Video-mediated doctor-patient communication. The effect of visual and auditory environmental factors on patients` privacy concerns and self-disclosure.

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Abstract

Comprehension of factors facilitating patients' self-disclosure in video consultations is crucial for the effectiveness of online doctor-patient communication. To this end, the present study examined how patients' willingness to share their personal medical information is affected by the regulation of two environmental factors (visual and auditory) and by two types of privacy concerns (informational and territory). A scenario-based experiment with a between-subjects design was conducted among 123 participants. Consequently, they were assigned to one of four scenarios, which varied in two levels of both auditory and visual environment regulation. Based upon those scenarios, the participants' privacy concerns and willingness to self-disclose were evaluated by providing statements. The results showed that both informational and territory privacy concerns negatively affect patients' self-disclosure. Furthermore, the visual regulation, such as the change of the doctor's virtual background, affected both patients' privacy concerns and their self-disclosure. On average, individuals who saw only a white wall as the doctor's background had more significant privacy concerns than people who saw the whole doctor's office there and, in turn, were less willing to share their personal information. Regarding the auditory environment regulation, the results showed that the usage of headphones by the doctor did not affect either patients' privacy concerns or their self-disclosure. These results give the direction for further research of various auditory and visual environmental factors and their impact on patients' privacy concerns and self-disclosure during medical video communications.

Keywords: Telemedicine, video-mediated consultation, privacy concerns, personal health information, doctor-patient communication, self-disclosure

Self-Disclosure in Video-Mediated Doctor-Patient Communication

Telemedicine is a rapidly evolving service, providing patients with increased access to high-quality medical care using informational technology (Kichloo et al., 2020). In addition, telemedicine makes doctor-patient consultations reachable and cost-effective (Kichloo et al., 2020), allowing patients to access medical specialists' expertise that was unavailable or difficult to get before (Wang et al., 2019). However, despite telemedicine's benefits, some patients experience barriers to using it, such as sharing private information in an online environment (Bol & Antheunis, 2022).

Sharing personal medical information, also called self-disclosure, is a vital component of communication between a patient and a doctor (Tates et al., 2017). Self-disclosure is defined as "an individual's voluntary and intentional behavior of revealing private information to others" (Derlega et al., 1993). The amount of information disclosed by the patient about the symptoms of their disease is a crucial prerequisite for doctors to make an adequate diagnosis (Tates et al., 2017), which may subsequently have a long-term impact on the development of their disease and hence on the overall patient's well-being (Singh et al., 2016). Therefore, there is an urgent need to detect and eliminate factors preventing a patient's willingness to self-disclose.

One of the factors affecting disclosure behavior is privacy, as it influences the risks associated with information sharing (Masur, 2019, p. 100). Privacy is defined as people's freedom to control to what extent and to whom their private information is disclosed (information privacy) and who has access to their private territory (territory privacy) (Altman, 1975; Westin, 1967). When individuals have concerns about the possible loss of privacy, so-called privacy concerns (Xu et al., 2008), it may govern their disclosure decision (Petronio, 2002).

A previous study by Bol and Antheunis (2022) found that privacy concerns negatively affect patients' self-disclosure behavior during video consultations with doctors. Nevertheless, as mentioned before, privacy has several forms, such as informational and territory. However, it is still unclear whether patients` concerns about violation of these two forms of privacy affect their self-disclosure in the context of telemedicine.

Information privacy concerns refer to how individuals are concerned about their ability to control the access and use of their personal information (Westin, 1967). Previous studies have found informational privacy concerns as a significant antecedent inhibiting self-disclosure in the online context (Lin, 2013; Malhotra et al., 2004). Nevertheless, there is a need to test whether the same relationship between these two variables exists in the context of online medical consultations. Territory privacy concerns are defined as "the degree to which an individual is concerned about the freedom to configure access to his or her virtual or physical private territory" (Lin, 2013). Previously, the impact of this type of privacy concerns on patients' self-disclosure has not been covered much in the literature. To address the existing gaps in the literature, the present study aims to investigate how patients` territory and informational privacy concerns can affect their willingness to self-disclosure during online medical visits. Knowing which sub-dimensions of privacy concerns affect patients' self-disclosure will help to understand which forms of privacy have to be ensured during online consultation to make patients feel more comfortable with sharing their personal information.

Moreover, to be able to provide, maintain and regulate privacy, we have to take the environment into account, as privacy depends on its attributes (Cohen, 2013). The level of privacy of a particular situation can be determined by environmental factors which surround individuals at that moment (Masur, 2019). Environmental factors are defined as "all

characteristics of the physical or virtual space in which the behavior of interest occurs" (Masur, 2019, p. 168). These factors can be visual and auditory, and they are constantly intertwined (Kuwano et al., 2001; Liu et al., 2019). An example of visual environmental factors can be light sources (Leissner et al., 2014; Negiloni et al., 2019) or subjects' salience, position, and size (Orquin et al., 2021), while auditory factors can be the sound location or noise type (MacCutcheon, 2020). To regulate the level of privacy and consequently be able to self-disclose, individuals manipulate and regulate the environment to improve further protection from privacy intrusions (Masur, 2019).

Previous studies have suggested several tactics to regulate the auditory environment and increase privacy during online medical visits, such as using headphones while discussing sensitive information (Meuter et al., 2021). Nevertheless, there is a need to empirically test whether this way of auditory environment regulation indeed affects patients' privacy concerns. Besides the auditory environment, communication through video encounters a visual environment. Previously researchers examined how the regulation of virtual backgrounds, such as using background filters hiding an individual's private environment, can affect the privacy concerns of those who use them (Hilgefort et al., 2021; Sabra et al., 2022). At the same time, when communicators do not see their opponent's environment on the background and who is present there, their privacy concerns may also be affected. This can be especially true in the context of medical consultation, as information that patients disclose is sensitive, and they may prefer to regulate who has access to it. Nonetheless, previous studies did not examine whether the regulation of doctor's virtual backgrounds affects patients' privacy concerns. Therefore, the present research aims to provide more insight into how the regulation of the audio and visual environment factors affects patients' privacy concerns.

From a theoretical perspective, this study can contribute in several ways. First, until now, scientific research has been concerned with privacy in telemedicine mainly from a data protection perspective, providing guidelines mostly about how to keep and transfer patients' personal data safely. Nevertheless, besides risks of private information leakage due to technical issues, patients' privacy concerns may be affected by the risk of consultation environment violation. This possible impact of environmental factors on privacy has received limited attention in empirical research. Secondly, this study can help identify whether the informational and territory privacy defined in Altman's (1975) and Westin's (1967) privacy theories are related to self-disclosure in the medical context. Thus, it will give an understanding of which components of privacy concerns affect patients' disclosure behavior and should be taken into consideration by future researchers and healthcare providers and which ones should not. Additionally, this study can contribute to the theory of situational privacy and self-disclosure (Masur, 2019), which is relatively new and needs empirical testing. Thus, the current study may help to show whether this theory can be applied in various contexts, in particular in the context of online medicine.

