A Qualitative Study: Exploring the Benefits, Barriers, and Needs of Nurses in Digitalized Care

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Word count: 9567

Abstract

Healthcare digitalization is spreading in the Netherlands to target the increasing demand for clients and healthcare workers. The impact of digitalization on healthcare workers and their experiences requires further investigation. Therefore, this study explored the experiences, benefits, barriers, and needs of nurses working in digitalized care settings through qualitative interviews with eleven nurses in the Netherlands. Results revealed joyful, positive experiences and frustrating negative experiences. The participants felt generally sufficiently educated to use technology at work but required more time and practical experience to adapt to their new working conditions. A novel work challenge was digitalizing clients. They further expressed suggestions for improving healthcare digitalization and recommended a personalized care approach. Results showed that digitalization has the potential to save time and reduce workloads through increased client self-reliance, which depends on technology, time, clients' needs, and their support network. In their practical experience, were these benefits experienced to a limited extent and challenged by barriers, such as product malfunctions, poor customer service, and long tool delivery times. Further, this study developed the CBTF framework, which indicated relevant factors and a holistic overview of technology adoption in care and provided a foundation for future research and organizational and educational improvements.

Keywords: Digitalization, Healthcare system, Nursing, Digitalized care, Qualitative research

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What will the future of care look like? Many countries, including the Netherlands, currently deal with demographic aging, hence a growing population of older people with increased life expectancy (Netherlands life expectancy 1950-2024, n.d.). In 2023 are, 26% of the Dutch population expected to be older than 65 (Statistics Netherlands, 2010, cited in Smits et al., 2013), and in 2050 are, 10,3% of the Dutch population expected to be older than 80 years (Statistics Netherlands, 2011, cited in Smits et al., 2013). In addition to that, is an increase in chronic diseases and multimorbidity expected (Skou et al., 2022). Therefore, the need for care is growing, but the care capacities are being challenged.

The main challenge is an existing and expected lack of healthcare professionals (Nardi & Gyurko, 2013; Reinert et al., 2012). Nurses in the Netherlands leave their position on average at 42 (Xu et al., 2023); if this trend continues, a shortage of 134.00 workers is

expected by 2032 (Nederlandse Gezondheidszorg, 2023, as cited in Kuffel, 2022). To address current challenges, the Dutch government enacted the Social Support Act 2015 (Ministerie van Volksgezondheid, Welzijn en Sport, 2022). This law outlines municipalities' responsibility in providing care and social inclusion for vulnerable groups of people while enhancing their self-reliance. In order to accomplish this, the Netherlands invests in healthcare digitalization (Ministerie van Volksgezondheid, Welzijn en Sport, 2022 Smits et al., 2013).

Digitalized care describes the integration of digital technology in healthcare. It can be categorized into three different types of technology (software, digital tools, sensors) and six different care steps (prevention, diagnosis, treatment, nursing, aftercare, and organization) (see Figure 1, Ministerie van Volksgezondheid, Welzijn en Sport, 2023). This study focuses on all types of technology within the care step of nursing.

Figure 1

Six types of digitalization within the fields of diagnosis, treatment, and nursing

Zorgstap → / Type ↓	Preventie	Diagnose	Behandeling	Verpleging	Nazorg	Organisatie
Software	Preventie-apps	AI bij diagnose-stelling	Begeleiding via app/online platform	Virtuele thuiszorg	Tele-revalidatie	Digitaal afspraken maken
Digitale hulp-middelen	Smartwatch	Darm-onderzoek met camerapil	VR-bril	Slimme medicijn-dispenser	Onder-steundende bril revalidatie	Logistieke robot
Sensoren	CO2-sensor roken	Meten slaappatronen slaapapneu	Realtime monitoring,	Leefstijl-monitoring	Sensoren voortgang revalidatie	Locatietags apparatuur

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Research displays that digitalization has benefits, such as enhanced patient care, workflow, and information availability (Wosny et al., 2023) and reduced healthcare costs (Duggal et al., 2018), but also barriers, such as workflow disruption, higher workload, and greater safety risk for patients (Wosny et al., 2023). However, additional research is required, especially on the impact of technology on nurses' work experience (Wosny et al., 2023). An in-depth exploration of their experiences is important to address further barriers and benefits along with an improved understanding of factors relevant to the acceptance and use of technology at work. There are several theories that explain aspects and mechanisms related to the adoption of technology.

One common model is Carl Rogers's diffusion of innovation model (Karnowski & Kümpel, 2015), which explains how innovations (e.g., healthcare technology) spread through society. The spread follows an S-shaped curve. Innovators are the first ones to adopt an innovation and are mostly risk-taking people with high societal and financial resources. The early adopters have similar characteristics and follow the innovator's steps. Moreover, they are driving the adoption process since they are "opinion leaders", which means that other people value their judgments. After them, the early and late majority accept the innovation. Resistant people (Laggards) are the last ones to accept the innovation. In addition to different groups of people, the spread of innovation depends on communication channels (e.g., media, education), time, the invented innovation, and the overall societal system.

Another framework from psychology breaks down an individual's problem into cognitive, emotional, and behavioral components (Simmons & Griffiths, 2017). This approach might also be beneficial for analyzing a person's challenges with technology adoption. Therefore, the following section discusses further theories of technology acceptance, with a focus on cognition, emotion, behavior, and the added category of environment.

The technology acceptance model (TAM) (Davis, 1985) is another prevalent model. It highlights two cognitive factors (perceived usefulness and ease of use) and states that a product is more accepted if it is perceived as useful and simple to use.

The UTAUT (Venkatesh et al., 2003) builds on TAM and proposes four factors influencing technology acceptance. The factors are performance expectancy, effort expectancy, social influence, and facilitators. Important cognitive factors are, hereby, performance and effort expectancy, which are similar and, hence, overlap with the perceived usefulness and ease of use of TAM (Davis, 1985). Moreover, the UTAUT model adds the factors of social influence and facilitating factors. Social influence is an environmental factor and is linked to a person's social work environment. Facilitating factors are the cognitive beliefs of being supported by an organization or technology. Therefore, it can be categorized as a cognitive and an environmental factor since it highlights a belief within the work environment.

The concept of technological frames of reference (TFR) (Orlikowski & Gash, 1994) is a social cognitive understanding of how different stakeholders of an organization perceive and interpret technologies within their organization. It highlights the importance of understanding a person's perception by explaining their experiences, beliefs, and social influences. The

factor of belief is hereby an important cognitive factor, whereas the factor of social influence is crucial in a person's social work environment.

Based on these theories and literature, the following sections cluster relevant factors for technology adoption into a cognitive, emotional, and environmental category.

Cognitive factors for technology adoption include thoughts (CBT by Simmons & Griffiths, 2017), beliefs (TFR by Orlikowski & Gash, 1994; UTATU by Venkatesh et al., 2003), and performance expectancy (UTAUT by Venkatesh et al., 2003)/perceived usefulness (TAM by Davis, 1985). Examples of cognitive barriers regarding technology use are unclear benefits (Schreiweis et al., 2019) and doubts about the utility and efficacy of a technological tool (Wosny et al., 2023). A cognitive benefit could be perceiving a tool as useful (Wosny et al., 2023).

The category of emotions generally includes the primary emotions of anger, fear, love, joy, surprise, and sadness, along with multiple sub-emotions (Hodder, n.d.). Hereby, anger, frustration, fear, and confusion (Wosny et al., 2023) are reported to hinder technology use, whereas joy, confidence, and satisfaction enhance technology use (Borges do Nascimento et al., 2023).

Within the category of environmental influences of utilizing technology are multiple factors highlighted in the literature. Time is one important factor with time constraints, increased workload (Borges do Nascimento et al., 2023), and insufficient workload integration (Wosny et al., 2023) hindering technology use. Training and education are also crucial elements. Hereby, hinders a lack of education and training (Schreiweis et al., 2019; de Leeuw et al., 2020) together with language and literacy barriers (Schreiweis et al., 2019) technology use, whereas comprehensive training (Wosny et al., 2023), effective training programs (Wosny et al., 2023) facilitate utilizing technology. The organizational/technological structure and support are other important environmental factors mentioned in the UTAUT (Venkatesh et al., 2003). Barriers include a lack of organizational support (Schreiweis et al., 2019) and financial constraints (Borges do Nascimento et al., 2023), whereas a supportive organizational structure is beneficial for digitalization (Wosny et al., 2023). A person's social work environment is, according to UTAUT (Venkatesh et al., 2003), TRF (Orlikowski & Gash, 1994), and further sources (Schreiweis et al., 2019; Borges do Nascimento et al., 2023) relevant as well.

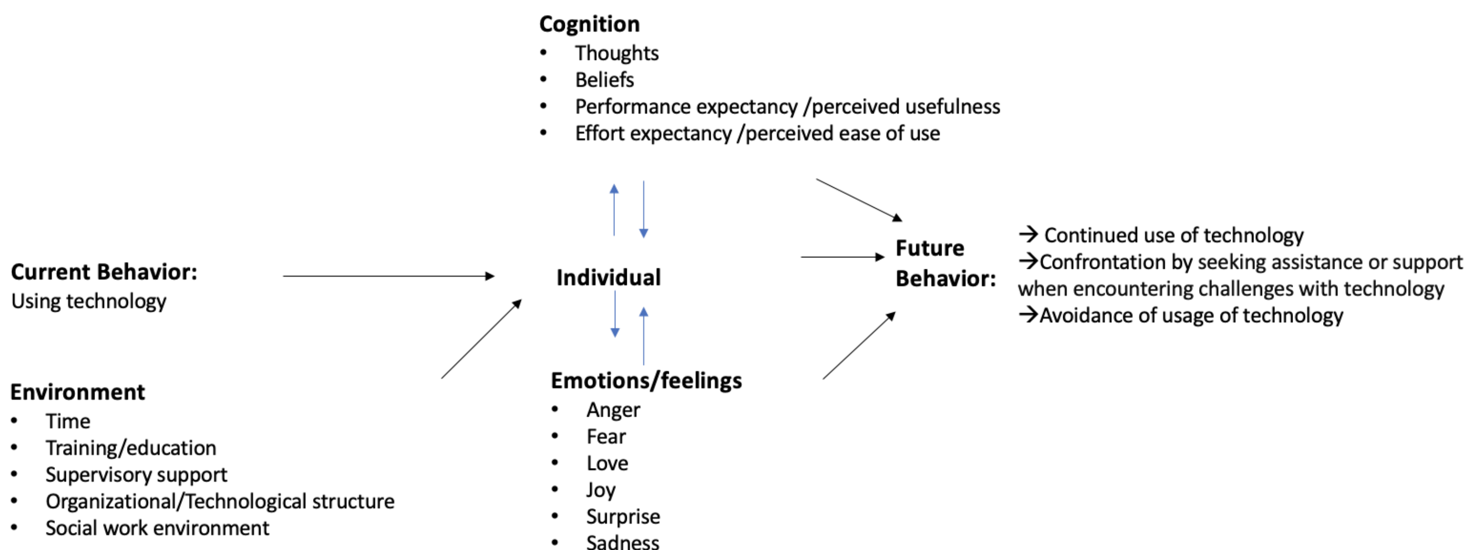
The above-mentioned factors are interconnected. An in-depth study (Leeuw et al., 2020), for instance, explained that insufficient digital education causes stress, frustration, and feelings of incompetence, which promotes technology avoidance, while sufficient training and

support enhances technology adoption. In this case, the environment (education) is linked to a person's emotions (frustration) and behaviors (avoidance). Therefore, it is crucial to explore multiple factors of cognition, emotion, environment, and behavior influencing an individual to understand their needs for technology use.

