregivers, while only half of the informal caregivers perceived it as relevant to use the technology to monitor physical deterioration (Wrede et al., 2021). Next to the purpose, the time of use may also make a difference. To illustrate, most older adults have been found to accept in-home monitoring only in later life or when their health declines, but not at the current point in time (Claes et al., 2015). Despite these findings, no study to date has addressed potential differences in informal caregivers' acceptance towards contactless in-home monitoring based on purpose and time of use.

Current Study

To bridge the outlined research gaps, the aim of this study was to investigate the perceived benefits and concerns of informal caregivers of community-dwelling people with dementia and mild cognitive impairment regarding contactless in-home monitoring technology for home-based care as well as their acceptance towards this technology. In addition, the goal was to examine the relationship between informal caregivers' perceptions and acceptance towards contactless in-home monitoring. In this study, technology acceptance is defined as the intention to use contactless in-home monitoring technology in the future. In particular, the aim was to answer the following research questions:

(1) To what extent do informal caregivers of community-dwelling people with dementia and mild cognitive impairment perceive different benefits and concerns of contactless in-home monitoring technology as relevant?

(2) To what extent do informal caregivers of community-dwelling people with dementia or mild cognitive impairment intend to use contactless in-home monitoring technology in home-based dementia care?

(3) Is there a difference in informal caregivers' intention to use contactless in-home monitoring technology in home-based dementia care between the current care situation versus a declined future situation?

(4) Are there differences in informal caregivers' intention to use contactless in-home monitoring technology in-based dementia care for different monitoring purposes?

(5) To what extent are informal caregivers' perceived benefits regarding contactless in-home monitoring technology in home-based dementia care associated with their intention to use the technology?

(6) To what extent are informal caregivers' perceived concerns about contactless in-home monitoring technology in home-based dementia care associated with their intention to use this technology?

Methods

Design

The study employed a cross-sectional quantitative survey design, using an online survey.

Participants

Participants were eligible to participate in the study if they were at least 18 years of age and if they provided informal home care to a person with dementia or mild cognitive impairment. Participants whose care recipients live in nursing homes were excluded. Participation was voluntary and rewarded with the chance to win a 10€ coupon for mydays or cadeaubon, depending on the participants' place of residence (Germany or Netherlands). Convenience and snowball sampling were used to select participants. Participants were recruited through social networking sites such as Instagram, Facebook, and WhatsApp by posting a digital information poster with the link to the study and the request to forward this poster to other informal caregivers. In addition, support groups for informal caregivers as well as dementia associations such as the Deutsche Alzheimer Gesellschaft e.V. were contacted and asked to share the survey via their web page, social media site or newsletter, or to forward the survey link via email to informal caregivers from their network.

Materials

The current study required the development of a survey, assessing the characteristics of participants and their care recipients, participants' perceived benefits and concerns, and their intention to use contactless in-home monitoring technology. To ensure that participants have the same information about the function and purpose of in-home monitoring when indicating their perceptions and intention to use the technology, a description and visualisation of contactless in-home monitoring were included. Since the survey was developed in collaboration with other researchers who investigated different research questions, the survey contains additional questions that are not discussed in this report. The survey, including the informed consent, is included in the appendix in both Dutch (see Appendix A) and German (see Appendix B).

Participant and Care Recipient Characteristics

Participants were asked sociodemographic questions including age, gender, country of residence and education. Besides, questions were asked about the participants' caregiving role (e.g., relationship with the care recipient, size of informal care network) and about the person the participant is caring for (e.g., age, type of dementia, housing situation).

Perceived Benefits

To assess informal caregivers' perceived benefits, participants were presented with eight benefits of in-home monitoring, each measured with a single item. The benefits included were formulated based on the qualitative study by Wrede et al. (2021), in which informal caregivers mentioned their expected benefits of using contactless in-home monitoring for dementia care. The benefits belong to five thematic categories, which were also adopted from Wrede et al. (2021), namely, (1) cross-checking self-care information (two items), (2) extended independent living (two items), (3) objective communication (one item), (4) prevention of health risks (one item), and (5) emotional reassurance (two items). Participants were asked to indicate to what extent they agree with the benefits listed on a five-point Likert scale, ranging from 1 (totally disagree) to 5 (totally agree). An example item was "I believe that in-home monitoring technology can help me to feel reassured about the safety of my loved one".

Perceived Concerns

To assess informal caregivers' perceived concerns, participants were presented with six concerns of in-home monitoring, each measured with a single item. The concerns included were formulated based on the expected barriers toward unobtrusive in-home monitoring as mentioned by informal caregivers of PwD in the study by Wrede et al. (2021). The concerns belong to three thematic categories, which were taken from Wrede et al. (2021), including (1) information overload (three items), (2) privacy concerns (two items) and (3) ethical concerns (one item). Participants were asked to indicate to what extent they agree with the concerns listed on a five-point Likert scale, ranging from 1 (totally disagree) to 5 (totally agree). The items were formulated as follows: "If I use in-home monitoring technology, I would feel concerned about being overloaded with too much information".

Intention

Intention to Use In-Home Monitoring. Participants' intention to use contactless in-home monitoring technology was measured with two items on a five-point Likert Scale ranging from 1 (totally disagree) to 5 (totally agree). One item assessed informal caregivers' intention to use the technology at this moment in life (current situation), and the other item their intention to use the technology in the future when the health of their care recipient declines (declined future situation). The overall intention score was computed by adding the scores of the two items.

Intention to Use In-Home Monitoring for Different Purposes. To assess participants' intention to use contactless monitoring technology for different purposes, participants were presented with five scenarios, which were derived from Wrede et al. (2021). The scenarios describe five specific purposes for which contactless in-home monitoring technology may be used, including (1) recognition of urgent situations (e.g., wandering), (2) monitoring of risk prediction (e.g., falls), (3) monitoring of self-care behaviour (e.g., drinking, eating, personal hygiene), (4) monitoring of well-being during the night (e.g., nocturnal restlessness, sleeping pattern) and (5) monitoring of long-term changes in cognitive and physical health. For each scenario, a single item was used to assess the extent to which participants intend to use monitoring technology for the respective purpose in the near future. Participants' intention to use monitoring technology was measured on a five-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree).

Procedure

The initial version of the survey was constructed in English. After it has been reviewed by the supervisors and adapted by the researchers, the survey was translated into German and Dutch by researchers fluent in the respective languages using the procedure of translation and back translation. The translated versions were once more reviewed by the supervisors and tested for clarity by two older native speakers of each language. Based on their feedback, some minor changes were made to the formulation of items and the description of monitoring technology. The Ethics Committee of the Faculty of Behavioural, Management and Social Science of the University of Twente also reviewed the study and granted ethical approval.

From 25th April to 18th May 2022, the German and Dutch versions of the survey were published via the online platform Qualtrics. Participants accessed the study via a hyperlink which was included in the information poster used to recruit participants. On the start page, participants were informed about the aim and duration of the study, the anonymous processing of their data and their rights as participants. In addition, the contact details of one researcher and the first supervisor were provided in case of questions or concerns (see Appendices A, B and C). Only when participants gave informed consent to voluntarily participate in the study, they were able to start with the survey. At the beginning of the survey, participants were asked to indicate information about themselves and their caregiving role as well as their care recipient. Next, participants were asked to have a look at the description and visualisation of contactless in-home monitoring technology and to indicate their understanding of the provided information. Subsequently, the use scenarios were presented. For each monitoring purpose, participants were asked to indicate their intention to use the technology. After that, participants were instructed to fill in questions about their perceived benefits and concerns as well as their overall intention to use the technology they had previously been informed about. In the end, participants had the chance to leave their email addresses to participate in the drawing of the coupons or to be contacted for future research.

Data Analysis

To analyse the data, the statistical software programme SPSS 25 was used. First, the data set was prepared for the analyses. To this end, participants who did not fully complete the survey and those who did not meet the inclusion criteria (18 years or older, informal caregiver of a person with dementia or mild cognitive impairment) were removed. Moreover, the variables age, perceived benefits, perceived concerns, intention to use contactless in-home monitoring in different situations (current vs. declined future situation), intention to use the technology for the five monitoring purposes and overall intention were assessed for normality using Shapiro-Wilk tests and histograms. Based on the outcomes, appropriate measures of central tendency (mean or median) and dispersion (standard deviation or interquartile range) and statistical tests were chosen.

Second, descriptive analyses were conducted for the characteristics of participants and their care recipients to describe the sample. Frequencies were computed for all categorical variables (e.g., gender, size of care network, type of dementia), and central tendency and dispersion were calculated for the numerical variable age.

Third, analyses were conducted to answer the research questions. To determine the extent to which informal caregivers perceive different benefits and concerns regarding contactless in-home monitoring care as relevant (RQ 1), central tendency and dispersion were calculated for all perceived benefits and concerns.

The question as to what extent informal caregivers of community-dwelling PwD intend to use contactless monitoring technologies for home-based dementia care (RQ 2) was answered by computing central tendency and dispersion for the overall score of intention.

To examine whether there is a difference in informal caregivers' intention to use monitoring technology between the current care situation versus a declined future situation (RQ 3), central tendency and dispersion were calculated for participants' intention to use contactless in-home monitoring technology in the two different situations. Besides, answering this research question required the comparison of two related groups. Therefore, a paired t-test or a Wilcoxon signed-rank test was applied, depending on the outcome of the normality test.

To determine potential differences in informal caregivers' intention to use monitoring technology between the five monitoring purposes (RQ 4), central tendency and dispersion were computed for participants' intention to use technology for each monitoring purpose. In addition, participants' different intention scores were compared with each other. To this end, either a one-way analysis of variance with repeated measures or a Friedman test was used, depending on whether the respective variables were normally distributed or not. Conditional on the outcome of the test, post-hoc pairwise comparisons were performed to determine how the monitoring purposes differ from each other.

To identify the extent to which informal caregivers' perceived benefits about contactless in-home monitoring technology are associated with their intention to use this technology (RQ 5), bivariate correlation analyses were performed between each perceived benefit and the total score of intention to use monitoring technology. In case of normally distributed data, Pearson's correlations, and in case of a skewed distribution, Spearman's correlations were performed. The same analyses were conducted with the six concerns to determine the extent to which informal caregivers' perceived concerns about contactless in-home monitoring technology are associated with their intention to use this technology (RQ 6).

Results

Sample Characteristics

In total, 228 people volunteered to participate in the study. 86 participants were excluded because the reason for care was not dementia or mild cognitive impairment. Additional 57 participants were removed because they did not fill in all relevant questions, resulting in a final dataset of 85 participants. The participants were predominantly female, highly educated and lived in Germany. Their age ranged from 22 to 81, with a median age of 56.0 (*IQR* = 9.0). The majority of participants cared for their loved ones from a distance (71%) and were supported in their caregiving tasks by at least one other informal caregiver (72%). In most cases, participants provided informal care to a parent (65%). The median age of the participants' care recipients was 83.0 (*IQR* = 8.8) and the most common diagnosis was Alzheimer's disease. 45% of the care recipients lived alone and 71% received some kind of professional assistance next to the participants' informal care. Table 1 and Table 2 summarise the characteristics of the participants and their care recipients.

