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How healthcare providers' IT identity is formed and how it affects the use of telemonitoring: a qualitative interview study in COPD care

Nienke Renting ,[1] Martijn R Brands ,[2,3] Emmie A B Velthausz,[4] Samantha C Gouw[2,3]

For numbered affiliations see end of article.

Correspondence to
Dr Nienke Renting;
n.renting@rug.nl

ABSTRACT

Background Telemonitoring is a promising approach to facilitate patients' self-management and improve health outcomes, especially among people with chronic health conditions. Yet, many healthcare organisations struggle to implement telemonitoring successfully. IT identity, an individual's self-identification with an information technology (IT) tool, has been suggested to strongly predict and shape the use of technology. IT identity is related to three emotional responses: emotional energy, dependence and relatedness.

Objective To explore how healthcare professionals' IT identity is shaped, and how it affects their attitude towards and intended use of telemonitoring.

Design Qualitative, semistructured interview study.

Setting Primary care and hospitals (general and academic) in the Netherlands.

Participants Sixteen nurses, pulmonologists, general practitioners and researchers working in chronic obstructive pulmonary disease (COPD) care.

Results Participants expressed varying emotional responses regarding the use of telemonitoring. We associated participants' responses with the three dimensions of IT identity. Regarding emotional energy, some expressed pride in innovating, while others lacked faith in using telemonitoring. Regarding dependence, different perceived intentions and needs for using telemonitoring were identified: to coach patients, prevent deterioration of health, achieve logistical advantages for patients and preserve the accessibility of healthcare. Regarding relatedness, some participants expressed a strong external but weak internal motivation to use telemonitoring. Based on emotional responses, we identified five manifestations of IT identity that illustrate how different healthcare professionals use telemonitoring in COPD care: the Scientist, Innovator, Protector, Empowerer and Conversationalist. These manifestations differ in their readiness to innovate and in their beliefs what it means to be a good healthcare provider: to protect or to coach.

Conclusion Healthcare professionals' emotional energy, dependence and relatedness regarding telemonitoring in COPD care shaped their IT identity and how they used telemonitoring. Implementation strategies tailored towards the five manifestations of IT identity could help the sustainable implementation of telemonitoring in clinical practice.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study has a rigorous inductive design to explore how healthcare professionals' IT identity is shaped.
⇒ We interviewed a range of participants from different backgrounds.
⇒ Since several interviewees principally worked with one kind of telemonitoring, this made the impact of this tool on the results of this study relatively large.
⇒ Since three of the interviewed nurses worked in the same hospital, they could have influenced each other's views.
⇒ We conducted interviews using video conferencing due to the COVID-19-pandemic. This could have resulted in selection bias; although at that time, most people with less digital proficiency were reasonably accustomed to using video conferencing.

BACKGROUND

Telemonitoring holds promise in actively engaging patients in their healthcare process, with the ultimate goal of improving their health. Telemonitoring encompasses a range of digital tools intended to monitor a patient's health status at a distance, such as monitoring hypertension through home blood pressure measurements and the progression of a disease through patient-reported symptoms in an app.[1] It has the potential to improve self-management and shared decision-making by actively involving patients in their own healthcare.[2–6] This patient-centric approach can empower patients to take ownership of their health, leading to improved healthcare outcomes. Moreover, telemonitoring can potentially address the pressing issue of rising healthcare costs.[7] With healthcare systems struggling with the challenges posed by an ageing population, the strain on available resources has become increasingly apparent.[8–12] Telemonitoring presents a viable solution to deliver care to a larger patient population, thereby potentially

preserving the accessibility of healthcare and mitigating the burden on limited resources.[13]

Telemonitoring could especially benefit people with chronic conditions, who often engage in self-management healthcare activities.[14–17] Such activities include adequately reacting to signs and symptoms and integrating the administration of medication into their everyday lives. Consider, for instance, chronic obstructive pulmonary disease (COPD), a progressive lung condition resulting in shortness of breath and cough, for which daily inhalation medication is often required. Nevertheless, exacerbations, episodes where symptoms worsen, frequently occur. Timely recognition of these exacerbations is essential to prevent hospitalisations. Telemonitoring has the potential to aid in this recognition process. Telemonitoring can help individuals to better interpret signs and symptoms, and can provide individuals and healthcare professionals with additional information such as blood oxygen saturation levels and pulmonary function (spirometry) tests. In this way, telemonitoring could help patients to better recognise exacerbations, manage their condition and, consequently, prevent adverse outcomes.[18]

Despite the promising effects of telemonitoring, many healthcare organisations struggle to successfully implement telemonitoring tools: few telemonitoring tools transition from pilot phases to sustainable implementation in practice.[19–22] This also holds for telemonitoring in COPD care.[23 24] A critical factor in this process is the extent to which healthcare professionals adopt and use telemonitoring systems in their daily work routines.[25–28] This is where the concept of information technology (IT) identity comes into play, describing how individuals (be it healthcare providers or patients) perceive the use of IT as an integral part of their personal identity.[29] IT encompasses the full spectrum of technologies used for information processing, such as hardware, software and communication technology. Previous research proposed that IT identity plays an instrumental role in how individuals use IT systems.[29 30] For persons with a strong IT identity, IT capabilities become personal resources that are intertwined with their sense of self. This intertwining leads to increased exploration and use of IT features for various tasks, including self-management tasks using telemonitoring.[29 31]