If environment regulation impacts privacy concerns, the current study will set the course for future research to empirically alter a patient's different auditory and visual environmental factors surrounding an online visit. As a result, researchers can find the optimal environment regulation methods that would help to reduce patients' privacy concerns and promote their self-disclosure to doctors. Furthermore, these insights can be valuable for healthcare organizations, such as The Royal Dutch Medical Association (RDMA), for creating guidelines and policy recommendations for doctors. These guidelines regulating doctor-patient online interaction are especially needed due to the rapidly developing and ubiquitous use of telemedicine. Thus, the results of this study can bring important practical implications to healthcare.

To address the above-mentioned gaps in the literature, the following exploratory research question was formed:

RQ: *"To what extent does the regulation of the audio and visual environment of the online medical visit affect the patient's information and territory privacy concerns and, in turn, their willingness to self-disclose to a doctor?"*

Theoretical Framework

Patients' Self-Disclosure During Online Medical Visits

Recently digital technologies have become convenient channels for patients to share health-related information (Choudhury et al., 2014; Zhang et al., 2018). By sharing their medical information, individuals hope to gain benefits that their self-disclosure leads to, such as receiving medical advice, access to health providers, and personalized evaluation of their health (Bansal et al., 2010). Moreover, self-disclosure can positively affect patients' well-being by reducing stress and enhancing the sense of relief (Tam et al., 2006).

In general, individuals' willingness to provide their personal information to others might be determined by the level of sensitivity of such information (Milne et al., 2016). As personal medical information is considered especially sensitive and private (Mat Kiah et al., 2014; Metzger, 2004), there might be more barriers to disclosing it than any other type of information. At the same time, self-disclosure depends on the context and the process of interaction (Joinson, 2003; Zhao et al., 2012). Hence, the context of doctor-patient communication can be regulated in a way that may encourage individuals to disclose even such sensitive types of information as personal medical data.

Referring to the views of Joinson (2001), a computer-mediated communication format (CMC) facilitates a higher level of patients` willingness to provide their medical information to

doctors. Furthermore, patients admit more symptoms of their diseases during CMC with a doctor compared to face-to-face (Robinson & West, 1992). The format of videoconferences allows for the transfer of almost the same number of non-verbal cues as Face-to-Face communication and has gained more popularity for online communication (Wright & Webb, 2011) and consequently for self-disclosure. Nevertheless, there remains a substantial number of people who still do not feel comfortable sharing medical information through videoconferencing (Urness et al., 2006). As information exchange during online doctor-patient communication determines the efficiency of medical visits (Tates et al., 2017), the current study focused on factors inhibiting patients' self-disclosure, one of which is privacy concerns (Bol & Antheunis, 2022).

Patients' Self-Disclosure and Privacy Concerns

Privacy is an essential factor that defines individuals' decisions to share their personal information online (Dienlin & Metzger, 2016). Privacy determines the amount and honesty of information shared by individuals (Zhang & Fu, 2020); hence it is a vital component in the context of medical self-disclosures.

To decrease the possible risks of revealing personal information to others, people need to have the ability to control the circulation of information relating to them (Malhotra et al., 2004). Communication privacy management (CPM) theory posits that to control the disclosed private information, individuals set privacy boundaries regulating accessibility to their data (Petronio, 2002). Privacy boundaries help communicators divide the information into that which can be shared with the public and that which should remain private and accessible to a limited number of people (Petronio, 2002). On that note, boundary turbulence happens when people become aware of violations, disruptions, or mistakes regarding established boundaries management rules (Lin, 2013). As boundary turbulence reveals individuals` personal information to third parties

without their permission, it may make them feel embarrassed or distressed (Petronio, 2002). Subsequently, when individuals perceive the threat of their established privacy boundaries being violated and have increased privacy concerns, they are less willing to disclose personal information. Previous studies have confirmed Petronio's (2002) supposition that privacy concerns lead to lower patients' willingness to self-disclose electronically (Abdelhamid et al., 2017) or through video-mediated medical communication (Bol & Antheunis, 2022). However, privacy has a range of aspects that encompass individuals' various needs (Finn et al., 2012), and it is still unclear which sub-dimensions of privacy concerns affect patients' self-disclosure during videoconferences.

One of the main individuals' needs in medical contexts is to keep their disclosed medical information private and confidential and to have control over what happens to their personal information and who has access to it (Allen, 2021). This need encompasses the concept of informational privacy. Patient health information leakage to third parties can result in social stigmatization (Valecha et al., 2021), patient embarrassment, and other physical and psychological harms (Denecke et al., 2015). Therefore, the protection of patients' privacy in medical information exchanges has received particular interest from researchers previously (Shaw et al., 2009). Moreover, a literature review by Almathami et al. (2020) showed that in previous research, informational privacy concerns are mentioned as one of the main barriers to participation in online health consultations.

Previous studies examined the ways of information privacy protection mainly from a technical perspective, such as using data encryption (Iqbal et al., 2018), anonymization (Abouelmehdi et al., 2018), or technical access control of users (Valecha et al., 2021). However, there is still a risk of information privacy violation. This is since patients' data collection during

an online visit is carried out not only in the virtual but also in offline space, which is not covered by software protection. For instance, private information can be simply overheard by bystanders. For some patients, such risk leads them to withhold vital information from healthcare professionals (Larsen et al., 2013). Therefore, although in previous studies, much attention was paid to individuals' privacy concerns regarding the protection and confidentiality of medical records after the visit (Keshta & Odeh, 2021; Li & Slee, 2014; Rahim et al., 2013), the current study is focused on patients' informational privacy concerns in relation to their data collection during an online visit.

Referring to the views of Allen (2021), patients` privacy concerns are also connected with physical privacy, which is "the degree to which one is physically accessible to others" (Leino-Kilpi et al., 2001). In her study, Allen (2021) outlines three forms of physical privacy in the medical context: bodily integrity, bodily modesty, and solitude. However, this dimension of privacy is also closely connected with the concept of territoriality (Leino-Kilpi et al., 2001; Masur, 2019). The concept of territoriality combines the physical space, which can have a special status (Altman, 1975) and the behavior of people interacting there (Leino-Kilpi et al., 2001). Furthermore, territoriality can provide people with privacy (Hayter, 1981),

To date, few studies have explored territory privacy as a form of physical privacy in the healthcare context (Lane, 1990). In the literature, the privacy of the medical consultation territory is defined as: "The degree to which the exam room and physician consulting room are inaccessible to walk-in intrusion and visual or audible intrusion from walk-by traffic." (LeRouge et al., 2014). According to the ethical code, healthcare professionals have to provide patients with such private space and minimize risks of privacy intrusions (American Medical Association, 2016). Nevertheless, in reality, the doctor's office can have a high risk of privacy

breaches (Mlinek & Pierce, 1997). In an experimental study by Mlinek and Pierce (1997), researchers fixed a significant amount of territory privacy breaches during the doctor's working day. Besides intrusive patients, all healthcare team members, such as medical students and nurses, easily committed breaches into a doctor's office when patients were disclosing their personal information (Mlinek & Pierce, 1997; Roy et al., 2016). Hence, individuals' concerns about the privacy of the doctor's office can be widespread; however, to my current knowledge, it was not studied much in the previous literature.