Table 1

Characteristics of Participants (N=85)

Variable	Category	*n*	%	*Mdn*	*IQR*
Age				56.0	9.0
Gender	Male	18	21		
	Female	67	79		
Highest level of education	Lower secondary education [a]	12	14		
	Upper secondary education [b]	17	20		
	Professional degree	11	13		
	Bachelor/ Master degree or equivalent	41	48		
	Doctoral degree	3	4		
	Other	1	1		
Country of residence	Netherlands	19	22		
	Germany	61	72		
	Other	5	6		
Relationship with care recipient	Spouse/partner	13	15		
	Daughter/son	55	65		
	Daughter/son in law	8	9		
	Grandchild	2	2		
	Neighbour/ friend	6	7		
	Other	1	1		
Size of informal care network	Only caregiver	24	28		
	1 other caregiver	34	40		
	2 other caregivers	14	17		
	3 other caregivers	7	8		
	4 or more other caregivers	6	7		
Distance to care recipient	Same house	25	29		
	1 to 5 min. away	7	8		
	6 to 15 min. away	22	26		
	16 to 30 min. away	13	15		
	31 to 60 min. away	9	11		
	More than 60 min. away	9	11		

[a] Equivalent to 'Real-/Hauptschulabschluss' in Germany and 'Voorbereidend middelbaar beroepsonderwijs' (VMBO) in the Netherlands

[b] Equivalent to 'Hochschulreife' in Germany and 'Hoger algemeen voortgezet onderwijs' (HAVO) or 'Voorbereidend wetenschappelijk onderwijs' (VWO) in the Netherlands

Table 2

Characteristics of Care Recipients (N=85)

Variable	Category	*n*	%	*Mdn*	*IQR*
Age				83.0	8.8
Time since symptoms	Less than 1 year	4	5		
	1 to 2 years	19	22		
	2 to 3 years	18	21		
	3 to 4 years	14	17		
	4 to 5 years	13	15		
	More than 5 years	17	20		
Type of dementia	Alzheimer's disease	34	40		
	Dementia with Lewy bodies	2	2		
	Vascular dementia	11	13		
	Mild cognitive impairment	12	14		
	Other/ don't know	15	18		
	No diagnosis yet	11	13		
Housing situation care recipient	Lives alone	38	45		
	Lives together with at least one other person	47	55		
Use of professional care	Home care by a nurse/ professional caregiver	32	38		
	Dementia case manager	19	22		
	Daycare/respite care	26	31		
	Household assistance	34	40		
	Meals on wheels	17	20		
	None of the above	17	19		

Normality Tests

Shapiro-Wilk tests revealed that the distribution of all perceived benefits, all perceived concerns, intention to use contactless in-home monitoring in different situations (current vs. declined future situation), intention to use the technology for each of the five monitoring purposes and overall intention significantly departed from normality (see Appendix C). Based on this outcome, medians with interquartile ranges were used to summarise the variables and non-parametric tests were chosen for the analyses.

Main Analyses

Perceived Benefits and Concerns (RQ1)

The medians and interquartile ranges for perceived benefits and concerns regarding contactless in-home monitoring technology are shown in Table 3 and Table 4. For six of the eight benefits that were investigated in this study, the median was 4.0, which indicates that participants agreed with these benefits. In comparison, participants typically took a neutral stance towards the benefits 'eliminate unnecessary control visits' and '(re)gain mobility and freedom' (*Mdn* = 3.0, *IQR* = 2.0). Participants also tended to neither agree nor disagree with five of the six concerns (*Mdn* = 3.0, *IQR* = 2.0). The concern 'risk of replacing human contact with technology' was typically not perceived as relevant (*Mdn* = 2.0, *IQR* = 2.0).

Table 3

Medians and IQR for Perceived Benefits of Contactless In-Home Monitoring

Perceived benefit	*Mdn*	*IQR*
Cross-checking self-care information		
Better self-care surveillance	4.0	1.0
Eliminate unnecessary control visits	3.0	2.0
Extended independent living		
Detect and remove factors that hinder independence	4.0	1.0
Find optimal timing for transition to nursing home	4.0	1.0
Objective communication about care recipients' situation	4.0	1.0
Prevention of health risks	4.0	0.0
Emotional reassurance		
Feel reassured about care recipient's safety	4.0	0.5
(Re)gain mobility and freedom	3.0	2.0

Note. $N = 85$. Measured on a 5-point Likert Scale (1 = totally disagree, 5 = totally agree).

Table 4

Medians and IQR for Perceived Concerns about Contactless In-Home Monitoring

Perceived concern	*Mdn*	*IQR*
Information overload		
Risk of being overloaded with too much information	3.0	2.0
Uncertainty of whether to respond to monitoring data	3.0	2.0
Risk of worrying for no reason	3.0	2.0
Privacy concerns		
Risk of losing control about data sharing	3.0	2.0
Trade-off privacy infringement versus benefits	3.0	2.0
Ethical concern (risk of replacing human contact)	2.0	2.0

Note. $N = 85$. Measured on a 5-point Likert Scale (1 = totally disagree, 5 = totally agree).

Intention to Use In-Home Monitoring (RQ 2)

The median (*IQR*) overall intention score to use contactless in-home monitoring was 7(2), implying that informal caregivers are slightly positive towards the use of this technology for home-based dementia care.

Intention to Use In-Home Monitoring: Current vs. Declined Future Situation (RQ 3)

A Wilcoxon's signed-rank test showed that respondents had a significantly higher intention to use in-home monitoring in a future situation in which the health of their loved one is declined (*Mdn* = 4.0, *IQR* = 1.0) compared to the current situation (*Mdn* = 3.0, *IQR* = 2.0), $Z = -3.19$, $p = .001$.

Intention to Use In-Home Monitoring for Different Monitoring Purposes (RQ 4)

A Friedman's test indicated that there is a significant difference in participants' intention to use contactless in-home monitoring for the five different monitoring purposes, $\chi^2 (4) = 11.6$, $p = .021$. Based on this outcome, post-hoc analysis with Wilcoxon signed-rank tests were conducted with a Bonferroni correction, resulting in an adjusted significance level set at $p < .005$. The analysis revealed that intention was significantly higher for the monitoring purpose 'recognition of urgent situations' (*Mdn* = 4.0, *IQR* = 1.0) than for the purpose 'risk prediction' (*Mdn* = 3.0, *IQR* = 1.5), $Z = -2.92$, $p = .003$. Apart from that, no significant differences in intention between the monitoring purposes were found (see Appendix D). Table 5 gives an overview of the medians and interquartile

ranges of participants' intention to use contactless in-home monitoring technology overall, in different situations and for different monitoring purposes.

Table 5
Medians and IQR for Intention to Use Contactless In-home Monitoring

Intention	*Mdn*	*IQR*
Overall intention to use	7.0	2.0
Current situation	3.0	2.0
Declined future situation	4.0	1.0
Monitoring purpose		
Recognition of urgent situations	4.0	1.0
Risk prediction	3.0	1.5
Monitoring of self-care behaviour	3.0	1.0
Monitoring of well-being during night	4.0	1.0
Monitoring of long-term changes in health	4.0	1.0

Note. $N = 85$. Measured on a 5-point Likert Scale (1 = totally disagree, 5 = totally agree).

Association between Perceived Benefits and Intention to Use In-Home Monitoring (RQ 5)

Each benefit was significantly positively correlated with intention to use contactless in-home monitoring, either to a moderate or strong extent. The benefit 'better self-care surveillance' was least associated with the intention to use the technology ($r_s = .44$). The highest correlation was found between intention and the benefit '(re)gain mobility and freedom' ($r_s = .62$). All correlations are shown in Table 6.

Association between Perceived Concerns and Intention to Use In-Home Monitoring (RQ 6)

Five of the six perceived concerns were significantly negatively correlated with participants' intention to use contactless in-home monitoring. Three of the significant correlations were weak and two were moderate (see Table 7).

Table 6

Spearman's Correlation Between Perceived Benefits and Intention to Use In-Home Monitoring

Perceived benefit	Intention	
	r_s	p
Cross-checking self-care information		
Better self-care surveillance	.44	< .001**
Eliminate unnecessary control visits	.59	< .001**
Extended independent living		
Detect and remove factors that hinder independence	.55	< .001**
Find optimal timing for transition to nursing home	.56	< .001**
Objective communication about care recipients' situation	.53	< .001**
Prevention of health risks	.60	< .001**
Emotional reassurance		
Feel reassured about safety	.59	< .001**
(Re)gain mobility and freedom	.62	< .001**

Note. $N = 85$. All variables were measured on a 5-point Likert Scale (1 = totally disagree, 5 = totally agree).

**$p < .01$

Table 7

Spearman's Correlation Between Perceived Concerns and Intention to Use In-Home Monitoring

Perceived concern	Intention	
	r_s	p
Information overload		
Risk of being overloaded with too much information	-.23	.033*
Uncertainty of whether to respond to monitoring data	-.16	.141
Risk of worrying for no reason	-.34	.001**
Privacy concerns		
Risk of losing control about data sharing	-.28	.010*
Trade-off privacy infringement versus benefits	-.41	< .001**
Ethical concern (risk of replacing human contact)	-.47	< .001**

Note. $N = 85$. All variables were measured on a 5-point Likert Scale (1 = totally disagree, 5 = totally agree).

*$p < .05$ **$p < .01$

Discussion

From the results of this study, it can be concluded that informal caregivers perceived various benefits of contactless in-home monitoring as relevant, including better self-care surveillance, objective communication about the care recipient's situation, prevention of health risks and emotional reassurance. Furthermore, the results indicate that informal caregivers of PwD typically took a neutral stance towards the concerns about information overload and privacy. The risk of replacing human contact with technology seemed to be a minor concern for informal caregivers. Apart from that, the results demonstrate that informal caregivers accepted contactless monitoring technology for home-based dementia care, but rather in the future when the health of their care recipients declines. Moreover, informal caregivers were found to have a higher intention to use contactless in-home monitoring for the recognition of urgent situations than for the prediction of risks. Besides, the results indicate that informal caregivers' perceived benefits were positively associated with their intention to use in-home monitoring for home-based dementia care. Depending on the benefit, the strength of this association was either moderate or high. In comparison, informal caregivers' perceived concerns were negatively related to their intention to use in-home monitoring. The strength of this relationship was weak or moderate.

Interpretation

One noteworthy finding is that the risk of replacing human contact with technology was perceived as a minor concern by informal caregivers in this study, while in previous research, reduced human contact as a result of technology use in home-based dementia care was a frequently raised ethical concern among older adults, their families and caregivers, as well as professionals (Jaschinski, 2018; Wangmo et al., 2019; Zwijsen et al., 2011). A potential reason for this difference is that these previous studies referred to the broader category of assistive technologies for dementia care. Some assistive technologies such as robots can assist PwD with their activities of daily living, which reduces the required help from caregivers (Jaschinski, 2018). Hence, using these technologies may be at the expense of human contact and care. In contrast, the idea of contactless in-home monitoring, which was investigated in the present study, is not to take over tasks of informal caregivers but to give them more control over the health and safety of their care recipients when they are not in the same place and allowing them to reduce visits that are only intended to ensure the care recipients are doing well (Wrede et al., 2021). Therefore, the use of contactless in-

home monitoring still requires informal caregivers to provide in-person care for PwD such as assistance with daily life tasks, which may explain why informal caregivers are not worried that the use of contactless in-home monitoring technology would replace human contact.

Another potential reason for the present finding is that informal caregivers may not be interested in using in-home monitoring technology to visit their care recipients less often. This notion is supported by the finding that most caregivers in this study disagree that in-home monitoring could be useful for them to eliminate control visits or regain mobility and freedom, suggesting that reducing the time and care for PwD is not perceived as a relevant benefit. When informal caregivers do not want to reduce the contact and can themselves decide whether they visit their care recipients or not, they have no need to be concerned about the loss of human contact as a consequence of using contactless in-home monitoring.

However, even though the risk of reduced human contact was a minor concern, it was moderately negatively associated with informal caregivers' intention to use contactless in-home monitoring technology. Conversely, some concerns that were perceived as moderately relevant (e.g., uncertainty of whether to respond to monitoring data) were only weakly associated with intention. This finding implies that widespread concerns may not necessarily be relevant to the intention to use in-home monitoring technology, while minor concerns may still play an important role. This is in line with the study by Claes et al. (2015) which revealed that not all concerns perceived by elderly people similarly translated into non-acceptance.

Moreover, it is striking that concerns which imply risks for the care recipient (e.g., loss of human contact) show a stronger relationship with acceptance than concerns that imply risks for the caregiver (e.g., information overload). Although no conclusions can be drawn about causal relationships between concerns and acceptance, the present finding leads to the assumption that the protection of the care recipient's rights and needs plays a greater role in informal caregivers' acceptance towards in-home monitoring than caregivers' own needs. This idea is consistent with the findings of a qualitative study among ten informal caregivers of PwD (Hughes et al., 2002). When faced with decisions involving a conflict of interest between the caregiver and the person in need of care, informal caregivers indicated that they would rather choose the option that was in the best interest of the person with dementia because they have to "represent the wishes of the people they care for" (Hughes et al., 2002, p. 244). Similarly, another study found that informal caregivers commonly make care-related decisions based on the best interests and well-being of the care

recipient (Samsi & Manthorpe, 2013). Consequently, it may be that informal caregivers especially take into account potential risks for their care recipient when deciding whether to use contactless in-home monitoring in the future.