To acquire a holistic understanding of technology adoption, the following provisional and self-constructed framework (see Figure 2) has been made. The Cognitive-Behavioral Technology Integration Framework (CBTIF) illustrates the intertwined influence of environmental, cognitive, emotional, and behavioral factors on a person's technology adoption behavior. The environment influences the individual and consists of the above-mentioned factors of time, training/education, supervisory support, social work environment, and organizational/technological infrastructure (data security, technological safety). After a person engages in a specific behavior (e.g., using technology), their cognition and emotions are activated. Cognition includes thoughts, beliefs, and perceptions of the tool's usefulness/performance expectancy and the tool's ease of use/effort expectancy. A triggered emotion could be joy, anger, fear, love, surprise, or sadness. The cognitive and emotional experiences are interconnected; a feeling of joy, for instance, triggers positive thoughts about technology, and anger might elicit negative thoughts. In addition are, cognition, emotion, and past behavior interconnected and induce a person's future behavior. In the context of technology adaption are 1) continued use of technology, 2) confrontation by seeking support to address technological challenges, and 3) avoiding using technology, potential future behavior outcomes. In sum, the self-constructed CBTIF captures multiple cognitive, environmental, emotional, and behavioral factors and recognizes their interconnected dynamic in contributing to a person's technology adoption. The following research will develop this model further by confirming and identifying existing and other relevant factors for technology adoption in care.

Figure 2

Cognitive-Behavioral Technology Integration Framework (CBTIF)



Research on the impact of technology on healthcare workers shows varying experiences, such as fluctuating levels of work satisfaction (Härkönen et al., 2024). The research highlighted that digitalization has a huge impact on care and that more research is needed in digital care settings and among healthcare workers.

Within the context of digitalized care in the sector of nursing is Virtual/Digital Care (Home care in the Netherlands, n.d.; MobileCare, n.d) spreading in the Netherlands. Virtual/Digital care is a form of blended care, also referred to as hybrid care. This care approach addresses clients' needs by combining technology with a classic physical care approach. These technologies can be integrated into various settings ranging from people living in their own homes or care facilities. The tools include medication adherence, monitoring of vital signs (e.g., weight), verbal support for daily structure, and safe and healthy home living with passive and active alarm systems. Clients within Virtue/Digital care reported greater satisfaction and improved care quality (de Lange, 2021). Especially older people use Virtua/Digital care and are the target group of digital care since they are expected to live more independently through technology (Ministerie van Algemene Zaken, 2022; Smits et al., 2013). As a result, they are also one group that is mostly affected by it. Even though older people value certain aspects of using digital tools, such as improving social relationships and improved physical care, they often fear using technology due to a lack of skills and experience (Hill et al., 2015).

Therefore, research on the impact of digital tools in care settings needs to be further investigated (Härkönen et al., 2024). Since nurses are crucial in delivering care and influencing the successful integration of digital services (Konttila et al., 2019; Henry et al., 2017), more research is needed regarding their experiences with digitalized care.

This study adds knowledge to these gaps by examining nurses’ work experiences within digitalized care homes. Moreover, this study aids in understanding the benefits and barriers of using technology within care by investigating their needs and relevant factors for technology adoption. These results can be used by care providers to improve their current digitalization process. The following research questions are:

1. What are the experiences of nurses in using technology in digitalized care for older adults?
2. Which cognitive, emotional, behavioral, and environmental benefits and barriers do nurses experience when using technology?
3. What are the needs of nurses in digitalized care?

This research expects to find common and individual different experiences with technological tools, identifying factors such as individual characteristics, facilitators, benefits, and barriers that contribute to varying experiences. Moreover, it is expected to develop the CBTIF framework further by conforming relevant factors and adding new factors to outline a holistic view of technology adoption in care.

Method

Research Design

This qualitative study used semi-structured interviews for data collection and an inductive/deductive hybrid coding approach (Proudfoot, 2023) for the thematic analysis to explore nurses' experiences in digitalized care.

Philosophical Assumptions/Paradigms

The study was conducted from a constructivist point of view using interpretative phenomenological epistemology. This means the researcher explores and interprets how the participants make sense of their own experiences to gain knowledge about a person's subjective truths instead of objective truths. To accomplish this, the researcher actively interprets the data, has to self-reflect, and needs to be aware of potential biases (Churchill & Wertz, 2001; Levitt et al., 2017).

Researcher-as-Instrument Statement

This is the Master’s thesis of a 24-year-old female Clinical Psychology student from Erasmus University Rotterdam (EUR). She is from Germany and used to work as a nurse

helper in a nursing home, which contributed to her interest in the topic of healthcare digitalization. Since this study focuses on the Netherlands, she had to educate herself about the Dutch healthcare system. The research was independent, i.e., not commissioned by anyone, and was supervised by a specialized professor in behavior change from EUR.

Participants

The sample consisted of 11 females from the Netherlands with a mean age of 33.91 years (range 20-54), which aligns with the anticipated range of 9-17 interviews for exploring a topic in greater depth while achieving data saturation (Hennink & Kaiser, 2022).
One participant had to be removed because he was not working in the Netherlands, and one participant dropped out due to sickness (both were already excluded from the final sample size). A purposive sampling approach was used to include participants who work as registered nurses, nurse students, nurse coaches, and nurse team leaders for a minimum of one year in a digitalized care setting. The nurses received no compensation for participating in this study. One exclusion criterion was not working in the Netherlands.

Recruitment, Procedure, and Setting

An ethical committee reviewed the study to ensure compliance with the Code of Ethics for Research in The Social and Behavioral Sciences Involving Human Participants, which applies to all universities in the Netherlands.

After this, participants were recruited by distributing flyers (see Appendix A) in care facilities, social media posts (LinkedIn, WhatsApp, Instagram), and directly contacting care organizations via email. Two nurses reacted from the platforms; the other participants were from a cooperating care organization. This organization offered the researcher the contact details of some nurses. Those received an invitation email with an information letter and consent form (Appendix B). The responding nurses signed the consent form and scheduled an interview time slot. All participants opted for an online interview, which lasted 30-60 minutes, was audio recorded, and automatically transcribed by Google Teams.

The interviews started with a welcoming introduction and continued with reassuring consent and voluntary participation, along with addressing remaining questions. After this, the recording started, and the interview continued with closed-ended demographic questions and open-ended questions regarding nurses' experiences of digitalized care, according to the interview guide (Appendix C).

The transcribed interviews were anonymized, re-checked, and stored on a password-protected computer (MacBook Pro) from which only the researcher had access.
The data was thematically analyzed with AtlasTi, double-checked by a second coder, and destroyed from the computer after data analysis. While writing the report, the researcher reflected on potential biases and assumptions and excluded identifying information to ensure the participant's anonymity.

Material/Source of Data

An interview guide (see Appendix C) guided the semi-structured interviews, which contained closed-ended demographic questions and open-ended questions regarding the participants' experiences, benefits, barriers, and needs regarding technology in their work setting.

Planned Data Processing and Data Analysis

The data was thematically analyzed with the software Atlas ti. A hybrid analysis method was used, which is a combination of deductive (top-down) and inductive (bottom-up) coding. The theories of TAM, UTAUT, TFR, and CBTIF were used to deductively pre-code the data into cognitive, emotional, behavioral, and environmental barriers, benefits, and needs. Afterward, the data was inductively coded to identify further themes, topics, and factors. Overlapping themes and subthemes were summarized in a code book (see Appendix D), which was used to finalize the coding. To align with the intercoder agreement, two students used the codebook to recode each one interview. No major differences were noted in the codes from the second assessors and the researcher, which enhances the study's reliability and validity. For further reliability, the researcher noted the research process with arising thoughts, observations, and reflections in a journal. Moreover, literature on research trustworthiness (Morrow's, 2005), qualitative research (Castleberry & Nolen, 2018), hybrid data analysis (Swain, 2018), and COREQ (consolidated criteria for reporting qualitative research) (Torres-Gordillo and Rodríguez-Santero, 2023) was applied.

Results

Participant Characteristics

The participants (see Appendix E for a table of participant characteristics) were all female and included seven HBO nurses and three HBO nurse students. All participants had a Dutch nationality and worked in the Netherlands; one had a migrant background. Their mean

age was 33.91 (median 32, range 20-54). Two participants worked in a nursing home, and nine worked in home care. From the home care nurses were five active nurses; four were former community nurses whose roles changed from nursing to working as team coaches, nurse advisors, and digital coaches responsible for coordinating care, nursing teams, and integrating technology into care.

Experience of Nurses with Digitalized Care

Implemented Technology

The implemented technology in home care included over 50 devices, such as monitoring tools (e.g., blood glucose and blood pressure measures), safety products (e.g., alarm buttons and bed sensors), reminder apps, medication dispensers, and digital patient files. Nursing homes applied relaxation pillows, sensors, alarms, and a tablet system that contained digital patient records with care plans, reports, and a care app for staff communication.

Nurses Emotions

At the beginning of workplace digitalization, participants' initial emotions varied. Some expressed immediate enthusiasm and excitement: *"Oh, I got enthusiastic"* (Participant 12), whereas others were more skeptical regarding digitalization. *“Well, I was a little skeptical about it at first”* (Participant 1). Initial learning frustrations and stress were common but faded after exposure and training. The experiences remain mixed. On the one hand, those who encountered more positive outcomes (e.g., calmer patients, improved communication) expressed less stress and more joy and satisfaction at work. *“...but then I started using it myself and saw the benefits. And that's why my opinion has changed a lot, yes”* (Participant 1). On the other hand, those who mentioned more negative experiences (e.g., malfunctioning products, tools, and project overload) reported more stress, less trust, confidence, and motivation at work. Hereby, the negative reactions were linked to specific situations and less to the overall idea of digitalization.

Nurses Cognition

Nurses' cognition (Kluwe, n.d.) includes a range of mental processes (e.g., thoughts, beliefs, perceptions, and expectations) that help them understand their surroundings. All participants mentioned generally more favorable perceptions of the use of technological tools in the workplace, particularly in terms of their usefulness and benefits for future care and

clients; the benefits of their personal work were unclear for some nurses. They reported the usefulness of technology in addressing staff shortages, enhancing client independence, speeding up assistance, and reducing healthcare costs. Experiencing these benefits made them more optimistic, and they believed that future clients and colleagues would easily adapt to the technology as they become more familiar with it, *"Yes, it really helps us with that healthcare demand, which is now increasing. You really look at what can be taken over by those technologies"* (Participant 11). In addition, all participants reported having sufficient knowledge and skills to use tools at work. *"I find it easy to use"* (Participant 10). However, it has been mentioned that some older colleagues found technology less easy to use. Additionally, participants from home care mentioned more negative views on digitalization compared to nurses from nursing homes. Those negative perceptions were mainly linked to technical disruptions, such as malfunctioning products, slow customer service, long delivery lines, and difficulties integrating technology-resistant clients into digitalized care. These experiences led participants to expect that the use of technology could have negative consequences for their work, such as increased work time, workload, and stress. *"No, no, I thought those disruptions were important to report because they significantly impact our work. You can really see that nine colleagues have a negative outlook because of the frequent glitches. They are less motivated to use the tool because it causes them stress whenever it malfunctions. It's frustrating when it doesn't work as expected"* (Participant 11).

Nurses work Environment

The following section focuses on nurses' work surroundings and describes aspects of their working conditions and factors that changed within their environment through workplace digitalization.

