Interviewing Healthcare Professionals On The Impact of Technology On Their Job

Luca Hoeijmans

Department of Psychology, University of Twente

Bachelor Thesis, Positive Clinical Psychology & Technology

Supervisors: 1st Marlon Nieuwenhuis, 2nd Maria Luisa Rispa Hoyos

Technological Interventions in Increasing Well-being

APA 7th edition

July 5, 2023

Table of Content

Abstract

Individuals have to use technology more and more in diverse ways and Professional Identity plays an important role when it comes to how technology is involved in the job of a healthcare professional. A professional can have multiple intertwined professional identities at once and is able to shift between these identities. Besides professional identity, technological acceptance plays an important role in the use of technology. Technological acceptance it's basis for technology use consists of Perceived Usefulness and Perceived Ease of Use.

Currently, there is little existing literature that depicts how technology is involved in jobs other than those of a technological nature. This paper aimed at added to the limited available resources regarding this matter as well as find different opportunities and challenges that technology can bring to a healthcare professional, as stated by healthcare professionals and interns from five different professions, which were nurse in acute care, clinical psychologist (and , neurologist, psychiatrist, and ENT (Ear, Nose, Throat) Doctor. Information regarding these opportunities and challenges, among other things, was obtained via qualitative in-depth interviews. The sample was reached via email, using a snowball sampling method.

It was found that having the opportunity of online video treatment was the most mentioned opportunity/benefit of technology within a healthcare professional's job, and Virtual Reality was stated to be the most opportunity-rich benefit of technology used in healthcare When it came to the challenges, clinical psychologists mostly mention the decrease in clinical view (being able to see the small little details such as posture or hand placement, and non-verbal cues such as small breaths) as the biggest challenge of online therapy, and privacy issues as the general challenge of technology in a healthcare professional's job, whereas other healthcare professionals mostly determined the technical difficulty of technology itself as the biggest challenge.

In conclusion, despite its limitations, this paper adds by representing the different opportunities and challenges technology brings as well as different requirements that should be in place before actually implementing technology as perceived by healthcare professionals that actually use them.

Introduction

Within the healthcare-field technology plays a significantly increasing role. Healthcare is modernized and individuals have to use technology more and more in diverse ways (Smith et al., 2022). But how does this change influence healthcare professionals and what role does it play in their professional identity? Is this change even accepted? Is there a difference in the acceptance between individuals? These are all questions during such a period of change that are currently left unanswered in literature. Based on that, different aspects regarding technology and professional identity will be discussed. Limited research is available on the study of technological involvement of a healthcare professional their job, as most available information relates to jobs that include technology in nature, such as tech professionals or Technology Physicians (Vogel et al., 2017). Evaluating the impact on a seemingly different work field might provide some interesting altercations to existing work.

To start, a picture will be painted of what Professional Identity entails. Professional Identity is constructed based on the combination of both Social- and Role Identity, reflecting a professional's depiction of a specific role and their self-definition as part of a profession (Chreim et al., 2007). Social Identities refer to the acceptance of the norms and values of a group as well as the identification with that group, whereas Role Identity refers to a particular role an individual plays entailing both performing tasks concerning this role as well as managing and controlling recourses associated with this role (Mishra et al., 2012). To summarize, Professional Identity refers to how healthcare professionals define themselves regarding work roles, this is the foundation of who they are as a professional.

Professionals have personal as well as professional identities, which are intertwined. Sometimes identities are foregrounded and others are backgrounded. The identities someone has, are influenced by interrelatedness. These interrelations can be adopted at different times and with different emotional states (Rees & Monrouxe, 2018). This means that an individual does not have a single identity, but multiple identities that exist simultaneously. However, these identities are not 'in action' at the same time rather one is more prominent at a specific time and later another. An individual moves through their different identities and thus can identify with multiple (Rees & Monrouxe, 2018). The strength or weakness of professional identities also plays a key role in overall job performance. Having a strong Professional Identity is beneficial for career choice,

well-being, and life satisfaction (Rees & Monrouxe, 2018). Yet a too strong or specific Professional Identity can lead to negative attitudes towards outgroups and participation in stereotypical behaviours. Developing a weak Professional Identity can be associated with a poor ability to cope under stressful circumstances. This could then lead to higher levels of personal, work-related, or patient-related burnouts (Monrouxe et al., 2017). Next to this, weak professional identities could cause both retention and teamwork problems (Reece & Monrouxe, 2018). Improving one's Professional Identity could be done with the help of formal activities such as anatomy learning, communication skills training, narrative inquiry, and guided reflection (Lingard et al., 2003). This means that even if an individual has a relatively low understanding of their professional identity, it can be improved through proper training.

Next, it will be discussed how technology can play a part in an individual's professional identity. It has been found that technology plays an important role in Professional Identity, for example, rapid changes in technology can cause shifts in identity, changing identities as well as shifts in strength (How strong someone relates to the identity and how much it is present) of set identity, both in the form of reinforcements (Increasing awareness and strength of identity) or deteriorations (Decreasing awareness and strength of identity), causing individuals to take action to promote identity maintenance (Chreim et al., 2007). Furthermore, if technology is perceived as compromising in aspects such as autonomy or scale of role, the result will be identity deterioration, indicating that technology can pose a threat to established professional identity (Mishra et al., 2012).

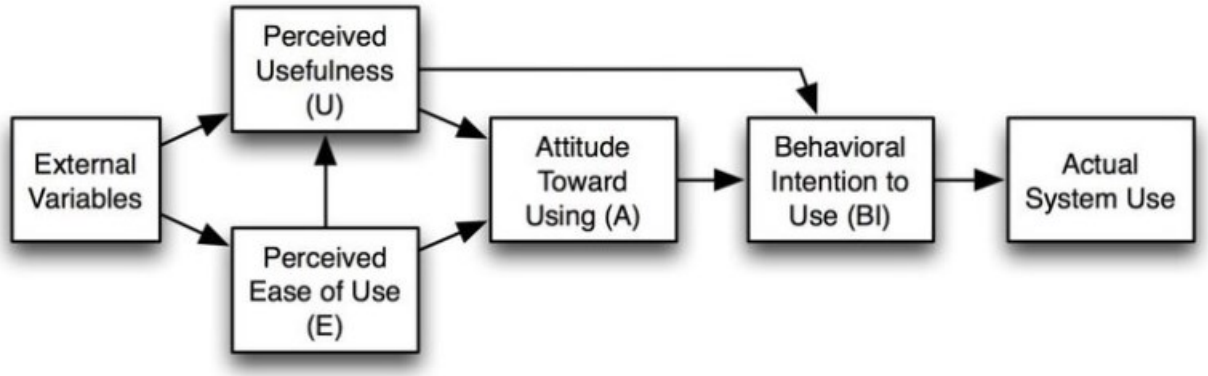
A healthcare professional has to have the right skills to use the ever-changing and evolving technology that are part of their job. Therefore, can competence be a part of one's professional identity, and regarding digitalisation from a healthcare perspective, this encompasses knowledge of digital technology and digital skill required to provide good patient care. As technology plays an increasing role within healthcare, this competence, and thus professional identity, is heavily dependent on a healthcare professionals' motivation and willingness to acquire experience of digitalisation in their professional context. Once again indicating that technology acceptance plays a significant role in, posing threats to, the subject of professional identity (Konttila et al., 2019). Mishra et al. (2012) found that technological acceptance could implicitly threaten a professional's Role identity as a care provider. Notes from a doctor made

this clear as his inability to use a technological device caused him to feel less adequate to perform his job. Other threats, such as pressure from vendors and insurances also seem to threaten professional identity, as they require all information regarding the amount and type of use of the technology from the professional, and are not able to fund all use in treatment (Mishra et al., 2017). Though, alternatively, technological developments might also serve as reinforcers for professional identities. This happens when technological developments enhance people's roles and positions in a social group and allows them to use similar cognitive schemas as they have used in previous behaviours (Stets and Burke, 2000).

The previous paragraph described the significance of technological acceptance in the use of technology in healthcare. To improve understanding of technological acceptance, the Technology Acceptance Model provides an overview of how technological acceptance is structured as well as reasoning and explanation as to why it is this way. The model is depicted in Figure 1 (Davis, 1989; Kim, 2009; Ortiz, 2009; Davis, 2000). Perceived Usefulness relates to the degree to which a person believes that a particular system would enhance job performance. Perceived Ease of Use relates to whether the use of the system would be effort-free (Davis, 1989). When looking at patients' behaviour, which is equal to that of the professional (Wu et al., 2011), to accept technology in availing healthcare services, perceived usefulness, perceived ease of use, privacy concern (which is considered a direct determinant of behavioural intention), and trust (which is associated with behavioural intention) were seen as direct predictors (Dhagarra et al., 2020).

Figure 1

The Technology Acceptance Model



Overall the model visible in Figure 1 explains the conditions that need to be met before individuals will start using technology within their daily routines (Strudwick, 2015). In the original work of Davis et al. (1989) 15 external factors were tested, however, to increase testability, a distinction was made by Kim et al. (2009) by grouping these external factors into three categories. These categories were Organisational factors, Individual factors and Social factors, the factors seen as external variables are the indicators of perceived ease of use and perceived usefulness. Perceived ease of use is linked to feature complexity and it was found that as feature complexity increases, perceived ease of use decreases. In turn, this caused system usage to decrease, which is visible as the foundation of the model depicted in Figure 1 (Kim et al., 2009). Together perceived usefulness and perceived ease of use have positive associations with technology acceptance (Davis et al., 1989), which in the model refers to attitude towards using. Using the UTAUT model, it was also confirmed that social influence was a direct determinant of intention to use, explaining the arrow in Figure 1 from perceived usefulness to behavioural intention to use (Kim et al., 2009). Attitude towards using is in turn responsible for the behavioural intention to use, which is similar to the theory of planned behaviour (Azjen, 1991).