Another finding that deserves attention is that informal caregivers had a significantly higher intention to use contactless monitoring technology for the recognition of urgent situations than for the prediction of risks. Even though informal caregivers neither fully trust in the reliability of emergency detection systems nor prediction systems (Gövercin et al., 2010; Meiland et al., 2014), it might be that they are more sceptical about the ability of technologies to accurately predict risks than they are of the ability to detect events that have already occurred. Probably, the prediction of risks is more complicated for informal caregivers to imagine and understand due to its complex and abstract nature (Forbes et al., 2019). Another potential explanation is that informal caregivers do not want to be informed when their care recipients are at increased risk of falling or wandering because they may expect that this knowledge would cause them additional worries. This assumption is supported by previous research that has shown that caregivers whose elderly care recipients have fallen in the past, and thus are at higher risk for future falls, are highly concerned about their care recipients (Ambrose et al., 2013; Ang et al., 2019).

Besides, informal caregivers may expect that they would not be able to prevent the predicted risk, for example, due to lacking knowledge about prevention strategies or because common prevention measures would not be feasible. A previous study revealed that caregivers do not know how to prevent their care recipients from falling or try to prevent falls by spending more time supervising and supporting the care recipient (Ang et al., 2019). However, this way of risk prevention could further increase caregivers' workload and associated burden (Ang et al., 2019). Moreover, informal caregivers may expect that they would not be able to react in time when being alarmed that their care recipient is at risk to fall or wander, which is plausible considering that the prediction of imminent risks leaves limited possibilities to intervene (Forbes et al., 2019). Consequently, informal caregivers may perceive it as unrealistic or too burdensome to use in-home monitoring technology for the prediction of risks.

Strengths and Limitations

This study has two strengths that are worth acknowledging. The first strength is that the study assesses informal caregivers' perceptions and intention to use monitoring technology in a

quantitative manner. So far, research into the perceptions of informal caregivers towards technology for home-based care mainly applied qualitative methods such as interviews or focus groups (Wrede et al., 2021). The second strength is that the present study is one of the first that solely focuses on contactless in-home monitoring technology. Most prior studies cover the broader category of assistive technologies or include monitoring systems such as cameras and wearables (Bastoni et al., 2021; Guisado-Fernández et al., 2019; Vermeer et al., 2019). However, since the development of in-home monitoring technology increasingly focuses on contactless devices (Wrede et al., 2021), research on users' perceptions and acceptance also needs to shift the focus as previous findings on obtrusive devices may not be transferable to the advanced technology.

However, this study also has some potential limitations that need to be recognised. One limitation concerns the representativeness of the sample for the target population, which restricts the generalisability of the conclusions. While contactless in-home monitoring is primarily meant for PwD who live independently (Claes et al., 2015), 55% of the participants' care recipients in this sample lived together with at least one other person. Informal caregivers whose care recipients live together with someone else may perceive the technology as less relevant and useful, which may affect their perceptions and intention to use in-home monitoring. Thus, the outcome of these variables would probably have been different in a sample that consisted mainly of caregivers whose care recipients lived alone. Moreover, the participants in this sample were predominantly highly educated with more than half of the participants holding a university degree, which is not representative of the educational level of the German and Dutch populations (OECD, 2021). Since people with higher education were found to be more likely to agree with the use of technology for dementia care (Wójcik et al., 2021), a sample with a lower proportion of highly educated caregivers might have yielded lower acceptance scores than the present study. These limitations could be addressed in future studies by using purposive sampling to recruit participants whose care recipients live alone, and proportional stratified sampling to ensure that participants' education level is proportional to the education level of the population.

Practical Recommendations

Despite these limitations, the findings of this study can be translated into recommendations for the development of contactless in-home monitoring. First, the findings highlight the importance of protecting the care recipients' privacy. To prevent unauthorised access to and misuse of

monitoring data, it is crucial that developers equip contactless in-home monitoring systems with the latest data protection techniques and continuously update them (Batista et al., 2021). Second, the results of this study point to the need for monitoring systems that can be customised to the preferences of individual users, supporting other researchers' recommendations (Fitzpatrick et al., 2015; Moyle, 2019). More precisely, informal caregivers should be offered the possibility to decide for which purpose they like to use the technology. This feature is important to ensure that informal caregivers who disagree with a particular purpose of in-home monitoring (e.g., risk prediction) are not entirely discouraged from using the technology.

Apart from that, the findings of the study underline the importance of certain strategies for the implementation of contactless in-home monitoring. One promising way to implement the technology is by demonstrating contactless in-home monitoring to informal caregivers and by offering them the opportunity to try it out without committing to or investing in it (Cain & Mittman, 2002; Jaschinski, 2018; Peek et al., 2014). Testing contactless in-home monitoring allows informal caregivers to familiarise themselves with the technology and become aware of its benefits for themselves as well as their care recipients (Cain & Mittman, 2002; Jaschinski, 2018; Peek et al., 2014). Since the present study revealed that caregivers' perceived benefits are positively related to their intention to use in-home monitoring, raising awareness of the benefits may facilitate acceptance and therefore the adoption of this technology. In addition, testing the technology can help informal caregivers to overcome potential concerns (Cain & Mittman, 2002).

Recommendations for Future Research

Although the present study has some important practical implications, more research is needed to reach a good fit between contactless in-home monitoring systems and their future users. First, future research should test the assumption that the needs and rights of care recipients are more important for informal caregivers' decision to accept contactless in-home monitoring than their own needs. To this end, future research could examine which aspects informal caregivers prioritise when making technology acceptance decisions, for example, by asking them to rate various aspects (e.g., care recipients' privacy) according to their importance for their decision to use the technology in the future. Knowing which factors are considered most by caregivers when they decide to accept contactless in-home monitoring is crucial to ensure that relevant aspects are regarded in the development of contactless in-home monitoring systems.

Second, future research should explore the reasons people accept the use of contactless in-home monitoring for risk prediction to a lesser extent than for the detection of urgent situations. To this end, an explorative study could prove useful to get insights into informal caregivers' perceptions, drivers and barriers to the use of risk prediction systems. Based on the assumption that informal caregivers may not feel able to prevent the risks that are predicted by the technology, it could be examined whether informal caregivers would be more open to the use of contactless in-home monitoring for risk prediction when they are given concrete advice about measures that can be taken to prevent the risk.

Third, related to the finding that informal caregivers rather intend to use contactless in-home monitoring when the health of their care recipient declines, future research should investigate informal caregivers' perceived need for in-home monitoring. The perceived need can be assessed in terms of informal caregivers' perceived need for support or in terms of the current health status of the care recipient (Jaschinski, 2018). A lack of perceived need has already been found to be a barrier to acceptance towards ambient assisted living technologies among informal caregivers (Jaschinski, 2018), which highlights the importance of researching informal caregivers' perceived need for contactless in-home monitoring systems. It would be especially interesting to identify the concrete conditions under which informal caregivers would perceive the need to use the technology and consequently accept to use it. With the help of scenarios, it could be investigated which symptoms and problems the care recipients need to have and how severe these problems need to be for informal caregivers to accept in-home monitoring in the care of PwD. Even though perceived need most likely cannot be influenced, insights into the perceived need and its relation to acceptance can help to ensure that in-home monitoring technology is implemented at the right time (Peek et al., 2014).

Conclusion

Although the generalisability of the current results must be established by future research, the present study contributes to the understanding of informal caregivers' perceptions of contactless in-home monitoring and their acceptance towards this new type of technology. This understanding can inform the further development of contactless in-home monitoring systems. Besides, the findings regarding informal caregivers' perceived benefits and concerns should be kept in mind when it comes to the implementation of contactless in-home monitoring systems in the future.

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Appendix A
Informed Consent and Survey (Dutch)

Acceptatie van innovatieve monitoring technologie in de zorg voor thuiswonende ouderen

Hartelijk dank voor uw bereidheid om deel te nemen aan dit onderzoek. Dit onderzoek wordt uitgevoerd door studenten Psychologie aan de Universiteit Twente als deel van hun Bachelor Scriptie.

Het doel van dit onderzoek is om meer inzicht te krijgen in factoren die een rol spelen bij de acceptatie van technologie voor het monitoren van thuiswonende ouderen. We zijn in dit onderzoek in het bijzonder geïnteresseerd in de mening van mantelzorgers van ouderen met dementie. Mantelzorgers zijn informele verzorgers die op vrijwillige basis onbetaalde zorg/hulp verlenen aan een zorgbehoevende naaste. Voorbeelden van een mantelzorger zijn een echtgenoot, zoon/dochter, een ander familielid of vriend. Deelname aan deze vragenlijst zal ongeveer 20 minuten duren.

Uw antwoorden zullen volledig anoniem worden verwerkt waardoor de gegevens dus niet tot een persoon kunnen worden herleid. Uw gegevens zullen alleen worden gebruikt voor dit wetenschappelijk onderzoek.

Uw deelname in dit onderzoek is volledig vrijwillig, wat betekent dat u op elk gewenst moment kunt stoppen met het invullen van de vragenlijst. Indien u vragen heeft over dit onderzoek kunt u contact opnemen met Ronja Rosenkranz, een van de onderzoekers, of Dr. L.M.A. Braakman-Jansen, de onderzoeksleider.

Om u te bedanken voor uw deelname bieden we u aan het einde van de vragenlijst de mogelijkheid aan om een prijs te winnen! U kunt namelijk een cadeaubon ter waarde van €10 winnen.

Verklaring van goedkeuring voor deelname
Ik bevestig dat ik 18 jaar of ouder ben en dat ik bovenstaande informatie gelezen en begrepen heb. Op basis van voorstaande keur ik vrijwillig goed om deel te nemen aan dit onderzoek.

- Ja
- Nee

Deel 1: Algemene vragen over de deelnemers

Fijn dat u mee wilt werken aan dit onderzoek. Wij willen graag beginnen met enkele vragen over uwzelf.

(Leeftijd)
Wat is uw leeftijd (in jaartallen)? _____

(Geslacht)
Wat is uw geslacht?

a. Man
b. Vrouw
c. Anders

(Residentie)
In welk land woont u?

a. In Nederland
b. In Duitsland
c. Anders

(Mantelzoger)
Bent u een mantelzorger?
(Een mantelzorger is iemand die vrijwillig (onbetaald) zorg/ hulp verleent aan een naaste. Voorbeelden van een mantelzorger zijn een echtgenoot, zoon/dochter, een ander familielid of vriend)

a. Ja
b. Nee

(Reden voor zorg)
Wat is de reden dat u mantelzorg verleent? (U kunt meerdere antwoorden kiezen)

a. Dementie of lichte cognitieve beperking / geheugen klachten
b. Ouderdom
c. Lichamelijke beperking(en)
d. Psychische stoornis
e. Anders

(Relatie met de zorgbehoevende)
Wat beschrijft het beste uw relatie met de persoon voor wie u zorgt?
Ik ben …

a. Echtgenoot/partner
b. Dochter/Zoon
c. Schoondochter/Schoonzoon

d. Zuster/ broer
e. Kleindochter/Kleinzoon
f. Buurman/ Buurvrouw/ Vriend
g. Anders, namelijk:

(Omvang van het zorgnetwerk)
Zijn er meer mantelzorgers die een aandeel in de zorg voor uw naaste hebben?

a. Nee, ik ben de enige mantelzorger voor mijn zorgbehoevende naaste
b. Ja, een andere persoon
c. Ja, twee andere personen
d. Ja, drie andere personen
e. Ja, 4 of meer andere personen

(Reistijd)
Welke van de volgende opties beschrijft het beste hoelang het gemiddeld duurt om bij de woning van uw zorgbehoevende naaste te arriveren? (Ga hierbij uit van uw meest gebruikte manier van transport).

a. Ik woon in hetzelfde huis als de persoon voor wie ik zorg
b. Ik woon op 1 tot 5 minuten afstand
c. Ik woon op 6 tot 15 minuten afstand
d. Ik woon op 16 tot 30 minuten afstand
e. Ik woon op 31 minuten tot 1 uur afstand
f. Ik woon op meer dan 1 uur afstand

Deel 2: Algemene vragen over de zorgbehoevende
Nu volgen een aantal vragen over de naaste voor wie u zorgt.