Training/Education Organizational Support

Digital training and education, along with organizational support, were important for healthcare workers to acquire the necessary skills to use technology at their workplace. In general, participants felt supported by the organization and considered their training to be sufficient. The training varied within and between organizations. Education within home care included tool demonstrations, various meetings, brainstorming sessions regarding client digitalization, and accessible online videos regarding various tools. Within nursing homes, voluntary training was mentioned, but the nurses did not attend and received an explanation from colleagues instead.

Participants highlighted that they learned using technology best by being exposed to it, hence "learning by doing," while being supported by staff. Some nurses recommended training improvements by suggesting additional training, such as conversation training, to acquire motivational techniques for convincing and educating clients and their families to use technology. *“Colleagues, especially older ones but also younger ones, found it very difficult to have the conversation with the client and caregivers. Especially when there is a lot of resistance, so they lack conversation techniques”* (Participant 12). Furthermore, home care nurses criticized the slow customer service and highlighted those delays made clients’ transition to digital care difficult since they adjusted to physical care within the waiting time.

Colleagues’ Attitudes/Beliefs and Behaviors

Colleagues are another factor in a nurse’s work environment. The staff’s digitalization engagement varied, with decreasing tendencies and lower engagement in older and technology-resistant nurses. *"It was difficult at first, but now colleagues are more open"* (Participant 1). Training, exposure, support, and nurse coaches’ motivation through sharing positive experiences and emphasizing the added value of the tools were mentioned to support the adoption process. Additionally, a nurse coach noted that future technology adoption may be easier as younger, more technologically familiar nurses and clients enter the field.

Clients’ Attitudes/Beliefs and Behaviors

Clients are another crucial aspect of the nurses' work environment. Especially older and dementic clients have been described to resist using technology. This has been reported to be challenging for nurses since one of their tasks in digitalized care is to integrate clients into using technology. The assumed reasons for client resistance are fear of technology and change as well as a preference for direct nurse contact for a greater sense of safety and opportunities for social interactions. Lack of skills and knowledge, lack of resources (e.g., Wi-fi, smartphone), incorrect use of (e.g., standing improperly on a scale), or forgetting to utilize technology (e.g., alarms) are additional reasons for client resistance. *They are so afraid of everything that has to do with electricity and digitalization. They just want to keep doing things the old-fashioned way...people just refuse"* (Participant 3). Moreover, clients often relied on family support for tool adoption. Their families have a crucial role in convincing, explaining, installing, and integrating technology *„They often need to consult with their children about it”* (Participant 1).

Nurses handled resistant clients in a different way. Some remained calm and offered them a sense of choice by telling them they could try out the tools and stop it if the client were dissatisfied, whereas others approached clients in a more direct and dominant manner *“We explain the new way of working and emphasize the importance of self-reliance. If clients refuse, we highlight that it's either using the technology or reducing our visits. This often helps them understand the necessity and agree to the new methods”* (Participant 8).

They reported that after tool installation, clients asked fewer questions, adjusted to the new situation, and developed more favorable perceptions of the tools through positive experiences (e.g., improved self-reliance and safety). Negative experiences (e.g., malfunctioning products) lead to stress and resistance.

Workload/Time/Tasks

Workload, work time, and work tasks are other important factors in nurses’ work environments. These factors are interconnected since workload refers to tasks that need to be completed within a certain time (Workload, 2024). The general workload level was mixed, with some mentioning high, some medium, and some low levels. Moreover, the impact of digitalization on workload was small with mixed effects. Some mentioned no effect, a small decrease, or a small increase in workload. The effect of digitalization on workload depended on technologies impact on saving time.

The time-saving aspects of digitalization relied largely on tool type, client needs, and the degree to which it replaces physical care. Tools like medication boxes, sensors, and monitoring vital signs were reported to have the potential to save more time. *"It can save time... With some tools, yes, with others, not”* (Participant 12). One nurse explained that if a client self-monitors their blood glucose, fewer visits are necessary, which saves time. However, if the nurse still needs to visit the client for other physical tasks, they save less time. Further time-consuming tasks included learning and adapting to the new tools, requesting them, convincing clients and families to use them, managing agreements, and installing the tools *“Installing it is a lot of work”* (Participant 7). Moreover, technical disruptions (e.g., false alarms, malfunctioning products) were reported as time-consuming.

Time-saving aspects of digitalization included automation, accurate documentation, and improved communication. Some vital signs, such as weight and blood glucose, were measured independently by clients, and the tools automatically uploaded the measured data to the patient's record, resulting in more accurate records and less bureaucratic reporting tasks. Visible work schedules and the ability to contact staff remotely have improved staff

coordination and communication with colleagues, while alarm buttons further reduced unnecessary visits while ensuring quick response in emergencies *"It is immediately automatically digitized in the file"* (Participant 11) *"Everyone can access it, making the transfer of information clear... you can always log in and access data. That's nice"* (Participant 7).

Nurses Experienced Benefits, Facilitators, and Barriers

Table 1 and Model 1 below (see Appendix G for a table with added quotations) summarized the cognitive, emotional, behavioral, and environmental facilitators, benefits, and barriers of technology in nurses' work routines.

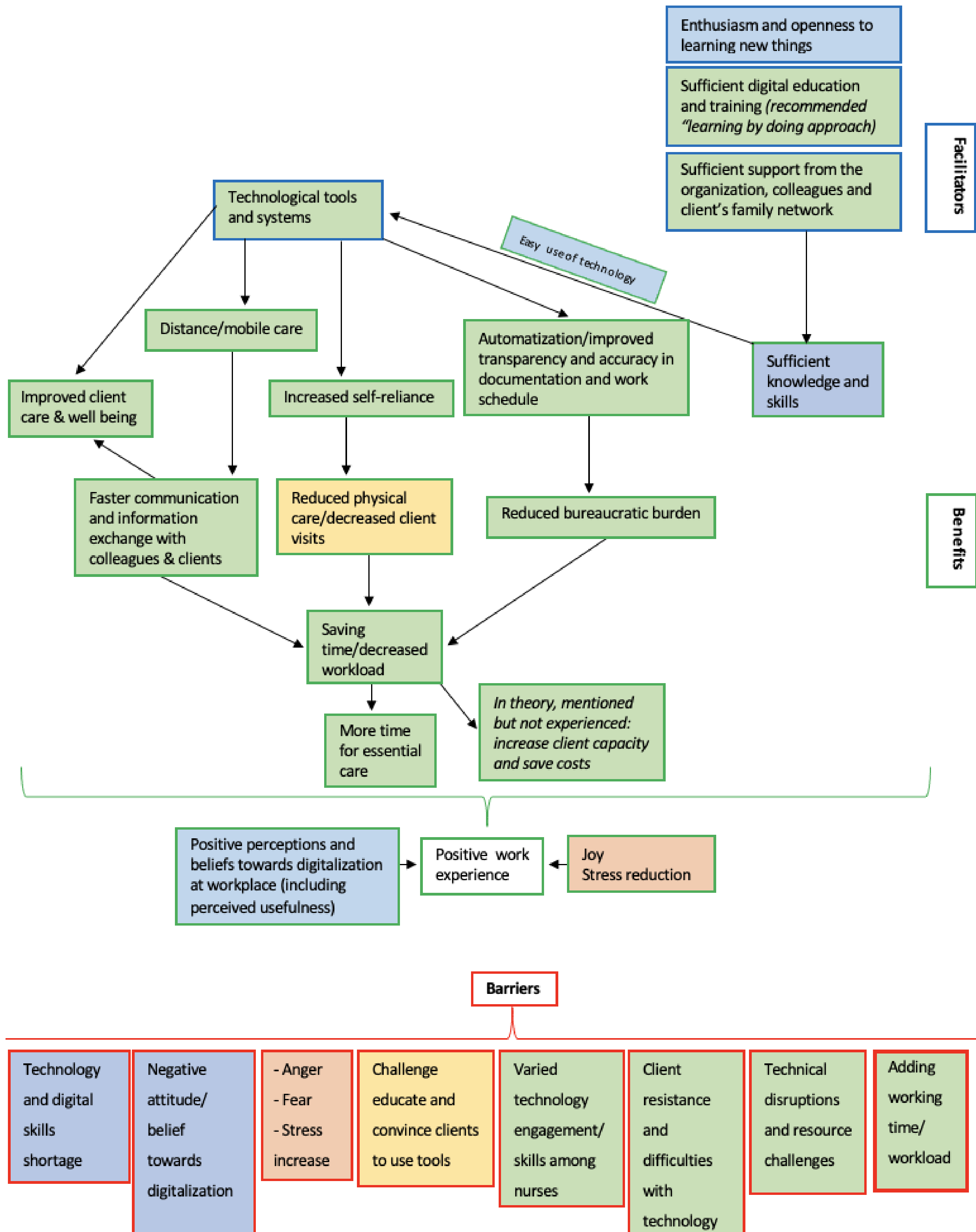
Table 1

Experienced facilitators, benefits, and barriers of nurses in digitalized care (Table)

	Facilitators	Benefits	Barrier
Cognitive	• Enthusiasm and openness to learning new things	• Sufficient knowledge/skills and ease of use • Positive attitudes and beliefs towards digitalization (Including perceived usefulness of tools)	• Technology and digital skills shortage • Negative attitude/belief towards digitalization
Emotion/ Feelings		• Joy • Stress reduction	• Anger • Fear • Stress increase
Behavioral		• Decreased client visits	• Challenge educate and convince clients to use tools
Environmental	• Technological tools and systems • Sufficient digital education and training *(recommended "learning by doing approach)* • Sufficient support from the organization, colleagues and client's family network	• Automatization/improved transparency and accuracy in documentation and work schedule • Reduced bureaucratic burden • enhanced client care, health, and well-being • support networks • Enhanced mobility, remote supervision • increased client independence • More efficient work time/decreased workload • Faster communication and information exchange with colleagues & clients	• Varied technology engagement/skills among nurses • Client resistance and difficulties with technology • Technical disruptions and resource challenges • Adding working time/workload

Model 1

Experienced facilitators, benefits, and barriers of nurses in digitalized care (Model)



Facilitators and Benefits

Nurses have mentioned various facilitators and benefits of digitalized care. Cognitive facilitators were initial enthusiasm and openness to learning new things. Environmental facilitators included sufficient digital education and training with a recommended "learning by doing approach" and a strong organizational and colleague support network. This helped them acquire the necessary skills for simplified technology use.

Likewise, properly working technological products were relevant for achieving beneficial outcomes such as increased client independence and reduced physical client visits. *"If someone needs insulin, they can show the pen in front of the screen, inject it while on the video call, and a care moment takes place without a physical visit"* (Participant 8).

Moreover, technology facilitated the automatic transfer of clients' data (e.g., vital signs) to their patient files, which improved transparency and documentation accuracy while reducing administrative burdens on nurses. *"Yeah, I think it's a benefit because you don't have to manually enter it into their file. You have everything at hand automatically. The scale also indicates if there's an increase or decrease in weight."* (Participant 5).

Communication tools (e.g., tablets, alarms) improved communication from a distance and faster information exchange, which gives nurses more time for essential care tasks and is thought to increase client capacity and save costs. However, the increase in client capacity and cost-saving aspects have not been experienced.

Some other tools improved clients' well-being and keep them better connected to their families. Other tools impacted clients' health positively through thorough documentation and a faster response in emergencies through alarms and sensors.

Overall, the various benefits enabled nurses to have a positive work experience, which is linked to positive emotions such as joy and satisfaction and reduced stress. This also enabled positive experiences and beliefs about digitalization in their workplace and helped them perceive its usefulness.

Barriers

Multiple barriers hindered the above-mentioned and reported the potential of digitalized care.