Determining the technological acceptance of healthcare professionals, threats and other aspects that could lead to healthcare professionals having lower technology acceptance are considerd. Most of the threats of the potential use of technology within the healthcare sector are posed by concerns regarding AI, meaning that acceptance of AI has to be discussed as this potentially could transform decision-making within healthcare as we know it. Clinical decision support systems can provide an enormous amount of predictive information regarding an individual's health (Amann et al, 2023). Both patients and Healthcare professionals seem to have a relatively positive attitude towards medical AI, as it could increase accuracy, speed, and efficiency, yet they understand that is not a stand-alone solution and could perhaps lead to new problems. Most concerns remain when it comes to a potential decrease in a patient's decision-making and the importance of relational aspects within care.

Therefore it is important to study the perspective regarding the opportunities and challenges of technology, the factors that should be included in implementation, their awareness of Professional Identity and the role of technology in this identity, and the technological

acceptance of healthcare professionals and how technology is involved in their job. The main research question is; What are the opportunities or challenges of technology within a healthcare professional's job, when it comes to patient care? An important sub-question that assists this research question is; to what extent are the perceived opportunities and/or challenges related to technology acceptance?

Methods

Design

Aimed to gain insight into the perceived impact of technology in healthcare, a qualitative descriptive study was conducted as a joint research project. The topic *Opportunities and Challenges that Technology Brings to a Healthcare Professional's Job* was of interest for this specific research. The study focused on the subjective experiences of healthcare professionals and clinical psychology master students currently performing their internships, on this matter. Therefore, it was deemed appropriate to conduct in-depth interviews, since this research method provides flexibility in what type of data is gathered as well that is provides advantages in acquiring enhanced understanding as extensive literature about individual attitudes of healthcare professionals concerning technology in healthcare is limited. The ethics committee of the Faculty of Behavioural, Management and Social Science of the University of Twente confirmed ethical approval for this study (request: 230347).

Participants & Procedure

Participants interviewed were of either German or Dutch nationality. The researchers recruited 11 participants in total. The participant's age ranges from 23 years old to 63 years old. In total, participants from six different healthcare professionals were interviewed, using three different methods of communication. Any specific or other participant-related information is provided in Table 1.

The study was conducted from March, to May 2023 and focused on healthcare professionals and clinical psychology master students from Germany and the Netherlands. People within multiple large hospitals in both countries as well as Master students from the University of Twente were contacted via convenience sampling. Those who were interested in partaking in the study were approached using pre-made draft emails containing information such as contact information to schedule the interviews and overall research information.

Criteria to be included in the study were that participants work in healthcare and directly assign treatment, meaning that they are responsible for the decision-making regarding what type of treatment a patient receives. or that they are performing their mandatory internship in a clinical psychology master. This research aimed at including at least 10 participants per researcher, leading to at least 20 participants in total. However, when this was deemed unmanageable, the

inclusion criterion was expanded to people who are not solely responsible for directly assigning treatment, such as Nurses, and rather than working in the healthcare sector, master students who were performing their mandatory internships in a clinical psychology master, for at least six months, were considered as admissible in the research as well.

Interviews with the participants were conducted one-on-one via various online video call applications, over a two-month time period and all subjects participated voluntarily and individually.

Prior to the interview, each participant was sent an informed consent form via email. Only after signing this informed consent, the interviews could start (See Appendix A). They were informed that the recordings, as well as the transcripts, will be stored until August 21, 2023, and that the data will be stored safely till this date, after which it will be deleted. Additionally, researchers´ contact information was provided, and they were asked about their age, gender, and nationality. Among the informed consent, participants were also provided with details about the interview, such as what the interview would be about, and how long the interview would approximately take. Furthermore, participants could decide which language they would prefer throughout the interview, with options being English, Dutch or German.

All collected data were transcribed first in the language spoken in the interview and afterwards translated into English. Only the translated data was used to create the codes and all other results. To transcribe the interviews, transcription software Descript and Otter.ai were used. Whilst transcribing it, mistakes or filled silences, such as ‘uhms’ and ‘eh’, were removed.

To ensure all collected data is not traceable back to the interviewee, whilst transcribing all data was pseudonymized by deletion of any names or other information (e.g., names of organisations) that could lead to the participants´ identification.

Materials

Two semi-structured interview guides were developed and an English interview scheme was created, which later was translated into the languages used throughout the interviews.

In order to detect necessary changes within the interview guide, one pilot test with healthcare professionals was conducted by each researcher, which lasted 19 and 29 minutes. The pilot tests revealed minor adjustments, such as the need for different formulations or

specifications of questions and making sure the questions would be answered in the intended way, needed for optimal conductance for consequent interviews. Due to a restricted time frame, it was not feasible to conduct pilot testing with the master students as well. Solely the data without modification was included in the final data analysis.

The interview guide included two (for healthcare professionals) to three (for Mater students) general questions regarding the individual's work. For Healthcare professionals the questions aimed at obtaining knowledge about how long the participant had been working as a healthcare professional and what their specialization was, whereas for Master students these questions aimed at obtaining knowledge about the longevity of their internship, what department their internship was in, and what type of work they carried out during their internship. Additionally, the questions were intended to ease the participants in the interviews. Next, there were eleven questions referring to technology use in direct patient care, which was related to their experience with overall use, different types used and for how long, their attitude towards the use (related to technology acceptance) and what in their opinions necessary conditions were for the implementation of technology. This section was followed by two questions to detect opportunities and challenges, as perceived by the participants, that technology could have for their work field and the following section consisted of six questions considering the impact of technology on the patient-carer relationship, with questions regarding the effect technology has had on the therapeutic relationship, conceptions for future technology use, strengths and weaknesses of technology specifically aimed at the therapeutic relationship and whether the participant perceived any differences in online vs. face-to-face treatment. Finally, the last sector included two questions asking whether participants were aware of their professional identity, how they would state their professional identity and the role of technology on their retrospective professional identity.

To ensure all questions were answered to their best ability, probes were included to clarify what was meant with a specific question (Standard Probes can be found near the bottom of Appendix B) or to gain further information from the participant (e.g.: "Okay, and could you tell me what Moonbird is then?"), whenever it was considered useful by either the participant or the researcher. As questions regarding the patient-carer relationship weren't of interest to this particular research, answers, and codes regarding these answers, were omitted. The interview

guide for healthcare professionals can be found in Appendix A. As the master students did not have the same experience, with technology used or overall patient-carer relationship, some questions were altered. Besides the aforementioned change in the first section of the interview, other changes include that they were asked to speculate about the possible impact of technology on the patient-carer relationship if they didn't have any experience regarding this matter, as well as asking them to speculate about challenges and opportunities in their future career rather than state their current experiences. The entire master student's guide is displayed in Appendix C

Data Analysis

To make sure that the answers could be compared and categorized, inductive, reflexive thematic analysis was used for this set of data. The thematic analysis used followed Braun and Clarke's (2006) guidelines, to ensure that the same coding process and structure were used for all transcripts. Steps involved familiarizing oneself with data, generating initial codes, creating and reviewing themes, defining and naming themes and lastly linking the codes to the report. To create all codes and compare the created codes and quotes, the qualitative data analysis program ATLAS.ti was used. Created codes are visible in Table 2, and the explanation for each code can be found in Appendix D

Results

Table 1

Sociodemographic Characteristics of The Participants

(N=11)	**Frequency**	**Percentage**
Gender		
Male	2	18.18%
Female	9	71.82%
Age **(M = 39.00, SD = 14.30)**		
20 - 30	4	36.36%
30 - 40	2	18.18%
40 - 50	2	18.18%
50 - 60	2	18.18%
60+	1	09.10%
Nationality		
Netherlands	6	54.55%
Germany	5	45.45%

Profession		
Clinical Psychologist	3	27.27%
Neurologist	1	09.10%
ENT Doctor	1	09.10%
Psychiatrist	2	18.18%
Master Student	3	27.27%
Nurse Acute Care	1	09.10%
Interviewed Via		
Whatsapp Call	6	54.55%
Zoom	4	36.36%
Teams	1	09.10%

Note: ENT = Ear, Nose, Throat

Table 2

Tech Profile Per Participant

	Gender + Age	Profession	Professional Identity	Type of Tech Used + (Rating)	Level of Tech Acceptance	View on Future
Person 1	Female, 28	**Clinical psychologist**[1]	Solely states to be aware of their identity **Behavioural Therapy psychologist** Technology is a high part of identity	- Documentation software - Video calling - Video therapy - Word	Perceived Ease of Use: States they are well-trained and prepared Perceived Usability: Experiences benefits of technology, but doesn't specifically mention usability. **Overall acceptance:** Glad Technology is there, though doesn't always agree that tech is the best way. E.g. would like to remain seeing patients live as well. However, does believe that it would be a pity if the use of technology decreases.	Would like to see a basic system that is available on every device. Also believes that video therapy should remain an option. If it's convenient to do online, then online. For people who prefer physical, should still be able to go to a therapist to see them live.
Person 2	Female, 32	**Clinical Psychologist**	Misinterpreted the definition of professional identity **Technological Supported Psychologist** Technology is a medium to high part of identity	- Computer - Patient File - Specific test procedure to test concentration in children - Documentation software - Applications to track behaviour - Applications that stimulate relaxation	Perceived Ease of Use: States that it is easy to learn by doing, and also rates the technology they use with a 9 Though also mentions that it's sometimes not intuitive how something works. Perceived Usability: They rate the perceived usefulness with a 7. Also, they like the fact that people who struggle with money, have the opportunity to do things online as well. **Overall Acceptance:** Understands the importance of technology, especially in for example patient documentation. Feels like technology can't be on its own, it shouldn't be exclusively video. Likes the remoteness opportunities it brings. Next to this is really open to the use of tech. Rather feels supported compared than threatened	Wishes that the hassle with insurance companies would be less. And that when a patient needs more flexibility, this is possible