The concepts of informational and territory privacy concerns are closely related. For example, when people perceive the risk of unwanted access to their private territory, they also perceive the risk of unwanted access to private information they disclose there (Lin, 2013). At the same time, the impact of these two concepts on patients' willingness to share their personal information may differ, as they encompass different privacy needs. Previous literature focused mainly on how information privacy concerns might affect individuals' self-disclosure (Li, 2011). Nevertheless, the possible impact of territory privacy concerns on self-disclosure has been left out of researchers' sight. Accordingly, the current study measures whether these two concepts have a similar impact on self-disclosure in the context of online visits.

Referring to the aforementioned study by Bol and Antheunis (2022), which states that general patients' privacy concerns decrease their willingness to disclose to doctors during video consultations, we can expect the same pattern for both territory and informational privacy concerns. Consequently, two following hypotheses were formulated:

H1 *Patients with greater informational privacy concerns are less willing to disclose their personal information to a doctor during an online medical visit.*

H2 *Patients with greater territory privacy concerns are less willing to disclose their personal information to a doctor during an online medical visit.*

Video Consultation Environment, Privacy Concerns and Self-Disclosure

Consequently, to better understand how patients' privacy concerns are shaped, we have to pay attention to the environment surrounding them during online consultation, as privacy is formed by a perception of the environment (Xu et al., 2008). Furthermore, the environment where individuals communicate might also influence their self-disclosure (Chaikin et al., 1976). In their study, Chaikin et al. (1976) found that participants were ready to reveal more intimate information about themselves in a more “warm” and intimate room, which had pictures on the wall and soft lighting than in a “cold” and non-intimate one with block walls and overhead fluorescent lighting. In a medical context, an online environment may facilitate patients' motivation to reveal their private information since in a shared digital space; they perceive more equalized power with doctors than in their office (Duane et al., 2022). At the same time, telehealth visits encompass not only a shared digital environment but also separate patients' and clinicians’ physical ones (Duane et al., 2022). Thus, the environment of online medical visits is hybrid and includes not only digital but physical environmental factors as well (Duane et al., 2022), which can have different effects on individuals` privacy perception and self-disclosure.

The theory studying how a specific combination of environmental factors and their regulation contributes to a certain level of privacy, which in turn facilitates individuals' self-disclose, was introduced by Masur (2019). His theory of situational privacy and self-disclosure states that individuals manipulate environmental factors to achieve a certain level of privacy, which would consequently allow them to self-disclose in a given situation. For example, people can close a room door to create a form of privacy (Masur, 2019). Nevertheless, environmental

regulation may involve the manipulation of many other factors, which may vary in their effect on self-disclosure.

These aforementioned environmental factors can be visual and/or auditory (Liu et al., 2019). The format of video conferences allows users to assess these both factor types in their communicator's environment, as video transmits both picture and sound (Manstead et al., 2011). Previous studies have suggested several tactics for regulating both visual and auditory factors in the context of online medical consultations. As for auditory regulation, Ye et al. (2014) mentioned that using headphones while communicating through the computer may mitigate the risk that bystanders will overhear information delivered through computer speakers. A study by (Mitchell et al., 2000) showed that headphones are often used for establishing privacy in online medical practice. Other studies encouraged using headphones to decrease patients' privacy concerns (Barney et al., 2020; Meuter et al., 2021; Smith & Badowski, 2021). Nonetheless, to my current knowledge, there was no study that empirically tested whether this way of auditory environment regulation indeed affects patients' privacy concerns.

What is more, according to Masur's theory of situational privacy and self-disclosure (2019), in case the usage of headphones by a doctor is an effective way for auditory environment regulation and has a significant effect on privacy concerns, it may likewise influence their disclosure behavior. Hereby in case individuals have fewer concerns that their territory or informational privacy may be violated when a doctor wears headphones, they would probably be more willing to share their personal information with the doctor. However, as far as it is known, these assumptions have not been suggested in previous research or theories. To cover the gaps in the literature regarding the effect of doctors' headphones usage on patients' privacy concerns and self-disclosure, the following Sub-RQ1 was formulated: *"To what extent does the regulation of*

the auditory environment, that is, usage of headphones by a doctor, affect the patient's information and territory privacy concerns and their willingness to self-disclose to the doctor?"

Beside auditory environmental factors, patients` willingness to self-disclose can also be affected by visual ones. For instance, in an offline environment, a patient's self-disclosure can be visually affected by the size of the consultation room and doctor's desk (Okken et al., 2012). Moreover, other visual factors, such as lighting conditions, can also affect self-disclosure behavior (Gifford, 1988; Miwa & Hanyu, 2006).

One of the visual environmental variables in online video conferencing settings is the doctor's background (Onor & Misan, 2005). The study by Stosic et al. (2022) showed that patients' perception of telemedicine background could affect important clinical outcomes, such as patients' ability to recall clinical information and their satisfaction with visits in general. It also showed that doctors' virtual backgrounds play an important role in building a trustworthy relationship between patient and doctor (Stosic et al., 2022). Participants were exposed to a 30-second video of a doctor with one of six different virtual backgrounds behind him. Backgrounds varied in the number and types of visible objects, such as personal photos, professional certifications, and natural objects (e.g., plants) (Stosic et al., 2022). Results showed that the patients who liked the doctor's office background more had more positive impressions of the doctor and felt higher satisfaction with the physician's care and immersion in visit interaction. However, the number of visual objects in the doctor's background did not play a role in these above-mentioned socioemotional responses. (Stosic et al., 2022).

With regards to the number of visual cues in the doctors' background, Elliott et al. (2022) suggested minimizing them to maintain standards of virtual care and make doctors look more professional during video calls. Accordingly, they advised doctors to either use virtual

backgrounds or have a white wall behind them. On the other hand, visual cues facilitate individuals' situational awareness (Patterson et al., 2016), that is, ‘an individual's perception of what is happening around them (Endsley et al., 2003, p. 13). Situational awareness may be a key element affecting human decision-making, privacy behavior, and disclosure (Sim et al., 2012). Perhaps, the usage of a background with more visual cues, showing patients doctor's office and who else is present there, may decrease their privacy concerns compared to the background with the white wall. Conversely, there is a lack of studies that tested this assumption previously.

Furthermore, taking into account the principles of Masur's theory (2019), we can assume that if the changing doctor's background affects patients` privacy concerns, it may affect their self-disclosure afterward. Nonetheless, there was a lack of studies that could support an assumption of a possible relationship between patients' perceptions of doctors' background, their privacy concerns, and disclosure. As a result, the following research question emerged:

Sub-RQ2: *"To what extent does the regulation of a patient's visual environment, that is, changing the doctor's background, affect the patient's information and territory privacy concerns and willingness to self-disclose to the doctor?"*.