Cognitive

Cognitive barriers that hindered tool integration were knowledge and skill gaps, including unclear benefits of digitization and lack of knowledge about tools used inside and generally outside of the organization. *"Knowledge shortage is a major disadvantage. Employees might be reluctant or need to cross a threshold because they don't fully understand how it works…Standard tools are used, but new ones are not well known" (Participant 10).* Moreover, client resistance, technical disruptions, long waiting lines in customer service, and tool delivery resulted in negative attitudes and unfavorable perceptions regarding digitalized care.

Emotional

Emotional barriers included annoyance, frustration, feelings of pressure and stress from malfunctioning products, digitalizing technology-fearing clients, project overload, staff shortage, and increased documentation requirements.

Behavioral

Participants mentioned the main behavioral challenges were persuading and explaining the use of technological tools to clients and their family members.

Environmental

Environmental barriers included varied technology engagement and skills among nurses, client resistance and difficulties with technology, technical disruptions, and added workload/work time. Those factors have been previously discussed in greater depth.

Needs and Suggestions of Nurses in Digitalized Care

Table 2 below (see Appendix F for a table with additional quotations) displays an overview of nurses' needs and suggestions regarding digitalized care.

Table 2

Needs and suggestions of nurses in digitalized care

	Organization	Training education	Technology	Personalized care	General needs for adaptation
Needs and Suggestions	• Clear digitalization vision • Enhanced collaboration and networking within the Netherlands • Standardizing digitalization during intake • Seamless tool request and delivery (product flexibility)	• Motivational interviewing • Multidisciplinary meetings • Specialized training for digital coaches/nurse leaders • Regular evolution • Options for more training • "Learning by doing"/ hand on learning experience	• Simpler and reliable tools • Unified electronic files • Interconnected products • More engaging design e.g., colorful tablets	• More video contacts • Client focused approaches • Support for clients with poor family contact	• More time • Positive work experience • Less technological disruptions

More Time for Technology Adaptation and Integration

All participants mentioned that adaption took time, effort, and exposure. Nurses' time for adapting to digital care took longer than the provider anticipated. *"…It really takes about 3-4 months because colleagues need to change their mindset,…It takes weeks, even months"* (Participant 12). Therefore, nurses suggested a slower, less pressured integration approach with sufficient time and exposure to properly adapt to their changing work expectations. Moreover, nurses mentioned the importance of positive experiences for which the facilitation and experience of the above-mentioned benefits are needed to acquire a positive attitude toward digitalization.

Training/Education

Nurses highlighted the need for improved digital training and education. They suggested more frequent and consistent training, team meetings, evaluations, multidisciplinary meetings (including people from multiple professions, e.g., doctors, nurses, and social workers), structured card index sessions for structured client discussion, and specialized training for digital coaches.

Furthermore, conversation techniques and motivational techniques for client digitalization talks were reported. Another nurse suggested mandatory digitalization talks with dedicated personnel for explaining and demonstrating tools to clients instead of adding this task to the nurse's workload. Regarding learning approaches, recommended nurses "learning by doing" as an approach and suggested a tool showroom for hands-on tool training. *"Learning by doing is essential"* (Participant 10).

Organizational Structure and Support

Concerning organizational structure and support, suggested nurses a clear organizational vision for digitalization, which is thought to provide better guidance and improve motivation. *"Everyone should tell them that it's how we work, so that helps with the mindset"* (Participant 12). Furthermore, nurse coaches recommended a greater collaboration of digitalization projects and ideas between Dutch care companies. Additionally, they emphasized on improved tool requests, delivery, and customer service.

Technology/ Tool Suggestions

Further suggestions included more engaging tool designs (e.g., colorful tablet) and an improved client issue overview to check which issue can be approached with which product. Due to long delivery waiting times and explaining the products to clients mainly with video material, one nurse suggested having some products stored close by for faster access, client presentation, and installation. Interconnected products, smart technologies that self-improve, and unified electronic files have been mentioned for the future of care. Unified electronic files are digital systems that integrate a person's various data in a standardized format that is accessible from various platforms and organizations.

Personalized Care

Participants expressed a preference for personalized care. Personalized care is a client-centered approach that involves understanding clients' conditions and preferences while taking nurses' needs into account. It encourages an open dialog to discuss concerns and provides education and care options for shared decision-making. More specific suggestions included enabling clients to have more video contact to connect them more with their families.

Discussion

This study interviewed nurses about their experiences, benefits, barriers, and needs in digitalized care. These insights are crucial for a thorough understanding of their work experiences and give insight into the successful integration of technology in care.

Principal Findings

Facilitators included having sufficient digital education and a strong organizational support network to acquire the necessary skills in order to use technology effectively. Properly functioning products improved communication with colleagues and clients, reduced bureaucracy and accurate documentation, enhanced clients' self-reliance, and reduced physical client visits. These benefits contributed to joyful, positive work experiences and positive attitudes toward digitalization. However, barriers such as challenges in digitalizing technology-resistant clients (convincing and educating clients to use tools, tool delivery, and installation) and varying engagement levels of nurses, which were prominent in older workers and technical disruption hindered the full potential of digitalization and contributed to frustrating, angry working experiences with negative attitudes towards digitalization.

The barriers and benefits affected nurses' working time and workload. Some participants recognized a slight reduction of workload, some an increase, and some no effect. However, most nurses believe in the future potential of digitalized care.

Regarding the future of care, nurses reported a need for more time, personalized care, greater collaboration within and across organizations, a clear organizational digitalization vision, faster tool delivery, improved customer service, more reliable and functioning products, more consistent and frequent evaluations and meetings, and improved digital training that conversation skills for digitizing clients.

Theoretical Discussion

Nurses' emotions about digitalization were mixed, with some expressing initial excitement or skepticism, feeling stressed and frustrated in the learning/integration phase, resulting in emotions of joy and satisfaction with positive work experiences (e.g., calmer patients) and emotions of anger, stress, and frustration in negative experiences (e.g., false alarms). Fear has been mainly observed in older colleagues and clients. The study reported emotions of joy, anger, and fear, which can be filtered out from Hodders' (n.d.) sheet, which covers all emotions. Furthermore, the results align with Wosny et al. (2023), who displayed that digitalization often leads to anger, frustration, and fear but does not fit with its observed

feelings of surprise and confusion. Joy, however, was linked to successful tool integration just as Borges do Nascimento et al. (2023) noted. Generally, the results show that emotions change within the digitalization process, with positive work experiences evoking joy and negative work experiences anger.

The staff and clients displayed varying technology engagement levels, with more people gradually adapting to technology over time. Older nurses and clients have been reported to exhibit more challenges with technology adoption. Therefore, digitalization is assumed to accelerate in the future since younger, technology-skilled generations enter the system. The increase in technology adoption aligns with Rogers's Diffusion of Innovation model, which explains how innovations spread through society and how individuals adopt inventions at different stages (Karnowski & Kümpel, 2015). Further analyzing the adoption trend in digitalized care is crucial for understanding the acceptance process of more resistant people within care.

One new work challenge reported by nurses is the integration of technology-resistant clients. Hereby, convincing and educating clients, along with tool installation, were reported as difficult. These challenges have not been addressed in previous literature. Nurses highlighted that the integration of resistant clients requires time, education, and support to elicit a mental and physical shift from traditional physical care to prioritizing technology-focused care. Moreover, the client technology resources and family network have been mentioned to enhance the digitalization process. In sum, these findings provide new insights into the crucial role of clients, their networks, and new work challenges of nursing within digitalized care.

Nurses reported that they need adequate education and organizational support to develop the skills to use technology. According to TAM (Davis, 1985), perceived usefulness and ease of use are key factors for adopting technology, and this study confirms these factors. Developing the necessary digital skills is crucial for simplified tool utilization. While participants saw the benefits of digitalization for clients and future challenges, some were uncertain about its advantages for their personal work. Overall, education and support are essential for technology adoption.

The education and organizational support have been rated as sufficient by nurses but included various suggestions for improvements. These included more, more frequent trainings and meetings, multidisciplinary discussions, a clearer organizational vision for digitalization, enhanced tool requests, tool delivery, customer service, and greater hands-on learning training. The importance of training (Schreiweis et al., 2019; Wosny et al., 2023) and

organizational support (Venkatesh et al., 2003) was highlighted in previous literature. However, this study adds further insights and suggestions for organizational training improvements.

One reported advantage of digitalization is that properly functioning technology enhanced communication between colleagues and clients while reducing bureaucracy through automated, accurate documentation. This confirms Wosny et al. (2023) mentioning of reduced documentation and administrative work through digitalization. Moreover, this current study expands on this by offering examples of how this improvement occurs, e.g., tablet systems and tools automatically transmit vital signs to patient files and mobile communication with tablets. Overall, the findings confirm reduced bureaucracy, improved communication, and enhanced documentation through digitalization while providing insights into the underlying reasons.

Another reported main advantage is increased client independence, which is, according to literature, the main objective of digitalized care (Ministerie van Algemene Zaken, 2022; Smits et al., 2013). These results add that the degree of client independence relies on the type of tool, the client's needs, and how well the tool integrates with physical care tasks, such as whether the nurse still needs to visit the client.

The degree to which client independence and other factors affect Nurses' workload and work time were mixed. Some reported small workload/work time increases and decreases, and some mentioned no effects. However, most participants believed in the potential for future improvements. This aligns with previous research, reporting that digitalization improves workflow and efficiency (Wosney et al., 2023; Duggal et al., 2018) but also increases workload and disruption workflow (Wosney et al., 2023; Borges do Nascimento et al., 2023). This study outlines the underlying driving factors for these mixed outcomes. Proper functioning technology saves time and improves workflow, while malfunctioning products, poor customer service, and initial adaptation efforts increase workload. Hence, digitalization has the potential to save time and improve workflow if tools are correctly integrated and barriers are limited.

The effects of this study on cost reduction still need to be clarified since nurses have no insights into this. However, nurse coaches highlighted the cost-saving potential of digitalization. Therefore, the digitalization-induced cost reduction notion in literature (Duggal et al. (2018) remains unclear and needs further investigation.

Results highlight the importance of properly working technology. This has not been adequately addressed in previous literature. Regarding the tools being used, nurses expressed

requiring more reliable devices with easy installation and fewer disruptions, as malfunctioning products were a commonly reported issue. The specific recommendations included a client/tool overview for improved care planning, quick access for demonstrating tools, more engaging design, interconnected technologies, and unified electronic files. Hence, product quality is crucial.

Besides, the request for improved products highlighted nurses' desires for more personalized care, which has not been mentioned in previous research. Suggestions for enabling client centered care included video contact, opened dialogs to address concerns, and offering alternative support networks for clients with weak social networks. Since this insight is new, further research on the effects of personalized care is recommended.