Person 3	Female. 63	**Clinical Psychologist** Medical psychologist, Oddball amongst medical staff, a questioner **Connective intermediary** Technology is a high part of identity	- Type machine - Word Perfect - MS Dos - Video calling (9/10) - 'Therapy land'(7) - Behavioural therapy programs - Mindfulness apps - Smartwatches - Virtual reality - Patient File (+7, -4*) - Psycho-education - Helen Dowling Institute	Ease of Use: Some technologies are extremely difficult to use, which is a pity, whereas others are great and easy to use/implement Perceived Usability: It is useful and promising and serves as a complement to their own skills. Different aspects of care have better use for technology than others **Overall acceptance:** Technology shouldn't remove the essence of their profession, be cautious when trying new things, and make sure they actually are beneficial first. Some technology advancements scare them, but they state it would be stupid not to explore the opportunities it brings.	Would like to see an increase in the use of visual, interactive psychological testing. Would like to see the possibility to speak notes into the file, rather than having to write them down.
Person 4	Female, 39	Neurologist Very aware of their professional identity Medical manager, Doctor, Colleague, Humans, Trainer, Educator, Scientist, Herself, Mother **All-round Professional** Technology is a high part of identity in some, low in others	- Patient file (EPIC, Hicks) (7) - AI (Research) - Stroke Viewer (8) - Video calling (Teams) (8/9)	Ease of Use: Most of the day-to-day patient care uses technology, which all seems easy and understandable. Skilled in such a sense they were responsible for helping colleagues Perceived Usability: Knows that not everyone is willing to embrace the technological change, which decreases perceived usability. **Overall Acceptance:** Very open to technology usage, thinks it's the future. States that it shouldn't be seen as a threat. Seize the opportunity that technology brings. Rates positivity with an eight	Would like to see that multiple hospitals are connected through some sort of cloud, for shared patient data Hopes technology is able to take some of the work out of the hands of the doctor.

Person 5	Female, 53	Psychiatrist	Really considers their professional identity. Considers expectations of patients **Professional practitioner** Technology is a high part of identity	- eLearning modules - Patient file - Moonbird[3](10) - Breathe app (10) - digital calendars (10) - Alarm clocks (10) - Virtual Reality (6)	Ease of Use: Rates the tools they use mostly very high, as they according to them are easy to use, work with, understand and explain Perceived Usability: Technology really assists in understanding and autonomy of patients. Really considers usefulness before actually using technology (how does it benefit the treatment) **Overall Acceptance:** Doesn't really acknowledge technology specifically and remains of the idea that their job is a talking profession, where the human touch is undeniably needed. Can't seem to shake the risks that technology might bring. Rates their positivity on the use of technology with an eight	Would like to see technology be able to help with the diagnostic process. Would like to see an increase in the use of technology in group treatment, for example, the use of psychoeducation Increased use of AI to assist in this psychoeducation.
Person 6	Female, 50	Psychiatrist	Collegiality is essential, as being approachable, and reliable **Collaborating Doctor** Technology is little to no part of identity	- Video calling (Zoom, Webex, Teams) (5) - Patient Portal - ROM[4] - Stories Database - Virtual Reality (8) - eHealth applications (7.5/8)	Ease of Use: Describes themselves as reasonably technically advanced. Understands technology quite quickly Perceived Usability: Technology provides great opportunities, such as increased efficiency. Though hassles with technology really decrease the value of technology. **Overall Acceptance:** Prefers face-to-face, however really sees potential in technology and even states that they should use it more. Rates their positivity on the use of technology with a nine	Would like to see an increase in the use of online video calling Hopes all technology used in healthcare is 'Monkey Proof' Would like to see an increase in VR-related treatment Opportunity for online outpatient check-ups Create an inventory for all eHealth apps Would like to be able to dictate notes, instead of typing them.

Person 7	Male, 41	ENT[2] Doctor	Aware of his presence and findability, Is responsible but feels equal to others **Doctor and Colleague** Technology is a medium to high part of identity (rated with 7)	- Operating tools (microscope, laryngoscope, stethoscope) (8) - MRI, CT, and PET scans (8) - SPECT (8) - AI (Investigating scans, predictive models) (8) - Virtual reality (Patient information) (8) - Video Calling (Zoom, Teams) (8)	Ease of Use: States that the use of technology makes their job easier, Feels prepared to use technology and also stated that all their used technology have the same ease to use. States that older colleagues might struggle with technology usage Perceived Usability: Sees a lot of positive benefits with regard to technology use. though, expresses frustration when technology malfunctions **Overall Acceptance:** Enjoys the fact that technology use is developing and Growing. Understands the need for innovation and isn't afraid to use and test technology. Rates their positivity towards the use of technology with a nine.	If AI or robots were to be able to more efficiently operate, humans are no longer needed. However, is sceptical towards the acceptance of patients regarding this matter. Have a digital questionnaire patients can fill in regarding their problems. Increased usage of PROMs (Patient Reported Outcome Matters)
Person 8	Female, 49	Nurse acute care	Aware of their professional identity, Experience of being a mother and woman helps **Experienced Female Nurse** Technology is little to no part of identity	- Patient files - Beeper system - Operating tools (Blood pressure measurements, infusion pumps, nebulization devices, ventilators) - DynaMap[5] - Mentions that nearly all tasks within their job require technology	Ease of Use: There is a testing system to ensure that everyone is prepared to use the technology, which is reviewed yearly. Rates overall preparedness to use technology with an eight Perceived Usability: Technology makes sure time is saved, and lots of things are already provided. Though, technology has caused a gap between practitioner and patient, care has become colder. **Overall Acceptance:** Has witnessed the transition of the use of technology and sees some issues with it, where the 'older ways' were better Rates their positivity towards the use of technology with a seven	The beeper system gets improved in such a way that patients can provide the information as to why they are beeping, so the practitioner can be better prepared when acting on the beeper.

Person 9	Male, 23	Master Student	Little aware of their professional identity **Learning Psychotherapist** Technology is no part of identity	- Timetables - Video therapy - Patient file - Psychoeducation (short films, online literature)	Ease of Use: Not all functions were clear immediately, rates ease of use with a six/seven. Past knowledge helped with this, the internship itself didn't increase preparedness. Perceived Usability: Technology wasn't as useful as hoped, it was poorly designed and outdated. Rates usability of current methods with a five **Overall Acceptance:** Perceives technology as a useful and necessary tool in treatment, however, current methods don't match the needed ones. Believes healthcare shouldn't become too technology focused.	Would like to see that the clinical intake, to determine whether people need treatment, could be done online Would like to see an increase in the use of technology in a clinical setting Would like to see a chat forum for patients who need quick help.
Person 10	Female, 25	Master Student	States they are partly aware of their professional identity **Person-focused Learning Psychiatrist** Technology is a little part of identity	- SPSS[6] - Word -eHealth	Ease of Use: States that due to the generation they are in, using technology comes quite easily, rates the ease of use with a seven Perceived Usability: Rates usefulness of technology with a six **Overall Acceptance:** Prefers the 'old fashioned' ways, and really considers the effects on the brain of using technology. Using less technology just seems easier for all	Would like to see a connection between multiple hospitals, to simplify data transfer.
Person 11	Female, 25	Master Student	Little aware of their professional identity Technology is no part of identity	-Device to scan papers -Patient file (IE)	Ease of Use: Unskilled in technology use, feels like it is complicated. Rates ease of use with a three/four Perceived Usability: Tech makes diagnosis easier to comprehend **Overall Acceptance:** Scared of the development of technology. Rates positivity on the use of technology with a five	Hopes that awareness regarding the benefits of technology increases

Note: [1]Participant mentioned both negative and positive aspects of this type of technology, the positive aspects were indicated with a + in front of the rating, whereas the negative aspects were indicated with a – in front of the rating., Final/important topics within the table are highlighted in Bold., [2]ENT = Ear, Nose, Throat., [3]Moonbird = device to help with breathing through vibrations., [4]ROM = Routine Outcome Measurement (digital patient questionnaire)., [5]DynaMap = device that measures vital signs, such as pulse and blood pressure. [6]SPSS = Statistical software that can help with data analysis of quantitative data.

