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RESEARCH PAPER

Trust transfer effects and associated risks in telemedicine adoption

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Abstract

Telemedicine has the potential to address considerable challenges in the efficient provision of health care services. However, this will not be realized until a high acceptance rate among patients is achieved. We address the research gap that arises from the need to explore the interplay of different trust referents (physician, technology, treatment) and perceived risk dimensions (performance, privacy, time, psychological) in patients' telemedicine adoption considering two different symptom types (physical vs. mental). We conducted a scenario-based online survey and performed *t*-tests, scenario-specific structural equation modeling, and multi-group analysis. *T*-tests and multi-group analysis do not indicate differences in perceptions and path coefficients between the symptoms. Furthermore, scenario-specific structural equation modeling reveals that for both scenarios, trust in physician is less important for trust transfer effects and intention to use than trust in technology and trust in treatment. Trust in treatment has similar effects for all risk dimensions, while only performance risk relates to use intention. Moreover, the results indicate a considerable intention-behavior gap. We advance IS research by emphasizing the relevance of considering multiple trust referents, trust transfer effects, and a multidimensional perspective on perceived risk.

Keywords Trust transfer · Multidimensional risk · Telemedicine · Technology adoption · Patient

JEL Classification I12 · D91

Introduction

Global demographic change, rising healthcare costs, and limited resources demand for new healthcare solutions because these factors put adequate healthcare at risk (Ishfaq & Raja, 2015). Furthermore, digitalization and the movement toward stronger patient orientation reinforce changes in healthcare services and emphasize the benefits of digital healthcare services, such as telemedicine (Dash, 2020; Greene et al., 2012; Ramaswamy et al., 2020). Telemedicine has the potential to address these challenges by contributing to high-quality, area-wide, and more efficient healthcare (Hjelm, 2005) and giving patients fast, flexible, and convenient access to healthcare services (Ishfaq & Raja, 2015). Telemedicine is a form of eHealth and is defined as the use of information and communication technologies (ICTs) by healthcare professionals to deliver healthcare services while bridging geographical distances (World Health Organization, 2010). It can take place between physicians (doctor-to-doctor) or, as referred to in this study, between physicians and patients (doctor-to-patient) (Ishfaq & Raja, 2015). There is a wide variety of applications and purposes for telemedicine. Examples include telemonitoring or telemedical video consultation, which is among the most frequently used applications in the field (Parimbelli et al., 2018). Despite its potential and increasing use, in many countries, telemedicine treatment has not yet established

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itself as a standard practice to support face-to-face consultation (Al-Samarraie et al., 2020).

To realize the potential of telemedicine, its use must be widely adopted in healthcare systems (Harst et al., 2019). Because patients are the prevailing end-user group, investigating factors that affect the process of their adoption of telemedicine has become a goal in recent information system (IS) research (Harst et al., 2019). Previous IS research has already made significant contributions by identifying relevant technology-related acceptance factors, such as perceived usefulness or effort expectancy (e.g., Harst et al., 2019). Nevertheless, the health context is an area characterized by high personal importance and personal, sensitive information (Bansal et al., 2016). Thus, besides technological acceptance factors, the particularities of the health context highlight the relevance of two psychological factors in the adoption process: trust and perceived risk.

Previous research in the overarching area of eHealth (i.e., the general use of ICT for health-related purposes) has frequently studied the relationships of trust and perceived risk for acceptance (e.g., Arfi et al., 2021; Bao et al., 2017; Zhang et al., 2018). Trust and perceived risk have been found to be closely related concepts impacting eHealth adoption (e.g., Deng et al., 2018). Research on trust in eHealth has examined different trust referents, including trust in providers (e.g., Bao et al., 2017; Zhang et al., 2018) or trust in websites (e.g., Bansal et al., 2016). The findings indicate that these trust referents can have varying relationships with intention to use. Furthermore, according to research from related areas, such as e-commerce, significant trust transfer effects which should not be neglected exist between trust referents (e.g., technology and provider) (Kim, 2014; Stewart, 2003). Related research on perceived risk has highlighted the multidimensionality of risk and the role of different perceived risks for intention to use (e.g., Featherman & Pavlou, 2003; Jacoby & Kaplan, 1972). Privacy risk, in particular, has been identified as a critical barrier to intention to use eHealth due to the high information sensitivity of the health context (e.g., Arfi et al., 2021; Bansal et al., 2010). However, the use of telemedicine stands out from other eHealth applications. This is because, in addition to the technology, the interaction also involves a relationship between patient and physician as an essential part of treatment (Li et al., 2016b) to address a health matter. Thus, telemedicine, transferring the patient-physician relationship to deal with a health problem to the digital context, represents an unique context.

Research on trust in telemedicine has suggested that the interaction with the physician through the use of technology as part of medical treatment implies multiple trust referents (van Velsen et al., 2017; Yang et al., 2021): technology, physician, and treatment (the expected outcome of using telemedicine). While previous research (e.g., Li et al., 2018; Yoo et al., 2021) has mostly focused on one trust referent, the close link between the individual trusted parties makes not only the individual consideration of each trusted party, but also the trust transfer effects that occur, crucial. However, only a few studies consider multiple trust referents, such as physician, technology, or organization (e.g., Cao et al., 2020; Gong et al., 2019; van Velsen et al., 2017). Similarly, previous research has examined only a few perceived risk dimensions (e.g., Yang et al., 2021) or analyzed the concept as one overall construct (e.g., Kamal et al., 2020; Mou & Cohen, 2014). This research has supported that perceived risk, especially privacy risk, hinders telemedicine adoption, and is negatively related to trust (Gong et al., 2019; Zheng et al., 2021). Nevertheless, the absence of face-to-face interaction and its replacement by consultation through a technical component can create uncertainty about additional possible negative consequences regarding use and treatment (Anderson & Agarwal, 2011). These further perceived risks should also be considered to respect the multidimensionality of risk (Featherman & Pavlou, 2003; Jacoby & Kaplan, 1972). To this end, telemedicine use predominantly includes the risk of telemedicine not providing the expected outcome (performance risk), the fear of misuse of health data (privacy risk), uncertainty regarding potential time loss (time risk), and the risk of feeling anxiety or stress (psychological risk) (Bakshi & Tandon, 2020; Featherman & Pavlou, 2003). Taken together, there is a considerable research gap on (a) trust in telemedicine, including the trust referents individual relationships for patients' telemedicine adoption and trust transfer effects, (b) the individual relationships of perceived risk dimensions for telemedicine adoption by patients, and (c) how trust reduces the individual perceived risk dimensions. The research stream on trust and perceived risk in telemedicine can thus be advanced by taking a holistic view on trust and risk in the telemedicine adoption process and integrating the relevant trust referents and risk dimensions and their individual relationships. In this regard, we suggest that trust transfer effects initialize a pattern, such that those who trust will perceive fewer risks and have a stronger positive relationship toward use compared to those who do not trust.

Research on trust and perceived risk in telemedicine can be further advanced by considering the complexity of the health context. Perceptions and relationships of different trust referents and risk dimensions can vary between contexts (Lee & Turban, 2001) and cause differences in the pattern of adoption. For example, in telemedicine, previous studies have focused either on one specific symptom or disease, e.g., diabetes, skin conditions, or mental diseases, or have not specified symptoms or diseases at all (Harst et al., 2019). Thus, it remains uncertain whether the implications of previous studies are symptom specific. However, to our best knowledge, there has been no research comparing how perceptions and relationships vary in the context of different symptom types (e.g., mental, physical). Thus, the interplay of different trust referents and perceived risk dimensions in the telemedicine adoption process with reference to different symptom types constitutes a notable research area that has not been examined so far. In sum, this leads to the following research question:

How do trust in different referents and a multidimensional perspective on perceived risk relate to each other and affect patients' telemedicine adoption for different symptom types?

This study thus aims to advance telemedicine research by transferring the physician–patient relationship to the digital context and comprehensively analyzing the relationships of different trust referents and perceived risk dimensions in the telemedicine adoption process. To answer the research question, first, we draw from trust transfer theory (Stewart, 2003) and suggest trust transfer effects between physician, technology, and treatment. We further analyze how the different trust referents relate to intention to use. Second, the relationships between trust in treatment as the expected outcome of telemedicine use to relevant perceived risk dimensions and how these, in turn, relate to intention to use are examined. Third, to complete our model, we include the relationship between intention to use and use behavior for a holistic perspective of the adoption process. The research models are compared against two different symptom types: physical and mental symptoms.

The research question is answered based on a scenario-based online survey. Within the survey, the participants were introduced to a potential medical consultation with their family physician via a video platform, a promising telemedicine medium, and were randomly assigned to one of two scenarios that differ in symptom types (physical vs. mental). Our findings contribute to IS and digital health research, emphasizing the need to consider trust transfer effects and a multidimensional perspective on perceived risk. In addition, we add to the trust transfer theory by supporting that context similarity is a fundamental condition for trust transfer effects. Finally, we find that the identified effects are symptom independent, as no significant differences were observed between the scenarios.

Related literature

Previous telemedicine acceptance literature has drawn in particular on established technology adoption models, such as the technology acceptance model (TAM; Davis, 1989) and the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003). These results have shown that the models are transferable to the telemedicine context and that the factors identified in these models are important determinants of intention to use (for an overview see Harst et al., 2019). Harst et al. (2019) report in their systematic literature review that the relationship between intention to use and use behavior in the telemedicine context has been studied predominantly from the perspective of healthcare professionals, whereas the patient perspective has rarely been considered (e.g., Dou et al., 2017).