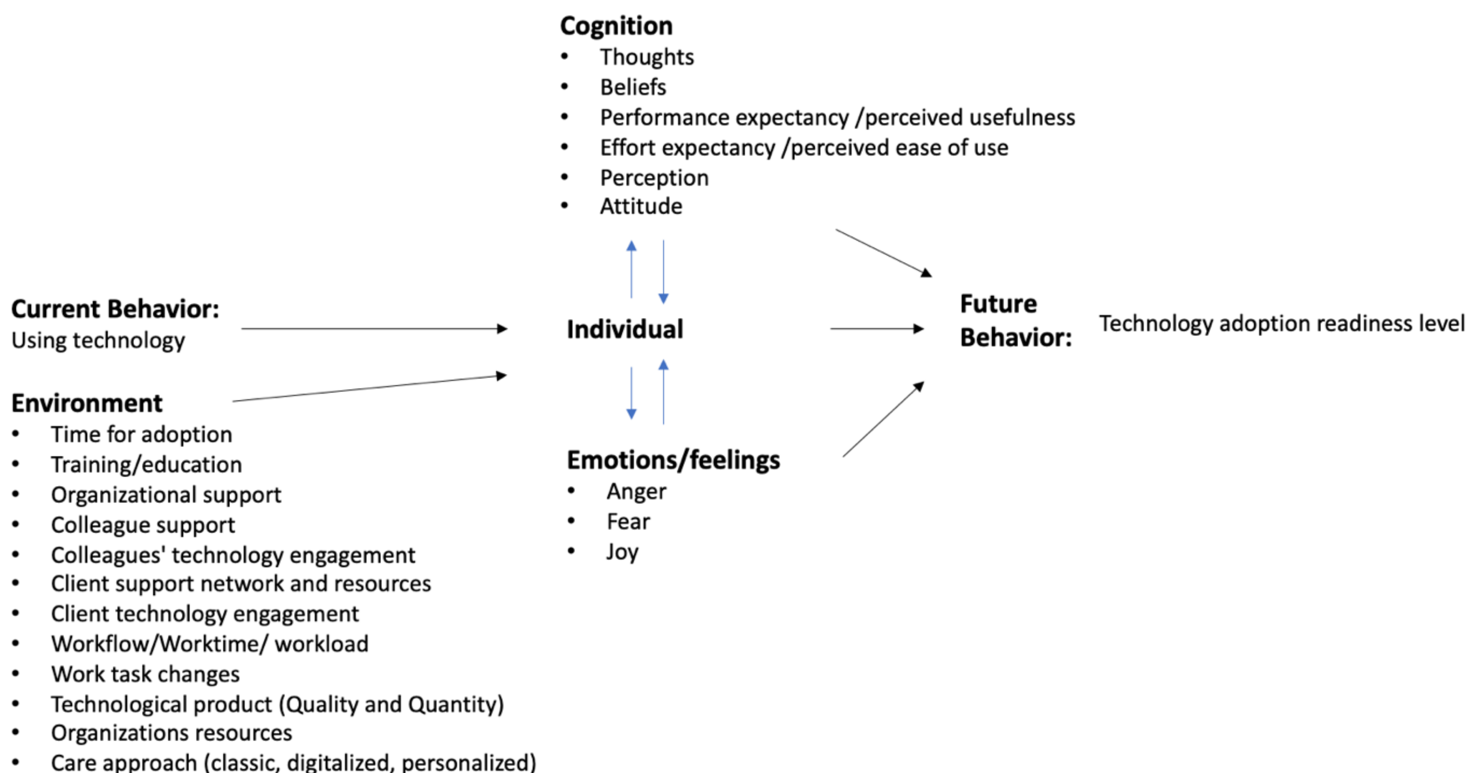
In conclusion, nurses reported joyful, positive-rated work experiences and anger-evoking negative work experiences. The effects on workload are small and mixed. Moreover, the technology engagement level of clients and nurses varied with an increasing adoption trend. Education and organizational support are crucial, and the main work challenges of nurses include digitizing clients. Furthermore, an emphasis on product quality was made since technical disruptions hinder the digitalization process. Further recommendations for technology, training, support, and a desire for personalized care have been reported.

Adaption of the CBTIF Model

At the beginning of the paper, the TAM, UTAUT, and TFR were summarized in the CBTIF model for a holistic understating of technology adoption. It recognizes the interconnected dynamics of behavior, environment, cognition, and emotion, which is crucial to understanding, explaining, and predicting an individual's behavior within the context of technology adoption.

Figure 3

Adapted Cognitive-Behavioral Technology Integration Framework (CBTIF)



Based on this study's results, the following adaptions of the model (Figure 3) have been made.

Within the emotion/feeling domain, the emotional spectrum has been narrowed down to the ones in the results, which are anger, fear, joy, and the added factor of stress levels.

Within the Cognitive domain, initial thoughts, beliefs, performance expectancy (perceived usefulness), and effort expectancy (perceived ease of use) remain crucial cognitive factors. The factor perception has been added to the framework as it highlights how someone interprets and makes sense of an experience. Attitude, which reflects a positive or negative evaluation of a situation (Krasny, 2020), has also been added since nurses clearly stated their likes and dislikes.

Future behavior outcomes have changed from a previous categorical approach to a more continuous and transitional approach. It is now called the technology adoption readiness level, which better fits the reported steady and slow adoption approach.

Regarding the environmental domain, time was previously mentioned as a factor since people require time to adapt to change. Training and education remain relevant factors for digital skill acquisition. The original factor of supervisory support has been expanded and subcategorized to various support sources. These include organizational support, colleague support, and client support. Moreover, nurses emphasized the importance of the client, which added the factor of client resources. A shift from classical to technology-focused care with a suggested personalized care approach has been reported. Therefore, the care approach has been added as another relevant factor to the model. The social work environment was

previously vague and has been refined to colleague support, workflow/work time/workload, and work task changes. Another addition to the model is the quality and quantity of technology. An additional relevant factor, which was mentioned less in the interviews but is still important, is organizational resources to have the general financial capacity for digitalization.

In summary, this framework illustrates a holistic view of factors relevant to technology adoption in care. These interconnected factors are categorized into cognitive, emotional, and environmental domains. Environmental factors are tangible and give opportunities for approaching proper technology integration. However, if not addressed, they can hinder technology adoption. Future research, companies, and educational programs can use this framework to assess specific or generally relevant factors for technology adoption.

Strength and Limitations

Strength

This study is, to a limited extent, generalizable to the nursing population in the Netherlands. A convenient sampling method resulted in a sample of varying demographics, including varying ages (20-52), work settings (home care and nursing homes), and professional roles (students, nurses, coaches, and team leaders). This diversity of participants provided insights into a broader spectrum of experiences. Furthermore, qualitative interviews were used as a research method, which has multiple strengths.

Firstly, qualitative research offered in-depth experience-based data for gaining insights into participants' subjective experiences. Their lived work experience has been previously reported to be underrepresented in research (Wosny et al., 2023; Härkönen et al., 2024). Therefore, this study adds knowledge to this gap by offering a valuable understanding of nurses' work experience. Hence, interviews allow for a more thorough and comprehensive understanding of nurses' perceptions and influential factors within healthcare digitalization.

Secondly, the qualitative method offers context-specific information and, thus, specific information about the working conditions, challenges, and opportunities within their digitalized work environment. These insights, especially the identified barriers, are relevant for facilitating a proper digitalization process.

Lastly, this research developed the CBTIF framework to enable a holistic understanding of factors that influence technology adoption among healthcare workers. This contributes to a holistic understanding of the complex and intertwined challenges of workers within digitalization in care.

Overall, the results not only explain phenomenological experiences and perceptions but also reveal contextual influences and subjective interpretations of nurses' understanding of digitalization. These specific and general insights contribute to a thorough understanding of how digitalization affects nurses' work.

Limitations

One limitation of this qualitative research is its limited generalizability. With a sample of 11 participants, data saturation was reached (Hennink & Kaiser, 2022). However, the convenience sampling methods resulted in a sample of participants who were more comfortable discussing technology, which excludes technology-resistant nurses. This minor group of people is difficult but crucial to engage and has been indirectly addressed within this study by participants referring to technology-avoiding colleagues. However, more research on resistant nurses is crucial, and this is the reason for the limited generalizability of the entire nursing population.

Moreover, it is important to acknowledge potential biases from the researcher and the participants, which might influence the data. The researcher's subjective beliefs, interviewing techniques, and analytical skills can influence the data collection and analysis. Despite the researcher's intention to remain neutral and unbiased throughout the study process, there are factors subconsciously influencing the data. The researcher limited the influence of these factors by keeping her assumptions regarding digitalization unknown to the participants and asking open-ended questions to prevent influencing the participant's answers.

The participant might also be biased. One common bias is social desirability; whereby participants provide responses, they believe will be perceived as more acceptable or favorable than their true beliefs. In the interview, the participant expressed strong support for the theoretical idea of healthcare digitalization despite reporting minimal impact on their current work environment. This suggests a significant gap between the idealized vision of digitalization and their actual experiences. Their positive attitude towards digitalization might also affect participants' ability to accurately recall their true experiences, e.g., negative experiences were not perceived as less severe. An awareness of these potential biases is crucial, although, to some extent, unavoidable in qualitative research.

Practical Implementation

The results can be applied in various ways. One main barrier in nurses' digitalized work routines is technical disruptions caused by malfunctioning products. This could be

counteracted by thorough product testing before implementation and extending different care facilities (Thomke & Bell, 2001). Further technical suggestions based on the results include more engaging product designs, interconnected smart products/systems, and unified electronic records.

Moreover, the results highlighted the importance of training, education, and support for technology adoption and offered suggestions for improvement. Nurses recommended more frequent and structured training, general meetings, multidisciplinary meetings, and evaluations. According to nurses, the training should include more hands-on experience, a show tool room and specialized staff for client digitalization talks, and conversation techniques for proper client digitalization talks. This training is recommended across organizations and should take the varying levels of staff skill into account. Training for nurses in new roles as coaches was mentioned, given that such training had not previously been offered. Also, the results displayed that staff digitalization took longer than anticipated. Therefore, time and less organizational pressure are suggested. An organizational vision and digitalization plan would support staff in visualizing and mentally preparing for the future of digitalized care by also explaining the potential benefits of digital care for nurses.

Lastly, this study developed the CBTIF framework for technology adoption. Future research, as well as companies and educational programs interested in technology adoption, can use this framework to gain an overview of key factors important for an individual's readiness for adopting new technologies.

Implications for Research

This study provided insights into the lived experiences, benefits, barriers, and needs of healthcare workers in digitalized care and the factors needed for a successful digital transformation in healthcare.

Future research could explore the topic of resistance to change, hence investigating the major causes of resistance to digitalization and further factors relevant to technology adoption. One way to achieve this is to interview technology-resistant, technology-uninterested, and older nurses and clients to better understand these practical groups of people. Therefore, further in-depth interviews or case studies are recommended.

In addition, longitudinal studies on various digitalization pilot projects could be developed, and their impact on nurses and patients could be accessed over a longer period of time. Such projects could include pilot studies on educational programs and campaigns

focused on digital education and integration, with a pre-test/post-test design to measure participants' skills and knowledge before and after the program to assess its effectiveness.

Moreover, a comprehensive overview of the current state of digital integration across healthcare systems within the Netherlands and Europe is essential for gaining a wide-ranging overview of the current state and process of digitalization in healthcare. This could include mixed-method surveys with quantitative and qualitative data from various healthcare companies. The data could list currently integrated and future planned technology, the level of staff training, competencies and motivation of workers, organizational readiness for digital transformation, including infrastructure and leadership, and staff and clients' satisfaction with workplace digitalization.

Addressing all of these research areas is crucial and can contribute to an improved understanding of digitalization and aid in facilitating healthcare digitalization.

Conclusion

This study explored the experiences, benefits, barriers, and needs of nurses who work in digitalized care. Results showed joyful, positive experiences and frustrating negative experiences. Participants felt sufficiently educated to use tools but recommended more training, including a "learning by doing" approach. One of their central work challenges was digitalizing client care. Nurses emphasized that clients' self-reliance depends on the specific tools, the needs of the client, and the extent to which technology can take over physical care tasks. Additionally, clients' support networks play a crucial role in facilitating their adaptation to digital tools, further highlighting the need for personalized care approaches.