(Leeftijd)
Wat is de leeftijd van de naaste voor wie u zorgt (in jaartallen)?

(Type dementie)
(Deze vraag wordt alleen weergegeven als bij de vraag "Reden voor zorg" optie A is gekozen)

Welk type dementie/cognitieve beperking is van toepassing op uw naaste?

a. Alzheimer
b. Lewy-Body dementie
c. Vasculaire dementie
d. Milde cognitieve stoornis
e. Ander type / Weet ik niet
f. Er is (nog) geen diagnose vastgesteld

(Tijd sinds het begin van de symptomen)
(Deze vraag wordt alleen weergegeven als bij de vraag "Reden voor zorg" optie A is gekozen)

Sinds wanneer vertoont uw zorgbehoevende naaste verschijnselen van dementie/ geheugenklachten (naar schatting)?

a. Minder dan 1 jaar
b. 1 tot 2 jaar
c. 2 tot 3 jaar
d. 3 tot 4 jaar
e. 4 tot 5 jaar
f. Meer dan 5 jaar

(Huisvestingssituatie van de zorgbehoevende)
Wat is de leefsituatie van uw zorgbehoevende naaste?

a. Alleenwonend
b. Samenwonend

Waar woont uw zorgbehoevende naaste?

a. In een eigen (huur)woning
b. Inwonend bij een familielid
c. In een aanleunwoning of aanleunappartement dat hoort bij een zorginstelling
d. In een verpleeg- of verzorgingshuis
e. Anders, namelijk:

(Gebruik van professionele zorg)
Van welke type professionele zorg/ service maakt uw zorgbehoevende naaste gebruik? (meerdere antwoorden mogelijk)

a. Thuiszorg door een (wijk)verpleegkundige of verzorgende
b. Casemanager dementie
c. Dagopvang/ dagbesteding/ tijdelijke opvang
d. Huishoudelijke hulp
e. Maaltijdservice
f. Geen van bovenstaande

Deel 3: Ervaren zorglast

In dit deel van de vragenlijst zijn we geïnteresseerd in de mogelijke zorglast die u ervaart vanwege het verlenen van mantelzorg aan uw zorgbehoevende naaste.

[4-item screening version of Zarit Burden Interview (Bédard et al., 2001)]

Deel 4: Digitale vaardigheden, innovativiteit & ervaring met technologie

In dit deel van de vragenlijst zijn we geïnteresseerd in hoe goed u uw eigen digitale vaardigheden inschat, in hoeverre u open staat voor nieuwe technologie en tenslotte hoeveel ervaring u heeft met diverse technologieën.

(Digitale vaardigheden)

[eHealth Literacy Questionnaire: scale 'ability to actively engage with digital services' (Kayser et al., 2018)]

(Innovativiteit)

[Personal innovativeness in information technology (PIIT) (Agarwal & Prasad, 1998)]

(Ervaring met technologie)
Welke van de volgende technologieën heeft u gebruikt of gebruikt u momenteel? (Meerdere antwoorden zijn mogelijk).

a. Monitorende technologie voor het monitoren van dagelijkse activiteiten of veiligheid van uw zorgbehoevende naaste (bijvoorbeeld sensoren, Alarm knoppen, GPS trackers)
b. Digitale communicatietechnologie om contact te behouden met uw zorgbehoevende naaste (bijvoorbeeld videobellen, sms en whatsapp en andere messaging apps)
c. Technologie om het geheugen en/ of de dagstructuur van uw zorgbehoevende naaste te ondersteunen (bv. een digitaal dagkalender die herinnert aan dagelijkse activiteiten, of een slimme medicijndispenser die herinnert aan medicatie inname)
d. Digitale zorgplatformen om de coördinatie en afstemming van de zorg voor uw naaste te ondersteunen (bv. communicatieplatformen die de mantelzorger, professionele zorgverleners en zorgontvanger met elkaar verbinden)
e. Geen van bovenstaande

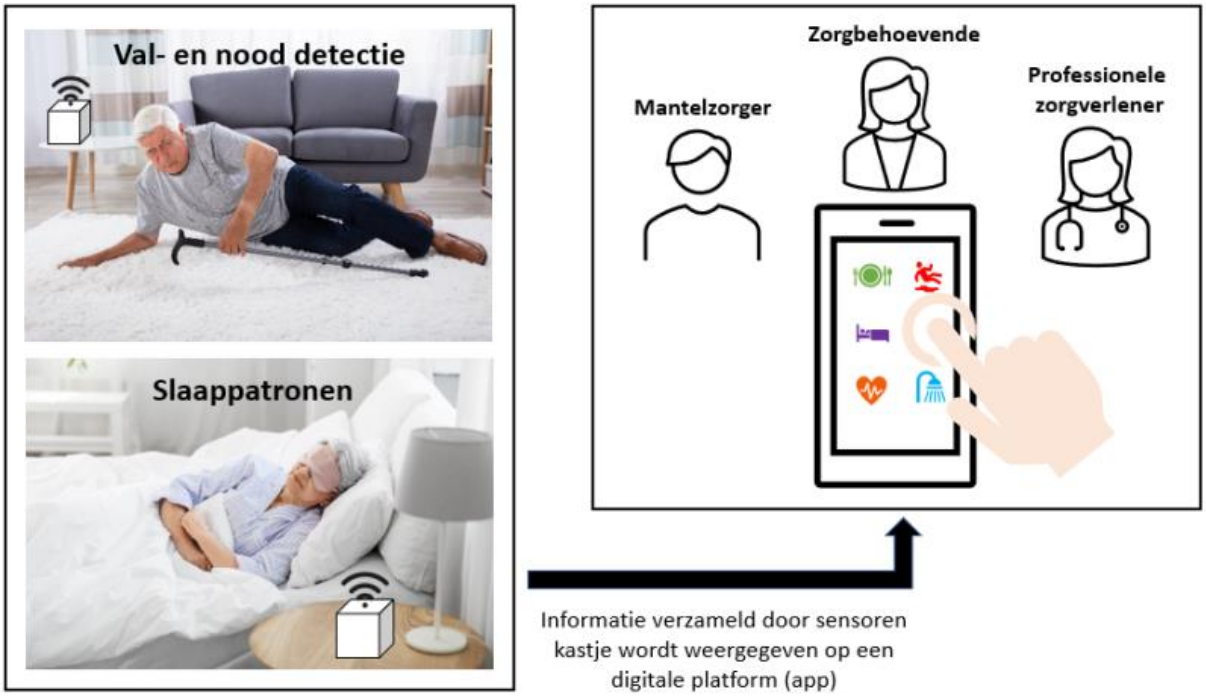
Deel 5: Contactloze monitoring technologie in de zorg voor een naaste

Bekijk a.u.b. de beschrijving en afbeelding hieronder voordat u verder gaat naar de volgende vragen.

Er worden steeds meer technologieën ontwikkeld die tot doel hebben mantelzorgers te ondersteunen en hun naasten in staat te stellen langer thuis te kunnen wonen. In dit deel van de vragenlijst richten we ons op een nieuwe vorm van ondersteunende technologie: Contactloze technologie voor het monitoren van uw zorgbehoevende naaste.
Contactloze monitoring technologie is een sensor systeem voor de thuisomgeving. Het is bedoeld om de mantelzorger een beter inzicht te geven in de situatie van zijn/haar thuiswonende naaste,

vooral wanneer de mantelzorger op afstand woont of het huis verlaat.

De technologie werkt contactloos, d.w.z. de naaste hoeft hierbij geen apparaten te dragen. Zoals u kunt zien in de onderstaande afbeelding kan er een klein kastje met ingebouwde sensoren in een hoek van de woning geplaatst worden. Dit slimme kastje kan met behulp van kunstmatige intelligentie het dagelijks leefpatroon van uw naaste leren herkennen en belangrijke veranderingen waarnemen, zoals minder drinken of eten of nachtelijke onrust. In geval van nood (zoals bv. een val) kan het systeem de mantelzorger alarmeren. De verzamelde informatie kan weergegeven worden op een digitaal platform dat toegankelijk is voor de mantelzorger en naaste. Indien gewenst kan de informatie ook gedeeld worden met betrokken zorgprofessionals.



(Controle van de begrijpelijkheid)
Hoe duidelijk vond u de beschrijving en afbeelding over contactloze monitoring technologie in de zorg voor een thuiswonende naaste?

a. Niet duidelijk
b. Een beetje duidelijk
c. Duidelijk

(Suggesties voor verbetering)
(Deze vraag wordt alleen getoond indien optie a of b is geselecteerd bij de vraag "Controleer de begrijpelijkheid")

Heeft u suggesties voor het verbeteren van de duidelijkheid van de beschrijving en afbeelding?

_____

Deel 5A: Verschillende gebruiksscenario's

In dit deel van de vragenlijst zullen we u 5 verschillende scenario's presenteren. De scenario's beschrijven verschillende situaties waarin contactloze monitoring technologie toegepast kan worden en ieder scenario omvangt andere aspecten waarover het systeem zou kunnen informeren. Voor elk scenario willen wij u graag een aantal vragen stellen.

Scenario 1: Het detecteren van noodsituaties

Stelt u zich voor: Bij uw zorgbehoevende naaste thuis is contactloze monitoring technologie geïnstalleerd. Deze technologie zal voortdurend de veiligheid van uw naaste monitoren in het gehele huis. Het systeem kan bijvoorbeeld valincidenten of dwalen detecteren en u als mantelzorger (of een door u aangewezen persoon) direct informeren over deze noodsituatie.

Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende uitspraken over dit scenario:

Contactloze technologie voor het detecteren van noodsituaties van mijn naaste…	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
(Acceptatie)					
Zou ik acceptabel vinden	○	○	○	○	○
Zou mijn zorgbehoevende naaste acceptabel vinden	○	○	○	○	○
(Waargenomen bruikbaarheid)					
Zou behulpzaam zijn voor mij	○	○	○	○	○
Zou mij ondersteunen in het verlenen of organiseren van de best mogelijke zorg	○	○	○	○	○

Zou mij in staat stellen om me gerust te voelen over de situatie van mijn naaste	○	○	○	○	○
Zou mij helpen om sneller te reageren op de zorgbehoeftes van mijn naaste	○	○	○	○	○
Zou mij helpen om mijn naaste langer thuis te laten wonen	○	○	○	○	○
Zou mij helpen om als mantelzorger langer vol te houden	○	○	○	○	○
(Bereidheid om informatie te delen)					
Zou mij informatie geven die ik graag zou willen delen met de zorgprofessional(s) van mijn zorgbehoevende naaste	○	○	○	○	○
(Intentie tot gebruik)					
Ik zou contactloze technologie voor het detecteren van noodsituaties van mijn naaste in de (nabije) toekomst willen gebruiken.	○	○	○	○	○

Scenario 2: Het voorspellen van acute situaties

Stelt u zich voor: Bij uw zorgbehoevende naaste thuis is contactloze monitoring technologie geïnstalleerd. Deze heeft als doel om acute situaties niet alleen te detecteren maar te voorspellen. Zo kan de technologie bijv. voortdurend de loopsnelheid en looppatroon van uw naaste monitoren. Door middel van deze informatie kan het systeem het risico op vallen van uw naaste voorspellen en u (of een door u aangewezen persoon) inlichten over de situatie. Het doel hiervan is om noodsituaties zoals bijv. vallen te voorkomen.

Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende uitspraken over dit scenario:

Contactloze technologie voor het voorspellen van acute situaties van mijn naaste…	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
(Acceptatie)					
Zou ik acceptabel vinden	○	○	○	○	○
Zou mijn zorgbehoevende naaste acceptabel vinden	○	○	○	○	○
(Waargenomen bruikbaarheid)					
Zou behulpzaam zijn voor mij	○	○	○	○	○
Zou mij ondersteunen in het verlenen of organiseren van de best mogelijke zorg	○	○	○	○	○
Zou mij in staat stellen om me gerust te voelen over de situatie van mijn naaste	○	○	○	○	○
Zou mij helpen om sneller te reageren op de zorgbehoeftes van mijn naaste	○	○	○	○	○
Zou mij helpen om mijn naaste langer thuis te laten wonen	○	○	○	○	○
Zou mij helpen om als mantelzorger langer vol te houden	○	○	○	○	○
(Bereidheid om informatie te delen)					
Zou mij informatie geven die ik graag zou willen delen met de zorgprofessional(s) van mijn zorgbehoevende naaste	○	○	○	○	○
(Intentie tot gebruik)					

Ik zou contactloze technologie voor het voorspellen van acute situaties van mijn naaste in de (nabije) toekomst willen gebruiken.	○	○	○	○	○

Scenario 3: Het monitoren van zelfzorg

Stelt u zich voor: Bij uw zorgbehoevende naaste thuis is contactloze monitoring technologie geïnstalleerd. Deze technologie zal voortdurend de zelfzorg van uw zorgbehoevende naaste monitoren zoals eten, drinken en persoonlijke hygiëne (bijv. wassen, toiletteren, aankleden). Het monitoring systeem kan belangrijke afwijkingen in de zelfzorg detecteren en u (of een door u aangewezen persoon) hierover inlichten.

Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende uitspraken over dit scenario:

Contactloze technologie voor het monitoren van de zelfzorg van mijn naaste…	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
(Acceptatie)					
Zou ik acceptabel vinden	○	○	○	○	○
Zou mijn zorgbehoevende naaste acceptabel vinden	○	○	○	○	○
(Waargenomen bruikbaarheid)					
Zou behulpzaam zijn voor mij	○	○	○	○	○
Zou mij ondersteunen in het verlenen of organiseren van de best mogelijke zorg	○	○	○	○	○
Zou mij in staat stellen om me gerust te voelen over de situatie van mijn naaste	○	○	○	○	○

Zou mij helpen om sneller te reageren op de zorgbehoeftes van mijn naaste	○	○	○	○	○
Zou mij helpen om mijn naaste langer thuis te laten wonen	○	○	○	○	○
Zou mij helpen om als mantelzorger langer vol te houden	○	○	○	○	○
(Bereidheid om informatie te delen)					
Zou mij informatie geven die ik graag zou willen delen met de zorgprofessional(s) van mijn zorgbehoevende naaste	○	○	○	○	○
(Intentie tot gebruik)					
Ik zou contactloze technologie voor het monitoren van de zelfzorg van mijn naaste in de (nabije) toekomst willen gebruiken.	○	○	○	○	○

Scenario 4: Het monitoren van welzijn gedurende de nacht

Stelt u zich voor: Bij uw zorgbehoevende naaste thuis is contactloze monitoring technologie geïnstalleerd. Deze technologie zal voortdurend het welzijn van uw zorgbehoevende naaste monitoren gedurende de nacht. Het monitoring systeem kan afwijkingen van het gewoonlijke nachtelijke patroon (zoals nachtelijke onrust, slaapproblemen of een instabiel dag- en nachtritme) detecteren en u (of een door u aangewezen persoon) hierover inlichten.

Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende uitspraken over dit scenario:

Contactloze technologie voor het monitoren van het welzijn van mijn naaste gedurende de nacht…	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
(Acceptatie)					
Zou ik acceptabel vinden	○	○	○	○	○
Zou mijn zorgbehoevende naaste acceptabel vinden	○	○	○	○	○
(Waargenomen bruikbaarheid)					
Zou behulpzaam zijn voor mij	○	○	○	○	○
Zou mij ondersteunen in het verlenen of organiseren van de best mogelijke zorg	○	○	○	○	○
Zou mij in staat stellen om me gerust te voelen over de situatie van mijn naaste	○	○	○	○	○
Zou mij helpen om sneller te reageren op de zorgbehoeftes van mijn naaste	○	○	○	○	○
Zou mij helpen om mijn naaste langer thuis te laten wonen	○	○	○	○	○
Zou mij helpen om als mantelzorger langer vol te houden	○	○	○	○	○
(Bereidheid om informatie te delen)					
Zou mij informatie geven die ik graag zou willen delen met de zorgprofessional(s) van mijn zorgbehoevende naaste	○	○	○	○	○
(Intentie tot gebruik)					

Ik zou contactloze technologie voor het monitoren van het welzijn van mijn naaste gedurende de nacht in de (nabije) toekomst willen gebruiken.	○	○	○	○	○

Scenario 5: Het monitoren van geleidelijke gezondheidsveranderingen

Stelt u zich voor: Bij uw zorgbehoevende naaste thuis is contactloze monitoring technologie geïnstalleerd. Deze technologie zal over een langere termijn veranderingen die geleidelijk ontwikkelen in de gezondheid van uw zorgbehoevende naaste monitoren. Het monitoring systeem kan u (of een door u aangewezen persoon) bijvoorbveeld informeren over cognitieve of fysieke veranderingen van uw naaste in een bepaalde periode.

Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende uitspraken over dit scenario:

Contactloze technologie voor het monitoren van geleidelijke gezondheidsveranderingen van mijn naaste…	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
(Acceptatie)					
Zou ik acceptabel vinden	○	○	○	○	○
Zou mijn zorgbehoevende naaste acceptabel vinden	○	○	○	○	○
(Waargenomen bruikbaarheid)					
Zou behulpzaam zijn voor mij	○	○	○	○	○
Zou mij ondersteunen in het verlenen of organiseren van de best mogelijke zorg	○	○	○	○	○
Zou mij in staat stellen om me gerust te voelen over de situatie van mijn naaste	○	○	○	○	○

Zou mij helpen om sneller te reageren op de zorgbehoeftes van mijn naaste	○	○	○	○	○
Zou mij helpen om mijn naaste langer thuis te laten wonen	○	○	○	○	○
Zou mij helpen om als mantelzorger langer vol te houden	○	○	○	○	○
(Bereidheid om informatie te delen)					
Zou mij informatie geven die ik graag zou willen delen met de zorgprofessional(s) van mijn zorgbehoevende naaste	○	○	○	○	○
(Intentie tot gebruik)					
Ik zou contactloze technologie voor het monitoren van geleidelijke gezondheidsveranderingen van mijn naaste in de (nabije) toekomst willen gebruiken.	○	○	○	○	○

Deel 5B: Verwachte voordelen & nadelen

In het volgende willen wij u enkele vragen stellen over de algemene voor- en nadelen m.b.t. contactloze monitoring technologie in de zorg voor uw naaste.

(Voordelen)
Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende uitspraken.

Ik denk dat contactloze monitoring technologie mij kan helpen om…	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens

Te controleren of mijn naaste voldoende voor zichzelf zorgt (bijv. Eten/drinken)	○	○	○	○	○
Onnodige bezoekjes ter controle van de zelfzorg van mijn naaste te voorkomen	○	○	○	○	○
Gerust te zijn over de veiligheid van mijn naaste	○	○	○	○	○
Meer vrijheid en mobiliteit voor mijzelf te verkrijgen	○	○	○	○	○
Factoren te identificeren en te verwijderen die de zelfstandigheid van mijn naaste mogelijk belemmeren	○	○	○	○	○
Sneller te reageren op de zorgbehoeftes van mijn naaste om gezondheidsrisico's te voorkomen (bijv. ondervoeding, slaapproblemen, eenzaamheid)	○	○	○	○	○
Anderen, inclusief professionele zorgverleners, een goed beeld van de situatie van mijn naaste te verstrekken	○	○	○	○	○
Het optimale moment te achterhalen waarin mijn naaste de overstap kan maken naar een andere woonvorm	○	○	○	○	○

(Nadelen)
Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende uitspraken.

Als ik contactloze monitoring technologie zou gebruiken, voel ik me…	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
Bezorgd om met te veel informatie beladen te worden	○	○	○	○	○
Bezorgd dat de monitoring informatie mij nodeloos bezorgd zou maken	○	○	○	○	○
Onzeker of ik wel of niet moet reageren op informatie uit het systeem	○	○	○	○	○
Bezorgd dat de monitoring informatie gedeeld wordt met derde partijen zonder toestemming	○	○	○	○	○
Bezorgd dat de voordelen niet opwegen tegen de schending van de privacy van mijn naaste	○	○	○	○	○
Bezorgd dat de technologie wellicht het menselijk contact vervangt.	○	○	○	○	○

Deel 5C: Algemene acceptatie van contactloze monitoring technologie

In het volgende zijn we geïnteresseerd in uw algemene acceptatie van contactloze monitoring technologie in de zorg voor een naaste. Houd hierbij rekening met alle informatie die u nu heeft over de functie en mogelijke inzet van deze technologie.

Geeft u alstublieft aan in hoeverre u het eens of oneens bent met de volgende stellingen:

	Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens

(Waargenomen bruikbaarheid) Ik denk dat contactloze monitoring technologie in de zorg voor mijn naaste behulpzaam is voor mij…					
… op dit moment in mijn leven.	○	○	○	○	○
… wanneer de cognitieve of fysieke gezondheid van mijn naaste verslechterd.	○	○	○	○	○
(Intentie tot gebruik) Ik zou contactloze monitoring technologie in de zorg voor mijn naaste willen gebruiken…					
… op dit moment in mijn leven.	○	○	○	○	○
… wanneer de cognitieve of fysieke gezondheid van mijn naaste verslechterd.	○	○	○	○	○
(Houding) Het is een goed idee om contactloze monitoring technologie te gebruiken in de zorg voor mijn naaste.	○	○	○	○	○
(Sociale invloed) Mijn familie en vrienden zouden het positief vinden wanneer ik contactloze monitoring technologie gebruik in de zorg voor mijn naaste.	○	○	○	○	○
De professionele zorgverleners van mijn naaste zouden het positief vinden wanneer ik contactloze monitoring	○	○	○	○	○

technologie gebruik in de zorg voor mijn naaste.					
(Waargenomen gebruiksgemak) Het zou voor mij gemakkelijk zijn om de aan het monitoring systeem gekoppelde informatieplatform (app) te leren bedienen.	○	○	○	○	○
(Faciliterende voorwaarden) Ik verwacht dat ik voldoende kennis en ondersteuning heb/ krijg om contactloze monitoring technologie in de zorg voor mijn naaste te gebruiken.	○	○	○	○	○

Deel 5D: Verschillende vormen van monitoring technologie

We zijn nu aangekomen in het laatste gedeelte van de vragenlijst. Monitoring technologie in het algemeen kan gebruik maken van verschillende apparaten/ sensoren om informatie in te winnen over de toestand van uw zorgbehoevende naaste. Deze variëren afhankelijk van het soort contact met het lichaam (contactloos, indirect contact, direct contact). We zijn benieuwd wat u van deze apparaten vindt.

Geeft u alstublieft voor elk van onderstaande apparaten/ sensoren aan in hoeverre u ze acceptabel vindt in de zorg voor uw thuiswonende naaste.

	Zeer onnacceptabel	Onnacceptabel	Neutraal	Acceptabel	Zeer acceptabel
Direct contact					

Draagbare apparaten (apparaten die dicht bij het lichaam gedragen worden; zoals smartwatches, mobiele telefoons, draagbare alarm knoppen)	○	○	○	○	○
Indirect contact					
Object-gebonden apparaten (apparaten die vast zitten aan dagelijks gebruikte voorwerpen zoals bewegingssensoren aan deuren of de koelkast of druksensoren op bed matrassen)	○	○	○	○	○
Contactloos					
Visuele apparaten (zoals camera's die geanonimiseerde beelden produceren, d.w.z. beelden waarop gezichten niet herkenbaar zijn)	○	○	○	○	○
Apparaten gebaseerd op geluidsdetectie (zoals microfoons, smart speakers)	○	○	○	○	○
Apparaten gebaseerd op radiofrequenties (zoals bv. een centraal geplaatste sensor die bewegingen binnen het huis kan detecteren via radar)	○	○	○	○	○

(Opleiding)

Ten slotte nog een laatste vraag over uwzelf:

Wat is uw hoogst genoten educatie (diploma behaald)?

a. Basisonderwijs of lager
b. Voortgezet onderwijs: VMBO
c. Voortgezet onderwijs: HAVO, VWO
d. Middelbaar beroepsonderwijs (MBO)
e. Bachelor/ Master of gelijkwaardig diploma (HBO of Universiteit)
f. Doctoraal diploma
g. Anders

Appendix B

Informed Consent and Survey (German)

Akzeptanz von Überwachungstechnologien in der Pflege älterer Menschen

Vielen Dank für Ihr Interesse an der Teilnahme an dieser Studie über den Einsatz von Technologien in der häuslichen Pflege. Die Studie wird von Psychologie-Studenten der Universität Twente im Rahmen ihrer Bachelor-Arbeiten durchgeführt.