In technology acceptance research, trust has been identified as an essential determinant of intention to use (Akter et al., 2013; Belanche et al., 2014; Pavlou, 2003). Research focusing on trust in the context of telemedicine acceptance has supported this relationship (Kamal et al., 2020; Yang et al., 2021). In this regard, most previous telemedicine studies have focused on trust in physician in their acceptance models (Yang et al., 2021), as it is an essential factor for consulting physicians and for the success of treatments in the face-to-face setting (Platonova et al., 2008). In other research areas, such as eHealth, the relevance of various trust referents has been broadly established (Kim, 2014; Mou & Cohen, 2017). Rooted in e-commerce literature, previous studies especially analyzed interpersonal (e.g., Akter et al., 2013; Deng et al., 2018) and technology trust (e.g., Meng et al., 2019; Shao et al., 2019) as trust referents and support the role of trust transfer effects between different referents (e.g., Belanche et al., 2014; Kim, 2014). Recent telemedicine research has explored possible trust referents and identified treatment, technology, and physician as explicitly relevant (van Velsen et al., 2017). However, there is limited research examining the role of different trust referents for telemedicine acceptance simultaneously. Yang et al. (2021) found similar positive effects for the relationships of both trust in physician and trust in technology to intention to use for medical consultation services. Cao et al. (2020) found a larger effect for trust in the technology than for trust in the physician in the analysis of use intention for an online health community. Their results suggest a relationship between physician and technology (Cao et al., 2020), while van Velsen et al. (2021) supported the trust transfer effects between technology, treatment, and care team. Studies that comprehensively examine trust transfer effects as well as the trust referents' role for use intention are missing. This approach, however, is valuable. It allows for the comparison of effects and, more importantly, for a comprehensive understanding of the relationships in the adoption process, as trust transfer effects can influence it.

Trust is closely related to perceived risk, which has been identified as a major barrier to technology use (Lu et al., 2011; Pavlou, 2003). The relationship between trust and perceived risk becomes particularly relevant in the technology adoption process because trust can reduce risk perceptions (Gefen et al., 2003). Most previous studies analyzing perceived risk in telemedicine have conceptualized perceived risk as one factor (Kamal et al., 2020; Yang et al., 2021) or focused on one particular risk dimension (Hall & McGraw, 2014). Previous telemedicine literature has predominantly examined the dimension of privacy risk. For example, Zheng et al. (2021) provide evidence for the negative relationship between trust in physician and perceived privacy risk, and Gong et al. (2019) demonstrate the negative relationship between trust in service providers and perceived privacy risk in the context of online consultation services. Also, the negative relationship between perceived risk and intention to use has been confirmed by various studies in the telemedicine context (Hall & McGraw, 2014;

Kamal et al., 2020; Yang et al., 2021). While these studies provide valuable insights regarding data concerns, research from related fields has suggested that different dimensions of perceived risk need to be considered (Featherman & Pavlou, 2003). Initial studies in the telemedicine field have considered multiple risk dimensions and have been able to support the existence of a relationship between both performance risk and privacy risk on the one hand and with the intention to use telemedicine on the other (Yang et al., 2021). Yet, besides performance and privacy risk, other dimensions, such as time risk and psychological risk, are also relevant and should be integrated (Featherman & Pavlou, 2003). A holistic, differentiated investigation of perceived risk, particularly in relation to trust, has not yet been carried out in the area of telemedicine.

As trust and risk perception are context specific (Lee & Turban, 2001) and telemedicine is used to address a specific health concern, differences between medical conditions need to be considered to understand the adoption process. However, in previous telemedicine research on trust and perceived risk, the research models have mostly not been analyzed for different symptoms (e.g., Gong et al., 2019; Kamal et al., 2020; Yang et al., 2021). This also applies to the overarching area of technology acceptance. Accordingly, Harst et al. (2019) were not able to derive implications as to whether technology acceptance varies between symptoms in their systematic literature review on telemedicine acceptance as previous studies have not throughout indicated the medical condition of the study participants. Thus, symptom comparison constitutes a relevant research gap.

Theoretical background and hypotheses

The following sections elaborate this study's understanding of the different trust referents and perceived risk dimensions and derive hypotheses on their relationships. Table 1 gives an overview of the conceptual definitions used in this study.

Trust referents in telemedicine

In light of the telemedicine adoption process, the interplay of the trust referents and how they affect intention to use represent the starting point of the proposed pattern. Trust is an interdisciplinary construct that has been studied in various research areas and lacks a uniform fundamental definition (Bahtiyar & Çağlayan, 2014). In the IS field, the understanding of trusting beliefs established by Mayer et al. (1995) and McKnight et al. (2011) is most commonly applied (e.g., Alalwan et al., 2017; Bahmanziari et al., 2003; Dash & Sahoo, 2022; Gefen, 2000). As such, we define trust as a patient's (trustee's) belief that the trust referent (trustor) has the attributes necessary to perform a behavior when negative consequences are possible (Mayer et al., 1995; McKnight et al., 2011). In the context of telemedicine, these trusting beliefs can be directed toward several referents: physician, technology, and treatment (van Velsen et al., 2017).

Given that telemedicine has a fairly wide range of applications, the focus selected for this study is the process of patients contacting their familiar family physician, which is transferred into a digital setting. The family physician is already known to the patient and serves as the patient's interpersonal contact for a medical problem. *Trust in physician* reflects a patient's belief in the physician's intention to act in the patient's best interest and in the physician's competence to provide the necessary treatment (Anderson & Dedrick, 1990). The term technology, in this study, refers to the technological artifact used for the interaction, e.g., the video software, and serves as technical support for the telemedical process. The concept of *trust in technology* originates from interpersonal trust literature and has been adapted to fit the particularities of technologies compared to humans (e.g., no will, no moral agency) (Benbasat & Wang, 2005; McKnight et al., 2011). Accordingly, we define trust in technology as the belief that the telemedicine platform is

Table 1 Overview of conceptual definitions of study variables

Variable	Definition
Trust in physician	The belief in the physician's intention to act in the patient's best interest and in the physician's competence to provide the necessary treatment (Anderson & Dedrick, 1990)
Trust in technology	The belief that the telemedicine platform has the functionality and reliability necessary for supporting the telemedicine consultation (McKnight et al., 2011)
Trust in treatment	The belief in the effectiveness and clarity of the treatment via telemedicine and the treatment as collaborative decision (van Velsen et al., 2017)
Performance risk	The extent to which an individual believes that telemedicine does not work as planned and does not provide the anticipated outcome (Grewal et al., 1994)
Privacy risk	The degree of uncertainty regarding the possible loss of control of sensitive, personal data (Featherman & Pavlou, 2003)
Time risk	The extent of perceived potential loss of time (Murray & Schlacter, 1990)
Psychological risk	The extent to which a patient experiences psychological stress or anxiety (Jacoby & Kaplan, 1972)
Intention to use	The extent to which a patient has plans to use telemedicine (Warshaw & Davis, 1985)
Use behavior	Whether patients have been using telemedicine (Oldeweme et al., 2021)

reliable and functional (McKnight et al., 2011). Functionality describes the ability of the telemedicine platform to fulfill its purpose of providing medical care to patients. Reliability, for its part, refers to the proper continuous working of the telemedicine platform used (McKnight et al., 2011). The third trusting belief proposed by McKnight et al. (2011) to constitute trust in technology, helpfulness, is neglected in this study. Personal contact with the physician during telemedicine interaction enables patients to interact with the physician directly in the case of questions or concerns, so the help function of the platform plays a subordinate role. The last trust referent considered, treatment, is the final outcome of the telemedical process, e.g., the given diagnosis or the received medical care, and is influenced by the consultation of the already-known family physician and the applied technology. *Trust in treatment* is a patient's belief that the treatment via telemedicine is effective in addressing their complaints, is clear, and is a collaborative decision with the physician (van Velsen et al., 2017). In the following paragraphs, the relationships between these trust referents will be derived using the trust transfer theory (Stewart, 2003), and the relationships between the trust referents to intention to use will be hypothesized.

Trust transfer theory (Stewart, 2003) assumes that trust can be transferred from a known entity to a new, unknown entity. Trust transfer effects are based on a categorization process that relies on a close source-target relationship. Accordingly, when evaluating their trust perceptions toward a relatively unknown entity, individuals use the existing trust toward a known, related entity as a signal (Gong et al., 2020; Stewart, 2003, 2006). In the telemedicine context, physicians as medical service providers, technology as technical infrastructure for the service, and treatment as the expected outcome of the service are closely related entities that together form the telemedicine process (van Velsen et al., 2017, 2021). In this context, the physician represents the known entity, as we assume that patients are already familiar with their family physician through previous experiences based on face-to-face visits and that patients' beliefs in their physician's competence and intention to act in their best interest remain unchanged despite the changed setting. On the other hand, the technology and the treatment are, from a patient's view, new in the digital setting and represent less-known entities of telemedicine.

Based on trust transfer theory (Stewart, 2003), we assume that a patient's trust in the physician can be transferred to the technology. Because telemedical technology is unknown in the context of medical treatment, patients base their perceptions of the technology and thus their trust, on the physician, who is known from previous face-to-face interactions and is regarded as a medical expert with highly valuable medical input for patients (Mazur et al., 2005). More precisely, patients' trust in the physician implies that they believe the physician will take the appropriate measures to solve the patient's health problems (Anderson & Dedrick, 1990). Such measures include choosing a functional and reliable telemedicine platform that adequately supports the consultation. Consequently, trusting beliefs in the physician can act as a signal for the technology's functionality and reliability. This implies that trust already established in the physician extends to the yet unfamiliar entity of the telemedicine platform chosen by the physician (Stewart, 2003). The trust transfer effect from medical professionals to technology has been supported by van Velsen et al. (2021) and Cao et al. (2020). In line with this argumentation, we propose:

> Hypothesis 1a (H1a): Trust in physician is positively related to trust in technology.