Generally, digitization has the potential to save time and reduce workload but is challenged in reality by barriers such as malfunctioning products, poor customer service, and long tool delivery times. Moreover, this research developed the CBTIF framework, which provides a holistic understanding of a person's technology adoption and can be used in future research, education, and organizations to implement more technology. Future research should investigate technology-resistant clients and the long-term effects of digitalized care. Furthermore, nurses noted recommendations for product and training improvements. In general, digitalization has the capacity to enhance care efficiency and quality as long as it is properly integrated and thoroughly addressed.

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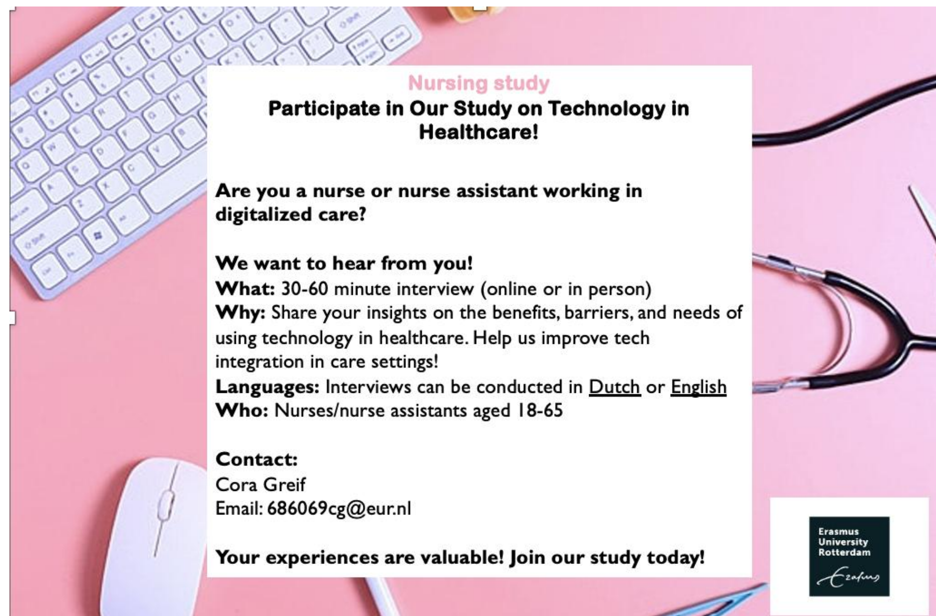
Appendix A: Flyer



Appendix B: Information Sheet and Informed Consent Form (English/Dutch)

Erasmus University Rotterdam *Information sheet and Informed consent Form (English)*

Informed Consent Form for Interviewee_______________

Cora Greif
Erasmus University Rotterdam
FSWP01 Master Thesis

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you choose to participate)**

Part I: Information Sheet

Study Title:
A Qualitative Study: Exploring the Barriers and Benefits of Healthcare Workers' Experience with Technology in Digitalized Care

Introduction
I am a Clinical Psychology Master’s student from Erasmus University in Rotterdam and am conducting interviews as part of the course “FSWP01 Master Thesis.” The interviews will explore

the experiences, benefits, barriers, and needs of nurses within a digitalized care workplace, hence using technology. The interview will last 30-60 minutes and will be voice-recorded and transcribed via Google Teams. All collected data will be used exclusively for this research, and all information remains confidential.

Purpose of the Interview

This research aims to determine the individual experience, benefits, barriers, and needs of nurses with technology within digitalized care settings. Understanding these factors is crucial for improving their experiences and technology adoption within healthcare.

Procedures

The interviewer/ researcher will briefly introduce herself and provide information about the research and the purpose of the interviews. Only the interviewer and participant will be present during the interview unless the participant would like someone to attend during that time. The interview questions will be automatically voice recorded and transcribed and cover broad demographic information and explore topics of needs, barriers, and benefits of using technology in care. If the participant would rather not answer any question during the interview, they will be allowed to indicate that, and the interviewer will proceed on to the next question or stop the interview. The identities of the participants will be kept confidential, and the names are anonymous in the data analysis and results. Moreover, the interviews will be recorded and transcribed through Google Transcript, which will be stored on a password-protected computer. This data will not be available to anyone besides the researcher and perhaps a second reader and thesis adviser. Thematic analysis will be performed on the transcribed interviews according to ESB (Department of Education and Social Science) standards. The analysis aims to identify patterns and overarching themes from the qualitative data. After the analysis, the data will be deleted and destroyed from the computer to ensure the participants' confidentiality and anonymity. The researcher will thoroughly check the data before reporting it so that no details can identify the participants. The researcher will also reflect on their biases and assumptions to increase the validity of the research findings.

Methodology

This qualitative study will use semi-structured interviews and seeks a minimum of 12 nurses/nurse assistants aged 18–65 years from various care homes in Rotterdam. The interviews last 30-60 minutes and can be conducted face-to-face or online, depending on the participants' preferences.

Participant Rights

Participation in the interview is voluntary, and the participant has the right to withdraw from the interview at any time without consequences. During the interviews, you can ask questions and seek clarity at any given time.

Anonymization and Confidentiality

This research is confidential, and the participants will remain anonymous. The interviews will be automatically transcribed and voice recorded, and this data will only be retained for analysis and deleted once the interviews have been analyzed. In addition to providing the participant's anonymity, the researcher and the second coder will accurately review the data to guarantee that no identifying information is included in the report. Participation is voluntary, and participants can withdraw at

any time without consequence. By participating, the participant gives consent to the automatic transcription and use the anonymized data for research purposes.

Contact Details:
If you have any questions, concerns or wish to withdraw from the interview, please feel free to contact me:

Full Name: Cora Greif
Student Number: 686069
Email: 686069cg@eur.nl
Phone: +4915753375698

Supervisor Information: The supervisor for my group in the course is:
Trainer's Name: Paul Kocken
Email: kocken@essb.eur.nl

Part II: Certificate of Consent

I have read the above-written information or had it read to me. I have had the opportunity to ask questions about it, and any questions I have been asked have been answered satisfactorily. I consent voluntarily to participate in this study.

Name of Participant__________________

Signature of Participant ___________________

Date ___________________________
Day/month/year

Erasmus Universiteit Rotterdam *Informatieblad en toestemmingsformulier (Dutch)*

Informatieblad voor geïnterviewde

Cora Greif Erasmus
Universiteit Rotterdam
FSWP01 Master Thesis

Dit Informed Consent Form bestaat uit twee delen:
- **Informatieblad (om informatie over het onderzoek met jou te delen)**

- **Certificaat van Toestemming (voor handtekeningen indien je ervoor kiest deel te nemen)**

Deel I: Informatieblad

Onderzoekstitel**:** Een Kwalitatieve Studie: Het Verkennen van de Barrières en Voordelen van de Ervaring van Zorgverleners met Technologie in Gedigitaliseerde Zorg

Introductie:
Ik ben een student die is ingeschreven in het Masterprogramma Klinische Psychologie aan de Erasmus Universiteit Rotterdam, en ik voer dit interview uit als onderdeel van de cursus "FSWP01 Master Thesis." Dit interview verkent de voordelen, barrières en behoeften van verpleegkundigen en verpleegassistenten die technologische hulpmiddelen (Virtuele Zorg) gebruiken op hun werkplek in de ouderenzorg. Dit interview duurt ongeveer 30-60 minuten en wordt mogelijk opgenomen en getranscribeerd via Google Teams. De verzamelde gegevens worden gebruikt voor de onderzoek en alle informatie blijft vertrouwelijk.

Doel van het Interview:
Dit onderzoek heeft tot doel de ervaringen, barrières en voordelen te verkennen die zorgverleners tegenkomen bij het gebruik van technologie in gedigitaliseerde zorgomgevingen. Het begrijpen van deze factoren zal helpen bij het verbeteren van de adoptie en integratie van technologie in de gezondheidszorg.

Procedures:
De interviewer zal een korte introductie geven over de onderzoeker en het doel van het interview. Niemand anders dan de interviewer zal aanwezig zijn, tenzij de deelnemer iemand anders aanwezig wil hebben. Het interview zal algemene demografische vragen bevatten en onderwerpen verkennen zoals behoeften, barrières en voordelen van het gebruik van virtuele zorg. Als je een van de vragen tijdens het interview niet wilt beantwoorden, kun je dat aangeven, en dan gaat de interviewer verder met de volgende vraag. De namen van de deelnemers blijven anoniem. De interviews worden opgenomen en getranscribeerd met behulp van Google Transcript. De transcripties worden veilig opgeslagen op een met een wachtwoord beveiligde computer. Niemand behalve de onderzoeker, een tweede lezer, en mogelijk een supervisor heeft toegang tot deze gegevens. De getranscribeerde interviews worden gebruikt voor een thematische analyse en volgen de normen van ESB (Department of Education and Social Science). De analyse is gericht op het identificeren van patronen en overkoepelende thema's uit de kwalitatieve gegevens. Na analyse van de gegevens worden deze van de computer verwijderd en vernietigd om de vertrouwelijkheid en anonimiteit van de deelnemers te waarborgen. De onderzoeker zal de gegevens nauwkeurig beoordelen om ervoor te zorgen dat er geen identificerende informatie in het rapport is opgenomen. Bovendien zal de onderzoeker reflecteren op hun vooroordelen en aannames om de validiteit van de onderzoeksbevindingen te vergroten.

Methodologie:
Deze kwalitatieve studie maakt gebruik van semigestructureerde interviews en richt zich op minimaal 12 verpleegkundigen/verpleegassistenten in de leeftijdsgroep van 18-65 jaar uit

verschillende zorginstellingen in Rotterdam. De interviews duren 30-60 minuten en kunnen persoonlijk of online worden afgenomen, afhankelijk van de voorkeur van de deelnemers.

Rechten van de Deelnemer:
Deelname aan dit interview is vrijwillig. Je hebt het recht om deelname te weigeren of je op elk moment terug te trekken uit het interview zonder consequenties. Als je besluit deel te nemen, kun je op elk moment tijdens het interview vragen stellen en om opheldering vragen.

Anonimisering en Vertrouwelijkheid:
Er worden maatregelen genomen om anonimiteit en vertrouwelijkheid te waarborgen. De interviews worden automatisch getranscribeerd, maar deze gegevens worden alleen bewaard voor analyse en verwijderd zodra de interviews zijn geanalyseerd om anonimiteit te waarborgen. Naast het waarborgen van de anonimiteit van de deelnemer, zullen de onderzoeker en de tweede codeur de gegevens nauwkeurig beoordelen om te garanderen dat er geen identificerende informatie in het rapport is opgenomen. Deelname is vrijwillig en deelnemers kunnen zich op elk moment zonder consequenties terugtrekken. Door deel te nemen, stem je in met de opname en het gebruik van je geanonimiseerde gegevens voor onderzoeksdoeleinden.

Contactgegevens:
Als je vragen of zorgen hebt, of je wilt je terugtrekken uit het interview, neem dan gerust contact met mij op:

Naam: Cora Greif
Studentnummer: 686069
Email: 686069cg@eur.nl
Telefoon: +4915753375698

Trainerinformatie: De trainer van mijn groep in de cursus is:
Naam trainer: Paul Kocken
Email: kocken@essb.eur.nl

Deel II: Certificaat van Toestemming

Ik heb bovenstaande informatie gelezen of deze is aan mij voorgelezen. Ik heb de gelegenheid gehad om vragen te stellen en eventuele vragen die ik heb gesteld, zijn naar tevredenheid beantwoord. Ik stem vrijwillig in met deelname aan deze studie.