Individuals can develop multiple IT identities regarding different IT tools, including telemonitoring, that together accumulate in one transcending IT identity. The formation of IT identity depends on three emotional responses: positive emotions and energy regarding the IT tool, dependence on the tool to maintain or enhance self-esteem, and the relatedness between the self and an IT tool.[29 30] Previous studies have shown that adopting an IT identity perspective can shed light on individuals' behaviours related to IT use. For example, the concept IT identity has been used to describe how gamification elements may lead to sustained use of health apps among US citizens, provided that three emotional responses—emotional attachment, dependence and relatedness—were elicited.[32] Similarly, a strong IT identity regarding personal health devices (eg, smartwatches) has been shown to drive expanded use of new features and use in new situations among US citizens.[31] Finally, among adult patients in Israel, IT identity was found to influence their intention to adopt health apps.[33]

Unlike patients, little is known about the formation of IT identity among healthcare professionals. Yet, IT identity has been suggested to strongly predict and shape the use of technology. Therefore, these insights are essential for the successful implementation of telemonitoring. We formulated two research questions: how is healthcare professionals' IT identity shaped, and how does healthcare professionals' IT identity affect their attitude towards and intended use of telemonitoring. Characterisation of common IT identity traits among healthcare professionals can facilitate the development of effective implementation strategies for telemonitoring in clinical practice, ultimately contributing to its sustainable integration into healthcare workflows.

METHODS

Study design

For this constructivist grounded theory study, we adopted a viewpoint that understands that individuals construct meaning and make sense of their experiences, by emphasising participants' subjective interpretations of their telemonitoring practices. We iteratively collected and analysed data to arrive at a new theory that was grounded in our data. Qualitative data were collected through formal semistructured, in-depth interviews. First, we employed a broad inductive approach, in which we sought patterns in our empirical observations in interviews, after which we tested our new theory against new data segments. Finally, we deductively interpreted our theory using the three constructs that constitute IT identity.

Participants

Study participants were pulmonologists, nurses, general practitioners and clinical researchers working in academic and nonacademic hospitals and general practitioner practices in the Netherlands. Participants work in different healthcare institutions. All participants had at least some experience in working with any type of telemonitoring used in COPD care, including home saturation or spirometry measurements, activity trackers, or the recurrent evaluation of symptoms using digital questionnaires. Through snowballing, potential interviewees were contacted by e-mail. Maximum variation purposive sampling was used to capture the widest range of potential perspectives by purposively including a diverse set of participants regarding their profession and potential attitudes towards telemonitoring. Our sample included participants with different levels of digital proficiency (maximum variation), but with at least sufficient proficiency to work with (user-friendly) telemonitoring to reflect on them in interviews. The inclusion of

participants was continued until thematic saturation was achieved: until no new core themes were introduced in the last four interviews. Theoretical saturation signifies that conducting additional interviews would no longer contribute to the development of the qualitative theory derived from the data.

Research team

Operating on the intersection of healthcare and technological innovation, the interdisciplinary research team leveraged their respective expertise in change management (EABV and NR), e-health (MRB and NR) and healthcare (MRB, SCG and NR). The team consisted of two social scientists (EABV and NR) and two medical doctors (MRB and SCG). All have previous experience with qualitative research techniques. There was no patient or public involvement in the design or conduct of this research.

Data collection

Interviews were conducted using video communication due to the COVID-19 restrictions. EABV conducted all interviews between 16 April 2021 and 31 May 2021. The duration of the interviews ranged from 24 to 59 min. An in-depth interviewing approach was adopted by asking flexible, open-ended questions to explore experiences and perspectives. All interviews were recorded and transcribed verbatim. The interview guide was developed for this study by EABV and NR. In part, the interview guide was based on literature to explore different types of identities. First, participants discussed their general, day-to-day use of technology in the workplace and their private lives. Second, they were asked about their experiences with and attitudes towards telemonitoring. This included follow-up questions on what characterises a successful telemonitoring tool and how it may affect patients' lives. Finally, participants were questioned on the best and lesser aspects of their job and discussed their roles in their healthcare team.

Data analysis

An inductive data analysis approach was used. First, using the software tool ATLAS.ti, open coding was used to identify domains. Second, axial coding was used to find connections between these domains and the themes within. Third, a coding scheme was defined, and the dataset was reanalysed to refine themes, explore discrepancies and establish personas. Online supplemental appendix A included the final coding scheme. EABV and MRB independently coded all interviews. Thematic discussions were done by EABV, MRB and NR.

RESULTS
Participants

Theoretical saturation was achieved at 16 participants: 5 pulmonologists, 4 nurses working in intramural COPD care, 4 general practitioners and 3 clinical researchers.