Furthermore, we suggest a trust transfer effect between existing trust in the physician and trust in treatment, the unknown outcome of the consultation. Treatment via telemedicine and physician are strongly linked because the physician suggests the treatment. Therefore, according to the trust transfer theory (Stewart, 2003), patients' trust perception of the treatment via telemedicine can be transferred from their trust perception of the known physician. Accordingly, patients will more likely evaluate the treatment via telemedicine as effective, clear, and agreed upon in improving their health, when the physician is known to be competent and known to act in the patient's best interest. This implies that greater trust in the known physician strengthens trust perceptions in the unfamiliar telemedicine treatment. Research on the patient-physician relationship in the face-to-face setting has found that patients' trust in the physician positively impacts their adherence to treatment (Hall et al., 2001). In telemedicine research, van Velsen et al. (2021) found empirical support for the relationship between trust in medical professionals and trust in treatment. Thus, we propose:

> Hypothesis 1b (H1b): Trust in physician is positively related to trust in treatment.

Because treatment is the outcome of a technology-mediated interaction with the physician, trust in treatment depends not only on trust in the physician but also on trust in the technology. The communication between physician and patient is a determining precondition for arriving at an effective, clear, and agreed-upon treatment (Hall et al., 2001). The telemedicine platform serves as means of communication and needs to accurately transfer all information between patient and physician necessary to arrive at a proper treatment. Therefore, a technology perceived as functional and reliable fosters patients' beliefs in a trustworthy medical treatment. Moreover, a platform that is able to support body language and communication through the adequate quality of image and sound can create a feeling of social presence and enhance patients' trust (Almathami et al., 2020). Accordingly, a higher level of trusting beliefs in the attributes of the technology increases the probability that the treatment will be perceived as effective, clear, and agreed upon. Thus, our hypothesis states:

Hypothesis 1c (H1c): Trust in technology is positively related to trust in treatment.

Alongside the trust referents' relationships to each other, their relationships to intention to use are important in the telemedicine adoption process (Gong et al., 2019; Yang et al., 2021). Research argues that trust can create a favorable attitude in a situation, reduce the situation's complexity, and consequently strengthen an individual's intention to engage in a behavior (Pavlou, 2003). With the patient-physician relationship being a central feature of healthcare services that considers trust an essential foundation (Li et al., 2016b), it is proposed that trust in the physician impacts patients' intention to use telemedicine. Patients' trust in the physician's competence and readiness to act in the patients' best interest can reduce the felt complexity of using telemedicine to receive treatment, increasing the willingness to use telemedicine. In line with previous findings that support the positive relationship of trust in physician to intention to use telemedicine services (e.g., Cao et al., 2020; Octavius & Antonio, 2021; Yang et al., 2021), we hypothesize:

Hypothesis 2a (H2a): Trust in physician is positively related to intention to use.

A patient's perception of technological infrastructure can influence telemedicine use. The literature review by Almathami et al. (2020) shows that platform stability and quality of image and sound are important to patients. Therefore, if patients believe in the functionality and reliability of the telemedicine platform to mediate the consultation, they will evaluate the telemedical consultation favorably. This enhances their intention to use telemedicine for receiving treatment. Previous studies have shown that patients' perception of trust in the technological infrastructure is positively related to their intention to use telemedicine services (e.g., Kamal et al., 2020; Octavius & Antonio, 2021; Yang et al., 2021). Therefore, stronger patients' beliefs that a technology will perform functionally and reliably during a healthcare service increase the probability of patients' willingness to use telemedicine. This leads to the following hypothesis:

Hypothesis 2b (H2b): Trust in technology is positively related to intention to use.

Trust in treatment has a crucial role for determining intention to use telemedicine. This is because medical treatment that meets the patient's health needs represents the rationale and outcome for using telemedicine services (van Velsen et al., 2017; Yang et al., 2021). Therefore, if patients are convinced that they will receive an effective, clear, and agreed-upon treatment through telemedicine, positive attitudes toward telemedicine emerge, increasing patients' likelihood to use telemedicine. Thus, we propose:

Hypothesis 2c (H2c): Trust in treatment is positively related to intention to use.

Perceived risk dimensions

Following the telemedicine adoption process pattern, trust is an important mechanism for mitigating associated risks (Pavlou, 2003), which are barriers to the intention to use digital health services (Gong et al., 2019; Mou & Cohen, 2014). *Perceived risk* combines two essential components: individuals' uncertainty and perceived severity of potentially adverse consequences of an action (Bauer, 1967; Featherman & Pavlou, 2003). Trustors are exposed to the possibility of negative consequences because they do not have complete control over trustees' behavior. Thus, trustors make themselves vulnerable (Mayer et al., 1995). In healthcare, in particular, a certain vulnerability exists for patients as potential associated risks concern their personal health (Yang et al., 2021). Individuals try to avoid risks by adjusting their behavior, e.g., decreasing their intention to use telemedicine, when risks are perceived as high (Kim et al., 2009; Mou et al., 2016; Peter & Tarpey, 1975). Previous research argues that perceived risks are decreased by trust as trust reduces complexity, provides a feeling of control, and strengthens a positive mindset (Pavlou, 2003). Various studies in related areas support the risk-reducing mechanism of trust (e.g., Das & Teng, 2001; Marriott & Williams, 2018; Pavlou, 2003). In the following, the risk dimensions associated with telemedicine (performance risk, privacy risk, time risk, and psychological risk) are defined. Furthermore, the relationships of how they are reduced by trust in treatment, the outcome of the telemedicine service, and how they decrease intention to use will be demonstrated.

Performance risk is given an important role in the telemedicine context (Yang et al., 2021), as personal health has a high priority for the individual (van Velsen et al., 2017). Performance risk in the present context describes the extent to which an individual believes that telemedicine does not work as planned and advertised and therefore does not provide the intended advantage (Grewal et al., 1994). Telemedicine lacks physical examination and face-to-face interaction with the physician (Yang et al., 2021) and is dependent on the support of technology. This can raise patients' concerns that information required for diagnosis and therapy cannot be gathered sufficiently (Kamal et al., 2020; Mou & Cohen, 2014) and, therefore, that telemedicine cannot provide fast, flexible, and cost-efficient help with health needs as desired (Almathami et al., 2020).

When people trust, they believe the trustee will perform as expected, attenuating risk (Pavlou, 2003). Accordingly, when trusting treatment via telemedicine, patients have confidence that the treatment suggested in the telemedicine consultation will help with their health needs (van Velsen et al., 2017). This trust toward the expected outcome lowers performance risk (Das & Teng, 2001). This means that when a patient trusts the treatment, the perceived risk of the possibility that the telemedicine service cannot bring the desired benefits caused by technology malfunctioning or the particularities of the online environment (e.g., absence of physical examination) is reduced. This implies that patients with higher trust in the treatment develop a weaker perceived risk that the telemedicine service will not perform as expected and fulfill their expectations. The following hypothesis emerges:

> Hypothesis 3a (H3a): Trust in treatment is negatively related to performance risk.

Poor telemedicine performance can hinder patients from addressing their health needs appropriately. As personal health has a high priority for individuals, patients would perceive the potential harm that poor telemedicine performance may cause them as being severe (van Velsen et al., 2017). Individuals are motivated to reduce risk by avoiding behaviors in which risks are perceived as high (Kim et al., 2009; Mou et al., 2016; Peter & Tarpey, 1975). Consequently, when patients have stronger beliefs that, for example, the telemedicine platform does not support the consultation process, or the lack of a physical examination and face-to-face interaction impedes accurate treatment, they develop lower intention to use telemedicine. Performance risk has been found to be negatively related to the intention to use telemedicine services (Yang et al., 2021). Also, for other digital health applications and services, performance risk has been identified as a barrier to intention to use (e.g., Deng et al., 2018). Thus, we propose:

> Hypothesis 3b (H3b): Performance risk is negatively related to intention to use.

In telemedicine especially, *privacy risk* is an issue because health data is perceived as highly sensitive (Bansal et al., 2010). Privacy risk is defined as uncertainty regarding the possible loss of control of sensitive, personal data when sharing health information with the physician via a technology platform, e.g., due to unauthorized processing or data leaks (Featherman & Pavlou, 2003). Patients need to share detailed personal health information with the physician during the video consultation. While this information is required to enable treatment, it also exposes them to privacy risk (Hoque et al., 2017; Yang et al., 2021). The level of perceived privacy risk can vary with the type and sensitivity of a patient's information (Bansal et al., 2010).

With increased privacy risk, patients feel more uncomfortable sharing their information with the physician via the telemedicine platform, as this could result in a misuse of information (Yang et al., 2021). In such situations, trust can create a sense of control and reduce the situation's complexity (Pavlou, 2003). Accordingly, trust has been found to decrease privacy risk (e.g., Mou & Cohen, 2014; Xu et al., 2005). In telemedicine, greater confidence that the treatment is clear, effective, and mutually agreed upon can create a feeling of control over the use of personal health data for the intended purpose and reduce the situation's complexity. This suggests that increased trust in treatment attenuates perceived privacy risk. Thus, the following hypothesis emerges:

> Hypothesis 4a (H4a): Trust in treatment is negatively related to privacy risk.