Ziel der Studie ist es, herauszufinden, wie pflegende Angehörige über die Nutzung von Überwachungstechnologien für die Pflege älterer Menschen denken. Pflegende Angehörige sind Personen, die unbezahlte Unterstützung/ Pflege für ein Familienmitglied, einen Freund oder einen Nachbarn leisten. Wenn Sie ein pflegender Angehöriger einer älteren Person, einer Person mit Demenz oder leichter kognitiver Beeinträchtigung sind, sind Sie herzlich eingeladen, an unserer Studie teilzunehmen. Die Teilnahme wird etwa 20 Minuten dauern.

Ihre Angaben werden anonym verarbeitet, sodass diese nicht auf einzelne Personen zurückgeführt werden können. Die erhobenen Daten werden ausschließlich für wissenschaftliche Forschungszwecke verwendet und nicht an Dritte weitergegeben.

Ihre Teilnahme an dieser Studie ist freiwillig und Sie können jederzeit ohne Angabe von Gründen von der Teilnahme zurücktreten. Sollten Sie Fragen zur Studie haben, können Sie sich gerne an Ronja Rosenkranz, eine der Student*innen, oder Frau Dr. Braakman-Jansen, die Projektleiterin, wenden.

Um Ihnen für Ihre Teilnahme zu danken, haben Sie am Ende des Fragebogens die Möglichkeit einen 10€ Mydays Gutschein zu gewinnen.

Einverständniserklärung
Ich bestätige, dass ich 18 Jahre alt bin und mit der oben beschriebenen Verarbeitung der Daten einverstanden bin. Ich nehme freiwillig an dieser Studie teil.

- Ja
- Nein

Teil 1: Allgemeine Fragen über die Teilnehmer
Vielen Dank. Wir möchten gerne mit einigen Fragen zu Ihrer Person beginnen.

(Alter)
Wie alt sind Sie (in Jahren)? _____

(Geschlecht)
Mit welcher der folgenden Optionen identifizieren Sie sich am meisten?

a. Männlich
b. Weiblich
c. Anders/ keine Angabe

(Wohnort)
In welchem Land wohnen Sie?

a. Niederlande
b. Deutschland
c. Keine der genannten Optionen trifft zu

(Pflegende/r Angehörige/r)
Sind Sie ein pflegender Angehöriger/ eine pflegende Angehörige?
(Pflegende Angehörige sind Personen, die unbezahlte Pflege/ Unterstützung für ein gesundheitlich eingeschränktes Familienmitglied (z.B. Partner oder Eltern), einen Freund oder Nachbarn leisten.)

a. Ja
b. Nein

(Grund der Pflege)
Was ist der Grund für die Pflege/ Unterstützung? (Mehrere Antworten sind möglich)

a. Demenz oder leichte kognitive Beeinträchtigung/ Gedächtnisstörungen
b. Folgen des normalen Alterungsprozess
c. Somatische Beeinträchtigung
d. Psychische Krankheit
e. Andere Gründe

(Beziehung zur pflegebedürftigen Person)
Was beschreibt die Beziehung zu der Person, die Sie pflegen/ unterstützen, am besten?
Ich bin...

a. (Ehe)partner
b. Tochter/ Sohn
c. Schwiegertochter/-sohn
d. Schwester/ Bruder

e. Nachbar(in) / Freund(in)
f. Enkel(in)
g. Anders, nämlich: _____

(Größe des Pflege-Netzwerks)
Gibt es weitere pflegende Angehörige, die an der Pflege/ Unterstützung Ihres Angehörigen beteiligt sind?

a. Nein, ich bin die einzige Person
b. Ja, 1 weitere Person
c. Ja, 2 weitere Personen
d. Ja, 3 weitere Personen
e. Ja, 4 oder mehr andere Personen

(Wegzeit)
Bitte geben Sie an, wie lange Sie brauchen, um zu der Wohnung der Person zu gelangen, die Sie pflegen/ unterstützen. Bitte beziehen Sie sich dabei auf das Fortbewegungsmittel, welches Sie überwiegend für diese Strecke nutzen (z.B. zu Fuß, Fahrrad, Bus, Bahn, Auto etc.)

Wie weit leben Sie von der Person, die Sie pflegen/ unterstützen, entfernt?

a. Ich lebe im gleichen Haus
b. Ich lebe zwischen 1 und 5 Minuten entfernt
c. Ich lebe zwischen 6 und 15 Minuten entfernt
d. Ich lebe zwischen 16 und 30 Minuten entfernt
e. Ich lebe zwischen 31 Minuten und 1 Stunde entfernt
f. Ich lebe mehr als 1 Stunde entfernt

Teil 2: Allgemeine Fragen über die pflegebedürftige Person

Im Folgenden möchten wir Ihnen einige Fragen stellen zu Ihrem/ Ihrer Angehörigen, welche(n) Sie pflegen/ unterstützen.

(Alter)
Wie alt ist die Person, die Sie pflegen/ unterstützen (in Jahren)?

(Art von Demenz/ kognitiver Beeinträchtigung)
(Diese Frage wird nur angezeigt, wenn bei der Frage "Grund der Pflege" Option A gewählt wurde)

Welche Art von Demenz oder kognitiver Beeinträchtigung betrifft die Person, die Sie pflegen/ unterstützen?

a. Alzheimer

b. Lewy-Body-Demenz bzw. Lewy-Körper-Demenz
c. Vaskuläre Demenz
d. Leichte kognitive Störung
e. Eine andere Art von Demenz/ ich weiß es nicht
f. Es wurde (noch) keine Diagnose festgestellt

(Zeit seit Symptombeginn)
(Diese Frage wird nur angezeigt, wenn bei der Frage "Grund der Pflege" Option A gewählt wurde)
Seit wann hat die Person, die Sie pflegen/ unterstützen, Symptome einer Demenz oder einer leichten kognitiven Beeinträchtigung (Schätzung)?

a. Weniger als 1 Jahr
b. 1 bis 2 Jahre
c. 2 bis 3 Jahre
d. 3 bis 4 Jahre
e. 4 bis 5 Jahre
f. Länger als 5 Jahre

(Wohnsituation der pflegebedürftigen Person)
Wie ist die aktuelle Wohnsituation der Person, die Sie pflegen/ unterstützen?

a. Die zu betreuende Person lebt allein
b. Die zu betreuende Person lebt mit anderen Personen zusammen

Wo wohnt die Person, die Sie pflegen/ unterstützen?

a. In einem eigenen (Miet-)Haus / einer eigenen (Miet-)Wohnung
b. In dem Haus/ der Wohnung eines Familienmitglieds
c. In einer (betreuten) Seniorenwohnung oder einer Wohnung, die zu einer Gesundheitseinrichtung gehört
d. In einem Pflegeheim
e. Anders, nämlich: _____

(Inanspruchnahme professioneller Pflege)
Welche Art von professioneller Pflege/Dienstleistung erhält Ihr Angehöriger? (Mehrere Angaben möglich)

a. Häusliche Pflege durch eine Krankenschwester oder einen Pfleger
b. Eine feste Ansprechperson welche die Pflege Ihres Angehörigen koordiniert
c. Tagespflege/ Tagesbetreuung
d. Hilfe für den Haushalt
e. Essen auf Rädern
f. Keine der oben genannten Optionen

Teil 3: Wahrgenommene Belastung durch die Pflege

In diesem Teil des Fragebogens interessieren wir uns für die Belastung, die Sie durch die Pflege/ Unterstützung Ihres Angehörigen möglicherweise erfahren.

[4-item screening version of Zarit Burden Interview (Bédard et al., 2001)]

Teil 4: Digitale Kompetenz, Innovations-Affinität & Erfahrung mit Technologien

In diesem Abschnitt des Fragebogens interessieren wir uns für Ihre digitale Kompetenz, Innovations-Affinität und Erfahrung mit Technologien.

(Digitale Kompetenz)

[eHealth Literacy Questionnaire: scale 'ability to actively engage with digital services' (Kayser et al., 2018)]

(Innovations-Affinität)

[Personal innovativeness in information technology (PIIT) (Agarwal & Prasad, 1998)]

(Erfahrung mit Technologien)
Welche der folgenden Technologien nutzen Sie derzeit oder haben Sie in der Vergangenheit bereits genutzt?

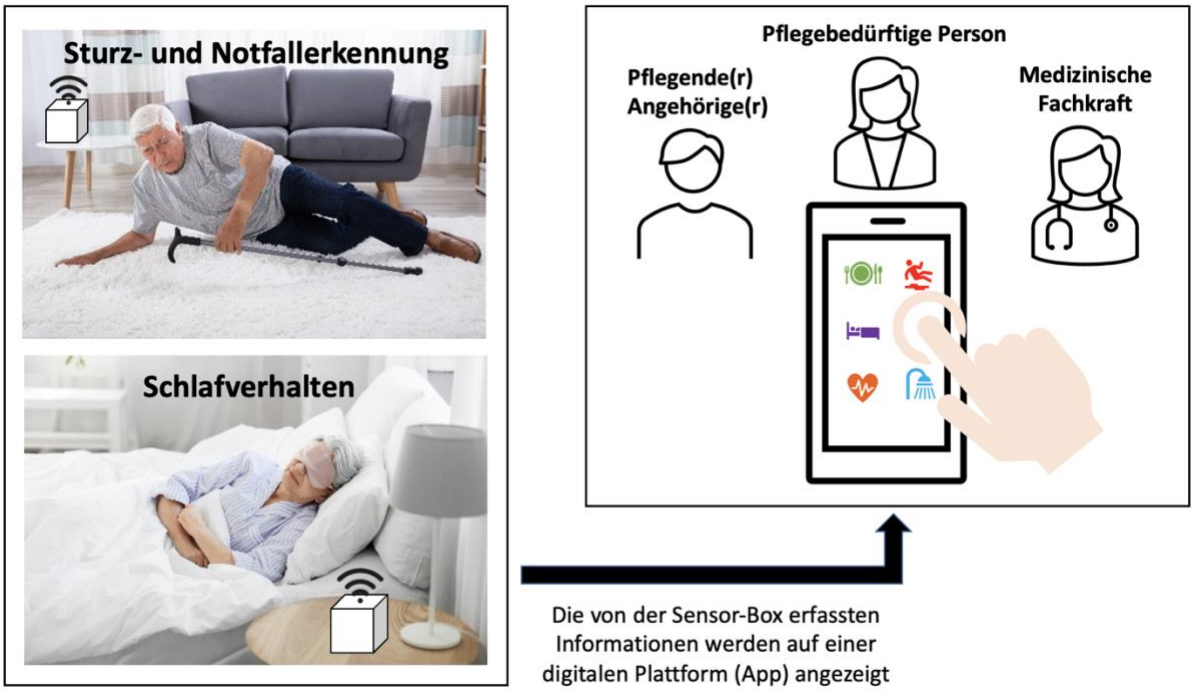
a. Technologien zur Überwachung der täglichen Aktivitäten/des Lebensstils Ihres Angehörigen (z.B. Sensortechnologie, Alarmknöpfe, GPS-Tracker)
b. Digitale Kommunikationstechnologie, um mit Ihrem Angehörigen in Kontakt zu bleiben (z.B. Videoanrufe, Nachrichten Systeme, WhatsApp)
c. Technologie zur Unterstützung des Gedächtnisses oder der Tagesstruktur Ihres Angehörigen (z.B. Erinnerungssysteme, Smartwatch (elektronische Multifunktions-Armbanduhr), automatischer Medikamentenspender (der die Einnahme von Medikamenten kontrolliert))
d. Digitale Pflegeplattformen zur Unterstützung der Koordination der Pflege Ihres Angehörigen (z.B. Plattformen zur Erleichterung der Kommunikation zwischen informellen und professionellen Pflegekräften)
e. Keine der oben genannten Technologien

Teil 5: Kontaktlose Überwachungstechnologie in der Pflege Angehöriger

Bitte sehen Sie sich die folgende Beschreibung und Illustration an, bevor Sie mit den nächsten Fragen fortfahren.