The following Figure 1 provides the present study's conceptual model, which summarizes the Sub-RQs and hypotheses mentioned in the theoretical framework.

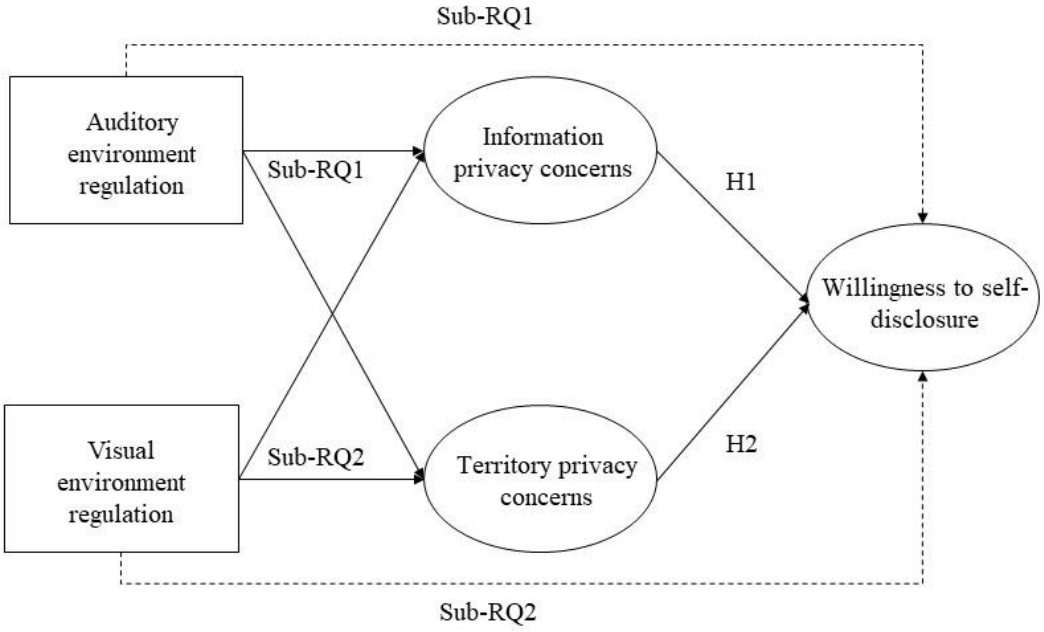

Figure 1. A conceptual model including two hypotheses, Sub-RQ1 and Sub-RQ2.

Methodology

Design

To test the hypotheses and sub-RQs, a 2 (auditory environment regulation: present vs. absent) x 2 (visual environment regulation: present vs. absent) between-subjects experiment was conducted. Conditions with present visual environment regulation implied that doctors' online background was regulated the way that the patient could see the medical office against the doctor's background and who was present in it during an online consultation. The absence of visual environment regulation implied conditions where patients could see only a white wall against a doctor's background during an online consultation. Conditions with present auditory environment regulation implied the regulation of auditory factors through the use of headphones by the doctor during the online consultation. Conditions with absent auditory regulation implied doctors did not use headphones and spoke with patients using a computer speaker during an

online consultation. It was subsequently investigated whether such regulation of environmental factors affects the patient's concerns about uncontrolled access to their personal information (informational privacy concerns), the consulting room's private territory (territory privacy concerns), and their willingness to self-disclose. In the current study, the willingness to self-disclose as a dependent variable; informational privacy concerns and territory privacy concerns were measured as mediators. These variables were measured using an experimental study design.

Experimental design is a research method that helps identify whether variables significantly affect other variables and determine whether variables have causal relationships (Treadwell & Davis, 2019). Due to the aim of the research question to test the causal effect of manipulated variables on dependent ones, an experimental method was chosen for this study, which was based on the manipulation of scenarios. A scenario-based experiment was chosen as this method allows for better control of manipulated variables and minimizes the effects of confounds (Kim & Jang, 2014). Furthermore, an online format of the scenario-based experiment was used for participants' convenience, as they were able to participate from any location virtually.

Participants

Data were collected from 160 participants for this experiment. The inclusion criterion for the current study was the age of participants, who had to be at least 18 years old to take part in the experiment. There was no maximum age limit. The second inclusion criterion was language proficiency. Participants had to have a sufficient level of English to understand the questions asked during the experiment. Other inclusion criteria were the experience in video platforms' usage and in medical visits. To better imagine experimental fictional scenarios and more accurately answer questions, participants had to be experienced in using online platforms for

communication through video and to have at least one offline or online consultation with doctors. Participants who refused to provide informed consent were excluded from the study and forwarded to the end of the survey. Furthermore, results from participants who selected the same answer for all questions regarding privacy concerns and self-disclosure, so-called "straightliners," were not included in the study analysis.

After filtering out the results that do not fall under the inclusion criteria (n = 17 have not answered all questions, n = 5 have never visited doctor, n = 11 have never used video platforms for communication, n = 4 were not agree to participate in the study), the final sample size consisted of 123 participants (condition 1: n = 27, 22% , condition 2: n = 31, 25%, condition 3: n = 31, 25%, condition 4: n = 34, 28%). In this sample, 36 (29,27%) participants were male, 80 of them (65,04%) were female, 4 (3,25%) indicated non-binary gender, and three respondents (2,44%) did not report their gender. The average age of respondents was 26.23 (SD = 6.54). Of the participants, 1 of them (0,81%) had less than a high school diploma, 7 (5,69%) had a high school diploma or equivalent, 9 (7,32%) attended some college but had no degree, 62(50,41%) had Bachelor's degree (3/4 years), 39 (31,71%) had a Master's degree, and 5 (4,07%) respondents did not enter their level of education. The sample included 40 Dutch people (32,52%), 17 Russians (13,82%) and 57 people (46,34%) who had other nationalities.

Procedure

Participants for the study were recruited using convenience and network sampling methods. These methods were chosen since the inclusion criteria for participants of this study were pretty broad and did not imply the participation of a specific group of individuals. In addition, convenience and network are efficient methods to collect data from participants in short order (Treadwell & Davis, 2019). Participants received invitations to participate in research

through SurveyCircle, SurveySwap, Facebook, Instagram, and LinkedIn. The invitation included the link redirecting participants to the Qualtrics web page.

Before the participants participated in the experiment, they were directed to the introduction page with informed consent that they were asked to read and agree to. The consent form explained the purpose of the study and that participation was anonymous and voluntary. It also informed them about the confidentiality of the data collected.

Afterward, participants were asked whether they had ever held video conferences using online platforms (for learning purposes, communication with friends, or at work) and how often they used videoconferences. Furthermore, they were asked if they had ever visited a doctor virtually or offline and how frequently they visited them. Finally, participants fitting the inclusion criteria were randomly assigned to one of four experimental conditions. These conditions varied with scenarios of online consultation with the doctor.