Naam van Deelnemer __________________

Handtekening van Deelnemer __________________

Datum __________________
Dag/maand/jaar

Appendix C: Interview Guide (English/Dutch)

Interview Questions (English)

Demographic Information:

- How old are you?
- Which gender do you identify with? (Male, Female, Non-binary, prefer not to say)
- What is your highest level of education?
- Please tell me about your background and role in the healthcare facility (e.g., job name, how long you have been working in this role).

Work and Technology Usage:

Monitoring vital signs (e.g., devices measuring weight, blood pressure, oxygen saturation, and glucose levels)

- How would you describe using these technological tools in your daily work routines?
- Which benefits do you encounter by using this tool?
- Which barriers do you encounter while using this tool?

Verbal support for daily structure (e.g., Google Home, Bbrain)

- How would you describe using these technological tools in your daily work routines?
- Which benefits do you encounter by using this tool?
- Which barriers do you encounter while using this tool?

Safe and healthy home living (e.g, various passive and active alarm systems)

- How would you describe using these technological tools in your daily work routines?
- Which benefits do you encounter by using this tool?
- Which barriers do you encounter while using this tool?

Medication adherence (e.g, Medication dispensers, pill boxes, and video contact)

- How would you describe using these technological tools in your daily work routines?
- Which benefits do you encounter by using this tool?
- Which barriers do you encounter while using this tool?

General Benefits:

- What general benefits/advantages have you experienced while using technology in your work?
- What difficulties/challenges do you face when using technology in your daily work routines?

Cognitive and Emotional Domains:

- How easy or difficult do you find using the technology in your daily tasks?
- How useful do you perceive the technological tools at your workplace?

- Could you describe the emotions you typically experience when using technology in your work? How do you feel about it overall? *(if you experience problems with describing your emotions, you can use the emotional wheel see Appendix 1)*

Training and Support:

- Can you elaborate on the training and education provided to support your use of technology?
- Do you feel adequately trained to use the technological tools provided to you?

Organizational Climate and Future Expectations:

- Do you experience support from your organization and colleagues in using technology?
- What changes and improvements would you like to see in the optimal use and integration of technology in your workplace?

Future expectations

- When you encounter challenges with technology, what is your typical response? (barely happens continues to use, confrontation, I don't like to use it and resist to do it)
- *Which one describes you the most? I find it easy to use technology at work and would like to continue using it. I sometimes struggle and would like to have more support to learn how to use it entirely, I don't like to use technology at work and resist changing behavior)*
- *What are your needs for the appropriate use of technology?*
- *Which changes would you like to see in technology and using technology at your workplace?*

Closing:

Thank you for sharing your insights today. Before we conclude, is there anything else you would like to add?

Interviewgids (Nederlands)

Demografische Informatie:

- Hoe oud ben je?
- Met welk geslacht identificeer jij je? (Man, Vrouw, Non-binair, liever niet zeggen)
- Wat is je hoogste opleidingsniveau?
- Kun je me iets vertellen over je achtergrond en rol in de zorginstelling (bijv. functienaam, hoe lang je deze rol al vervult)?

Werk en Technologiegebruik:

Het monitoren van vitale functies (Apparaten die gewicht, bloeddruk, zuurstofsaturatie en glucosewaarden meten)

- Hoe zou je het gebruik van deze technologische hulpmiddelen in je dagelijkse werkroutines beschrijven?
- Welke voordelen ervaar je bij het gebruik van dit hulpmiddel?
- Welke barrières kom je tegen bij het gebruik van dit hulpmiddel?

Verbale ondersteuning voor dagelijkse structuur (Buddy, Google Home, Bbrain)

- Hoe zou je het gebruik van deze technologische hulpmiddelen in je dagelijkse werkroutines beschrijven?
- Welke voordelen ervaar je bij het gebruik van dit hulpmiddel?
- Welke barrières kom je tegen bij het gebruik van dit hulpmiddel?

Veilig en gezond thuis wonen (Verschillende passieve en actieve alarmsystemen)

- Hoe zou je het gebruik van deze technologische hulpmiddelen in je dagelijkse werkroutines beschrijven?
- Welke voordelen ervaar je bij het gebruik van dit hulpmiddel?
- Welke barrières kom je tegen bij het gebruik van dit hulpmiddel?

Medicatie-naleving (Medicijndispensers, pillendoosjes en videocontact)

- Hoe zou je het gebruik van deze technologische hulpmiddelen in je dagelijkse werkroutines beschrijven?
- Welke voordelen ervaar je bij het gebruik van dit hulpmiddel?
- Welke barrières kom je tegen bij het gebruik van dit hulpmiddel?

Algemene Voordelen/Uitdagingen:

- Welke algemene voordelen heb je ervaren bij het gebruik van technologie in je werk?
- Welke moeilijkheden kom je tegen bij het gebruik van technologie in je dagelijkse werkroutines?

Cognitieve en Emotionele Domeinen:

- Hoe makkelijk of moeilijk vind je het om technologie te gebruiken in je dagelijkse taken?
- Hoe nuttig vind je de technologische hulpmiddelen op je werkplek?
- Kun je de emoties beschrijven die je meestal ervaart bij het gebruik van technologie in je werk? Hoe voel je je er over het algemeen bij? (Als je moeite hebt met het beschrijven van je emoties, kun je het emotiewiel gebruiken, zie Bijlage 1)

Opleiding en Ondersteuning:

- Kun je meer vertellen over de training en educatie die je hebt gekregen om je gebruik van technologie te ondersteunen?
- Voel je je voldoende getraind om de technologische hulpmiddelen te gebruiken die je hebt gekregen?

Organisatorisch Klimaat en Toekomstverwachtingen:

- Ervaar je steun van je organisatie en collega's bij het gebruik van technologie?

- Welke veranderingen en verbeteringen zou je willen zien in het optimale gebruik en de integratie van technologie op je werkplek?

Toekomstverwachtingen:

- Wat is je typische reactie als je uitdagingen tegenkomt met technologie? Zoek je ondersteuning, probeer je het probleem te omzeilen of weiger je de technologie te gebruiken?

Afsluiting:

Bedankt voor het delen van je inzichten vandaag. Voordat we afsluiten, is er nog iets dat je wilt toevoegen?

Appendix D: Codebook

Code	*Explanation*

Demographics

Age	Age of nurse
Education Level	Highest completed or currently occupied education level within nursing school
Gender	Male, female, non-binary, prefer not to say
Nationality	Nationality of nurse
Nurse Type	The specific role and specialization within care, e.g., community nurse, nursing home, team leader, digital coach

Barrier: Cognitive

Negative Attitudes and Beliefs Towards Digitalization (including perceived usefulness of tools)	Unfavorable perceptions and convictions that healthcare workers hold regarding the adoption and use of digital tools at work
Technology Knowledge and Digital Skills Shortage	Lack of knowledge regarding the variety and benefits of technological tools used at work, as well as insufficient training on how to use these tools

Barrier: Emotional

Anger	Feelings of annoyance and frustration related to using technological tools at work
Fear	Feelings of anxiety and discomfort associated with using technological tools at work
Sadness	Feelings of disappointment related to using technological tools at work
Stress Increase	Increased feelings stress related to using technological tools at work

Barrier: Behavioral

Challenge Educate and Convince Clients to Use Tools	Difficulties in persuading and teaching clients to use technological tools

Barrier: Environmental

Adding Working Time/Workload	Additional working time caused by the integration of technological tools, including technical disruptions, explaining and convincing clients to use tools, installing and requesting tools, and time spent learning and acquiring skills
Client Resistance and Difficulties with Technology	Clients' unwillingness or inability to use technological tools effectively
Technical Disruptions and Resource Challenges	Issues such as software updates, malfunctioning products, and lack of resources such as proper client Wi-Fi or educational tools
Varied Technology Engagement/Skills Among Nurses	Differences in technology proficiency and/or motivation to integrate or learn about technological tools among nurses

Benefits: Cognitive

Perceives Technology as Ease of Use	Nurse perceives technological tools at work as simple to use
Positive Attitudes and Beliefs Towards Digitalization (including perceived usefulness of tools)	Favorable perceptions and opinions that nurses hold regarding the adoption and use of technological tools at work
Sufficient Knowledge and Digital Skills	Adequate knowledge regarding the variety and benefits of technological tools used at work, along with proficiency in using these tools

Benefits: Emotional

Joy	Satisfaction, happiness, and enthusiasm regarding the use and integration of technological tools at work
Stress Decrease	Decreased feelings of stress due to the effective use of technological tools

Benefits: Behavioral

Decreased Client Visits	Reduction in the number and frequency of physical visits to clients due to effective use of technological tools at work

Benefits: Environmental

Enhanced Client Care, Health, and Well-being	Improvement in care quality, as well as physical and mental health, facilitated by technological tools at work
Enhanced Mobility and Remote Supervision	Ability to monitor and manage patients from a distance
Improved and Efficient Communication	Improved exchange of information e.g., automatization, alarm buttons
Increased Client Self-Reliance/Independence	Clients are able to manage their own care tasks with the help of technological tools
More Efficient Work Time/Decreased Workload	Better time management and productivity through the effective use of technological tools
Support Network	Assistance in acquiring digital competencies, as well as support from the organization, colleagues, and clients' families and friends in integrating technological tools at work
Transparency/Accuracy in Documentation and Work Schedule	Improved accuracy in client documentation and work schedules
Work Climate: Most People Positive and Motivated Using Technology	A general positive attitude and motivation among staff towards using technology

Needs

More Client-Centered Care	Wish for a greater focus on personalized care tailored to the individual needs of patients, including alternative client support systems and greater contact via video calls
Organizational and Operational Improvements	Suggestions for structural organizational improvements, including vision, communication, and collaboration within different sectors
Importance of Positive Experience and Noticing Improvements	Nurses mention the importance of positive experiences in using technology at work
Suggestions Staff Support and Training	Suggestions for the quality and quantity of trainings, education, and meetings
Suggestions Technology/Tools	Suggestions for further technological improvements, including specific tools and generalized technological wishes
More Time for Adaptation and Integration	Wish for more time to adopt knowledge and work with technological tools at work

Appendix E: Characteristics of the Participants

Respondent number	Sex	Age	Nationality	Nursing degree/Education	Job description	Work experience
1	female	32	Dutch	HBO student	Community nurse/ home care	Previous work in marketing, graduates in few months as nurse
2	female	29	Dutch	HBO	Community nurse/ home care	Previous work in hospital, working in home care since over 8 years
3	female	54	Dutch with migrant background	HBO	Community nurse/ home care	Previous work in hospital, working since 30 yeas in care
4*	*	*	*	*	*	*
5	female	20	Dutch	HBO student	Nursing home/elderly care	Previous work as medical assistant, next year expected nurse graduation
6	female	20	Dutch	HBO student	Nursing home/elderly care	Working in healthcare since over 4 years, soon expected graduatoion
7	female	37	Dutch	HBO	Community nurse/ home care	Working in care for 9.5 years, Previous work in hospital, working in home care for 6 years,

8	female	33	Dutch	HBO	Home care/ digital coach	Previous home care nurse with coordinating role, recent role as digital coach (support colleauges with technology)
9	female	31	Dutch	HBO	Community nurse/ home care	2 years' work experience home care nurse
10	female	31	Dutch	HBO	Home care/ nurse consultant	Working as home care nurse for 9 years, new recent position as nurse consultant (provide recommendations for technology in nursing teams)
11	female	32	Dutch	HBO	Community nurse/home care with added role as team advisors and care coordinator	Working in home care for 9 years
12	female	54	Dutch	HBO	Home care/ Implementation coach	Working in home care for over 30 years, recent position as technology implementation coach