Es werden immer mehr Technologien entwickelt, die darauf abzielen, pflegende Angehörige zu unterstützen und es ihren Angehörigen zu ermöglichen, länger zu Hause zu leben. In diesem Teil des Fragebogens konzentrieren wir uns auf eine spezielle Form der unterstützenden Technologie: kontaktlose Überwachungstechnologien.
Bei kontaktloser Heimüberwachungstechnologie handelt es sich um ein Sensorsystem, das in der Wohnung älterer Personen installiert werden kann und rund um die Uhr Informationen über deren Lebensstil, Gesundheit und Sicherheit liefert. Die Technologie soll dem pflegenden Angehörigen einen besseren Einblick in die Situation des älteren Menschen geben, insbesondere wenn der pflegende Angehörige weit entfernt wohnt oder das Haus verlässt.

Die Technologie funktioniert kontaktlos, d.h. ältere Menschen müssen keine Geräte tragen. Wie in dem Bild zu sehen ist, kann eine kleine Box mit eingebauten Sensoren in einer Ecke der Wohnung platziert werden. Mit Hilfe künstlicher Intelligenz kann dieses System lernen den täglichen Lebensstil Ihres Angehörigen zu erkennen und wichtige Veränderungen zu signalisieren, wie z.B. weniger essen und trinken oder nächtliche Unruhe. In Notfällen (z.B. Sturz) kann das System den pflegenden Angehörigen alarmieren. Die gesammelten Informationen können in Echtzeit auf einer digitalen Plattform angezeigt werden, auf die der pflegende Angehörige, die pflegebedürftige Person und, falls gewünscht, das medizinische Fachpersonal aus der Ferne zugreifen können.



(Überprüfung der Verständlichkeit)

Wie verständlich fanden Sie die obige Beschreibung und die Bilder über die kontaktlose Heimüberwachungstechnologie?

a. Nicht klar

b. Ziemlich klar
c. Eindeutig

(Verbesserungsvorschläge)
(Diese Frage wird nur angezeigt, wenn bei der Frage "Überprüfung der Verständlichkeit" Option a oder b ausgewählt wird)

Haben Sie Vorschläge, wie man die Klarheit der Beschreibung verbessern kann? _____

Teil 5A: Verschiedene Nutzungsszenarien

Im Folgenden werden Ihnen 5 verschiedene Szenarien vorgestellt. Die Szenarien sind Beschreibungen von Situationen, in denen kontaklose Überwachungstechnologie in der häuslichen Pflege eingesetzt werden könnte. Alle Szenarien enthalten verschiedene Aspekte, die überwacht werden können. Bitte beantworten Sie die folgenden Fragen für jedes Szenario.

Szenario 1: Erkennen von Notsituationen
Stellen Sie sich Folgendes vor: In der Wohnung Ihres Angehörigen wird eine kontaklose Überwachungstechnologie installiert. Diese Technologie überwacht kontinuierlich sicherheitsgefährdende Aspekte, wie z.B. Stürze oder Umherirren. Es kann solche Notsituationen in Echtzeit erkennen und Sie oder eine andere autorisierte Person alarmieren.

Bitte geben Sie an, inwieweit Sie den folgenden Aussagen zu Szenario 1 zustimmen:

Kontaktlose Überwachungstechnologie zur Erkennung von Notsituationen meines Angehörigen…	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu
(Akzeptanz)					
Würde ich akzeptabel finden	○	○	○	○	○
Würde mein Angehöriger akzeptabel finden	○	○	○	○	○
(Wahrgenommene Nützlichkeit)					
Wäre nützlich für mich	○	○	○	○	○
Würde mich dabei unterstützen, die bestmögliche Pflege für meinen Angehörigen zu leisten	○	○	○	○	○

Würde mich dabei unterstützen, mich über die Situation meines Angehörigen rückzuversichern	○	○	○	○	○
Würde mir dabei helfen, schneller auf die Pflegebedürfnisse meines Angehörigen einzugehen	○	○	○	○	○
Würde dazu beitragen, dass mein Angehöriger länger Zuhause leben kann.	○	○	○	○	○
Würde mir dabei helfen, in meiner Rolle als pflegender Angehöriger länger durchzuhalten.	○	○	○	○	○
(Bereitschaft Informationen zu teilen)					
Würde mir Informationen liefern, die ich mit den medizinischen Fachkräften meines Angehörigen teilen möchte.	○	○	○	○	○
(Nutzungsabsicht)					
Ich würde die kontaktlose Überwachungstechnologie zur Erkennung von Notsituationen meines Angehörigen in (naher) Zukunft nutzen wollen.	○	○	○	○	○

Szenario 2: Risikovorhersagen

Stellen Sie sich Folgendes vor: In der Wohnung Ihres Angehörigen wird eine kontaklose Überwachungstechnologie installiert. Diese zielt darauf ab, akute Situationen nicht nur zu erkennen, sondern vorherzusagen. So kann die Technologie z.B. kontinuierlich die Gehgeschwindigkeit und das Gehverhalten Ihres Angehörigen überwachen. Anhand dieser Informationen kann das System das Sturzrisiko vorhersagen und Sie oder eine andere autorisierte Person darüber informieren. Das Ziel ist es, Notsituationen wie z.B. Stürze zu verhindern.

Bitte geben Sie an, inwieweit Sie den folgenden Aussagen zu Szenario 2 zustimmen:

Kontaktlose Überwachungstechnologie zur Vorhersage von Risiken …	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu
(Akzeptanz)					
Würde ich akzeptabel finden	○	○	○	○	○
Würde mein Angehöriger akzeptabel finden	○	○	○	○	○
(Wahrgenommene Nützlichkeit)					
Wäre nützlich für mich	○	○	○	○	○
Würde mich dabei unterstützen, die bestmögliche Pflege für meinen Angehörigen zu leisten	○	○	○	○	○
Würde mich dabei unterstützen, mich über die Situation meines Angehörigen rückzuversichern	○	○	○	○	○
Würde mir dabei helfen, schneller auf die Pflegebedürfnisse meines Angehörigen einzugehen	○	○	○	○	○
Würde dazu beitragen, dass mein Angehöriger länger Zuhause leben kann.	○	○	○	○	○
Würde mir dabei helfen, in meiner Rolle als pflegender Angehöriger länger durchzuhalten.	○	○	○	○	○
(Bereitschaft Informationen zu teilen)					

Würde mir Informationen liefern, die ich mit den medizinischen Fachkräften meines Angehörigen teilen möchte.	○	○	○	○	○
(Nutzungsabsicht)					
Ich würde die kontaktlose Überwachungstechnologie zur Vorhersage von Risiken in (naher) Zukunft nutzen wollen.	○	○	○	○	○

Szenario 3: Überwachung des Selbstpflegeverhaltens

Stellen Sie sich Folgendes vor: In der Wohnung Ihres Angehörigen wird eine kontaktlose Überwachungstechnologie installiert. Diese überwacht kontinuierlich die Selbstversorgung Ihres Angehörigen wie Essen, Trinken und Körperpflege (z. B. Baden, Toilettengang, Anziehen). Das System kann größere Abweichungen im Selbstpflegeverhalten erkennen und Benachrichtigungen an Sie oder eine andere autorisierte Person senden.

Bitte geben Sie an, inwieweit Sie den folgenden Aussagen zu Szenario 3 zustimmen:

Kontaktlose Überwachungstechnologie zur Überwachung des Selbstpflegeverhaltens meines Angehörigen…	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu
(Akzeptanz)					
Würde ich akzeptabel finden	○	○	○	○	○
Würde mein Angehöriger akzeptabel finden	○	○	○	○	○
(Wahrgenommene Nützlichkeit)					
Wäre nützlich für mich	○	○	○	○	○

Würde mich dabei unterstützen, die bestmögliche Pflege für meinen Angehörigen zu leisten	○	○	○	○	○
Würde mich dabei unterstützen, mich über die Situation meines Angehörigen rückzuversichern	○	○	○	○	○
Würde mir dabei helfen, schneller auf die Pflegebedürfnisse meines Angehörigen einzugehen	○	○	○	○	○
Würde dazu beitragen, dass mein Angehöriger länger Zuhause leben kann.	○	○	○	○	○
Würde mir dabei helfen, in meiner Rolle als pflegender Angehöriger länger durchzuhalten.	○	○	○	○	○
(Bereitschaft Informationen zu teilen)					
Würde mir Informationen liefern, die ich mit den medizinischen Fachkräften meines Angehörigen teilen möchte.	○	○	○	○	○
(Nutzungsabsicht)					
Ich würde die kontaktlose Überwachungstechnologie zur Überwachung des Selbstpflegeverhaltens meines Angehörigen in (naher) Zukunft nutzen wollen.	○	○	○	○	○

Szenario 4: Überwachung des Wohlbefindens während der Nacht

Stellen Sie sich Folgendes vor: In der Wohnung Ihres Angehörigen wird eine kontaktlose

Überwachungstechnologie installiert. Diese überwacht kontinuierlich das Wohlbefinden Ihres Angehörigen während der Nacht. Das System kann Abweichungen (z. B. nächtliche Unruhe, Schlafprobleme oder einen gestörten Tag-Nacht-Rhythmus) erkennen und Benachrichtigungen an Sie oder eine andere von Ihnen autorisierte Person senden.

Bitte geben Sie an, inwieweit Sie den folgenden Aussagen zu Szenario 4 zustimmen:

Kontaktlose Überwachungstechnologie zur Überwachung des Wohlbefindens meines Angehörigen während der Nacht…	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu
(Akzeptanz)					
Würde ich akzeptabel finden	○	○	○	○	○
Würde mein Angehöriger akzeptabel finden	○	○	○	○	○
(Wahrgenommene Nützlichkeit)					
Wäre nützlich für mich	○	○	○	○	○
Würde mich dabei unterstützen, die bestmögliche Pflege für meinen Angehörigen zu leisten	○	○	○	○	○
Würde mich dabei unterstützen, mich über die Situation meines Angehörigen rückzuversichern	○	○	○	○	○
Würde mir dabei helfen, schneller auf die Pflegebedürfnisse meines Angehörigen einzugehen	○	○	○	○	○
Würde dazu beitragen, dass mein Angehöriger länger Zuhause leben kann.	○	○	○	○	○

Würde mir dabei helfen, in meiner Rolle als pflegender Angehöriger länger durchzuhalten.	○	○	○	○	○
(Bereitschaft Informationen zu teilen)					
Würde mir Informationen liefern, die ich mit den medizinischen Fachkräften meines Angehörigen teilen möchte.	○	○	○	○	○
(Nutzungsabsicht)					
Ich würde die kontaktlose Überwachungstechnologie zur Überwachung des Wohlbefindens meines Angehörigen während der Nacht in (naher) Zukunft nutzen wollen.	○	○	○	○	○

Szenario 5: Überwachung von langfristigen Gesundheitsveränderungen

Stellen Sie sich Folgendes vor: In der Wohnung Ihres Angehörigen wird eine kontaktlose Überwachungstechnologie installiert. Diese überwacht mögliche Veränderungen des Gesundheitszustandes der Person, die sich im Laufe der Zeit entwickeln. Das System kann Sie oder eine andere autorisierte Person beispielsweise darüber informieren, ob es in einem bestimmten Zeitraum zu einer kognitiven oder körperlichen Verschlechterung gekommen ist. Bitte geben Sie an, inwieweit Sie den folgenden Aussagen zu Szenario 5 zustimmen:

Kontaktlose Technologie zur Überwachung langfristiger Gesundheitsveränderungen meines Angehörigen…

Kontaktlose Überwachungstechnologie zur Überwachung langfristiger Gesundheitsveränderungen meines Angehörigen…	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu

(Akzeptanz)					
Würde ich akzeptabel finden	○	○	○	○	○
Würde mein Angehöriger akzeptabel finden	○	○	○	○	○
(Wahrgenommene Nützlichkeit)					
Wäre nützlich für mich	○	○	○	○	○
Würde mich dabei unterstützen, die bestmögliche Pflege für meinen Angehörigen zu leisten	○	○	○	○	○
Würde mich dabei unterstützen, mich über die Situation meines Angehörigen rückzuversichern	○	○	○	○	○
Würde mir dabei helfen, schneller auf die Pflegebedürfnisse meines Angehörigen einzugehen	○	○	○	○	○
Würde dazu beitragen, dass mein Angehöriger länger Zuhause leben kann.	○	○	○	○	○
Würde mir dabei helfen, in meiner Rolle als pflegender Angehöriger länger durchzuhalten.	○	○	○	○	○
(Bereitschaft Informationen zu teilen)					
Würde mir Informationen liefern, die ich mit den medizinischen Fachkräften meines Angehörigen teilen möchte.	○	○	○	○	○
(Nutzungsabsicht)					

Ich würde die kontaktlose Überwachungstechnologie zur Überwachung langfristiger Gesundheitsveränderungen meines Angehörigen in (naher) Zukunft nutzen wollen.	○	○	○	○	○

Teil 5B: Wahrgenommene Vorteile & Bedenken

Im Folgenden möchten wir Sie nach den von Ihnen erwarteten Vorteilen und Bedenken in Bezug auf kontaktlose Überwachungstechnologie fragen.