Participant characteristics are presented in table 1. Of participants, eight (50%) were female. Thirteen participants (81%) discussed their experiences with a telemonitoring intervention for patients with COPD that integrates home oxygen saturation and spirometry measurements, often combined with self-reported symptoms and questionnaires. Based on these parameters, patients learn to monitor their condition and signal deterioration. Other telemonitoring interventions that were discussed were an activity tracker (2/16, 13%) and drug-device combinations to improve treatment adherence (1/16, 6%). In addition, eight (50%) participants also discussed teleconsulting, and two (6%) discussed home mechanical ventilation.

Identification with telemonitoring

We found that participants expressed varying emotional responses, beliefs and convictions regarding the use of telemonitoring. These responses influenced participants' intended use of telemonitoring. In this section, we present participants' identification with telemonitoring along the lines of the three dimensions of IT identity: emotional energy (positive emotions and energy regarding the IT tool), dependence (dependence on the tool to maintain or enhance self-esteem) and relatedness (the relatedness between the self and an IT tool).

Emotional energy

Emotional energy relates to extended feelings of excitement, empowerment or security when using IT, or a lack thereof. Emotional energy developed from all previous experiences with IT.[34] Several participants said that innovating is what characterises them. They felt continuous pride in introducing new ideas to their colleagues and often had previously participated in scientific evaluations of digital health innovations. 'I am an early adopter', as a general practitioner (#13) self-analysed. 'At one point, for this trial, we were instructed to work with home spirometers, but for me, this was already part of standard healthcare'. In contrast, a minority of participants placed themselves on the opposite end of this spectrum. 'It sort of must be your hobby… you have to be 'into it', a pulmonologist (#11) stated. Most of the nurses adopted this stance and expressed a lack of confidence that they were able to properly use technology based on their previous experiences.

Dependence

Dependence relates to the perceived need for IT, or a lack thereof.[34] Four distinct reasons why healthcare providers felt a dependence on telemonitoring were formulated. First, many participants used telemonitoring to coach patients, increase their health knowledge and ultimately improve self-management and autonomy. As a general practitioner (#7) stated: 'Especially in diseases such as COPD, it is essential to support and coach patients, and to increase patients' insight in how their illness affects their lives'. All general practitioners and multiple

Table 1 Participant characteristics (n=16)

No.	Occupation	Gender	Institution	Estimated digital expertise*	Main topic of discussion		
					Teleconsulting	Telemonitoring and/or questionnaires†	Home mechanical ventilation
1	Pulmonologist	Female	Academic	High	–	–	Yes
2	Researcher transmural care	Male	Academic	Medium	–	Only activity tracker	–
3	Nurse	Female	Nonacademic	Low	Yes	Sat/Spiro[a]	–
4	Researcher e-health (and pharmacist)	Male	Academic	High	–	Only drug-device combinations	–
5	Pulmonologist	Male	Academic	Medium	Yes	Sat/Spiro[a]	Yes
6	Pulmonologist	Female	Nonacademic	Low	–	Sat/Spiro[a]	–
7	General practitioner (and e-health researcher)	Male	Academic	High	–	Sat/Spiro[a]	–
8	Nurse	Female	Nonacademic	Low	Yes	Sat/Spiro[a]	–
9	Pulmonologist	Female	Nonacademic	High	Yes	Sat/Spiro[a]	–
10	Movement sciences researcher	Male	Academic	High	–	Sat/Spiro[a]	–
11	Nurse	Female	Nonacademic	Low	–	Sat/Spiro[a]	–
12	Nurse	Female	Nonacademic	Low	–	Sat/Spiro[a]	–
13	General practitioner (and researcher)	Male	Nonacademic	Medium	Yes	Sat/Spiro[a]	–
14	Pulmonologist	Male	Academic	Medium	Yes	Sat/Spiro[a]	–
15	General practitioner	Female	Nonacademic	Medium	Yes	Sat/Spiro[a]	–
16	General practitioner (and e-health researcher)	Male	Academic	High	Yes	Sat/Spiro[a], Activity tracker	–

*Digital proficiency was estimated by the interviewer based on claims made by the interviewee, provided explanations by interviewee how they use information technology and (if applicable) one's self-assessment of their capabilities. All interviewed healthcare providers, regardless of their level of digital expertise, reported having at least basic skills sufficient to effectively use telemonitoring tools.
†Participants generally referred to telemonitoring tools that combine home oxygen saturation measurements and home spirometry measurements with questionnaires (indicated by the abbreviation 'Sat/Spiro[a]'). If participants referred to other telemonitoring tools, this is specifically indicated.

other participants formulated this goal. Second, several participants used telemonitoring to monitor patients and prevent deterioration of health, especially among patients who have difficulties in signalling this themselves. 'An automated warning system', as a pulmonologist (#14) put it. This view was predominantly expressed by nurses and pulmonologists. Third, many participants used telemonitoring for its practical advantages of using telemonitoring for patients. These advantages relate to fewer hospital visits and less travel time. One pulmonologist (#1) said: 'Patients do not want to visit hospitals, except when acutely ill. They prefer to stay at home'. Fourth, some participants used telemonitoring for its practical advantages for healthcare providers, which relate to the future accessibility of healthcare. In ageing populations, telemonitoring was generally thought to aid triaging. 'Because we want to limit redundant visits […] to lower the pressure on healthcare institutions',

a general practitioner (#7) explained. According to a pulmonologist (#9), this might even result in 'more time for the patients you're seeing in person, because we can monitor a large group of patients differently'. In contrast, multiple participants, including most nurses, stated that they prefer face-to-face care, which has proven itself to be valuable and useful, especially in the care of older and less digitally able patients.