Codes

The results of the analysis of the interviews led to the creation of 22 codes in total, referring to different aspects of the interview, clustered in eight groups of codes (see Table 2) Namely:

1. Benefits of technology in treatment (Which also refers to opportunities)
2. Challenges of technology in treatment
3. Technology acceptance
4. Professional identity
5. Types of technology used in treatment
6. Other Non-Distinctive Challenges
7. Important factors to implement technology
8. Concepts for future treatment

Accessibility is seen as one code, however, contains both positive and negative aspects. Hence why it is part of both the 'Benefits of Technology in Treatment' and the 'Challenges of Technology in Treatment' group. Some specific quotes fit within multiple codes, as they tackle different aspects, but are important for both groups. A definition of all the codes created can be found in Appendix D

Of all the main codes created, Effect on The Therapeutic Relationship was mentioned the least. It was assumed that this partly has to do with the fact that not everyone fully understood the question regarding this topic and that not every interviewed participant has had experiences regarding this topic. Additionally, this topic obtained a code in only 8 of the 11 interviews, which further supports this assumption, hence it was omitted from Table 2. Due to this omission, the group Professional Identity was mentioned the least, though as solely two questions referred to this in the questionnaire it was expected.

It was also found that even though more challenges than benefits were reported in the interviews (See table 3), more different opportunities were mentioned, whereas the challenges mentioned throughout the interviews were all quite similar. Seemingly all participants considered similar issues that technology could have.

Table 3

Generated Interview Codes

Group	Code	Frequency	%	Appearance in number of interviews
Benefits of Technology in Treatment (Frequency: 77 (15.25%))	Practical benefits of technology	37	7.58	11
	Technical benefits of technology	10	2.05	7
	Comfortability	10	2.05	6
	Accessibility	17	3.48	7
Challenges of Technology in Treatment (Frequency: 86 (17.03%))	Practical challenges of technology	17	3.48	8
	Technical challenges of technology	24	4.92	10
	Privacy challenges of technology	9	1.84	7
	Accessibility	4	0.82	3
Other Non-Distinctive Challenges (Frequency: 68 (13.93%))	General obstacles	28	5.74	10
	Interpersonal difficulties	28	5.74	10
	Situational obstacles	9	1.84	7
	Insurance involvement	3	0.61	2

Technology Acceptance (Frequency: 142 (28.12%))	Technological acceptance	67	13.73	11
	Perceived usefulness	40	8.20	10
	Perceived ease of use	35	7.17	11
Professional Identity (Frequency: 24 (4.92%))	Professional identity	9	1.84	7
	Technology as part of identity	15	3.07	11
Types of technology Used in Treatment		51	10.45	11
Important Factors to Implement Technology		16	3.28	10
Conceptions for Future Treatment		24	4.92	9
Total: 8	21	488	100	11

Findings

Overall a lot of different opportunities and challenges were mentioned. All participants were able to identify both challenges linked with the technology used in healthcare as well as opportunities. In this text there will be referred to a variety of 'Person', and different 'codes' and 'groups' these are in accordance with the person as referred to in Table 2.

Opportunities

One of the most mentioned opportunities was the fact that it brings so many different and innovative ways to look at, generate and compare results as well as that it overall makes their work more efficient. Outcomes of test results become more precise and it is possible to see smaller margins of change, which belongs to the code 'Technical benefits of technology'.

Furthermore, Virtual Reality was seen as one of the most opportunity-rich technological advancements, especially when it came to therapy-related treatment. exercises, which used to be very time-consuming and acted out using books, became significantly more effective, doable and observable with Virtual Reality, which was coded as 'Practical benefits of technology'. Basically, all participants that mentioned VR were interested to see how it would further develop and be implemented in the future. Person 7 even stated that the use of virtual reality in matters of psychoeducation allows for an increased understanding of the problem, process or treatment, compared to when only words/pictures are used in the explanation. Technology furthermore allows the explanation to be re-watched/re-listened to, which expands understanding and reduces tension, which belonged to the code of 'Technical benefits of technology'.

Another often-mentioned opportunity is the fact that it increases the autonomy of patients (Person 4) due to the accessibility (which was also coded as 'Accessibility' in the group Benefits of Technology in Treatment) of eHealth applications or homework exercises. Technology is able to assist patients even when the healthcare professional is not around, through this digitalization of psychoeducation, which in turn also decreases the workload of the professional. Eventually, this also helps with prevention and positive lifestyle promotion.

Speaking of the healthcare professional not being around at all times, the accessibility and remoteness possibilities technology brings were also considered as one of the opportunities. The fact that online treatment is possible was the most mentioned opportunity technology can bring, as it, for example, removes travel time, for the patient, and flexibility for both patient and professional, as stated by Person 1 and Person 7, but also travel expense (Person 2), all belonging to the code of 'Accessibility' in the group Benefits of Technology in Treatment. It might even lower the threshold to partake in treatment (Person 6) as there is more comfortability and safety in a participant's own environment, which is familiar to them, as stated by, Person 9 and Person 11, among others, which belonged to the code of 'Comfortability'. This flexibility can express

itself in 24/7 treatment opportunities, where it allows for consultations apart from traditional office hours, which is an immense benefit for i.e. people with a full-time jobs and has even prevented crises. Adding to this, online treatment sometimes takes place via video calls, where people are in their home environment, sometimes allowing the professional to find out additional information about their patient which would otherwise remain unnoticed, which was coded as 'Practical benefits of technology'.

Additionally, creating, reviewing and including notes without actually having to write them down, was one of the opportunities mentioned by all participants that worked with patient files. Accordingly, this also results in fewer errors concerning misinterpretation of handwriting, e.g. wrong medication, which was coded as 'Technical benefits of technology'. Another useful trait of online patient files is that it saves storage. A lot of patients see a professional for a while but may revisit them after a few years. Their files are both more accessible in an online environment and the fact that not an abundance of paper notes have to be securely stored in a room of some sort (Person 8), which was coded as 'Practical benefits of technology'.

A more diverse answer provided by Person 10, was the fact that technology can help with trustworthiness and reliability. They stated that using technology builds trust amongst patients and increases the idea that what you're trying to convince your patient of is actually valid, which was coded as 'Practical benefits of technology'.

According to Person 5, whenever technology is involved in treatment, participants often feel like they are being taken seriously, as well as that it generates excitement to partake in the treatment (Person 7), which was coded as 'Comfortability' and that it generates empowerment amongst patients (Person 3), which was coded as 'Perceived usefulness'.

Challenges

Person 3 mentions challenges such as privacy and responsibility. They consider data storage and data collection as sensitive and possibly dangerous when technology is involved (Person 1). Next to this, the privacy challenges of the openness of the patient file systems were a reoccurring challenge for them. Additionally, they have difficulties with predicting who would be responsible if any data would be leaked for example. Having the opportunity of a hacker being able to steal data or cause data to get lost, was mentioned as a sensitivity issue (Person 10). Technology also has provided privacy issues concerning documentation of employees or searing

for healthcare professionals online (Person 8). These challenges were all coded as Privacy challenges of technology.

Interpersonal difficulties were mentioned as one of the challenges, the gap in human interaction was perceived as harmful to the treatment process as, for example, motivation or empathy issues (Person 4) could arise by the treatment being less personal and more distant. Additionally, only being able to partly see the patient leaves out parts of the body language, hand movement/placement or other forms of non-verbal communication (Person 6) which was stated as key to treating participants. This non-verbal communication is also referred to as clinical view (Person 8) and comments related to this topic were all coded as 'Interpersonal difficulties'

Even though a lot of participants mentioned the positive aspects of online video treatment, it has its downsides as well. Looking solely at the technical aspects, issues with for example Wi-Fi and WLAN stability were mentioned (Person 1 & Person 11) as well as issues with for example microphone or video quality. A lot of participants mentioned that connectivity issues were one of the most upsetting aspects of online treatment, for example suddenly disappearing on your patient, due to connectivity issues, can give the complete opposite effect as hoped in treatment (Person 9). These challenges all belonged to the code 'Technical challenges of technology'. Besides connectivity issues, being able to provide 'on-site' treatment was described as being more valuable, as patients would have time to process their session on their way home for example (Person 10), which was part of the code 'Practical challenges of technology'.

Remoteness was stated as one of the benefits as it provided accessibility for people. Not having to pay for travel, or travel in general was described as a benefit. However, if online treatment were to be completely involuntarily, people would need to have access to computers, cell phones, etc., which for lower-income patients might not be as standard as hoped (Person 2), these challenges belonged to the code 'Accessibility' in the group Challenges of Technology in Treatment.

Another aspect mentioned as the negative involvement of technology in the healthcare sector was the involvement of health insurance companies. They want to know every detail and the billing aspect became more important than it should be, some professionals were only able to hold 30% of treatment via video conferences (Person 2). To quote Person 6: "Insurance

companies want to know every single detail. All insurance related challenges were part of the code ‘Insurance involvement’ in the group Other Non-Distinctive Challenges.

The use of AI and the fact that it sometimes might be based on faulty information was mentioned by Person 3 as one of the scary aspects of the involvement of Artificial Intelligence, which was coded as ‘Technical challenges of technology’. Additionally, this relates to relying too much on technology as mentioned earlier, which belonged to the code ‘General obstacles’.

Lastly, interpersonal differences, which has its focus on the individual preferences of professionals, (Different from interpersonal difficulties which refer to the code Interpersonal difficulties in the group Other Non-Distinctive Challenges) were mentioned as a challenge. Participants stated that it was difficult to decide who might benefit from the use of technology and who might prefer the ‘old fashioned’ way, which counts for both patient and professional (Person 4). An example, as mentioned by Person 11, could be that the older generation has more difficulties with using technology in treatment compared to the newer generation. Examples such as these were part of the code ‘Perceived ease of use’ as they refer to the difficulty of using tecnology. These differences also relate to how some participants simply do not know how to use technology (i.e. older people or mentally challenged people) or how a professional might become dependent on the use of technology. Their lack of technology acceptance is disrupting treatment usefulness (Person 7). Additionally, it was stated that the more complicated technology becomes, the more the measurement might differ from the preferred outcome, which was coded as ‘Technical challenges of technology’.