As the disclosure of information related to health can lead to social stigma, discrimination by insurance agencies and employers, and even job loss (Beckerman et al., 2008), individuals want to prevent their sensitive health data from being misused (Deng et al., 2018; Kamal et al., 2020). Thus, potential issues related to data privacy and confidentiality reduce a patient's intention to disclose this information (Deng et al., 2018; Kamal et al., 2020). However, unrestricted sharing of all needed personal health information with the physician in the telemedicine consultation is necessary to receive proper treatment (Guo et al., 2016; Yang et al., 2021). This suggests that higher levels of perceived privacy risk reduce the intention to use telemedicine. In telemedicine research, having greater concerns about the possible misuse of personal data has been found to relate to a lower willingness to use telemedicine (Yang et al., 2021). Also for other digital health services, such as mobile health, privacy risk has been found to decrease usage intention. (e.g., Deng et al., 2018; Li et al., 2016a; Zhang et al., 2019). Thus, we propose:

> Hypothesis 4b (H4b): Privacy risk is negatively related to intention to use.

Although telemedicine does offer patients the potential to save waiting and travel time (Almathami et al., 2020), *time risk*, which refers to a perceived potential loss of time associated with telemedicine (Murray & Schlacter, 1990), may be experienced. Besides the telemedical consultation itself, patients might lose time, for example, learning to use and adapt to telemedicine (Featherman & Pavlou, 2003). Furthermore, patients may perceive the risk of spending time having to additionally see a physician in person (Murray & Schlacter, 1990).

Trust in treatment is proposed to reduce time risk. This is because trust can improve an individual's beliefs in a certain situation (Pavlou, 2003). Patients who trust in the effectiveness and clarity of the treatment that is decided on collaboratively in the telemedicine consultation will evaluate the time spent adapting to telemedicine and the consultation itself as well spent and reasonable. In contrast, when patients are less convinced that telemedicine treatment addresses their health needs, they develop stronger concerns that the time associated with telemedicine use is wasted. This line of reasoning suggests that stronger trust beliefs toward the treatment decrease perceived time risk. Thus, we hypothesize:

Hypothesis 5a (H5a): Trust in treatment is negatively related to time risk.

Individuals are usually averse to losing time. Consequently, they aim to avoid time loss by adjusting their behavior (Featherman & Pavlou, 2003). Telemedicine use, on the one hand, can save time spent traveling and waiting compared to face-to-face visits (Almathami et al., 2020). Yet the time invested in learning to use telemedicine can be evaluated as time lost. Patients protect themselves from the risk of potentially losing time and are less likely to use telemedicine services that they expect to have high time investments. Therefore, higher levels of perceived time risk decrease the intention to use telemedicine. Research has shown that with an increasing perception of time risk, patients are less inclined to use telemedicine (e.g., Bakshi & Tandon, 2020) and other digital health services (e.g., Cocosila, 2013; Mou & Cohen, 2014). This leads to the following hypothesis:

Hypothesis 5b (H5b): Time risk is negatively related to intention to use.

Another vital risk dimension is *psychological risk* (Featherman & Pavlou, 2003). Psychological risk refers to the extent to which a patient experiences psychological stress or anxiety associated with the use of telemedicine (Jacoby & Kaplan, 1972). For example, patients may experience frustration and a lack of satisfaction regarding the telemedicine consultation not meeting their expectations (Featherman & Pavlou, 2003). Patients may also be nervous about their health needs not being sufficiently addressed when using telemedicine, which could harm their well-being (Featherman & Pavlou, 2003). Furthermore, low or no experience with a digital service can expose individuals to mental discomfort (Cocosila & Archer, 2010; Hong & Cha, 2013; Kamal et al., 2020). As telemedicine is still unfamiliar to many patients (Yang et al., 2021), psychological discomfort may arise.

Patients expect to get help for their health needs quickly and flexibly through telemedicine (Almathami et al., 2020). When patients believe that they will receive effective treatment from telemedicine use that is clear to them and agreed upon with the physician, they create a more positive mindset toward telemedicine as their expectations are met. This, in turn, reduces the potential for them to feel dissatisfied, stressed, or frustrated about telemedicine use. The line of argumentation suggests that higher trust in the treatment leads to lower levels of perceived psychological risk. Therefore, the following hypothesis can be stated:

Hypothesis 6a (H6a): Trust in treatment is negatively related to psychological risk.

Triggering feelings of mental discomfort or anxiety during the adoption decision can impact the intention to use telemedicine. Individuals want to prevent negative feelings, such as anxiety and stress (Dowling & Staelin, 1994; Featherman & Fuller, 2003). To reduce the potential of being exposed to psychological risk, patients will avoid using telemedicine if they perceive a high likelihood of psychological discomfort. Consequently, increasing psychological risk decreases patients' willingness to use telemedicine. Kamal et al. (2020) and Wu and Ho (2023), for example, found that patients are less likely to use telemedicine with increased levels of fear of using technology. Thus, we propose:

Hypothesis 6b (H6b): Psychological risk is negatively related to intention to use.

An important part of the adoption process is the relationship between intention to use and use behavior. Several studies have already shown that individuals who are more willing to use a specific technology are more likely to perform the related behavior (Davis, 1989; Venkatesh et al., 2003). This effect has also been demonstrated in the context of digital health services (e.g., Gu et al., 2021). Based on well-established intention-behavior literature in technology acceptance (Davis, 1989; Venkatesh et al., 2003), we suggest that a patient is more likely to use telemedicine if they already have the intention to do so. Therefore, we hypothesize:

Hypothesis 7 (H7): Intention to use is positively related to use behavior.

The resulting research model is depicted in Fig. 1.

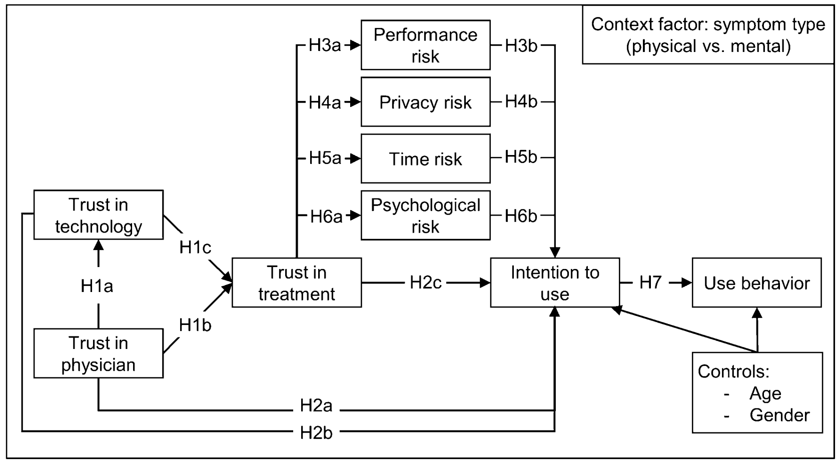

Fig. 1 Research model

Method

Research design and participants

To empirically test the proposed research model for different symptom types (i.e., physical symptoms, mental symptoms), a structured scenario-based online survey was distributed via Bilendi in December 2021. Since Bilendi, as a third-party provider, collected the corresponding survey data, the research team had no direct contact with the respondents and thus no access to personal participant data. Furthermore, no identifying data was collected, so the anonymity and privacy of the respondents were guaranteed at all times. Prior to the main survey, we conducted a pre-test with 20 persons and fine-tuned the scales. The main survey was distributed in Germany among individuals between the ages of 18 and 69 years.

At the beginning of the survey, respondents were randomly assigned to one of two scenarios and asked to put themselves in the position described in the respective scenario. The first scenario (group 1) described physical complaints (skin rash on the abdomen) and the second scenario (group 2) mental complaints (inner restlessness and sleep disturbances) occurring for the first time, whereupon the family doctor (physician) in charge was to be consulted via video consultation. Both scenarios followed the same structure and were supported by descriptive text and graphics. Prior to beginning the questionnaire, in order to avoid potential bias (Podsakoff et al., 2003), participants were explicitly informed that the survey was anonymous and there were no right or wrong answers. First, the respective complaints were explained to the respondents, after which a definition of telemedicine was provided, and the general procedure of video consultation and the necessary equipment were described. A query for demographic data followed this. The following questions dealt with individual attitudes to and perceptions regarding the trust referents and risk dimensions with regard to the use of telemedicine, considering the respective scenario.

A total of 1,944 people were invited to participate in the survey, of whom 666 completed the survey. A general attention test was implemented in the survey to ensure adequate data quality. Another attention check was implemented specifically asking whether the participants still knew their assigned scenario. This was to check whether the participants refer to and visualize their assigned scenario while answering the questionnaire. Individuals who failed were automatically filtered out of the data set. Finally, 551 respondents completed the survey. As part of the data-cleaning process, a total of 85 respondents were excluded from the analysis based on four criteria related to slow response times (34), conspicuous response patterns and outliers (10), and missing data (41) (Leiner, 2019). The final sample includes 466 valid responses, with a similar distribution for sample size and demographic characteristics between group 1 ($N=236$) and group 2 ($N=230$). Table 2 summarizes the demographic distribution of each group. Both groups are representative of the German population in terms of gender, age, education, and residence according to the current population status. The telemedicine adoption rate is 7.6% in group 1 and 10.4% in group 2.

Power analysis was performed to determine the required sample size for testing the proposed research model. In order to identify medium effect sizes (~0.3) with an alpha error of 0.05 and a power of 0.9 in our model with eight latent and 35 observed variables (only items included in the analysis were counted), the minimum sample size is 218 (Cohen, 2013; Westland, 2010). The samples for both scenarios (group 1 = 236; group 2 = 230) exceed the required sample size slightly.