Relatedness

Relatedness refers to the experienced connection with IT, and its integration into one's everyday life.[34] In this study, participants predominantly discussed a lack of relatedness. A few participants acknowledged that they primarily used telemonitoring because their colleagues or superiors expected them to. 'Hospitals and healthcare providers which were skeptical at first are now gradually overwhelmed by external pressure … to not be considered an old-fashioned hospital',

as a researcher (#10) mentioned. Continuing, he related this: 'in part to a technology push, and in part … to a blind trust that technology is offering the one and only solution to a society panicking over rising costs'. Several participants signalled that technology aversion is becoming less and less accepted. 'Nowadays, you need to have some affinity with technology. It's impossible to do without' (Pulmonologist, #4).

IT identity dimensions

These three dimensions together determine the formation of one's IT identity. First, regarding emotional energy, some participants expressed pride in innovating, while others questioned if they can properly use telemonitoring. Second, regarding dependence, or a lack thereof, some did not experience any dependency on telemonitoring, while others formulated four distinct reasons to use (and depend on) telemonitoring: to coach patients, to prevent deterioration of health, for logistical advantages, and to preserve the accessibility of healthcare. Third, regarding relatedness, some participants mentioned that they are merely instructed to use telemonitoring without being intrinsically motivated.

Health IT identity: 5 archetypes

After establishing the groundedness of IT identity in its three dimensions, we set out to establish patterns in the diverging perspectives. In this section, we discuss five manifestations of IT identity that emerged inductively from the data, each representing an archetypical IT identity among healthcare professionals. We present them as five personas, namely, (1) the scientist, (2) the innovator, (3) the protector, (4) the empowerer and (5) the conversationalist. In general, for each healthcare provider, one persona could generally be identified as more prominent than others. Yet, healthcare professionals usually identified with aspects of multiple personas, as visualised in the spider chart in figure 1. The spider graph is a visual representation and has not been validated. Therefore, constructing a spider chart per included participants to represent their persona(s) is not (yet) possible. In table 2, we present the core beliefs, allergies, potential role in the implementation of telemonitoring and to which other personas they are complimentary. All identified themes are included in these personas.

The Scientist

The persona of the scientist identifies as a critical professional who strives to exclusively implement health interventions that are effective and add value. They fully self-identify as scientists who intend to withstand the technology push and reject smooth commercial marketing. Before adopting, they seek evidence and follow it. This generally results in a critical stance towards telemonitoring. A pulmonologist (#1) declared: 'For us, it must be proven to be effective before we even consider it'. The scientists' core values are academic objectivity and evidence-based medicine. 'Much is claimed regarding the value of this

e-Health domain, but when you consider the evidence … paper thin', as a researcher (#2) stated. A pulmonologist (#5) added: 'Start-ups are great at selling their products, but when you look at their results as a scientist, it's just hot air'. The scientist mostly works in academic institutions. They are skilled in detecting biases, such as selection bias in the inclusion of participants that results in an overestimation of reported effects. The scientist can help decide whether or not to adopt a tool and co-design a research trial to evaluate its effects. Finally, the scientist can help differentiate for which patient groups telemonitoring might work best. A researcher (#10) mentioned: 'I'm sceptical towards this one-size-fits-all approach. There are no criteria whatsoever, based on evidence, that can help to determine which patient I should or should not offer such a tool'. Scientists complement innovators by valuing evidence-based effectiveness over novelty: 'I won't adopt every new tool just to show how cool I am. […] Only when it's clear it actually works, I will embrace it', as a general practitioner (#16) said.

The Innovator

The innovators identify as visionaries, pioneers and enthusiasts. They believe they can inspire their colleagues. Innovators strongly believe that telemonitoring tools will prove their own worth. They advocate not underestimating patients in working with telemonitoring. Innovators consider the effectiveness of telemonitoring to be more important than whoever developed it: academic or commercial. A researcher (#4) observed: 'Healthcare providers are quite conservative, and mainly listen to each other. Not so much to people from outside'. Innovators believe that strong hierarchical structures, and rigid organisational policies and regulations hamper innovation. Their natural contribution to implementation teams is to be a 'change champion' who sees opportunities and energises others. One researcher (#2) described his mission as: 'If we believe that telemonitoring is important and adds value … then we must invest. Costs precede benefits. But you can't just reap the benefits without making costs, as opposed to what some expect'. Innovators complement conversationalists and scientists in their enthusiasm for telemonitoring and determination to make the change happen. According to innovators, the cautiousness of conversationalists and scientists could result in rigidity: 'Really, in the field of medical technology, you come across many professionals who simply have a certain mindset on what works and what doesn't' (Researcher, #2).