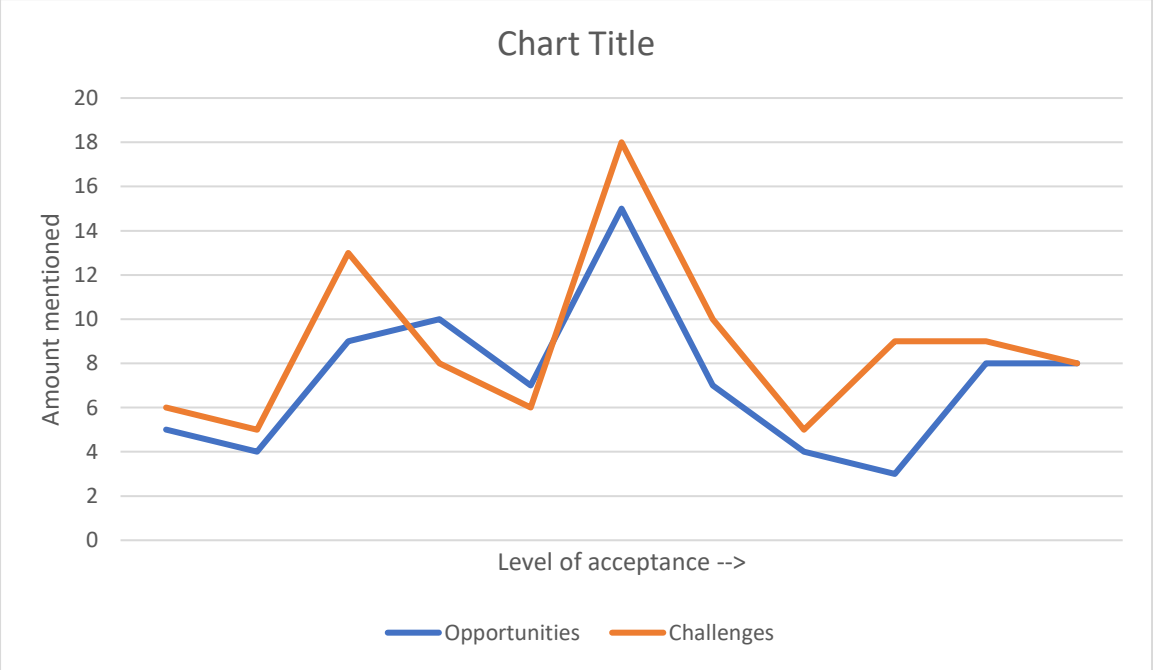
Exploratory Findings

It seemed that psychologists mentioned more Privacy challenges and Interpersonal difficulties as challenges, as well as Comfortability as opportunities. Whereas, other healthcare professionals mostly mentioned Accessibility and Practical benefits as opportunities and saw Technical challenges more as obstacles. Which didn’t really come to light in the answers provided by the psychologists. Another interesting finding resulted from the fact that looking at the positively mentioned remoteness opportunity, psychologists seemed to also acknowledge negative aspects of this remoteness, as they were less able to use their clinical view (noticing small breaths, the way a person looks, how someone interacts, someone’s posture or hand movements) compared to face-to-face treatment options.

Another finding that might pique some interest, is that nearly all participants were in agreeance when it came to the necessary conditions to implement new technologies within their sector. The most mentioned factor was time, yet it was also concluded that within healthcare this aspect is lacking the most. An example by Person 5: “Let alone that there is time to study or learn new technologies.”. Besides time, also resources and validity were mentioned often as aspects that should be considered when new technologies ought to be implemented.

Figure 2

Technology Acceptance vs. Mentioned Opportunities/Challenges



For Figure 2, The level of acceptances was deduced based on the provided answers and then compared to the number of stated Challenges of Technology in Treatment and Benefits of Technology in Treatment. This was done to grasp whether the level of technology acceptance has any influence on the perceived challenges or benefits of technology as part of treatment. As visible in Figure 2, we can state that there does not seem to be a difference in the mentioned amount of opportunities compared to challenges when technology acceptance increases.

Figure 3

Professional Identity and Age

Figure 3 shows how well the interviewees were aware of their professional identity according to age. The awareness of a professional was deduced by looking at their provided answer to the questions related to Professional Identity and their level of understanding regarding the definition of Professional Identity. This was done to showcase whether age has any effect on this awareness. As visible in Figure 3, it is clear that as professionals get older, and have more experience regarding their field of work, their awareness of professional identity increases. It also seems that there is a peak in awareness around the age of 40, after which it partly decreases again.

Discussion

The purpose of this study was to find opportunities and challenges mentioned by a variety of healthcare professionals as there was little know research about how technology is involved in jobs that do not have a technological nature. The main research question 'What are the opportunities or challenges of technology within a healthcare professional's job, when it comes to patient care?' aimed at finding out the different opportunities and challenges that could arise if technology were part of treatment. After careful analysis, a large variety of different opportunities and challenges were abstracted from the interviews which were classified into different categories (individual codes). For opportunities, the individual codes were: Practical benefits of technology, Technical benefits of technology, Comfortability and Accessibility. This provided insight about the different themes when it comes to what positive aspects technology brings to the healthcare sector. For the challenges, the individual codes were: Practical challenges of technology, Technical challenges of technology, Privacy challenges of technology and Accessibility, which shows the overall themes of perceived challenges. Based on answers provided by participants accessibility had both negative and positive aspects, hence why it appeared in both Opportunities and Challenges. This is also an indicator that not all participants were in agreeance, for some perceived positive effects were described as negative by others. To explain this, technology acceptance comes into play. Some answers were considered Non-distinctive, codes in this group were: General obstacles, Interpersonal difficulties, Situational obstacles and Insurance involvement

It was found that having the opportunity of online video treatment was the most mentioned opportunity/benefit of technology within a healthcare professional's job as this provided flexibility for both patient and professional, which was coded as 'Practical benefits of technology'. Additionally, it was stated that it decreases the threshold for partaking in treatment, as people have better 'Accessibility' (No travel expenses, no travel time and 24/7 treatment possibilities) and 'Comfortability' (From their own homes, known and safe space). The benefit of technology in healthcare that was stated as most opportunity-rich was Virtual Reality, meaning that nearly all participants were in agreeance that VR should be used more often, which was coded as 'Technical benefits of technology' and provides a lot of practical, beneficial treatment options such as for psychoeducation, and these aspects were coded as 'Practical benefits of technology'. When it comes to the challenges, clinical psychologists mostly mention the decrease

in clinical view (being able to see the small little details such as posture or hand placement, and non-verbal cues such as small breaths) as the biggest challenge of online therapy, which were coded as Practical challenges of technology, and privacy issues as the general challenge of technology in a healthcare professional's job, which was part of the Privacy challenges of technology code, whereas, other healthcare professionals determined the technical difficulty of technology itself as the biggest challenge, which were coded as Technical difficulties of technology.

Other codes, that allowed other aspects of the results, as abstracted from the interviews, to answer sub-questions as well as create links back to the theory were: Technology Acceptance (Which was divided into: Perceived ease of use, Perceived usability and Technological acceptance), codes in this group were also used to determine the view of participants and whether an increase in technology acceptance would lead to an increase in perceived opportunities of technology. The next group was Professional Identity (Which was divided into: Professional identity and Technology as part of identity), Professional Identity profiles were made based on how the answers provided by participants could be linked to literature explaining it. Such as how Role- and Social identity were part of the professionals, as described by Mishra et al. (2012) who stated that Role-identity refers to managing and controlling resources whilst also performing this role, whereas Social-identity refers to the acceptance of certain norms and values of a group and identification with that group. Codes as: Types of Technology Used in Treatment, Important Factors to Implement Technology and Conceptions for Future Treatment. Provided insights into the different technologies used by different types of healthcare professions (such as different types of video consultants, types of eHealth interventions and breathing devices), what was perceived as necessary factors that are needed to ensure successful implementation (such as time, recourses and money), and what professionals hope technology brings to their job in the future (such as decreased workload, audible notes and AI in diagnostics).

This research has shown that the level of technology acceptance, as conveyed by the researcher, based on the provided answers in the interview, does not necessarily influence the number of challenges or opportunities that were mentioned by participants. Meaning, when technology acceptance increased it did not cause an increase in the number of mentioned codes in the group Benefits of Technology in Treatment nor a decrease in the number of mentioned codes

in the group Challenges of Technology in Treatment. Besides it was concluded that the level of awareness regarding Professional Identity seemed to be at its peak around the age of 40. There seems to be some sort of curve, where before the age of 40 it steeply increases and afterwards only slowly decreases. If this were proven to be significant, it would add to the research of Chreim et al. (2007), Mishra et al. (2012) and Monrouxe et al. (2017, 2018) as they do not mention an age range for the development of a Professional Identity

Even though Types of Technology Used in Treatment, Important Factors to Implement Technology and Conceptions for Future Treatment were individual codes, these served as additional information used to structure and add explorative findings, rather than answering the research question or any sub-questions.