(Vorteile)
Bitte geben Sie an, inwieweit Sie den folgenden Aussagen zustimmen:

Ich glaube, dass mir kontaktlose Überwachungstechnologie in der häuslichen Pflege helfen kann …	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu
Zu überprüfen, ob mein Angehöriger angemessen für sich selbst sorgt (z.B. Essen, Trinken)	○	○	○	○	○
Nicht erforderliche Besuche zu vermeiden wie z.B. Besuche zur Kontrolle der Selbstpflege meines Angehörigen	○	○	○	○	○
Mich bezüglich der Sicherheit meines Angehörigen zu vergewissern	○	○	○	○	○
Meine Freiheit und Mobilität wiederzuerlangen	○	○	○	○	○
Faktoren, welche die Unabhängigkeit meines	○	○	○	○	○

Angehörigen einschränken, zu erkennen und zu beseitigen					
Schneller auf den Pflegebedarf meines Angehörigen zu reagieren, um Gesundheitsrisiken vorzubeugen (z.B. Unterernährung, Schlafprobleme, Einsamkeit)	○	○	○	○	○
Anderen Personen (einschließlich Pflegefachkräften) einen objektiven Einblick in die Situation meines Angehörigen zu geben	○	○	○	○	○
Den optimalen Zeitpunkt für den Übergang meines Angehörigen in ein Pflegeheim oder zu einer anderen Wohnform zu finden	○	○	○	○	○

(Bedenken)
Bitte geben Sie an, inwieweit Sie den folgenden Aussagen zustimmen:

Wenn ich kontaktlose Überwachungstechnologie in der häuslichen Pflege einsetzen würde, wäre ich …	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu
Besorgt, mit zu vielen Informationen überhäuft zu werden	○	○	○	○	○
Besorgt, dass die Überwachungsinformationen mich unnötig beunruhigen würden	○	○	○	○	○

Verunsichert, auf welche Informationen ich reagieren sollte	○	○	○	○	○
Besorgt, dass Überwachungsdaten ohne unsere Zustimmung an Dritte weitergegeben werden könnten	○	○	○	○	○
Verunsichert, ob die Vorteile des Systems die Verletzung der Privatsphäre meines Angehörigen rechtfertigen	○	○	○	○	○
Besorgt, dass die Technologie den menschlichen Kontakt ersetzen könnte	○	○	○	○	○

Teil 5C: Allgemeine Akzeptanz von kontaktloser Überwachungstechnologie

Nun interessieren wir uns für Ihre allgemeine Akzeptanz von kontaktloser Überwachungstechnologie in der häuslichen Pflege. Bitte berücksichtigen Sie alle Informationen, die Sie nun über die Funktion und den Einsatz dieser Technologien haben und geben Sie an, inwieweit Sie den folgenden Aussagen zustimmen.

	Stimme überhaupt nicht zu	Stimme nicht zu	Neutral	Stimme zu	Stimme völlig zu
(Wahrgenommene Nützlichkeit) Ich denke, dass kontaktlose Überwachungstechnologie in der Pflege meines Angehörigen nützlich sein kann … Zu diesem Zeitpunkt in meinem Leben	○	○	○	○	○

Wenn sich die kognitive oder körperliche Gesundheit meiner Pflegeperson verschlechtert	○	○	○	○	○
(Nutzungsabsicht) Ich würde kontaktlose Überwachungstechnologie in der Pflege meines Angehörigen nutzen wollen … Zu diesem Zeitpunkt in meinem Leben Wenn sich die kognitive oder körperliche Gesundheit meiner Pflegeperson verschlechtert	○ ○	○ ○	○ ○	○ ○	○ ○
(Einstellung) Es ist eine gute Idee kontaktlose Überwachungstechnologie in der Pflege meines Angehörigen zu nutzen	○	○	○	○	○
(Sozialer Einfluss) Meine Familie und Freunde würden es gut finden, wenn ich bei der Pflege meines Angehörigen kontaktlose Überwachungstechnologie einsetzen würde Die professionellen Pflegekräfte/ medizinischen Fachkräfte meines Angehörigen würden es gut finden, wenn ich bei der Pflege meines Angehörigen kontaktlose Überwachungstechnologie einsetzen würde	○ ○	○ ○	○ ○	○ ○	○ ○

(Wahrgenommene Benutzerfreundlichkeit) Die an das Überwachungssystem angeschlossene digitale Plattform (App) bedienen zu lernen wäre leicht für mich	○	○	○	○	○
(Begünstigende Bedingungen) Ich denke, dass ich das nötige Wissen und die Unterstützung habe/ bekomme, um kontaktlose Überwachungstechnologie in der Pflege meines Angehörigen zu verwenden	○	○	○	○	○

Teil 5D: Verschiedene Formen von Überwachungstechnologie

Wir sind nun beim letzten Teil des Fragebogens angelangt.
Häusliche Überwachungstechnologie im Allgemeinen kann verschiedene Geräte/Sensoren einsetzen, um Informationen über die tägliche Situation einer pflegebedürftigen Person zu erfassen. Diese Geräte variieren je nach Art des Kontakts mit dem Körper (kontaktlos, indirekter Kontakt, direkter Kontakt). Uns interessiert, was Sie von diesen Geräten halten.

Bitte geben Sie für jedes der unten aufgeführten Überwachungsgeräte an, inwiefern Sie dessen Einsatz für die Pflege Ihres Angehörigen für akzeptabel halten.

	Völlig inakzeptabel	Inakzeptabel	Neutral	Akzeptabel	Sehr akzeptabel
Direkter Kontakt					
Tragbare Geräte (Technologie, die am oder in der Nähe des Körpers getragen wird, wie z.B. Smartwatches, Mobiltelefone, tragbare Alarmknöpfe)	○	○	○	○	○

Indirekter Kontakt					
Objekt-gebundene Technologie: Sensoren, die an Gegenständen des täglichen Gebrauchs angebracht sind (z.B. Bewegungssensoren an Türen, am Kühlschrank oder an der Bettmatratze)	○	○	○	○	○
Kontaktlos					
Visuelle Geräte (z.B. Kameras, die anonymisierte Bilder erzeugen, d.h. Bilder, auf denen Gesichter nicht erkennbar sind)	○	○	○	○	○
Auf Ton basierende Geräte (z.B. Mikrofon, Smart Speaker)	○	○	○	○	○
Radiofrequenz Geräte (z.B. Sensoren, die an einer zentralen Stelle im Haus angebracht werden und Bewegungsdaten per Radar erfassen)	○	○	○	○	○

(Bildung)
Zum Schluss noch eine letzte Frage zu Ihrer Person:

Was ist der höchste schulische Abschluss, den Sie erworben haben?

a. Grundschulabschluss oder kein Abschluss
b. Haupt-/Realschulabschluss
c. Abitur

d. Berufsschulabschluss
e. Bachelor-/ Masterabschluss oder Diplom
f. Doktorgrad
g. Keine der genannten Optionen trifft zu

Appendix C

Normality Tests (Shapiro-Wilk)

Table D1

Normality Test (Shapiro-Wilk) for Demographics

Age	*W*	*df*	*p*
Age of participant (years)	.91	85	.000
Age of care recipient (years)	.92	85	.000

Table D2

Normality Test (Shapiro-Wilk) for Perceived Benefits

Perceived benefit	*W*	*df*	*p*
Cross-checking self-care information			
Better self-care surveillance	.83	85	.000
Eliminate unnecessary control visits	.90	85	.000
Extended independent living			
Detect and remove factors that hinder independence	.88	85	.000
Find optimal timing for transition to nursing home	.86	85	.000
Objective communication about care recipients' situation	.81	85	.000
Prevention of health risks	.76	85	.000
Emotional reassurance			
Feel reassured about safety	.78	85	.000
(Re)gain mobility and freedom	.92	85	.000

Table D3

Normality Test (Shaprio-Wilk) for Perceived Concerns

Perceived concern	*W*	*df*	*p*
Information overload			
Risk of being overloaded with too much information	.91	85	.000
Uncertainty of whether to respond to monitoring data	.91	85	.000
Risk of worrying for no reason	.90	85	.000
Privacy concerns			

Risk of losing control about data sharing	.90	85	.000
Trade-off privacy infringement versus benefits	.89	85	.000
Ethical concern (risk of replacing human contact)	.88	85	.000

Table D4

Normality Test (Shapiro-Wilk) for Intention to Use Contactless In-Home Monitoring

Intention	*W*	*df*	*p*
Overall intention	.94	85	.000
Current situation	.90	85	.000
Declined future situation	.85	85	.000
Intention to use for different purposes			
Recognition of urgent situations	.89	85	.000
Risk predictions	.89	85	.000
Monitoring of self-care behaviour	.89	85	.000
Monitoring of well-being during the night	.88	85	.000
Monitoring of long-term changes in health	.88	85	.000

Appendix D

Post-Hoc Wilcoxon Signed-Rank Tests for Intention to Use Contactless In-Home Monitoring for Different Monitoring Purposes

	Negative ranks			Positive ranks			Test statistic	
	n	Mean rank	Sum of ranks	*n*	Mean rank	Sum of ranks	*Z*	*p*
(Risk prediction) - (Recognition of urgent situations)	24	17.33	416.0	8	14.0	112.0	-2.921 [a]	.003*
(Monitoring of self-care behaviour) - (Recognition of urgent situations)	27	19.85	536.0	11	18.64	205.0	-2.501 [a]	.012
(Monitoring of well-being during night) - (Recognition of urgent situations)	23	18.26	420.0	14	20.21	283.0	-1.064 [a]	.287
(Monitoring of long-term changes in health) - (Recognition of urgent situations)	22	16.23	357.0	10	17.10	171.0	-1.803 [a]	.071
(Monitoring of self-care behaviour) - (Risk prediction)	19	18.24	346.5	19	20.76	394.5	-0.363 [b]	.717
(Monitoring of well-being during night) - (Risk prediction)	16	18.94	303.0	24	21.54	517.0	-1.489 [b]	.137
(Monitoring of long-term changes in health) - (Risk prediction)	13	14.27	185.5	18	17.25	310.5	-1.260 [b]	.208
(Monitoring of well-being during night) - (Monitoring of self-care behaviour)	13	14.88	193.5	19	17.61	334.5	-1.369 [b]	.171
(Monitoring of long-term changes in health)	8	12.13	97.0	14	11.14	156.0	-0.999 [b]	.318

- (Monitoring of self-care behaviour)								
(Monitoring of long-term changes in health) - (Monitoring of well-being during night)	19	15.08	286.5	13	18.58	241.5	-0.444 [a]	.657

*$p < .005$

[a] based on positive ranks

[b] based on negative ranks