The Protector

The protector believes that good healthcare providers protect their patients from deterioration. They view telemonitoring as a potential tool to achieve this. Protectors believe telemonitoring offers the most value to patients who have trouble verbalising their problems or trivialising symptoms. For this specific group of patients, protectors deem a rather
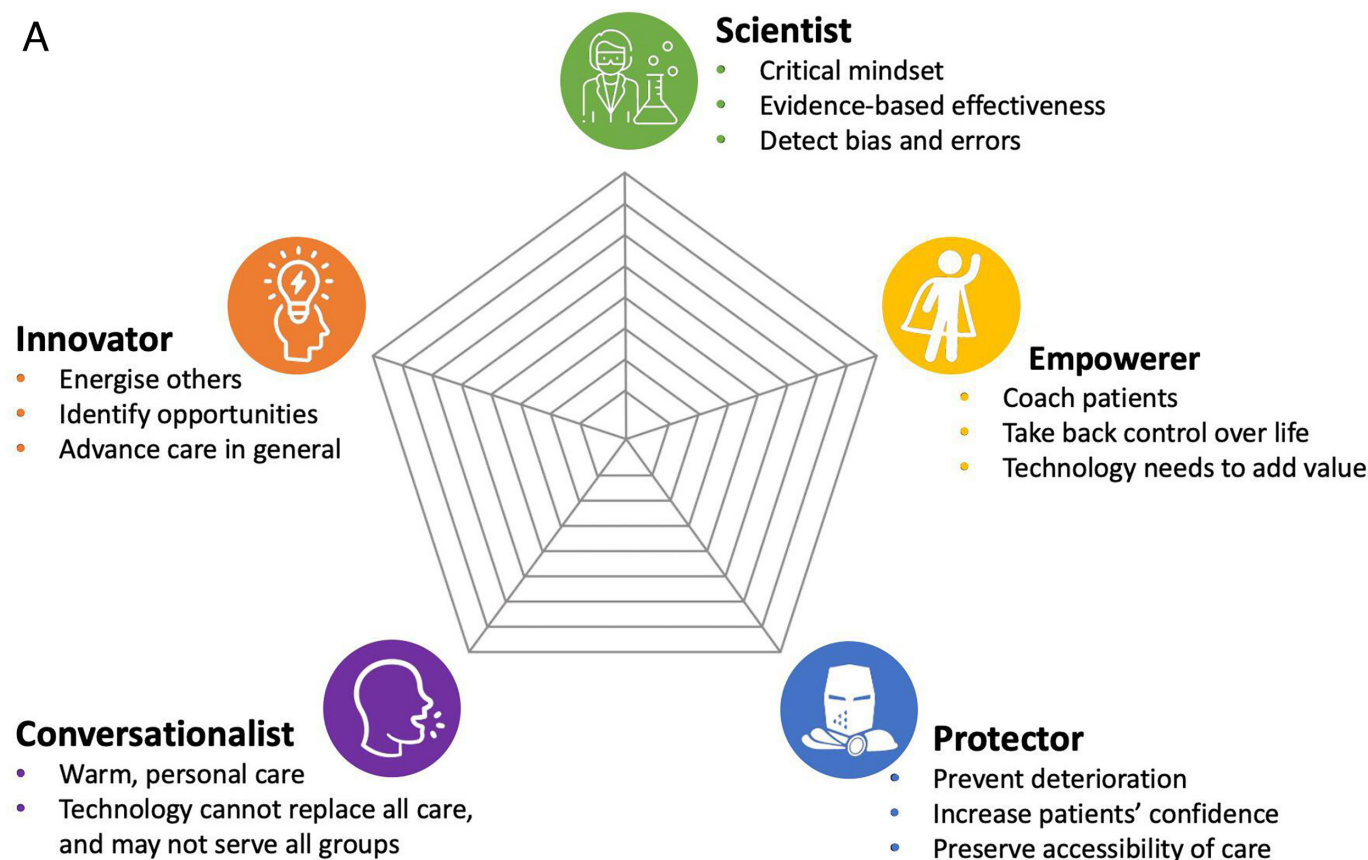
Figure 1 A spider chart that represents the five interdependent manifestations of IT identity, which describes how healthcare providers' attitudes and identities shape working with telemonitoring. Healthcare providers are usually identified with aspects of multiple personas, although generally one persona can be identified as more prominent than others, which is depicted schematically in part B. IT, information technology.

paternalistic approach necessary. Protectors appreciate that surveillance makes patients feel safe. As a general practitioner (#5) said: 'Some patients find it reassuring that we look over their shoulder. It gives them confidence'. Protectors believe that through monitoring, they can better triage what care the patient needs most, which aids in safeguarding the accessibility of healthcare. Protectors understand that tools must be easy to use for all patients. Protectors can help implementation by analysing liability and responsibility issues, especially by keeping the most vulnerable and least digitally able patients in mind. 'How to position tools in healthcare pathways? Who manages tools? Who receives alerts? Who takes on the responsibility for patients in contact with multiple healthcare providers? […] And which professional pays?' as a researcher (#2) summed up. Protectors complement empowerers, by representing patients whom they consider to be insufficiently able to contribute to and influence their own healthcare and by engaging with these patients.