Measurements and validity

Established scales were used in the development of the survey to ensure sufficient reliability, and the items were adapted to the telemedicine context. The scales were translated into German and back-translated into English to ensure a reasonable translation. As a procedural remedy for possible

Table 2 Sample characteristics

Demographics	Group 1: physical ($N=236$)	Group 2: mental ($N=230$)
Gender (Female)	122 (51.7%)	119 (51.7%)
Age		
< 20 years old	8 (3.4%)	9 (3.9%)
20–29 years old	38 (16.1%)	38 (16.5%)
30–39 years old	40 (16.9%)	41 (17.8%)
40–49 years old	43 (18.2%)	43 (18.7%)
50–59 years old	59 (25.0%)	51 (22.2%)
60–69 years old	48 (20.3%)	48 (20.9%)
Mean (SD)	45.36 (14.55)	44.89 (14.87)
Educational level		
Less than high school diploma	156 (66.1%)	151 (65.7%)
High school diploma	29 (12.3%)	41 (17.8%)
Bachelor's degree	21 (8.9%)	8 (3.5%)
Master's degree	29 (12.3%)	28 (12.2%)
Doctoral degree	1 (0.4%)	2 (0.9%)
Telemedicine adoption rate	7.6%	10.4%

bias, the order of the items was randomized (Podsakoff et al., 2003). Trust in physician (TP) was operationalized using eleven items of the established "Trust in Physician Scale" by Anderson and Dedrick (1990). Trust in technology (TTC) was modeled as a reflective second-order multidimensional factor, according to the conceptualization of McKnight et al. (2011). Here, the constructs reliability and functionality represent the dimensions forming trust in technology. Reliability was measured using four, and functionality using three, items, based on McKnight et al. (2011). Trust in treatment (TT) was measured by five items from van Velsen et al.'s (2017) scale. The risk dimensions performance risk (PER) and psychological risk (PR) were operationalized using three items, each based on the established scales of Stone and Grønhaug (1993). Time risk (TR), consisting of three items was based on a study by Laroche et al. (2004). Privacy risk (PPR) was measured by five items and was adapted from the study by Rauschnabel et al. (2018). The intention to use (BI) construct is based on Venkatesh et al.'s (2003) UTAUT and was measured using three items. Except for use behavior and demographic data, respondents rated each item on a 7-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Use behavior (USE) was treated as a binary variable using the item "I have been using telemedicine" (Oldeweme et al., 2021). The English measurement items and factor loadings are depicted in Table 3.

The measurement model was tested for reliability and validity. First, at the indicator level, it was checked whether the factor loadings of the items were positive and greater than 0.7 (Hair et al., 2021). All standardized factor loadings exceed the threshold, except for four items of the construct trust in physician and one of the construct trust in treatment. Therefore, these items were excluded from the following analysis. Second, to test reliability and validity at the construct level, Cronbach's alpha (CA), composite reliability (CR), average variance extracted (AVE), and heterotrait-monotrait ratio were used. The results of these tests are presented in Tables 4 and 5. The CA values of all constructs are above the recommended threshold of 0.7, thus achieving sufficient internal reliability (Cronbach, 1951). Tables 4 and 5 show that for both groups, the AVE and factor reliabilities of all constructs exceed the respective required thresholds of 0.5 and 0.6, so convergence validity can be assumed (Fornell & Larcker, 1981; Hair et al., 2021; Henseler et al., 2015). The Fornell-Larcker criterion and the heterotrait-monotrait ratio were applied to test for discriminant validity (Henseler et al., 2015). The Fornell-Larcker criterion is met if the square root of the average extracted variance of each construct is greater than any correlation that one construct has with another (Fornell & Larcker, 1981). This is the case for all constructs. A sufficiently discriminant measurement of the variables is given since the heterotrait-monotrait ratio reported in Tables 4 and 5 is below 0.9 for all constructs (Henseler et al., 2015). Multicollinearity, which may affect the validity of the models, seems unlikely to be a problem as all variance inflation factor values were below 5 (Ringle et al., 2012). We used Kock's (2015) full collinearity assessment approach to test for common method bias. The results suggest little to no impact of common method bias on the model.

Data analysis

Data analysis was conducted in two steps. First, before analyzing the role of trust referents and perceived risks in the proposed telemedicine adoption pattern, mean comparisons between group 1 (physical) and group 2 (mental) were performed for all latent variables. For this purpose, independent samples Welch's *t*-test using IBM SPSS Statistics Version 27 software (Rasch et al., 2011) was conducted. Due to the issue of multiple testing and the associated alpha error accumulation within the *t*-tests performed, the Bonferroni-Holm correction was considered (Holm, 1979). The mean comparisons were evaluated at the 5% level of significance ($p < 0.05$). In addition, Cohen's d was calculated to determine the effect size (Cohen, 2013). The means and standard deviations of the latent variables in the research model and the results of the independent samples *t*-test are summarized in Table 6. The results of the comparison of means show no significant differences in the perceptions of trust referents, risk dimensions, and intention to use between individuals in group 1 (physical) and group 2 (mental). Thus, the Bonferroni-Holm correction could be omitted since it follows a rather conservative approach (Holm, 1979).

Table 3 Measurement items and loadings

Construct measurements	Factor loading	
	Group 1: physical	Group 2: mental
Trust in physician (TP)		
TP1: I doubt that my doctor really cares about me as a person. (r)*		
TP2: My doctor is usually considerate of my needs and puts them first.	0.827	0.742
TP3: I trust my doctor so much I always try to follow his/her advice.	0.860	0.830
TP4: If my doctor tells me something is so, then it must be true.	0.765	0.740
TP5: I sometimes distrust my doctor's opinions and would like a second one. (r)*		
TP6: I trust my doctor's judgments about my medical care.	0.832	0.873
TP7: I feel my doctor does not do everything he/she should about my medical care. (r)*		
TP8: I trust my doctor to put my medical needs above all other considerations when treating my medical problems.	0.825	0.839
TP9: My doctor is well qualified to manage (diagnose and treat or make an appropriate referral) medical problems like mine.	0.810	0.840
TP10: I trust my doctor to tell me if a mistake was made about my treatment.	0.789	0.817
TP11: I sometimes worry that my doctor may not keep the information we discuss totally private. (r)*		
Trust in technology - reliability (TTC-R)		
TTC-R1: The telemedicine platform is a very reliable platform.	0.900	0.871
TTC-R2: The telemedicine platform does not fail me.	0.924	0.888
TTC-R3: The telemedicine platform is extremely dependable.	0.936	0.905
TTC-R4: The telemedicine platform does not malfunction for me.	0.837	0.845
Trust in technology - functionality (TTC-F)		
TTC-F1: The telemedicine platform has the functionality I need.	0.918	0.885
TTC-F1: The telemedicine platform has the features required for my tasks.	0.936	0.915
TTC-F1: The telemedicine platform has the ability to do what I want it to do.	0.929	0.903
Trust in treatment (TT)		
TT1: The treatment I receive would be effective.	0.910	0.893
TT2: It would be clear to me what the treatment I receive entails.	0.902	0.892
TT3: Together, my physician and I would make the choice for this treatment.	0.834	0.774
TT4: The treatment I receive would not be helping me enough. (r)*		
TT5: It would be explained well to me what my treatment entails.	0.886	0.860
Performance risk (PER)		
PER1: As I consider the use of telemedicine, I worry about whether it will really perform as well as it is supposed to.	0.890	0.848
PER2: If I were to use telemedicine, I would become concerned that the service will not provide the level of benefits that I would be expecting.	0.934	0.936
PER3: The thought of using telemedicine causes me to be concerned for how really reliable that service will be.	0.920	0.943
Privacy risk (PPR)		
PPR1: Telemedicine would collect too much information about a user.	0.902	0.923
PPR2: I would be concerned about my privacy when using telemedicine.	0.945	0.959
PPR3: I have doubts as to how well my privacy is protected while using telemedicine.	0.940	0.957
PPR4: My personal information would be misused when telemedicine is running.	0.921	0.926
PPR5: My personal information would be accessed by unknown parties when using telemedicine in my everyday life.	0.923	0.931
Time risk (TR)		
TR1: Using telemedicine could lead to an inefficient use of time.	0.918	0.949
TR2: Using telemedicine could involve important time losses.	0.950	0.958
TR3: The demands on my schedule are such that using telemedicine concerns me, because it could create even more time pressures on me that I don't need.	0.797	0.851
Psychological risk (PR)		
PR1: The thought of using telemedicine makes me feel psychologically uncomfortable.	0.943	0.950

Table 3 (continued)

Construct measurements	Factor loading	
	Group 1: physical	Group 2: mental
PR2: The thought of using telemedicine gives me an unwanted feeling of anxiety.	0.967	0.957
PR3: The thought of using telemedicine causes me to experience unnecessary tension.	0.962	0.962
Intention to use (BI)		
BI1: I intend to use telemedicine.	0.981	0.978
BI2: I predict I would use telemedicine.	0.989	0.986
BI3: I plan to use telemedicine.	0.980	0.991

(r) reverse coded.

*Item was excluded due to low factor loadings. Final factor loadings.

Second, partial least squares structural equation modeling (PLS-SEM) was applied to test the research model and hypotheses empirically. The corresponding calculations were performed using SmartPLS version 3.3.5 software (Ringle et al., 2012). Bias-corrected bootstrapping based on a sample of 5000 was used to test the PLS-SEM (Hair et al., 2021). This was conducted for group 1 and group 2. PLS-SEM was preferred over covariance-based SEM because it is particularly suitable for complex models with multiple relationships in the structural model and does not require normal distribution of the data used (Hair et al., 2021; Henseler et al., 2015). In addition, the rather exploratory context of the proposed research model also supports its use, as the literature recommends PLS-SEM instead of covariance-based structural equation modeling in this context (Hair et al., 2021). Furthermore, having a sufficiently large sample ($N=236$ in group 1 and $N=230$ in group 2) and factors with more than two indicators addressed the potential biases in PLS-SEM suggested in the literature (Sarstedt et al., 2016). Finally, the bootstrapping method increases the robustness of PLS-SEM results (Hair et al., 2021).