Link to Previous Research

Compared to the research findings of Amann et al. (2023), which state that AI is the biggest technological threat currently when it comes to technology use in healthcare, this research has shown that even though AI was part of the mentioned challenges, other challenges were presented as more concerning. The involvement of insurance companies was mentioned as one of the challenges of technology in a healthcare professional's job. People who mentioned this as a challenge also were less aware of their professional identity compared to others, which is in line with the findings of Stets and Burke (2000), who stated that pressure from vendors and insurances seemed to threaten professional identity. Konttila et al. (2019) stated the importance of technology acceptance, and how it can pose threats to an individual's professional identity, which seemed in line with the findings as depicted in Table 2, as professionals who were classified with a lower level of technology acceptance also had less awareness of their professional identity. Next to this, the participants that seemed to have little awareness of their professional identity also stated less technology involvement within their identities and more overall stated challenges, which could suggest that it is in line with the findings of Monrouxe et al. (2017, 2018), who stated the issues that could arise when professionals have a weak professional identity. They were also right in the fact that professionals might identify with more than one professional identity as some professionals described their professional identities on both Social and Role levels (See Table 2). Overall it was indicated that technology could pose a threat to professional identity (Mishra et al., 2012) and as all professionals mentioned at least some challenges of technology,

and not all individuals were aware of the strength of their professional identity or their professional identity at all, it can be suggested that Mishra et al. (2012) was correct in this indication. Lastly, all participants were asked questions related to perceived usefulness and perceived ease of use, which was done to determine actual technology use, as suggested by The Technology Acceptance Model (Depicted in Figure 1). People who rated the ease of use and perceived usefulness higher also depicted a higher score on overall technological acceptance (Table 2). This research thus confirms the model created by Davis et al. (1989).

Limitations

Despite putting in a tremendous amount of effort in finding participants, merely 11 participants took part in this study. Due to the chosen way of sampling, the busy schedules of healthcare professionals and quite some non-responses, in total eight healthcare professionals took part in this study. To increase the sample, Master Students, that have been in their internship for at least two months, were reached out to. In total, this led to an additional three participants.

Even though the inclusion of master students was beneficial when it came to the subject pool. Some of their answers, for example regarding professional identity, were less fruitful than hoped beforehand. Even though this did not come unexpectedly, it was still considered unfortunate. This applied to the inclusion of one of the pilot studies, which was conducted with a nurse in acute care, as well. Both the nurse and the master students, according to the answers, had a different relationship with patients compared to the other healthcare professionals. For the pilot study some questions were formulated a bit differently, resulting in a different focus of the outcome for some questions, compared to the actual questionnaire used (Appendix B) for the other participants.

Coding was done by two different people with different research questions. Even though some similar codes were used in both types of research, the different perspectives used to look at the interviews, and even the codes themselves caused some issues. Even after discussing the intention of the codes and each other's perspectives, some codes were still unclear. The different perspectives caused some similar answers to be placed in different codes, leading to an error in the amount of, and the apprehensibility of, the codes themselves.

Furthermore, some of the questions could've perhaps used additional explanation. In some interviews, a full explanation would be provided regarding questions such as those

revolving around Professional Identity. To these participants, the meaning of the questions as well as the direction of the expected answer was presumably more clear, as those interviews allowed for more refined answers and outcomes. This inclines me to say that this approach should've been used in all interviews.

Lastly, the Other Non-Distinctive Challenges group of codes could have been removed as a separate group and rather should have been part of the Challenges of Technology in Treatment group. Both groups had a focus on technology still and gave insights into different challenges, which lead to some confusion. Clarity, structure and concreteness would have been improved if they were merged into a singular code group.

Strengths

Even though this paper has its limitations, it still adds new information on how healthcare professionals perceive technology usage within their work field. Different perspectives on possible threats, new insights into how it could possibly be applied and important factors that should be included when new technology is implemented from a user perspective rather than an organisational one. Lastly, it contributes by mapping different perceived opportunities and challenges which can be considered when organisations plan on implementing different types of technology.

Future Research

When it comes to future research regarding this topic, it might be interesting to look at the differences between clinical psychologists specifically compared to other healthcare professionals, regarding professional identity, and technology acceptance. As the sample used only used provided answers from two psychologists and at least six other healthcare professions (not including master students), it might be interesting to see an actual comparative study, with a more representable sample, as overall challenges and opportunities might be different and perhaps a more detailed depiction of the stated opportunities and challenges found in this research. Next to this, looking at technology acceptance and professional identity, it might be interesting to make a distinction between male and female participants when looking at the results to determine whether gender has any effect on technology acceptance or awareness of their professional identity. Lastly, it might be interesting to create a different study based on nurses within clinical care situations and/or master students and their relationship with their

patients, as the results from this study suggested that there was a difference in patient relationships, compared to the other healthcare professions that were part of this study.

There seemed to be a diverse perspective on the opportunities and challenges that technology can bring for a healthcare professional their job. Different professions, though still somewhat in line with each other in some aspects. Opportunities had to do with practicality, technicality, innovativeness, comfortability and accessibility, whereas challenges had to do with privacy, Interpersonal difficulties, personal preferences and insurance involvement. Awareness of Professional Identity and how much technology is involved in this identity seem to peak during midlife, and technological acceptance seems to not have an influence on the number of perceived opportunities or challenges. Future research might prove beneficial as it has the potential to refine, concretize, or add to findings from this report.

References

Amann J, Vayena E, Ormond KE, Frey D, Madai VI, Blasimme A (2023) Expectations and attitudes towards medical artificial intelligence: A qualitative study in the field of stroke. *PLoS ONE 18(1)*: e0279088.

Ajzen, Icek (1991). "The theory of planned behavior". *Organizational Behavior and Human Decision Processes.* 50 (2): 179–211. doi:10.1016/0749-5978(91)90020-T.

Braun, Virginia and Clarke, Victoria (2006) Using thematic analysis in psychology. Qualitative Research in Psychology, 3 (2). pp. 77-101. ISSN 1478-0887

Chreim, S., B. Williams, C. Hinings. 2007. Interlevel influences on the reconstruction of professional role identity. *Acad. Management J.* 50(6) 1515–1539

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008

Dhagarra, D., Goswami, M., & Kumar, G. (2020). Impact of trust and privacy concerns on technology acceptance in healthcare: an Indian perspective. *International journal of medical informatics*, *141*, 104164. https://doi.org/10.1016/j.ijmedinf.2020.104164

Kim, H. J., Mannino, M., & Nieschwietz, R. J. (2009). Information technology acceptance in the internal audit profession: Impact of technology features and complexity. International Journal of Accounting Information Systems, 10(4), 214-228.

Konttila, J., Siira, H., Kyngäs, H., Lahtinen, M., Elo, S., Kääriäinen, M., ... & Mikkonen, K. (2019). Healthcare professionals' competence in digitalisation: A systematic review. *Journal of clinical nursing*, 28(5-6), 745-761. https://doi.org/10.1111/jocn.14710

Lingard L, Garwood K, Schryer CF, Spafford MM. A certain art of uncertainty: case presentation and the development of professional identity. *Soc Sci Med* 2003; 56: 603-616.

Mishra, Abhay & Anderson, Catherine & Angst, Corey & Agarwal, Ritu. (2012). Electronic Health Records Assimilation and Physician Identity Evolution: An Identity Theory Perspective. Information Systems Research. 23. 738-760. 10.2307/23276483.

Monrouxe LV, Bullock A, Tseng HM, Wells SE. Association of professional identity, gender, team understanding, anxiety and workplace learning alignment with burnout in junior doctors: a longitudinal cohort study. *BMJ Open* 2017; 7: e017942

Rees, C. E., & Monrouxe, L. V. (2018). Who are you and who do you want to be? Key considerations in developing professional identities in medicine. *Med J Aust*, 209(5), 202-203.

Smith, J., Johnson, A., & Brown, K. (2022). The role of technology in modern healthcare: Trends and implications. *Journal of Medical Technology and Informatics*, 35(3), 153-167. https://doi.org/10.1002/jmti.21788

Stets, J. E., P. J. Burke. 2000. Identity theory and social identity theory. *Soc. Psych.* Quart. 63(3) 224–237

Strudwick, G. (2015). Predicting nurses' use of healthcare technology using the Technology Acceptance Model. *CIN: Computers, Informatics, Nursing, 33(5),* 189–198. https://doi.org/10.1097/cin.0000000000000142.

Vogel, M. E., Kanzler, K. E., Aikens, J. E., & Goodie, J. L. (2017). Integration of behavioral health and primary care: Current knowledge and future directions. *Journal of Behavioral Medicine*, *40*, 69-84.

Wu, L., Li, J. Y., & Fu, C. Y. (2011). The adoption of mobile healthcare by hospital's professionals: An integrative perspective. *Decision support systems*, *51*(3), 587-596. https://doi.org/10.1016/j.dss.2011.03.003

Appendix A

Interview Guide + Informed consent

Introduction

You are being invited to participate in a research study titled **Interviewing healthcare professionals on the impact of technology on their job.** This study is being done by Luca Hoeijmans and Sophia Kordelas from the Faculty of Behavioural, Management and Social Sciences at the University of Twente.

We are investigating thoughts about, and experiences with technology in healthcare. We wish to discover challenges, opportunities and general acknowledgements towards technology use. As experiences can differ, we will conduct interviews with multiple health professionals. By analysing this, we hope to gain sufficient knowledge about this matter.

Before we begin, I would like to explain some aspects of the research and how we will handle the data.

We are interested in your own personal experiences. This means that there are no right or wrong answers: you are the expert on this subject.

The interview will last approximately 30-45 minutes. I would also like to record the interview. This will enable me to transcribe it word for word so that we can analyse and compare the different interviews. We are going to keep the recordings until August 21st 2023 and delete them afterwards. Do you agree with these terms?