Table 2 Characteristics of the five manifestations of IT identity that show how different healthcare providers use telemonitoring

Persona	Core beliefs	Allergic to	Role in implementation
Scientist	▲ As a good health care provider I need to be critical. (1, 2, 5, 10, 15, 16) ▲ Care needs to be as evidence-based as possible: a telemonitoring tool is just another intervention that needs to be validated by the same standards. (1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 16) ▲ We, academic professionals, are notoriously critical. (1, 2, 5, 10, 16)	▲ Commercial parties: their main incentive is money. By merely digitalizing existing care pathways (and not merging or building upon them), less impact is made. (3, 4, 10) ▲ Flashy marketing is not grounded in evidence. (4, 5, 10) ▲ Unjustified technology-push: the conviction that technology is the answer to everything is illegitimate. (2, 10)	▲ To detect bias in studies (eg, only motivated participants) and see past sales pitches. (6, 10, 15) ▲ To determine for which patient telemonitoring works best; to differentiate. (7, 10, 13) ▲ To see the bigger picture in telemonitoring and collaborate. (10) ▲ To help decide whether or not to start adoption of a telemonitoring tool. (6, 10, 15) ▲ Understands organizational changes are often required. (1, 2, 4, 5, 6, 10, 15) ▲ To design a trial to evaluate the effects of an implemented tool. (1, 2, 5, 10, 13, 16)
Innovator	▲ I love pioneering and trying out new things. (1, 2, 7, 9, 13, 16) ▲ We (young, visionary professionals), are different from them (old and rigid), since we strive to advance care. (4, 9) ▲ I grew up with technology, so it is only logical to incorporate this in my work. (1, 4, 5, 13, 15) ▲ Once patients have experienced telemonitoring, they will understand its benefits. (1, 7, 9) ▲ Telemonitoring reduces travel time and hospital visits for patients. (7, 15)	▲ Disregarding innovation simply because it is not ours, but commercial. (2, 4) ▲ Rigid people and a strong hierarchy: these hamper innovation. (4, 9) ▲ Logistical hurdles when trying to implement innovations in daily practice. (1, 9, 11, 16)	▲ To bring forth ideas and to see opportunities. (2, 7) ▲ To be a "change champion" that energizes and mobilizes others. (1, 7, 9) ▲ To understand that costs precede benefits, and motivate others to invest money to sooner reap the benefits. (2)
Protector	▲ A good health care provider always tries to protect his/her patients from deteriorating. Telemonitoring can help to achieve this. (4, 5, 6, 7, 8, 9, 11, 14, 15) ▲ Telemonitoring boosts patients' confidence: they feel safe if we are watching over their shoulders. (5, 6, 12, 14) ▲ Telemonitoring helps to protect the accessibility of care, by better triaging patients (who needs care). (1, 5, 6, 7, 9, 10, 11, 12)	▲ The assumption that all patients can verbalize their problems: many cannot. (5, 7, 13)	▲ To help discuss costs, liability and responsibilities issues. (2, 4, 6, 13) ▲ To advocate we need to collaborate across institutions more for optimal use of telemonitoring (link data). (15) ▲ To make sure tools are easy-to-use. (1, 3, 5, 16)
Empowerer	▲ As a good health care provider, I need to be a coach. (7, 15, 16) ▲ I aim to empower people to take (back) control over their lives. (7, 8, 9, 10, 13, 14, 15, 16) ▲ It is short-sighted to think that the few times a year that we see a patient, we can control their lives. (7, 15, 16)	▲ Paternalistic care. (5, 7, 10, 13)	▲ To make sure telemonitoring adds value to people's lives, and we are not measuring just for the sake of measuring. (1, 4, 7, 10, 14, 15, 16) ▲ To safeguard the ease-of-use for all patients, but also make sure it offers more depth if desired. (16) ▲ To pursue co-creation with patients. (7, 8, 16)

Continued

Table 2 Continued

Persona	Core beliefs	Allergic to	Role in implementation
Conversationalist	▲ A good health care provider delivers personal and warm care. I prefer face-to-face care: to lay a hand on a patients shoulder. Technology can never replace this. (3, 5, 7, 9, 11, 13, 14) ▲ Telemonitoring may not be imposed upon us. (2, 10) ▲ Many people still prefer 'old-fashioned' personal care. (4, 14)	▲ The technology push: that is not the only way to deliver care. (6, 10) ▲ Time-consuming technology: if telemonitoring is not functioning properly, it takes up a patient's precious consultation time. (5, 15) ▲ Not receiving adequate training before using telemonitoring. (4, 11, 12) ▲ Empowering through telemonitoring is too premature: the prerequisites are still missing for it to properly work (eg, interoperability). (4, 5, 10, 11, 14, 15)	▲ To help identify for which patients telemonitoring might not work. (3, 5, 6, 7, 8, 9, 10, 11, 12, 15) ▲ To help elucidate that the patients who could benefit the most from using telemonitoring tools, are the most difficult to reach. (1, 11, 12, 16) ▲ To empathize with cautious colleagues: if you are too overworked, you have no room in your head to adopt innovations. (5, 15)

The numbers in parenthesis specify the participants (listed in table 1) whose quotations appear in that code group.
IT, information technology.