Beyond testing the research model separately for the two scenarios, a multi-group analysis was performed to test for significant differences between the path coefficients within the physical symptom (group 1) and the mental symptom scenario (group 2). The tests for measurement invariance between these two groups (see Table 7) reveal that (1) configural invariance (model without constraints), (2) metric invariance (model with equal factor loadings between groups), and (3) scalar invariance (model with equal factor loadings and intercepts between groups) occur, allowing bias-free comparisons of the results from the two scenarios (van de Schoot et al., 2012).

Results

Measurement model

Confirmatory factor analysis (CFA) was applied using R-based lavaan package (Rosseel, 2012). Before testing the proposed structural model, we performed CFA to test

Table 4 Reliability and validity of measurement instruments for group 1: physical symptoms

				Correlations/heterotrait-monotrait ratio								
Construct	CA	CR	AVE	TP	TTC	TT	PER	PPR	TR	PR	BI	Use
Trust in physician (TP)	0.917	0.933	0.666	–	0.189	0.191	−0.182	−0.207	−0.150	−0.082	−0.012	0.007
Trust in technology (TTC)	0.949	0.958	0.765	0.193	–	0.828	−0.580	−0.526	−0.480	−0.535	0.674	0.243
Trust in treatment (TT)	0.906	0.934	0.781	0.208	0.888	–	−0.585	−0.492	−0.515	−0.491	0.719	0.204
Performance risk (PER)	0.903	0.939	0.837	0.194	0.626	0.635	–	0.602	0.535	0.599	−0.630	−0.225
Privacy risk (PPR)	0.958	0.968	0.857	0.213	0.552	0.528	0.644	–	0.505	0.624	−0.482	−0.193
Time risk (TR)	0.869	0.920	0.793	0.164	0.518	0.568	0.593	0.546	–	0.660	−0.508	−0.046
Psychological risk (PR)	0.955	0.971	0.917	0.113	0.561	0.525	0.644	0.654	0.722	–	−0.543	−0.137
Intention to use (BI)	0.983	0.989	0.967	0.046	0.696	0.756	0.658	0.494	0.542	0.560	–	0.216
Use behavior (USE)	N/A[a]	N/A[a]	N/A[a]	0.036	0.251	0.212	0.232	0.196	0.045	0.140	0.218	–

Correlations are presented on the upper triangle, and heterotrait-monotrait ratios are presented on the lower triangle.

CA Cronbach's alpha, *CR* composite reliability, *AVE* average variance extracted.

[a]Single item and therefore not applicable.

Table 5 Reliability and validity of measurement instruments for group 2: mental symptoms

Construct	CA	CR	AVE	Correlations/heterotrait-monotrait ratio								
				TP	TTC	TT	PER	PPR	TR	PR	BI	Use
Trust in physician (TP)	0.920	0.932	0.661	–	0.132	0.195	0.063	−0.006	0.011	−0.052	−0.012	0.062
Trust in technology (TTC)	0.939	0.950	0.731	0.112	–	0.796	−0.547	−0.542	−0.527	−0.540	0.618	0.217
Trust in treatment (TT)	0.878	0.916	0.733	0.193	0.869	–	−0.566	−0.491	−0.513	−0.534	0.643	0.140
Performance risk (PER)	0.896	0.935	0.828	0.101	0.594	0.624	–	0.666	0.607	0.648	−0.566	−0.155
Privacy risk (PPR)	0.967	0.974	0.883	0.090	0.569	0.525	0.711	–	0.625	0.700	−0.486	−0.173
Time risk (TR)	0.910	0.943	0.847	0.106	0.565	0.563	0.670	0.664	–	0.667	−0.477	−0.064
Psychological risk (PR)	0.954	0.970	0.915	0.059	0.570	0.582	0.700	0.728	0.721	–	−0.525	−0.150
Intention to use (BI)	0.985	0.990	0.970	0.043	0.642	0.682	0.595	0.497	0.498	0.540	–	0.229
Use behavior (USE)	N/A[a]	N/A[a]	N/A[a]	0.079	0.224	0.145	0.168	0.176	0.065	0.154	0.230	–

Correlations are presented on the upper triangle, and heterotrait-monotrait ratios are presented on the lower triangle.

CA Cronbach's alpha, *CR* composite reliability, *AVE* average variance extracted.

[a]Single item and therefore not applicable.

the fit of the measurement model (Kline, 2016), assessing a model with eight latent constructs and 35 items (seven items each for trust in physician and trust in technology, five items for privacy risk, four items for trust in treatment, and three items each for performance risk, time risk, psychological risk, and intention to use). The measurement model revealed a good fit in group 1 (physical: $\chi^2(532) = 1193.149$, $p \leq 0.001$; $\chi^2/df = 2.242$; CFI = 0.926; TLI = 0.917; RMSEA = 0.073; SRMR = 0.049) and group 2 (mental: $\chi^2(712) = 1448.109$, $p \leq 0.001$; $\chi^2/df = 2.034$; CFI = 0.919; TLI = 0.911; RMSEA = 0.067; SRMR = 0.064) (Hooper et al., 2008; Hu & Bentler, 1999; Kline, 2016).

Structural model

To empirically test the research model and the corresponding hypotheses, PLS-SEM was performed for both groups. The hypotheses were evaluated based on the standardized regression coefficients (β) and the significance level of 5% ($p < 0.05$) for group 1 (physical) and group 2 (mental). The results are summarized in Table 8. H1a is partially supported since trust in physician and trust in technology show a positive relationship only for group 1 (physical). H1b is rejected because there is no association between trust in physician and trust in treatment. In contrast, trust in technology and trust in treatment are positively related, so H1c is supported. The relationship between trust in physician and intention to use shows a negative effect for group 1 (physical) and a non-significant effect for group 2 (mental). Since a positive relationship was hypothesized, H2a is rejected. H2b and H2c are supported because there is a positive relationship between trust in technology and intention to use as well as trust in treatment and intention to use. H3a and H3b are also supported as there is a negative relationship between trust in treatment and performance risk as well as performance risk and intention to use. H4a is also supported since trust in treatment and privacy risk are negatively related, while H4b is rejected as there is no relationship between privacy risk and intention to use. There is a negative relationship between trust in treatment and time risk, so H5a is supported. No association was observed between time risk and intention to

Table 6 Descriptive statistics and comparative analysis

Construct	Mean (SD)		Mean difference	p	Cohen's d
	Group 1: physical	Group 2: mental			
Trust in physician	4.984 (1.180)	4.945 (1.146)	0.040	0.714	0.034
Trust in technology	4.325 (1.179)	4.344 (1.142)	0.018	0.864	0.016
Trust in treatment	4.529 (1.290)	4.605 (1.189)	0.077	0.504	0.062
Performance risk	4.346 (1.707)	4.109 (1.627)	0.237	0.125	0.142
Privacy risk	3.953 (1.711)	3.924 (1.772)	0.030	0.853	0.017
Time risk	2.814 (1.507)	2.829 (1.567)	0.015	0.914	0.010
Psychological risk	3.196 (1.854)	3.203 (1.755)	0.007	0.969	0.004
Intention to use	3.992 (2.032)	4.107 (1.981)	0.116	0.534	0.058

SD standard deviation, *p* *p*-value.

Table 7 Test of measurement invariance

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	$\Delta\chi^2$	*p*
Configural invariance[1]	2224.86***	1064	0.934	0.926	0.068	0.048		
Metric invariance[2]	46,460.35***	1091	0.934	0.928	0.068	0.050	34.16	0.161
Scalar invariance[3]	46,276.92***	1126	0.934	0.930	0.067	0.051	31.62	0.632

$N_{Group1+2} = 466$

CFI comparative fit index, *TLI* Tucker-Lewis fit index, *RMSEA* root-mean-square error of approximation, *SRMR* standardized root mean square residual.

[1]Model without constraints.

[2]Model with equal factor loadings between groups.

[3]Model with equal factor loadings and intercepts between groups.

***$p < 0.001$.

use, so H5b is rejected. A negative relationship was identified between trust in treatment and psychological risk, so H6a is supported. In contrast, H6b is rejected because there is no association between psychological risk and intention to use. Finally, H7 is supported for both groups, although a certain intention-behavior gap is identified since there is only a small-effect relationship between intention to use and use behavior (Cohen, 2013). The control variables age and gender were tested for their relationship with intention to use and use behavior. The results show only a negative relationship between age and use behavior for group 2.

To evaluate the research model, the coefficient of determination R^2, which indicates the proportion of variance explained, was calculated for all dependent variables in both groups, and the Stone-Geisser test, which uses the Q^2 value to evaluate the predictive power of the model, was performed. Results show that the data explains intention to use well with an R^2 value of 0.639 (group 1) and 0.517 (group 2). Moreover, the Stone-Geisser test shows that the model has strong predictive power for intention to use with a Q^2 of 0.601 (group 1) and a Q^2 of 0.484 (group 2). In contrast, the model explained little variance in use behavior in both group 1 ($R^2 = 0.059$) and group 2 ($R^2 = 0.079$) and has low predictive power for use behavior for both groups, with a Q^2 of 0.044 (group 1) and Q^2 of 0.060 (group 2) (Hair et al., 2021).

The multi-group analysis shows that none of the relationships tested differ significantly in terms of path coefficients between the two groups considered. Table 8 depicts the results of PLS-SEM and multi-group analysis.