After reading one of four scenarios, participants were asked to answer survey items related to informational privacy concerns, territory privacy concerns, and willingness to self-disclose. At the end of the study, they were asked to complete demographic questions about age, gender, nationality, and educational background. On average, participants spent 17 minutes (*SD* = 44.11) taking part in the experiment.

Materials

Due to the 2x2 between-subjects design of the experiment, four scenarios were created. All four scenarios were supported with a picture in which the doctor was depicted in the videoconference window as in online medical consultation. These additional picture stimuli were supposed to help participants better imagine the situation described in the scenarios. The scenarios varied depending on the presence of regulation of the visual and auditory factors of the

doctor's physical environment. Scenarios and picture stimuli used in the experiment can be found in Appendix A.

All four scenarios had a common general introduction asking participants to imagine themselves in a situation when they felt unwell and decided to make a video consultation with a doctor. According to that imagined situation, participants had to provide their personal medical information to a doctor. The first scenario also included the detail of the context that in the video they could see the entire office behind the doctor, including who else is present there. In addition, in line with a scenario doctor used headphones while he was speaking with the participant. The second scenario included context with present visual but absent auditory regulation. Thus, based on the scenario, the participant could see the entire office on the doctor's background, but the doctor spoke with the participant using a computer speaker. The third scenario had an absent visual in the context but present auditory regulation, so participants could see only a white wall on the doctor's background, but the doctor used headphones during consultation. The last fourth scenario had both auditory and visual regulation absent. Hence, participants saw only a white wall behind the doctor while he was speaking with them using a computer speaker.

Pilot Study

Before running the main experiment of the current study, a pilot study was conducted. This pilot study aimed to examine whether the materials expected to be manipulated in a larger-scale experiment, such as scenarios and pictures, were suitable and efficient for measuring the constructs of the study. First, it was checked whether auditory and visual environmental factors manipulated in the four experimental conditions could be recalled by participants. Second, the pilot study allowed me to check the effect of the manipulated visual and auditory regulation on

individuals' perceived control over territory and information. The items measuring these concepts are described in section Manipulation Checks.

Participants for the pilot study were recruited using convenience sampling method in Sarphatipark in Amsterdam and via SurveyCircle. The results collected from 24 participants and examined with Pearson's chi-squared test showed that there was no significant association between experimental conditions where doctors wore or did not wear headphones and participants' responses stating that it was true or false, $\chi 2$ (1) = 0.96, p = .327. Moreover, only 14 (58,33%) participants out of 24 answered correctly whether the doctor wore headphones according to the scenario. There was also an insignificant association between conditions where participants saw or did not see a white wall on the doctor's background and their answers indicating whether it was true or false that doctor's background depicted a white wall, $\chi 2$ (1) = 2.81, p = .093. In addition, only 16 (66,66%) participants out of 24 answered correctly whether the doctor had a white wall on the background. An insignificant association was also found between conditions where participants saw or did not see the entire office on the doctor's background and their responses indicating whether it was true or false that doctor's background depicted the entire office, $\chi 2$ (1) = 1.38, p = .239. Furthermore, 15 (62,50%) participants out of 24 answered correctly whether the doctor had the background showing his entire office behind him. These three insignificant Chi-squared test statistics show that participants did not pay significant attention to the facts of using headphones by a doctor or what was on their background in scenarios in order to remember it well enough to recall it later.

Furthermore, a Two-Way Multivariate Analysis of Variance (MANOVA) did not find a significant main effect of auditory environmental factors regulation on perceived control over information, F(1, 20) = 0.03, p = .872, and perceived control over doctor's office territory, F(1,

20) = 0.85, p = .368. Accordingly, whether the doctor wore headphones in the scenario did not affect participants' perception of control over the doctor's space surrounding him during online consultation, as well as their perceived control over the information disclosed to doctors. There was also no significant main effect of visual environmental factors regulation on the perceived control over information disclosed to doctors, $F(1, 20) = 0.08$, p = .785, and perceived control over doctor's office territory, $F(1, 20) = 0.23$, p = .631. Hence, the participants` perception of control over territory surrounding the doctor, as well as their perceived control over the information disclosed to doctors, were not affected by the manipulation of the background that the doctor had during the video conference. Subsequently, it was decided to adapt scenarios by bolding the text describing auditory and visual environment regulation, thus emphasizing factors participants should pay attention to.

Measurements

All items of research constructs were measured with a 7-point Likert scale, where higher scores denoted higher willingness to self-disclose and greater privacy concerns. To test whether the items are valid for measuring constructs of privacy concerns and willingness to self-disclose, a factor analysis using Varimax rotation was performed. Before interpreting the results of the first-factor analysis with eight items measuring privacy concerns, it was checked whether factor analysis was an appropriate technique to use for clustering the data. Bartlett's test was significant ($p < .001$) indicating that the variables in the dataset are indeed related, χ^2 (28) = 1142.92, $p <$ .001. Factor Analysis with a fixed number of two factors showed that four items designed for measuring informational privacy concerns were clustered well together as factor loadings ranged between .85 and .73. The four items that measured territory privacy concerns were also clustered well together, with factor loadings ranging between .86 and .67. Moreover, with a value of .95,

Kaiser-Meyer-Olkin's (KMO) measure for sampling adequacy was well above the 0.5 minimum value, which means that a substantial proportion of the variance could be accounted for by two factors. These two factors together explained 86.61% of the variance in the eight items included in this Factor Analysis.

The second factor analysis with ten items measuring the willingness to self-disclose showed that items were clustered well together, having factor loadings between .88 and .67. Moreover, Bartlett's test was significant ($p < .001$), indicating that the variables in the dataset were indeed related, χ^2 (45) = 1115.368, $p < .001$, and KMO value was .79, showing that sampling was adequate.

Mediating Variables

Privacy concerns. The study measured two constructs of privacy concerns: informational and territory privacy concerns. Each construct of privacy concerns was measured with four items using a 7-point Likert scale (1 = *'strongly disagree'*, 7 = *'strongly agree'*). The items used to measure privacy concerns are listed in Appendix B.

Informational privacy concerns, reflecting individuals' concerns about their ability to control the access and use of their personal information (Westin, 1967), were measured using a 4-item scale adapted from Baek and Morimoto (2012). An example item measuring information privacy concerns is: "I am afraid that personal medical information that I consider private may be available to third parties during an online visit." The four items had a high reliability $\alpha = .94$ ($M = 4.09$, $SD = 1.73$) and could not be improved by omitting one or more items. Consequently, these four items were averaged into one scale, in which higher scores indicated higher levels of informational privacy concerns.