The Empowerer

The empowerers believe that a good healthcare provider needs to coach and empower people and make them active partners in their healthcare. Empowerers strongly advocate the paradigm shift away from paternalistic care, towards shared decision-making. A general practitioner (#7) mentioned: 'Before, we believed that what we said during consultations was the most important. Ignorant of the fact that patients muddle along by themselves the rest of the year. […] Now, we are beginning to realize we … our role is to coach'. Empowerers seek to ensure that telemonitoring adds value to patients' lives and promotes self-management. 'Ideally, people define personal goals and we build a monitoring program around that', as a general practitioner (#16) said, 'but often abstract medical parameters are taken as objectives, […] which people just don't understand'. According to empowerers, telemonitoring only adds value if it fulfils three requirements: (i) gives direct feedback on patient-reported information and measurements, (ii) guarantees that people can act on this feedback and (iii) ensures that the goal of telemonitoring aligns with people's personal goals. Empowerers can help personalise telemonitoring, ranging from easy-to-use to in-depth features. They can contribute to the change process through co-creation with patients, which they strongly advocate. Empowerers complement innovators: they do not assume the added value of telemonitoring, but consider it conditional to the three requirements mentioned above. Most strongly, empowerers complement protectors in promoting a radically different role for patients. 'Using telemonitoring (for surveillance) is diametrically opposed to empowerment', as a general practitioner (#7) said. 'We should educate patients to recognize worsening of their condition and how to respond. If telemonitoring does not require an action from patients, […] it only reinforces laziness'.

The Conversationalist

The conversationalists believe that a good healthcare provider talks with people and establishes an emotional connection. This emotional connection energises them and is what they value most in their work. Conversationalists are identified as warm and personal caregivers. 'Telemonitoring can never replace the best part of this job: to reach out to the patient you're talking to … to give a pat on the back', as a general practitioner (#7) said. Conversationalists argue that many patients still prefer 'old-fashioned' healthcare and advocate professional autonomy in determining whether or not to adopt telemonitoring. They signal that ill-functioning telemonitoring tools take up scarce and precious consultation time, especially if neither patients nor professionals received adequate training in using the tool. The conversationalist questions whether the current healthcare system is ready for the widespread adoption of telemonitoring. 'We are preoccupied with empowerment … patients in control … involvement of patients. But should we focus on that? I'd much rather see that we first improve communication

between healthcare providers. […] How can we empower patients if we haven't sorted this?', a general practitioner (#15) explained. Conversationalists can help identify for which patients' telemonitoring might not work. They can empathise with cautious colleagues and stress that other factors might influence telemonitoring adoption. 'The strain on them. […] When you're worrying how you're going to make it to the end of the week… you won't be the first to raise your hand'. Furthermore, conversationalists can help assess change readiness and prioritise goals. As such, they complement innovators. Typically, conversationalists are resistant users or non-users, either because of negative IT experiences or a lack of IT experiences altogether.

DISCUSSION

In this interview study, we set out to explore how healthcare providers' IT identity is shaped, how this affects their attitude towards telemonitoring and their intended use of telemonitoring. Participants working in COPD care, which we considered as a representative example of a chronic disease, expressed varying emotional responses, beliefs and convictions regarding the use of telemonitoring. As explained in the Identification with telemonitoring section, participants' responses were closely associated with the three dimensions of IT identity: emotional energy (eg, pride and insecurity), dependence (eg, coaching patients and protecting patients) and relatedness (eg, experiencing a strong technology push from management). Based on these emotional responses, in the Manifestations of IT identity section, we regrouped perspectives to formulate five different manifestations of IT identity among healthcare professionals, called personas: the scientist, the innovator, the protector, the empowerer and the conversationalist. Among others, these personas differed in their readiness to innovate, and what they believe it means to be a good healthcare provider: to protect or to coach.

Theoretical interpretation
The five identified manifestations of IT identity reflect healthcare providers' motives for (not) using telemonitoring. In these personas, identity is expressed on both an individual personal level (self-identification) and a collective group level.[30 35] Collective identity is the shared identity that arises from belonging to a group with common interests and shared experiences.[36 37] One type of collective identity is professional identity: how you self-define as a member of a profession.[38] The empowerer, protector and conversationalist could be considered manifestations of professional identity that closely resemble how you commit to professional values and enact your role. Their beliefs regarding telemonitoring (eg, to coach, to prevent deterioration or to prefer face-to-face care) largely reflect what they consider it means to be a good healthcare provider. In contrast, the scientist and innovator could be considered manifestations of personal identity. Their

beliefs, such as being critical or innovative, transcended professional identities such as 'doctor', 'nurse' and even 'healthcare provider' and have become more intertwined with how they behave regardless of social group or situation.