Discussion

General discussion

This study comprehensively analyzed different trust referents and associated risk dimensions in the telemedicine adoption process from the patient's perspective for two different symptom types. Overall, we find that intention to use and use behavior of telemedicine are a result of a pattern of relationships initialized by trust transfer effects, such that those who trust more will perceive risks less strongly and have a stronger positive relationship to use, compared to those who trust less. The underlying key findings are summarized in the following. First, our findings suggest that the model does not differ between the symptom types examined. The comparison of means showed no significant differences between the groups in the perceptions of each construct. However, the mean comparison revealed that trust in each referent is experienced in varying degrees. Trust in physician is strongest, while trust in technology is weakest. Associated risks are also perceived as having varying degrees of risk. Performance risk is perceived most strongly, followed by privacy risk; time risk and psychological risk are perceived as being relatively weaker. Moreover, multi-group analysis does not suggest differences for the relationships between the groups. Based on these findings, we will not distinguish between the groups in the remainder of this discussion except for notable differences.

Our second key finding implies that trust in physician is less important in the telemedicine adoption process than trust in technology and treatment. Due to the interwoven trust relationships, a brief assessment of the individual hypothesis results is given first, followed by a more detailed interpretation in the next paragraph. Concerning trust transfer relationships, SEM results indicate that trust in the physician is not a significant factor, as we found minor transfer effects to trust in technology (H1a) and to trust in treatment (H1b). Trust in physician showed only a small trust transfer effect (Cohen, 2013) to trust in technology for group 1 (physical symptoms). This means that a patient's trust in the physician's competence and intention to act in their best interest formed in the familiar setting does not necessarily mean that the patient is also convinced of the functionality and reliability of the technology (H1a) or of the effectiveness, clarity, and agreement of the treatment via telemedicine (H1b). Rather, the large effect size (Cohen, 2013) for the relationship between trust in technology and trust in treatment implies that the perception of the telemedicine platform as

Table 8 Results of structural equation model and multi-group analysis

Hypothesis		Group 1: physical		Group 2: mental		Hypothesis assessment	Multi-group analysis	
		ß	*p*	*ß*	*p*		*Diff*	*p*
H1a	Trust in physician → trust in technology	0.189	0.021	0.132	0.221	Partly supported	0.057	0.685
H1b	Trust in physician → trust in treatment	0.035	0.433	0.090	0.101	Rejected	−0.055	0.417
H1c	Trust in technology → trust in treatment	0.822	<0.001	0.784	<0.001	Supported	0.038	0.386
H2a	Trust in physician → intention to use	−0.162	0.001	−0.098	0.084	Rejected	−0.064	0.373
H2b	Trust in technology → intention to use	0.153	0.041	0.179	0.020	Supported	−0.026	0.816
H2c	Trust in treatment → intention to use	0.409	<0.001	0.346	<0.001	Supported	0.063	0.577
H3a	Trust in treatment → performance risk	−0.586	<0.001	−0.567	<0.001	Supported	−0.019	0.822
H3b	Performance risk → intention to use	−0.254	<0.001	−0.171	0.032	Supported	−0.083	0.422
H4a	Trust in treatment → privacy risk	−0.491	<0.001	−0.492	<0.001	Supported	0.001	0.999
H4b	Privacy risk → intention to use	−0.003	0.967	0.008	0.912	Rejected	−0.011	0.908
H5a	Trust in treatment → time risk	−0.516	<0.001	−0.513	<0.001	Supported	−0.003	0.965
H5b	Time risk → intention to use	−0.057	0.388	−0.008	0.918	Rejected	−0.049	0.616
H6a	Trust in treatment → psychological risk	−0.492	<0.001	−0.534	<0.001	Supported	0.042	0.597
H6b	Psychological risk → intention to use	−0.084	0.301	−0.138	0.102	Rejected	0.054	0.637
H7	Intention to use → use behavior	0.210	<0.001	0.209	<0.001	Supported	0.001	0.894
Controls								
	Age → intention to use	−0.063	0.139	−0.039	0.433	–	−0.024	0.714
	Age → use behavior	−0.113	0.063	−0.164	0.002	–	0.051	0.300
	Gender → intention to use	0.024	0.555	0.067	0.187	–	−0.091	0.511
	Gender → use behavior	−0.033	0.615	−0.062	0.331	–	0.029	0.971

ß standardized effect size, *p p*-value, *Diff.* difference in estimates.

reliable and functional strengthens the beliefs in effective, clear, and agreed-upon treatment (H1c). These results on the trust transfer effects emanating from trust in physician contradict previous studies. For example, Cao et al. (2020) found support for the trust transfer effect from the trust in online physicians to trust in the telemedicine platform and van Velsen et al. (2021) for trust in medical professionals to trust in treatment. Nevertheless, previous studies found that for overall trust in telemedicine, trust in physician is of higher relevance than trust in treatment and trust in technology (e.g., van Velsen et al., 2017). In addition to these valuable findings on trust transfer effects, SEM results suggest that trust referents are differently related to the intention to use telemedicine. On the one hand, the results show either no relationship (group 2) or even a negative relationship (group 1) between trust in physician and intention to use (H2a). This implies that stronger beliefs in a physician's competence and intention to act in the patient's best interest will not affect or might even decrease the patient's willingness to use telemedicine (H2a). These results contradict existing literature, which has found a positive relationship (Yang et al., 2021). On the other hand, our results show that trust in technology has a small, and trust in treatment a medium, relationship to intention to use telemedicine (Cohen, 2013). This supports our assumption that patients are more likely to use telemedicine, the more believe that the telemedicine platform works reliably and is functional (H2b). More importantly, the more patients trust the telemedicine treatment, i.e., are convinced that the treatment is effective, clear, and collaboratively agreed upon, they will more likely use telemedicine (H2c). The relatively low mean value for trust in technology and its importance for trust in treatment and use intention implies that strengthening trust in technology is an essential lever for increasing adoption. These findings are in line with those of existing literature on the acceptance of digital health services, which have attributed a vital role to trust in technology that exceeds the one of trust in physician (Cao et al., 2020). Moreover, previous research has identified trust in the service as one of the essential factors for intention to use (Gu et al., 2021; Kamal et al., 2020). The medium effect between trust in treatment and intention to use highlights the significance of trust in medical treatment and individual's health for willingness to use telemedicine.

In the light of our hypotheses in the "Theoretical background and hypotheses" section, the lesser relevance of trust in physician for trust transfer effects and intention to use seems surprising. A possible explanation resides in the change in the physician-patient relationship and the general setting of telemedicine compared to face-to-face consultation. Using telemedicine involves integrating technology, modifying the treatment environment, and creates an impression of distancing from the physician (Agha et al., 2009). This change can affect the trust in physician relationships in our research model in different ways. First, it can limit context similarity and similarity between trust in physician and other trust referents. As this is essential for the transfer effects described by Stewart's (2003) trust transfer theory, trust transfer from physician to technology and treatment is inhibited (Cao et al., 2020). Second, the magnitude of changes limits the transferability of trust in physician that has been established in the familiar setting to the new telemedicine setting. Consequently, trust in physician is less important for trust transfer and intention to use than trust in technology (Cao et al., 2020). Third, patients may not want the relationship or situation to change. The relationship with the physician, of which trust is an important part, is a high priority for patients (Detsky, 2011). As telemedicine does not seem as personal as in-person visits, patients who strongly trust the physician and value their relationship might have less intention to deviate from their current behavior (Valikodath et al., 2017). Besides, research has shown that trust in physician is related to satisfaction with treatment, and satisfied patients have less intention to change their behavior than dissatisfied ones (Platonova et al., 2008).

As a third key finding, we highlight the differences in the perceived risk dimensions in the telemedicine adoption process. Although the risk dimensions are perceived differently, SEM results showed medium to large negative effects (Cohen, 2013) to trust in treatment (H3a, 4a, 5a, 6a). The negative relationships align with research addressing the relationship between trust and perceived risk (Pavlou, 2003). Furthermore, previous studies in digital health services identifying trust in the service as an important factor in overcoming perceived risks are supported (Gong et al., 2019; Mou & Cohen, 2017). SEM results also show that evidence supporting the assumption that patients are more inclined to avoid risks than to maximize benefits is limited in telemedicine, contrary to our hypotheses. Only the negative relationship between performance risk and intention to use (H3b) is in line with our hypotheses. Patients are thus less likely to use telemedicine, the more they believe telemedicine will not work as planned and will not provide the expected results. This relationship supports previous literature on telemedicine or digital health services, which has identified performance risk as one of the most important factors affecting intention to use (Deng et al., 2018; Yang et al., 2021). Contrary to the original expectation, other perceived risk dimensions were not found to be related to intention to use. Thus, while patients have concerns about the privacy of personal health information and the disclosure of this information without consent (H4b), possible time loss (H5b), or feeling stress and anxiety (H6b), these concerns do not inhibit their intention to use telemedicine. While Gong et al. (2019) also find an insignificant effect between privacy risk and intention to use online consultation, these results contradict most previous literature in related fields (Bansal et al., 2010; Cocosila & Archer, 2010; Kamal et al., 2020; Yang et al., 2021). An explanation for the lack of significance of these relationships lies in the risk-benefit calculus (Barth & Jong, 2017). In the present context, this manifests itself in the fact that the high priority of personal health and the benefits of telemedicine, namely, the fast and flexible access to medical health services (van Velsen et al., 2017), outweigh patients' concerns about privacy, time, and psychological risk. In the context of privacy risk, this phenomenon is referred to as a privacy paradox, i.e., a mismatch between individuals' privacy concerns and their usage behavior. It occurs when people deviate from the initially expected privacy behavior and show a different behavior despite expressing major privacy concerns (Norberg et al., 2007).