I will write a bachelor's thesis, including the assistance of a fellow student relating to the research. This will be assessed by the teaching staff. The other student and the supervising staff will therefore be able to read the transcription of your interview. However, I will first ensure that all your answers are anonymous: names, dates, and places will be removed. We may want to use quotes from your interview in our report. These will also be anonymous. Anybody reading the report will not be able to work out which answers you gave. The interview will not be used for any other purpose than for our report.

You can stop the interview at any time and you may decide to withdraw from the study at any time.

I would like to ask whether you agree to the above procedures. Please can you sign the following informed consent form?

Informed consent form

Title research:

Responsible researcher:

To be completed by the participant:

I declare in a manner obvious to me, to be informed about the nature, method, target and of the investigation. I know that the data and results of the study will only be published anonymously and confidentially to third parties. My questions have been answered satisfactorily.

I understand that audio recordings thereof will be used only for analysis and / or scientific presentations. I voluntarily agree to take part in this study. While I reserve the right to terminate my participation in this study without giving a reason at any time.

Name participant: …..……

Date: ……..……

Signature participant: …...……

To be completed by the executive researcher I have given a verbal and written explanation of the study. I will answer remaining questions about the investigation into power. The participant will not suffer any adverse consequences in case of any early termination of participation in this study.

Name researcher: ……..

Date: ……..……

Signature researcher: ……....……

Appendix B

Healthcare Professional Interview Guide

Interview Guide

Thank you for taking the time in order to participate in our study. I would like to start with some general questions regarding your work.

What is your specialisation?

How long have you been a healthcare professional?

The following questions will refer to technology use regarding direct patient care, but sometimes other work-related topics. A definition of technology or Technological acceptance and some examples can be provided if that might help you, you can always ask for this definition to be repeated.

What has been your technology experience prior to your current job? (Years + Type of use)

How long have you been using technology within your current sector? (Years)

What kind of work requires technology within your sector?

What type of technology do you use within your sector? (Provide examples e.g. AI, VR (see probes))

(Ask additional questions based on the type of technology they mention)

To what extent do you feel competent in using that type of technology within your sector? (scale 1-10 + reasoning as to why you feel that way)

To what extent do you feel it's useful to use this type of technology within your job?

Would you say you are adequately prepared to use technology in your job? (Yes/No + reasoning) (Links to e.g., lack of learned perceived usefulness)

How would you rate the ease of use on a scale of 1-10 + reasoning (Ask for specific tech used as well)

Could you describe your attitude towards the use of technology within your work field? (Personal opinion, probes: useful/useless, beneficial/threatening, potential/useless

How positive do you feel about the use of technology (Scale 1-10)

What are necessary conditions to implement new technology successfully in your job? (e.g., sufficient resources, time, knowledge, usefulness, etc.)

The next sector will relate to potential opportunities and challenges technology might have for your job. This is a completely personal opinion, if you do not see any opportunities or do not see challenges you can mention this as well.

What are some opportunities that could occur if technology were to be part of your job?

Practical opportunities? (does it work your job more efficiently)

Treatment opportunities? (autonomy level, decision-making)

Can you think of any challenges that technology might bring to your job?

Practical challenges? (does it work your job more efficiently)

Treatment challenges? (autonomy level, decision making)

The next Questions are specifically related to the relationship you have with your patient (Therapeutic relationship) and the effect technology might have on this relationship.

What are your experiences with technology considering the direct treatment with your patients?

From your perspective, what are the strengths of the technology you are using for the relationship with your patients?

And what are its weaknesses?

How would you rate your experiences, if you had any, with online treatment compared to face-to-face treatment?

What are the most significant differences that you detect in the communication with your clients?

Did technology have an effect on the relationship with your patient?

How do you want to have technological treatment proceeding in the future?

This last question refers to professional identity and how technology plays a role in this identity. If you need an explanation of what professional identity entails, one can be provided

Are you aware of your professional identity?

How much do you feel technology is a part of this identity?

As I do not have any questions left, we are coming to the end of the interview. Thank you very much for your participation.

Probes:

Technology we mean:

Technology refers to electronics or internet-based tools used to make your job easier, in the aspect of patient care. It starts as simple forms of communication such as ZOOM as part of video communication or online care possibilities, but we do not count email or WhatsApp. But gets progressively more complicated as we also refer to innovative ways to provide care, such as VR (virtual reality) or augmented reality or other types of "online" treatment methods. We also refer to actual devices such as robots that help with integrating data and predictive analysis, wearable devices (pedometers or various sensors, smart hearing aids, biopatch technology), remote patient monitoring or other medical devices that allow e.g. insights into monitoring the human body such as bioprinting or organ care technology. Lastly, we consider AI to be an example of technology, that sometimes is used in for example decision-making (Reading CT-scans, Improving diagnosis) or improving certain qualities within devices.

Professional Identity:

Professional Identity is constructed based on the combination of both social- and role identity. Reflecting their depiction of a specific role and their self-definition as part of a profession. Social identities refer to the acceptance of the norms and values of a group as well as the identification with that group. Role identity refers to a particular role an individual plays entailing both performing tasks concerning this role as well as managing and controlling resources associated with this role.

Summarising, it refers to how healthcare professionals define themselves regarding work roles, this is the foundation of who they are as a professional.

Example: Care Provider. Doctor, but also, Colleague or Assistant

Technological acceptance:

Technology acceptance can be defined as a user's willingness to employ technology for the tasks it is designed to support.

Appendix C

Master Student Interview Guide

Interview Guide

Thank you for taking the time in order to participate in our study. I would like to start with some general questions regarding your work.

In what department are you currently doing your internship?

What type of work do you carry out during your internship?

How long does your internship last in total?

The following questions will refer to technology use regarding direct patient care, but sometimes other work-related topics. A definition of technology or Technological acceptance and some examples can be provided if that might help you, you can always ask for this definition to be repeated.

What has been your technology experience prior to your internship? (Years + Type of use)

What kind of work requires technology within your internship?

What type of technology do you use within your internship? (Provide examples e.g. AI, VR (see probes))

(Ask additional questions based on the type of technology they mention)

To what extent do you feel competent in using that type of technology within your internship? (scale 1-10 + reasoning as to why you feel that way)

To what extent do you feel it's useful to use this type of technology within this job?

Would you say you are adequately prepared to use technology in your internship? Or would you say you will be adequately prepared to use this technology in the job later on? (Yes/No + reasoning) (Links to e.g., lack of learned perceived usefulness)

How would you rate the ease of use on a scale of 1-10 + reasoning? (Ask for specific tech used as well)

Could you describe your attitude towards the use of technology within the job you are doing the internship for? (Personal opinion, probes: useful/useless, beneficial/threatening, potential/useless

How positive do you feel about the use of technology (Scale 1-10)?

What are necessary conditions to implement new technology successfully in your internship or the job you're doing the internship for? (e.g., sufficient resources, time, knowledge, usefulness, etc.)

The next sector will relate to potential opportunities and challenges technology might have for your internship. This is a completely personal opinion, if you do not see any opportunities or do not see challenges you can mention this as well.

What are some opportunities that could occur if technology were to be part of your future job?

Practical opportunities? (does it work your job more efficiently)

Treatment opportunities? (autonomy level, decision-making)

Can you think of any challenges that technology might bring to your future job?

Practical challenges? (does it work your job more efficiently)

Treatment challenges? (autonomy level, decision making)

The next Questions are specifically related to the relationship you have with your patient (Therapeutic relationship) and the effect technology might have on this relationship.

What are your experiences with technology considering the direct treatment with your patients? (only if they have any)

From your perspective, what are the strengths of the technology you are using for the relationship with your patients?

And what are its weaknesses?

If they have not any: What do you think could be strengths of the technology you are using for the relationship with your patients?

And what are its weaknesses?

How would you rate your experiences, if you had any, with online treatment compared to face-to-face treatment?

What are the most significant differences that you detect in the communication with your clients?

If they have not any: What do you think could be the most significant differences that you detect in the communication with your clients?

Did technology have an effect on the relationship with your patient?

If they have not any: Do you think technology can have an effect on the relationship with your patient?

How do you want to have technological treatment proceeding in the future?

This last question refers to professional identity and how technology plays a role in this identity. If you need an explanation of what professional identity entails, one can be provided

Are you aware of your professional identity?

How much do you feel technology is a part of this identity?

As I do not have any questions left, we are coming to the end of the interview. Thank you very much for your participation.

Probes:

Technology we mean:

Technology refers to electronics or internet-based tools used to make your job easier, in the aspect of patient care. It starts as simple forms of communication such as ZOOM as part of video

communication or online care possibilities, but we do not count email or WhatsApp. But gets progressively more complicated as we also refer to innovative ways to provide care, such as VR (virtual reality) or augmented reality or other types of "online" treatment methods. We also refer to actual devices such as robots that help with integrating data and predictive analysis, wearable devices (pedometers or various sensors, smart hearing aids, biopatch technology), remote patient monitoring or other medical devices that allow e.g. insights into monitoring the human body such as bioprinting or organ care technology. Lastly, we consider AI to be an example of technology, that sometimes is used in for example decision-making (Reading CT-scans, Improving diagnosis) or improving certain qualities within devices.

Professional Identity:

Professional Identity is constructed based on the combination of both social- and role identity. Reflecting their depiction of a specific role and their self-definition as part of a profession. Social identities refer to the acceptance of the norms and values of a group as well as the identification with that group. Role identity refers to a particular role an individual plays entailing both performing tasks concerning this role as well as managing and controlling resources associated with this role.