It has been suggested that individuals can develop multiple IT identities regarding different IT tools. Each can be stronger or weaker (ie, more or less integral to the sense of self).[29 33] Two personas strongly constructed their selves in terms of using IT: they strongly feel that IT is part of their self or strongly feel it is not. While the innovator has a strong, positive IT identity, the conversationalist has a stronger, more negative one (eg, caused by negative past experiences). Although one excellent or ill-functioning IT tool only slightly affects general IT identity, accumulating exposures set a precedent and gradually reshape identity. This includes pilot trials, so precaution is needed even in these contexts. Additionally, while some personas consider telemonitoring as a means to reach a goal (empowerer and protector), others find motivation in using the telemonitoring tools as a goal itself (scientist and innovator).

Comparison to earlier evidence
In analysing healthcare professionals' emotional responses, beliefs and convictions about the use of telemonitoring, we observed a gradual range of responses from protecting (surveillance) to coaching (empowering). Some primarily aimed to increase patients' confidence by watching over their shoulders, while others increased confidence by assuring that help is just a click away, by teaching patients to better apply telemonitoring feedback, and ultimately to educate patients to proactively self-analyse deterioration and lower their dependence on healthcare providers. Previous research on the beliefs and convictions of healthcare professionals towards telemonitoring confirmed the relevance of this surveillance-empowerment axis. All were qualitative interview studies: an Australian study among healthcare providers in chronic care,[39] a Scottish study assessing chronic heart failure care,[40] a US interview study assessing irritable bowel syndrome care,[41] a US study evaluating hypertension telemonitoring[42] and a Canadian study evaluating pre-eclampsia telemonitoring.[43] Additionally, these studies illustrate the many similarities between different chronic conditions.

Strengths and limitations
The major strength of this study is the range of participants involved from different backgrounds. The robust inductive design and involvement of researchers from various fields with different professional experiences strengthened our conclusions. Although we exclusively assessed telemonitoring tools in COPD care, our results may also be applicable to other settings. Yet, limitations are present. First, several interviewees principally worked with one kind of telemonitoring: a tool that combines home saturation and spirometry measurements with

questionnaires to enable early signalling of exacerbations. This made the impact of this tool on the results of this study relatively large. Second, three nurses all worked in the same hospital, which means that they could have influenced each other's views. Third, we have conducted all interviews using video conferencing. However, since interviews were conducted during the COVID-19 pandemic, all participants were used to video conferencing, including the less digitally proficient.

Implications for practice

This research suggests that by focusing on the five personas that describe the different manifestations of IT identity, implementation strategies can be better tailored towards the variety of attitudes present among healthcare professionals. The personas that emerged in this study can be used to better leverage differences that naturally exist in teams of healthcare providers, during the design, implementation and evaluation phases of telemonitoring. In each phase, personas will likely play different roles. The innovator can help energise in the design and implementation phase, while the protector, empowerer and conversationalist will likely determine the contents in the design phase, and the scientist will presumably lead the evaluation phase. This could ultimately help the successful implementation and upscaling of telemonitoring in clinical practice.

Personas are archetypical representations of healthcare providers. In practice, one healthcare provider will likely exhibit characteristics of multiple personas, with one being the most dominant. This is underpinned by table 2 which shows that most participants have quotes that are assigned to code groups of multiple personas. Hence, we advocate an approach depicted in figure 1A. This spider chart does justice to the complex and multifaceted construct of healthcare providers' IT identity that emerged from our data. Further research is needed to develop tools (eg, questionnaires) that can identify the most prominent persona. Moreover, more research is needed to investigate how these personas affect the adoption and continued use of telemonitoring in practice, and if professionals with various personas interact differently with patients.

CONCLUSION

Healthcare professionals' emotional energy, dependence and relatedness regarding telemonitoring shape their IT identity. Based on these emotional responses, we identified different manifestations of IT identity among healthcare professionals, which we grouped under five personas that describe how healthcare providers use telemonitoring. Implementation strategies tailored towards these manifestations could help the sustainable implementation of telemonitoring in clinical practice.

Author affiliations
¹Faculty of Behavioural and Social Sciences, University of Groningen, Groningen, The Netherlands
²Department of Pediatric Hematology, Emma Children's Hospital, Amsterdam UMC location University of Amsterdam, Amsterdam, The Netherlands
³Amsterdam Reproduction & Development, Public Health, Amsterdam UMC location University of Amsterdam, Amsterdam, The Netherlands
⁴Faculty of Economics and Business, University of Groningen, Groningen, The Netherlands

ORCID iDs
Nienke Renting http://orcid.org/0000-0001-8545-8763
Martijn R Brands http://orcid.org/0000-0002-3188-5900

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