As a fourth key finding, we emphasize the considerable intention behavior gap. SEM results showed a significant but weak relationship between intention to use and use behavior (H7), and only a small percentage of the variance of use behavior is explained by the research model. While the positive effect is in line with previous technology acceptance and digital health service literature, the effect size is small compared to other studies (Gu et al., 2021; Venkatesh et al., 2003). This indicates the presence of an intention-behavior gap, which might be due to missing availability and knowledge (Sheeran, 2002). If the physician does not offer telemedicine, patients' intention to use cannot be realized. On the other hand, patients might not know that the physician offers telemedicine, e.g., due to poor communication or missing technical infrastructure on both sides. In addition, the intention-behavior gap may result from a change of intention prior to starting use, e.g., due to becoming aware of the associated risks and potential consequences (Sheeran, 2002).

Implications for theory

By analyzing the trust and risk relationships in the telemedicine adoption process from the patient's perspective, our study generates important implications for trust and technology acceptance research. First, we contribute to the transferability and generalizability of Stewart's (2003) trust transfer theory from the patient's perspective in telemedicine. Previous studies have predominately analyzed patients' trust in physician and trust in technology and supported transfer effects from physician to technology (e.g., Cao et al., 2020; van Velsen et al., 2021) and physician to treatment (e.g., van Velsen et al., 2021). In contrast, our findings indicate that of the three trust referents examined in our study, although trust perceptions toward a known physician are strongest, trust transfer from a known physician to technology and treatment is limited. This implies limited generalizability of patients' trust transfer effects from a physician to other trust referents, which may be due to the changes the telemedicine context brings compared to an in-person visit. The importance of the source-target relationship for trust transfer has been emphasized in existing literature (Gong et al., 2020). Therefore, we add to the application of the trust transfer theory (Stewart, 2003) in telemedicine by highlighting that the categorization process based on the source-target relationship is critical for trust transfer and by providing some tentative initial indications of the conditions of the source-target relationship for trust transfer in telemedicine. Next to our contributions regarding the trust transfer theory, we demonstrate that trust in technology is powerful in forming trust in treatment via telemedicine. Taking our results regarding the trust relationships together, our findings demonstrate that the trust referents' relationships to each other are complex, and their analysis can reveal important insights. Given the rather fragmented consideration of trust transference in existing telemedicine literature (Sarkar et al., 2020), our study extends the research on patients' perspective of trust in digital health services and sheds light on how trust referents are related, how trust can be established in a complex environment, and the trust transfer effects' roles in the adoption process. These findings imply that researchers should include different trust referents and trust transfer effects in their research models.

Second, we contribute to technology acceptance research by underscoring the relevance of considering different trust referents holistically when examining patients' telemedicine adoption process. Previous studies on patients' technology acceptance in telemedicine and other research areas focused primarily on one trust referent in their research models (e.g., Kamal et al., 2020; Mou & Cohen, 2014). Research that integrates multiple trust referents is limited (e.g., Cao et al., 2020; Yang et al., 2021). These few studies provide preliminary evidence that trust in technology is a stronger predictor of intention to use telemedicine than trust in the physician. Our results support this finding and thus add to telemedicine acceptance literature by extending the evidence. In addition, by further integrating trust in treatment and, therefore, analyzing the relationships of multiple trust referents, our results shed light on their roles in the patients' adoption process. The findings generated add to technology acceptance research by demonstrating that it is reasonable to include multiple trust referents, as they have different but relevant relationships to intention to use. Future research should thus differentiate between trust referents to understand their role in the adoption process and refrain from representing trust as an overall trust variable or from including only one referent.

Third, we contribute to technology acceptance literature by emphasizing the multidimensionality of perceived risk in patients' telemedicine adoption process. Previous research has analyzed relationships of only a few perceived risk dimensions (e.g., Yang et al., 2021). Others have considered multiple perceived risk dimensions; however, they have built an overall factor and analyzed only the overall factors' relationships (e.g., Kamal et al., 2020; Mou & Cohen, 2014). In contrast, our study holistically examined both the relevant perceived risk dimensions and their individual relationships. By revealing that the degree to which risks are perceived and the degree to which the risk dimensions are related to trust and intention to use and trust can vary, our findings emphasize the complex, multidimensional nature of risk. We thus contribute to technology acceptance research by emphasizing the necessity of a multidimensional view of perceived risk that integrates the relationships of each dimension individually. The consideration of risk as an aggregated construct (e.g., Cocosila & Trabelsi, 2016; Dahabiyeh et al., 2020) or taking an isolated perspective on only a few dimensions (e.g., Gong et al., 2019) should consequently evolve into the integration of multidimensional risks, all of which have differentiated definitions, relationships, and relevance in application. This implies that those risks that are important for the respective technology's adoption process must be identified and addressed. Not distinguishing among perceived risk dimensions can lead to ambiguous results and incomplete understanding.

Fourth, we contribute research on the telemedicine adoption of patients by revealing a considerable intention-behavior gap in patients' telemedicine use. Existing telemedicine research has usually focused on the relationships determining intention to use (e.g., Cao et al., 2020). However, research in other areas has emphasized the importance of the relationship between the willingness to use and actual use (Sheeran & Webb, 2016). Our results thus advance telemedicine acceptance research by demonstrating patients' intention-behavior gap. The inconsistency between intended and actual use behavior indicates that there are external factors limiting actual use. The large gap implies that researchers should not base the investigation of telemedicine adoption on intention to use alone.

Fifth, we contribute to the literature by showing that in comparable scenarios that vary only in symptom type, it can be concluded that a difference in symptom type does not significantly impact the patient trust and risk relationships considered. Our results empirically support Harst et al.'s (2019) assumption that patients' telemedicine acceptance does not differ significantly for different symptoms. Thus, previous symptom- or disease-specific results are transferable.

Practical implications

Based on this study's empirical results, practical implications can be derived to increase patients' intention to use telemedicine and, consequently, its diffusion. First, trust in technology, which has been shown to be of great importance for trust in treatment and intention to use, needs to be strengthened to advance telemedicine adoption. For this purpose, it is essential to convince patients of the trustworthiness of the technology. When making an appointment, physicians could point out the technology's suitability for the treatment, inform patients about prerequisites, and provide tutorials. Second, the high relevance of trust in treatment for patients' telemedicine adoption highlights the need to strengthen their perception that treatment via telemedicine is effective, clear, and a collaborative decision with the physician. This can be achieved by ensuring patients that the physician is transparent about the treatment and openly communicates treatment details to the patient. Third, physicians should inform their patients about telemedicine sufficiently to reduce the perception of performance risk and its negative consequences on intention to use. This information should include what telemedicine can and cannot do. Fourth, the discrepancy between patients' intention to use and use behavior needs to be reduced. Physicians can increase patients' awareness of the availability of telemedicine on their websites and in their practice. In addition, to increase the availability of telemedicine applications, physicians should be informed and incentivized.

Limitations and future research directions

This study has some limitations. First, we chose two specific symptom types to derive implications about symptom-specific differences of trust and perceived risk in the adoption process. While this has enabled valuable insights, the generalizability of the results across all symptoms is limited. In addition, other medical attributes, such as perceived severity of complaints, might influence trust and risk perceptions and their relationships. Future research could thus study how perceived severity influences trust and perceived risk in the adoption process.

A second limitation concerns the focus on video consultation as one specific medium of doctor-to-patient telemedicine. Regarding the research question, choosing one specific medium that represents an important form of telemedicine was reasonable. Nevertheless, other forms of telemedicine exist, e.g., telemonitoring via wearables. It is thus a matter for future research to compare trust and perceived risk in the adoption process between different mediums and derive conclusions about generalizability.

Third, our study is limited to the German context. This constraint is reasonable as relationships in the adoption process may vary between countries due to cultural differences and regulatory frameworks. Our findings might thus not be transferable to other countries. In future work, applying the model to other countries might prove important.

Fourth, the identified intention-behavior gap is related to some limitations. The variable use behavior is self-reported and was measured in this cross-sectional study at the same time as the intention to use. However, due to high data security measures in Germany, actual behavior was not measured directly. Furthermore, we provide possible explanations but no evidence for the intention-behavior gap. However, as this study aimed to analyze trust and perceived risk in the adoption process, a detailed analysis was beyond the study's scope. Future research could thus empirically explore factors that influence the intention-behavior gap in telemedicine and draw on observed use behavior data.

A further important avenue for future research is the physician's perspective of trust and perceived risk in the adoption process. After all, physicians offer telemedicine services and represent one side of the trust relationship with patients. Thus, their acceptance is also critical for a broad diffusion of telemedicine.

Conclusion

To realize the potential of telemedicine for healthcare in terms of quality and efficiency, a high adoption rate among patients is required. Given the highly sensitive context of personal health, trust and risk are critical acceptance factors. Although telemedicine involves multiple trust entities (e.g., physicians, technology) and perceived risks, our literature review revealed that previous studies took a rather narrow approach. As trust can be transferred between referents, our study aimed to take a holistic approach to understand the role of multiple trust referents, trust transfer effects, and multidimensional risk in the telemedicine adoption process.

We tested our research model by conducting a scenario-based survey for physical ($N=236$) and mental ($N=230$) symptoms and generated far-reaching insights on trust transfer and the role of associated perceived risks in the process of patients' telemedicine adoption. First, trust, risk perceptions, and their relationships are comparable for both scenarios. Our results contribute substantially to trust transfer theory by highlighting the importance of considering multiple trust referents and including trust transfer effects. The results reveal that trust in technology is more strongly related to trust in telemedical treatment than trust in the already-known physician. Moreover, we contribute to technology adoption research as our findings emphasize adopting a multidimensional perspective on perceived risk as perceptions and relationships differ between dimensions. While trust in treatment is found to have similar negative effects with all investigated perceived risk dimensions, only performance risk relates to use intention. In addition, our results imply a considerable intention-behavior gap. On this basis, we have identified practical implications and recommendations for future research.

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Data Availability The data that support the findings of this study are available from the corresponding author, LK, upon reasonable request.

Declarations

Conflict of interest The authors declare no competing interests.

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