*Participant has been removed

Appendix F: List of Needs

	Needs and suggestions	*Quotes*
General	More time	*"Yes, but that's not just with colleagues. It's also with clients. It's also with caregivers, and we as a project group thought. Well, let them get to know virtual home care for a month and then they'll use it. Well, that wasn't the case. It really takes about 3-4 months because colleagues need to change their mindset, clients, caregivers, and that doesn't happen in a week. It takes weeks, even months"* (Participant 12)
	Positive experience	*"Well, I was a little skeptical about it at first. I thought, yes, why is that necessary, right? They didn't use that before, but then I started using it myself and saw the benefits. And that's why my opinion has changed a lot, yes"* (Participant 1)
	Less technological disruptions	*"No, no, I thought those disruptions were important to report because they significantly impact our work. You can really see that 9 colleagues have a negative outlook because of the frequent glitches. They are less motivated to use the tool because it causes them stress whenever it malfunctions. It's frustrating when it doesn't work as expected"* (Participant 11)
Organizational	Clear digitalization vision	*"Everyone should tell them that it's how we work, so that helps with the mindset"* (Participant 12)

	Enhanced collaboration and networking within the Netherlands	*"Well, I think there should be more exchange between organizations, so you don't keep it within your organization"* (Participant 12)
	Standardizing digitalization during intake	*"We work with a project group to standardize the approach and ensure everyone understands the benefits and processes. This makes it easier to integrate technology into daily work and client care plans"* (Participant 8)
	Simple and fast tool request and delivery (product flexibility)	*"Yes, it needs to become easier to request. So colleagues spend less time on requests because they find that difficult"* (Participant 12) *"Yes, customer service and maybe… that we can use it sooner"* (Participant 2)
Training/education	Motivational interviewing/conversation techniques	*"Motivational interviewing is needed to show the added value and that it's not a replacement but an enhancement"* (Participant 10)
	More hand on ("learning by doing") learning experience	*"I learned by doing and eventually became the specialist, focusing on installations and client support to understand the products thoroughly."* (Participant 8) *"Learning by doing is essential"* (Participant 10)
	Multidisciplinary meetings	*"Multidisciplinary consultations and offering card index sessions for client discussions are helpful. Providing accessible one-on-one case discussions and flexibility with products can improve the situation"* (Participant 10)

	Specialized training for digital coaches/nurse leaders	*"Well, I would have taken them more by the hand with those conversation techniques…I would have liked more support in the coach role"* (Participant 12)
	Regular evaluations	*"Well, I think it's still evaluating again, continuing to evaluate those tools and the collaboration between the two organizations"* (Participant 9)
	More training and time for training	*"Providing time for training and reading is crucial. Some employees may be reluctant if they have to learn in their own time"* (Participant 10) *"I sometimes have older colleagues who are less familiar with this, so to speak. I do think that if more training were offered, they would be happy with it"* (Participant 9) *"So colleagues should have more time to delve into it. And they just don't get that now. That they get the tools to implement it well in practice. And that they are well guided through the entire care process, from intake to the end of care"* (Participant 12)
Technology	Simpler and reliable tools	*"It should be simpler to use and set up, also for clients themselves"* (Participant 7)
	Unified electronic files	*"I would like to see a dashboard linked to the ECDD (Electronic Client Data Dashboard) as part of the ECD (Electronic Client Dossier). Ideally, all organizations should use the same electronic file for seamless integration,*

		but it's challenging with different systems" (Participant 8)
	Interconnected products	*"We will soon have more interconnected products rather than separate ones. Current technology can be improved to better integrate these connections"* (Participant 10)
	More engaging design	*"For example, the tablet is white, and they have pasted it against a white wall, which makes the tablet really disappear. Maybe if they give it a really bright color, it might attract more attention, and they will use it more often"* (Participant 5)
Personalized care	More video contacts	*"I would like to make more video calls with clients, so we have more direct contact with clients and can work more remotely. And that we can quickly get in touch with someone"* (Participant 9)
	Client focused approaches	*"First, look carefully at what people need. Our clients need care, and our employees need support. Look at what the actual needs are"* (Participant 7)

Appendix G: List of Facilitators, Benefits, and Barriers

	Facilitators	Benefits	Barriers
Cognitive	• Enthusiasm and openness to learning new things *"Oh, I got enthusiastic about that. And the fact that I can help people"* (Participant 12)	• Sufficient knowledge/skills and ease of use *"I'm doing fine. I find it easy to use"* (Participant 10) • Positive attitudes and beliefs towards digitalization (Including perceived usefulness of tools) *"Yes, it really helps us with that healthcare demand, which is now increasing. You really look at what can be taken over by those technologies"*(Participant 11) *"I emphasize that these tools are not replacements but enhancements, allowing us to serve more clients. It's about changing the mindset and seeing the added value"* (Participant 10) *"Very useful, as it allows for quick communication and*	• Technology and digital skills shortage *"Yes, there was a lot of resistance from the employees because they did not understand why the changes were happening"* (Participant 11) *"Knowledge shortage is a major disadvantage. Employees might be reluctant or need to cross a threshold because they don't fully understand how it works…Standard tools are used, but new ones are not well known"* (Participant 10) • Negative attitude/belief towards digitalization *"You have to trust it, but it's difficult if it doesn't work once. Then you lose confidence in the devices"* (Participant 7) *"No, no, I thought those disruptions were important to report because they significantly impact our work. You can really see that 9 colleagues have a negative*

		collaboration"(Participant 10)	*outlook because of the frequent glitches. They are less motivated to use the tool because it causes them stress whenever it malfunctions. It's frustrating when it doesn't work as expected"* (Participant 11)
Emotion/ Feelings		• Joy *"Oh, I got enthusiastic about that. And the fact that I can help people. Yes, that makes me happy"* (Participant 12) *"I think it's fun. I like it. Yes, I like it. It makes your job a little bit more challenging because I like to learn new things"* (Participant 2) • Stress reduction *"It really gives less stress because if you have given all the medicines, you have peace of mind knowing you have taken care of everything….It's not easily error-prone because there is double-checking everywhere, so that's very nice"* (Participant 5)	• Anger *"It was quite frustrating at first because some things did not work, and they were very busy"* (Participant 5) *"Disruptions after disruptions. That's really annoying"* (Participant 11) • Fear *"Scared, angry. Yes, scared and angry, I think, mostly scared because they don't know what it will bring them and they are afraid of losing their job…Colleagues are afraid of the duty of care…They are afraid they won't have the nice chat with the client anymore"* (Participant 12) • Stress increase *"We said there had to be a second colleague, and we never found that second*

		"If you have a calm patient it is also a bit quieter and less stressful at work" (Participant 6)	*colleague…so my stress level is high"* (Participant 12) *"For the older colleagues who did not understand it well in the beginning, there was more workload due to the technology. They were already a bit stressed and found it difficult. It was quite frustrating at first because some things did not work, and they were very busy"* (Participant 5)
Behavioral		• Decreased client visits *"It reduces the real physical burden because you don't have to visit customers as often"* (Participant 11) *"If someone needs insulin, they can show the pen in front of the screen, inject it while on the video call, and a care moment takes place without a physical visit"* (Participant 8)	• Challenge educate and convince clients to use tools *"They just want to keep doing things the old-fashioned way. And that is what you encounter as an employee. People just refuse. They don't want it that way"* (Participant 3)
Environmental	• Technological tools and systems *"We have a package of 50 home care devices that I advise on "*(Participant 10)	• Automatization/ improved transparency and accuracy in documentation and work schedule *"Yeah, I think it's a benefit because you don't have to manually enter it into their*	• Varied technology engagement/skills among nurses *"It varies greatly per team and per employee. The young girls use it easily, no problem. And the older ones or those who have nothing to do with*

	"The app is on some tablets at work and it works very nicely and clearly, which is also very nice. You just have to log in with your details." (Participant 6) *"Yes, what is most common are wrist alarms or neck alarms, so a button that someone can press to ask for help. Also the sensor, if someone is in bed and wants to get out of bed, for example, we will receive a notification on our pager that we can go there quickly."* (Participant 6) • Sufficient digital education and training *(recommended "learning by doing approach)* *"I think I am sufficiently trained*	*file. You have everything at hand automatically. The scale also indicates if there's an increase or decrease in weight. It saves a little time, but not that much"* (Participant 5) • Reduced bureaucratic burden *"Yes, there is also less bureaucracy and that also prevents mistakes, of course. And yes, you can follow the process more easily"*(Participant 11) *"Yeah, I think it's a benefit because you don't have to manually enter it into their file. You have everything at hand automatically."* (Participant 1) • Enhanced client care, health, and well-being *"Seeing the real improvements for clients, such as more control and self-reliance. Clients were happy with tools like support stockings, which saved them time and made them happier. It improved their overall health and*	*technology. Well, they find it very difficult and just don't do it"* (Participant 12) • Client resistance and difficulties with technology *"It was also necessary to explain this to the customers, as some still preferred to see a person rather than have a device or technology do things for them"* (Participant 11) *"Yes, because we work with people with dementia, they very often forget that they have a button they can press…or you have people who don't want to understand it because they are a bit old-school and don't feel like learning it. You notice that sometimes"* (Participant 5) • Technical disruptions and resource challenges *"Yes, you know, they don't have WiFi"* (Participant 3) *"Yes, well, a very big disadvantage is simply disruptions"* (Participant 11) • Adding working time/workload

	and educated, and some others are too, but maybe not all colleagues. The general meetings were for everyone, but it was up to each person to attend." (Participant 1) *"Yes, there was sufficient training provided"* (Participant 9) *"Learning by doing is essential"* (Participant 10) • Sufficient support from the organization, colleagues and client's family network *"So there is a lot in terms of support and within the organization we also have people who lead a project, so you can always contact them"* (Participant 11)	*gave me more time to improve care quality in other areas…* *it also aids in prevention, noticing things earlier"* (Participant 10) • Support networks *"So there is a lot in terms of support and within the organization we also have people who lead a project, so you can always contact them"* (Participant 11) *"It was difficult at first, but now colleagues are more open to using technology and discussing it with clients. They have become more proactive in adopting new tools"* (Participant 8) *"If you don't want to know anything about the technology and leave it as it is, you exclude yourself a bit"* (Participant 5) • Enhanced mobility, remote supervision *"…a care moment takes place without a physical visit"* (Participant 8)	*"Well, look, the workload is still high. It's really awful now. I finished very late today"* (Participant 3) *"And if things do not work, it creates more work pressure because then you still need to visit, and your day structure is disrupted" (Participant 9)* *"There are more and more things to report, and it involves a lot of clicking"* (Participant 7)

	"It was difficult at first, but now colleagues are more open to using technology and discussing it with clients. They have become more proactive in adopting new tools" (Participant 8) *"If you don't want to know anything about the technology and leave it as it is, you exclude yourself a bit"* (Participant 5) *"…some clients just don't have a network. So we run into who will handle that?"* (Participant 12)	• Increased client independence *"People are more self-reliant and have more control over their situation"* (Participant 10) • More efficient work time/decreased workload *"Yes, it just saves us working time, because we are just very busy. The pressure, the work pressure is quite high, so every customer who can be helped by digital technology reduces our workload"* (Participant 11) *"It saves travel time and allows for more efficient routes"* (Participant 10) • Faster communication and information exchange with colleagues & clients *"If we want to communicate with other departments, we also do it via an online platform called "opines." You can send messages to a specific*	

		group and everyone can see that" (Participant 5)	