Territory privacy concerns reflecting individuals' concerns about their freedom to configure access to their virtual or physical private territory (Lin, 2013) were measured with scales developed especially for the current study using the deductive facet method. The 4 items were created based on three dimensions of territory privacy concerns: *access, control,* and *awareness* (Lin, 2013). An example item measuring territory privacy concerns is: "I am afraid that the doctor's territory can be accessible to third parties during an online visit with me." Reliability analysis showed good internal consistency of the scale α = .95 (*M* = 4.13, *SD* = 1.67). The scales could not be improved by omitting any of the 4 items. Later, these four items were averaged into one scale, in which higher scores indicated higher levels of territory privacy concerns.

Dependent Variable

The willingness to self-disclose items scale, reflecting individuals' willingness to share personal medical information, was measured with ten items scale by Bol and Antheunis (2022). These items helped to understand the extent to which participants are willing to disclose personal information and what type of information they were willing to share with a doctor through video communication format. For example, the question measuring a patient's willingness to self-disclose is: *"How likely are you to share the following personal information via a video consultation?"*. The items- statements used to measure willingness to disclose are listed in Appendix B. An example of these items is: "Your concerns and fears related to your health situation." Consequently, each item was measured on a scale from (1) *very unlikely* to (7) *very likely*. The scale, consisting of 10 items, had a high reliability α = .92 (*M* = 5.83, *SD* = 1.01) and could not be improved by omitting one or more items. Finally, these 10 items were also averaged

into one scale. The higher scores in that scale indicated higher levels of individuals' willingness to disclose.

Demographics

Questions were asked regarding participants' age (open-ended question), gender (man/woman/non-binary or third gender/other), nationality (open-ended question), and what was the highest level of their completed education (Less than a high school diploma/High school diploma or equivalent/Some college, no degree/Bachelor's degree in college (3/4 years)/Master's degree/Doctoral degree/Other).

Manipulation Check

After participants were introduced to the main experiment conditions, they were asked six questions measuring perceived control over territory and information, which served as control variables in the pilot study. The constructs of perceived control included three dimensions: control, regulation, and awareness. Six items measuring perceived control were designed using a facet method. An example of an item measuring perceived control over information was: "I felt I had control over the personal information I told the doctor via the online video consultation.". One of the items measuring perceived control over territory was: "I felt I was aware of other people entering the doctor's office during the online video consultation." Thereafter, each item was measured on a scale from (1) *strongly disagree* to (7) *strongly agree*.

The three-items scale measuring perceived control over information had a high reliability Cronbach's $\alpha = .81$ ($M = 4.17$, $SD = 1.28$). These three items were consequently averaged to obtain a mean score, in which a higher score number denoted higher perceived control over information. The three-item scale measuring perceived control over territory also had a high

reliability score, Cronbach's α = .92 (*M* = 3.98, *SD* = 1.54), and were also averaged into one scale, where a higher score number indicated higher perceived control.

Data Analyses

For the statistical analyses of data collected from participants, SPSS statistical software was used. Before analyzing the data for variables of the conceptual model, the descriptive statistics for demographic variables were calculated.

Consequently, before proceeding with the main analysis and testing of hypotheses and two Sub-RQs, a manipulation check using Two-Way MANOVA was conducted. This analysis tested whether independent variables of auditory and visual environment regulation affected individuals` perceived control over territory and information, which served as dependent variables.

Mediation analysis was performed to test whether there is a significant direct effect of the independent variables (visual and auditory environment regulation) on the mediators (informational and territory privacy concerns). Additionally, this analysis helped to test whether a proposed causal indirect effect of the independent variables on the dependent variable (willingness to self-disclose) might be transmitted through two parallel mediating variables (Preacher et al., 2007), answering Sub-RQ1 and Sub-RQ2. Moreover, this analysis tested the direct effect of the mediators (i.e., informational and territory privacy concerns) on the dependent variable (i.e., willingness to self-disclose) to check whether H1 and H2 could be supported. The statistical analysis, helping to answer Sub-RQs and testing hypotheses, was performed using Model 4 of PROCESS macro (Hayes, 2022) using the bootstrapping method with 95% confidence intervals.

Results

Manipulation Checks

For auditory environment regulation, a Two-Way MANOVA showed a significant main effect on perceived control over information $F(1, 119) = 19.08$, $p < .001$. Hence, participants` perceived control over the information disclosed to a doctor was significantly higher in conditions where the doctor wore headphones ($M = 4.63$, $SD = 1.12$) than in conditions where he did not wear it ($M = 3.75$, $SD = 1.27$). Conversely, the main effect of auditory environment regulation on perceived control over territory was insignificant $F(1, 119) = 2.91$, $p = .091$. Hence, the participants did not perceive more or less control over the territory surrounding the doctor because the doctor wore headphones or not in the scenario.

Regarding the main effect of visual environment regulation, its effect on perceived control over information was significant $F(1, 119) = 12.17$, $p = .001$ as well as on perceived control over territory $F(1, 119) = 64.73$, $p < .001$. Participants' perceived control over the doctor's territory and over their private information was significantly different in conditions where they saw the whole office in the doctor's background compared to conditions in which they saw only a white wall in the doctor's background. Participants who saw the white wall perceived less control over disclosed information ($M = 3.84$, $SD = 1.09$) than those who saw the entire office from the doctor's background ($M = 4.54$, $SD = 1.37$). In addition, people who saw the white wall perceived less control over the doctor's territory ($M = 3.13$, $SD = 1.27$) than those who saw the entire office from the doctor's background ($M = 4.93$, $SD = 1.23$). To sum up, both manipulation checks were successful.

Model Testing

It was assumed that greater information privacy concerns (H1) and greater territory privacy concerns (H2) were associated with a lower willingness to self-disclose. Including both

territory and informational privacy concerns in the model resulted in an insignificant effect of informational privacy concerns on willingness to self-disclose (b = -0.13, se = .10, p = .186) and an insignificant effect of territory privacy concerns on willingness to self-disclose (b = -0.19, se = .10, p = .073). However, the insignificant effect could have occurred due to multicollinearity[1] (Allen, 1997). To test whether this assumption is true, the additional Pearson Correlation analysis was performed, testing the strength of the association between informational and territory privacy concerns. The analysis indeed showed a significantly strong correlation between these two variables, r = .88, p < .001.

Consequently, to isolate the relationship between each independent variable and the dependent variable, two additional mediation analyses were performed with a separate model for information privacy concerns and a separate model for territory privacy concerns. The first analysis of a model with only informational privacy concerns serving as a mediator showed the significant negative direct effect of informational privacy concerns on willingness to self-disclose (b = -0.30, SE =.05, p < .001). This outcome confirms the H1, meaning that when individuals are more concerned about informational privacy during an online visit, they are less likely to share their personal information with the doctor.

The second analysis of a model, in which only territory privacy concerns served as a mediator, showed a significant negative direct effect of this mediating variable on willingness to self-disclose (b = -0.31, se = .05, p < .001). Thus, when patients are more concerned about a possible violation of territory privacy, they are less willing to disclose their personal information to the doctor. These results substantiate the second hypothesis.