Summarising, it refers to how healthcare professionals define themselves regarding work roles, this is the foundation of who they are as a professional.

Example: Care Provider. Doctor, but also, Colleague or Assistant

Technological acceptance:

Technology acceptance can be defined as a user's willingness to employ technology for the tasks it is designed to support.

Appendix D

Code Explanation

Explanation

Benefits of Technology in Treatment

All aspects that could be seen as positive outcomes resulting from the use of technology within the healthcare sector, stated by the interviewee, were placed in this group. This code is also used to refer to the opportunities of technology used in healthcare. The group has been split into 4 codes; Practical benefits of technology, Technical benefits of technology, Comfortability, and accessibility.

Practical benefits of technology

This code refers to all practical benefits that arise from the use of technology within treatment. Codes all refer to increasing treatment outcomes, according to the interviewee, from a practical standpoint. Such as increasing opportunities for treatment during e.g. Corona period, but also application usage to increase knowledge or tracking of certain data.

Examples are: “I think. There are also apps that can track behaviour or thoughts or feelings. That's really good, for example, it helps patients to write things down much more quickly than if you give them a piece of paper and a pen.” and “I think it's cool that you can just go away once and still do therapy from somewhere else, I think that's practical.”.

Technical benefits of technology

This code refers to all technical benefits that arise from the use of technology within treatment. Codes in this category referred to increased treatment outcome, on a technological level. Things as joined patient files and technology allowing distance between practitioner and client are encapsulated within this group. An example code is: “And that's why I'm really happy to be able to see all the reports and not have to read them by hand. So when a patient is transferred, I can simply look through the preliminary reports. It's all there and anyone who has access to the computer can look at it. I think that's great.”.

Comfortability

This code refers to all increases of comfort felt by the client, caused by technology being part of treatment. Things such as being able to do exercises from a safe, home environment and in general getting comfortable with using technology are part of this code. An example is: “Because they are at home in a comfortable setting. It's very anonymous. There's no one in the room directly and, you know, it feels a little bit more distant. So it's mostly easier for them to open up and form a bond faster with the therapist.”.

An interesting outcome regarding this code is that multiple interviewees have mentioned that a comfortable and safe environment allows clients to open up more, and create a bond more quickly.

Accessibility

This code refers to how therapy becomes more available for clients when technology is involved in treatment. Not regarding situation aspects such as corona, but more regarding travel time, money to get to the therapy location etc. But it also refers to clients’ feelings, by a decreased threshold to actually go into treatment, and schedule-wise availability, e.g. 24/7 availability. Example codes are: “But even for, especially for people in really rural areas, I think it will be a great option and way better than waiting for a therapy place where you have to go in person, then you need to travel maybe two hours.” and “So I think that really lowers the threshold and allows us to reach more people because of that. I think that's a good thing. And you don't have to go straight to the psychiatrist for every problem, do you?”.

Challenges of Technology in Treatment

All aspects that could be seen as negative outcomes resulting from the use of technology within the healthcare sector, stated by the interviewee, were placed in this group. The group has been split into 4 codes; Practical challenges of technology, Technical challenges of technology, Privacy challenges of technology, and Accessibility.

Practical challenges of technology

This code refers to all impairments caused by the use of technology, according to the interviewee, within treatment. Things such as lack of possibility for physical exercises and unknowingness regarding usefulness are part of this code. Examples are: “So I feel like there's great, great use for technology in this field, but yes, it's, it's difficult to judge which person it fits and which individual may not benefit from using technology at all.”You can't necessarily do these exercises that you could otherwise do on the spot, like role-playing or, it's more difficult. That's why it's more of a cool thing for in between, when there's no other way.”

Technical challenges of technology

This code refers to negative aspects of the actual technical side of technology that is part of treatment. Consider things such as bad connections, faulty microphones, and technical incapability of clients to use technology as part of this code. An example is: “Then I made phone calls afterwards and sometimes it didn't work. Then it was somehow because the microphone on the device was not activated or the camera was not switched on. So you have to practise it properly with the patient. It doesn't always work straight away.”.

Privacy challenges of technology

This code refers to all potential issues, mentioned by the interviewee, regarding privacy and data protection. Difficulties regarding the safety of sensitive client data and such are elements of this code. An example is: “Of course technology also poses risk factors, for example, for confidentiality, etc. I would be very careful with how much responsibility is placed on technology.”

Accessibility

This code refers to how the accessibility of treatment might decrease due to the rise of technology use. Things such as money, time, and preferences play an important role within this code. Examples of this code are: “Yes, what is often a huge problem is simply the availability. You need a certain device. And if you have parents of children who don't have the financial means, then that's a huge problem. Then I don't have any equipment to actually do it.” and “but I have the feeling that revolving-door patients in psychiatric wards or people who have been treated psychiatrically more often tend to prefer to continue doing it in person.”

Technology Acceptance

This group is based on all comments made by the interviewee regarding their standpoint on technology. Their idea on how technology is implemented within treatment, should be used and whether they are capable of using technology. This group consists of both positive and negative points of view. This group is split into three different codes: Technological acceptance, Perceived usefulness, and Perceived ease of use.

Technological acceptance

This code refers specifically to how the interviewees felt about technology being part of treatment. Comments show how different healthcare professionals and different professions view technology. An example of this code is: “And I think that would be good if it stays that way. I'm just worried that it will be taken back again, because Corona has already modernised it a lot and I'm worried that they will row back again. It would be a pity if that were the case, because it is simply an advantage. It should be an option.”.

Perceived usefulness

This code represents all comments made by the interviewee regarding the usefulness of technology being part of treatment. This code was partly linked to ratings on a scale from 1-10, based on how well the interviewees felt technology could be used within their treatment plans as well as how well they were prepared to use certain types of technology. Examples of this code are: “The biggest drawback I see is that it becomes too technology focused, right? So, because technology, as we can already see today, is a thing that mainly decreases workloads and makes everything a lot easier. And that will also be the case in the clinical setting…” and “I would give it maybe a five. It was not a great program for organizational purposes. Okay. It was not. Especially usability wise…”.

Perceived ease of use

This code refers to statements made by the interviewees on how easy they felt different types of technology were to use within treatment. Also for this code, different ratings on a scale

from 1-10 were collected. An example of this code is: “Because it's not intuitive at all. For example, I have an iPhone and I think it's very, very intuitive. If I want to dial, I have to click on the phone symbol, and this hospital documentation is not at all intuitive. So you really have to know what you're clicking on.”.

Types of Technology Used in Treatment

This code refers to all the different types of technology, mentioned by the interviewee, that were being used in treatment. VR technology, Patient documentation, Online exercises are all examples of possible types of technologies mentioned within the interviews. Based on the scores provided in e.g. ease of use, it can for example be determined how well different types of technology are incorporated within treatment.

Other Non-Distinctive Challenges

This group refers to the obstacles experienced by either the interviewee or their clients, regarding technology use. This group looks mostly into e.g. remote treatment and obstacles that arise there, rather than the issues with the technology itself. It looks at challenges that occur less often, have less influence, or were perceived as not big enough to be part of the challenges category. This group has been split up into four different codes; General obstacles, Interpersonal difficulties, Situational obstacles, and Insurance involvement.

General obstacles

This code refers to obstacles perceived that could not be explained in any other category. Issues that don’t arise situationally but are present regardless of the situation. For example when you look at responsibility, or preparedness for technology as a hospital as a whole. An example is: “So, who is responsible? Things like that, too. Where do you lie if, if a mistake happens, who is responsible? You should never leave too much on it , I think.”

Interpersonal difficulties

This code refers to the lack of connection that can be created between the care provider and their client. It is very well linked with the therapeutic relationship. In this code, things such as the lack of visible body language, emotional aspects and frustrations will come to light. Examples of this code are: “it is going to be like, I guess more difficult to read somebody's body

language, because you can see what they do with their feet under the table, if they're like, you know, skipping their legs and stuff like that. So you really have to kind of interpret more of the cues that you can see like the language, the tone, the the facial expressions." and "like patients get frustrated by technology and then talk to you in different ways. Yeah, it's just the frustration itself.".

Situational obstacles

This code consists of occasional aspects. Things that can happen within treatment but aren't generalised. Certain issues that arise when technology is part of treatment that might for example also be very client specific. An example is: "I think that as a human being you always bring along a mood and your posture, and you just don't see that. Some people hold their hands directly in front of their face. You don't see the person as a whole. I think that can sometimes be a real disadvantage.".

Insurance involvement

This code refers to obstacles that occur within treatment that revolve around thrid parties, such as insurance companies. All statements that refer to health insurance and the effect technology has on this matter, were associated with this code. An example of this code is: "the privacy sensitivity is really a weakness. And the fact that health insurance really wants to know from every fart what a person has before diagnosis and that you have to provide that, I'm really on that against."

Important Factors to Implement Technology

This code entails all mentioned aspects that should be present to successfully implement new technologies to assist treatment. Think of items such as time and knowledge. An example of this code is: "That's why I said I think slowly implementing everything is key. If you do it fast, then it'll be too much. So, you really have to implement something and then monitor how we are working with it…".

Conceptions For Future Treatment

This code refers to how the interviewees foresee the future of technology use within treatment. Things they´d like to see different, aspects that need improvement regarding current

methodology, or completely new and innovative ways of technology use. An example of this code is: “Well, I actually think it would be ideal that there are all, preferably ideaal, we're working on that now, that people have already received some kind of questionnaire before they come to you. With their problems. And that when they're sitting here, they're already seeing this, this or this is going on.”.