[1] Multicollinearity occurs in regression analysis when independent variables, which serve as predictors of the dependent variable, are strongly correlated with each other (Allen, 1997). As a result, multicollinearity undermines the statistical significance of independent variables on the dependent variable as they cancel out each other's effects.

As for Sub-RQ1, the mediation analysis showed that a direct effect of auditory environment regulation on informational privacy concerns was not significant (b = 0.27, se = .31, p = .376). Additionally, the auditory environment regulation did not significantly affect territory privacy concerns (b = 0.0004, se = .30, p = .999). In other words, patients` concerns about a possible violation of their informational and territory privacy were not affected by the fact that the doctor used or did not use headphones during the consultation. Additionally, the mediation analysis showed that the total indirect effect of such auditory environment regulation on self-disclosure, mediated by territory and informational privacy concerns, was not significant, b = -0.04, 95% CI [-0.23, 0.16]. To put it more simply, the doctors' headphones usage did not affect patients' willingness to disclose through their privacy concerns.

With regard to Sub-RQ2, the results showed that the direct effect of visual environment regulation on informational privacy concerns was significant (b = 0.65, se = .31, p = .036), as well as its direct effect on territory privacy concerns (b = 0.62, se = .30, p = .039). These results indicate that participants' concerns about their information and territory privacy depended on the background that doctor had behind him. Specifically, on average, patients who saw the entire office on a doctor's background had fewer informational privacy concerns (M = 3.75, SD = 1.66) than people who saw a white wall on a doctor's background (M = 4.40, SD = 1.75). The same pattern was found for territory privacy concerns. Generally, patients who saw the entire office on a doctor's background were concerned less about territory privacy (M = 3.80, SD = 1.64) than people who saw a white wall on a doctor's background (M = 4.42, SD = 1.64). Lastly, Sub-RQ2 also questioned to what extent the regulation of a patient's visual environment, that is, changing the background behind the doctor, affects individuals' self-disclosure through mediating variables: information and territory privacy concerns. The results of the analysis showed that the

total indirect effect of visual environment regulation on self-disclosure, mediated by territory and informational privacy concerns, was significant, b = -0.20, 95% CI [-0.40, -0.02]. This outcome shows that influencing patients` privacy concerns, the type of background that patients see behind the doctor consequently also affects their willingness to self-disclose. In general, people who saw the white wall on the doctor's background were less willing to disclose to the doctor (M = 5.78, SD = 1.05) than people who saw the entire office there (M = 5.88, SD = 0.98).

Discussion

With the fast development of telemedicine, healthcare providers increasingly use video-mediated communication to provide support to their patients. For this reason, it is crucial to identify and understand the factors that hinder the effectiveness of this type of communication, which is formed by the amount and the type of personal information that patients share with doctors. The current study set out to investigate whether individuals' willingness to disclose their personal information during online medical consultation can be affected by concerns about territory and informational privacy. Furthermore, this study examined whether regulation of visual or auditory environmental factors mediated by privacy concerns affects patients` willingness to self-disclose. To systematically test the potential differential effects of two types of both environment regulation and privacy concerns on self-disclose, a scenario-based experiment was conducted among 123 participants who had prior experience visiting a doctor and using video conferencing technology.

Key Findings

The findings showed that if individuals are concerned about possible privacy violations regarding their information or their doctor's physical territory, they are less willing to disclose their personal information to their doctor. Supporting assumptions of H1 and H2, these outcomes

likewise confirm Petronio's Communication privacy management (CPM) theory (2002), which states that individuals` concerns about a privacy violation affect their self-disclosure. Accordingly, these results supplement Petronio's theory, showing that it can be applied to the context of online medical visits. In addition, these outcomes are consistent with the results obtained earlier by Bol and Antheunis (2022) and Abdelhamid et al. (2017), stating that general patients` privacy concerns negatively affect their willingness to share their personal information online.

Moreover, these results complement the study by Bol and Antheunis (2022), which investigated general privacy concerns in the context of video-mediated communication. The current study has shown which forms of patient privacy concerns affect their decision to self-disclose, pointing out to researchers and health care practitioners the need to take into account the territory and informational privacy of online consultations in the future. Moreover, researchers have to investigate factors that form these two types of privacy concerns and how to decrease them in order to make patients feel more comfortable with sharing their personal information.

Furthermore, the results of the current study showed that auditory environment regulation, such as the usage of headphones by doctors, has neither a significant direct effect on patients` privacy concerns nor a direct or indirect effect on patients` self-disclosure. These results are not consistent with the guidelines that have suggested headphone usage as good practice for establishing privacy for patients (Badowski et al., 2021; Barney et al., 2020; Koskimies et al., 2020, Smith & Badowski, 2021). This outcome can be explained by the fact that the usage of headphones by the doctor does not exclude the fact that the information discussed during the visit may become accessible to third parties. Even when a communicator uses headphones during

the conversation, bystanders can still hear what he or she is telling the microphone; thus the private dialog can still be half-overheard (Groening, 2013). In addition, information may become available to third parties through the patient's physical environment, for example, to members of their family who live with the patient in the same place and are present there during an online consultation (Almathami et al., 2020). Furthermore, perhaps the risk associated with privacy concerns that headphones mitigate can be relatively small compared to other risks regarding privacy that patients can perceive. For example, in case the dialogue between doctor and patient is overheard by a bystander, the patient's private information will be accessed by a few people unintentionally. At the same time, there are many other risks resulting in data breaches, such as IT hacking or unauthorized access to patient's personal information (Gabriel & Walden, 2018). These risks of malicious personal data breaches to intruders entail comparatively more negative consequences for the patient, as in these cases, the data is accessible to people who initially intended to misuse it. Furthermore, because environmental regulation did not affect privacy concerns significantly, it also did not have a significant effect on the patient's self-disclosure.

Another key finding is that visual environment regulation has both a direct effect on patients` privacy concerns and an indirect effect on patients` self-disclosure. These results show that changing doctors' virtual background is an efficient way of achieving a sufficient level of privacy, which afterward contributes to patients' willingness to self-disclose (Masur, 2019). Moreover, in conditions where the doctor had a background showing the whole office and who was present there, participants had fewer concerns about territory and informational privacy compared to participants who saw only white walls on the doctor's background. Thus, although previous studies did not find that the number of visual cues affects patients` impression of the doctor and satisfaction with the physician's care and immersion in visit interaction (Stosic et al.,

2022), this study shows that it can affect their decision to disclose information. Furthermore, although previous studies suggested minimizing the number of objects and visual cues in doctors' backgrounds to maintain virtual care standards Elliott et al. (2022), overly minimal background increases patients' privacy concerns. Thus, there is a tradeoff between patients' subjective impressions of clinicians and their privacy concerns with self-disclosure.

Limitations and Future Research

There are four limitations in this study that could be addressed in future research. First, the sample was drawn from a population of primarily young people, as almost 66 percent of the sample were 22-27 years old. On average, young people may have fewer physical complaints or have a lower threshold for reporting complaints, which people of older age tend to normalize (Eriksen, 1998). Therefore, their willingness to share this information with doctors can be higher than that of people of older ages, as they can be more willing to reduce uncertainty about illnesses to which older people are used or because they have fewer substantial complaints to be embarrassed about. Thus, the results of this study may not be generalizable to people of all ages.

In addition, 65 percent of the sample were female. Gender plays a role in the willingness to self-disclose (Hill & Stull, 1987). Specifically, a previous study showed that men generally reveal less information about themselves than women (Jourard & Lasakow, 1958). Thus, in some conditions, a lower or higher level of participants' willingness to disclose could be explained not by the effect of predictors, but by the confounding effect of gender. To address these limitations regarding gender and age, future studies can do experiments based on more equally distributed samples.

Another limitation that impacts the generalization of the study results is the diversity of the participants' national backgrounds and cultures. People's perceptions of medical encounters

can be different among countries (Napoles-Springer et al., 2005) due to differences in the healthcare system, code of medical ethics, and standard rules set in hospitals. Moreover, a previous study found that people's concerns about privacy may vary across nationalities, partially due to different national cultural values (Cho et al., 2009). The study showed that people from highly collectivistic countries are less likely to be concerned about potential privacy intrusion than people from highly individualistic countries (Cho et al., 2009). Consequently, future studies are encouraged to set up an experiment with people from one country or from countries with similar health care systems and cultural values.

Moreover, in the current study, participants' privacy concerns about privacy were assessed only in relation to possible violations of the doctor's territory and whether the use of headphones by the doctor could mitigate such concerns. However, the privacy of the territory can also be violated through the physical environment of the patient (Almathami et al., 2020). Therefore, future researchers can measure whether patients experience concerns about possible violation of the territory, where they are present during online consultation. Furthermore, they can examine how this possible concerns may affect their self-disclosure and whether usage of headphones from patients' side can mitigate their concerns about privacy.

In addition to limitations, future researchers can pay attention to the finding regarding the effect of a doctor's background with more visual cues on willingness to disclose. The current study showed that when individuals see who is present in the doctor's room, they are more willing to disclose. This outcome is in line with previous studies (Sim, 2010; Sim et al., 2012), stating that situational awareness may affect individuals' self-disclosure. However, future studies have to test this assumption more precisely and understand whether the background showing patients doctor's office indeed contributes to their situational awareness. Moreover, they should

examine whether situational awareness facilitates or impedes patients' privacy concerns and, later, their disclosure.

Theoretical And Practical Implications

The current study contributes theoretically to the previous research by broadening concepts of both territory and informational privacy in the context of online medical consultations. Previously, studies examining informational privacy in the online context have mainly focused on the security and protection of patient's personal data, providing insight into ensuring informational privacy from a technical point of view (Abouelmehdi et al., 2018; Iqbal et al., 2018; Valecha et al., 2021). The current study examined patients' informational privacy regarding the accessibility of their private information in a doctor's physical environment during an online consultation. By doing so, the current study shows that in telemedicine, the concept of informational privacy is broad and includes many factors related to both physical and online environments. The current study helped to broaden the concept of physical privacy as well. One of its forms, territory privacy, was previously insufficiently studied in the context of a medical visit to a doctor (Lane, 1990). Talking about physical privacy in the context of medical visits, Allen (2021) was mostly focused on bodily integrity, bodily modesty, and solitude, that is, the patient's need to stay alone in their personal space. The current study showed that besides three forms of physical privacy formulated by Allen, territory privacy also has to be taken into account in the context of doctor-patient communication.

In addition, the results showed that the concepts of territory privacy concerns and informational privacy concerns statistically are strongly interrelated. These findings inform future researchers about both the opportunities of measuring these concepts separately and the challenges. On the other hand, measuring these concepts together can bring a theoretical

contribution, as they are theoretically different. On the other hand, future researchers have to consider that measuring these concepts together can lead to multicollinearity.

As for the practical implications, the results showed the importance of informational and territory privacy for patients in terms of establishing boundaries for whom their private information and doctor's physical territory can be accessed. Hereby, it indicates a need for developing and installing certain rules between doctor and patient, which will regulate patients' information and territory privacy during an online consultation. For example, before starting a visit, doctors can inform patients that they guarantee that there is no one in the office next to them and that no one can enter there during their visit. Thus, knowing about the existence of rules established for conducting online medical visits, patients can be less concerned about their privacy and feel freer to disclose their personal information to doctors.

Moreover, the outcomes showed that auditory environment regulation, such as usage of headphones, does not significantly affect patients' privacy concerns. It means that even though some studies advise headphones as an efficient tool to increase the privacy of visits (Barney et al., 2020; Koskimies et al., 2020; Smith & Badowski, 2021), in some contexts, their effectiveness may be insufficient. Therefore, there is a need to find alternative ways of environmental regulation to provide patients with sufficient privacy so they can freely self-disclose. Moreover, researchers may adjust guidelines provided to doctors, which advise them to wear headphones during online consultations (Barney et al., 2020; Meuter et al., 2021; Smith & Badowski, 2021). Based on the results of the current study, they may specify that the effectiveness of this auditory regulation may be negligible when the doctor uses headphones alone. Nevertheless, more research is needed to replicate the findings of the current study and to

examine the usage of headphones from a patient’s side, to state that headphones usage during online medical visits is ineffective for mitigating privacy-related issues.

Perhaps, healthcare providers should focus more on visual environment regulation, as it showed a significant effect on disclosure and privacy concerns. Furthermore, as the type of doctors` background matters, it could serve as an incentive to adopt amendments to the standards of telemedicine's virtual care that advise using backgrounds with a white wall or virtual backgrounds to make doctors look more professional during online medical consultation (Elliott et al., 2022). To achieve both goals, doctors can show patients their whole office, thus decreasing their privacy concerns, but at the same time maintain the professional look of the office in the background (e. g., excluding personal things and keeping the environment neat).

Thus, the current study provides essential new fundamental knowledge and insights into how the environment surrounding medical video-mediated communication can be regulated to improve the interaction between patient and doctor, which consequently impacts patient well-being.

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Appendix A

Scenarios

Description of the 4 scenarios based on 2 (Auditory environment regulation: present vs. absent) x 2 (Visual environment regulation: present vs. absent) between-subjects experiment.

General introduction to all scenarios

Imagine a situation in which you recently felt unwell and decided to make a doctor's appointment. You and the doctor agree it is best to first meet via a video conferencing tool, such as Skype or Teams.

Just before the start of your video consultation, you are behind your computer and wait for the doctor to set up the video connection. As soon as the video switches on, you see the doctor on the screen, as in the picture below. Before starting the consultation, the doctor explains to you that he will need to ask you some questions regarding your symptoms, both general (such as height and weight) and more personal (concerning your symptoms), in order to give you an adequate diagnosis and prescribe the right treatment plan.

Manipulated conditions

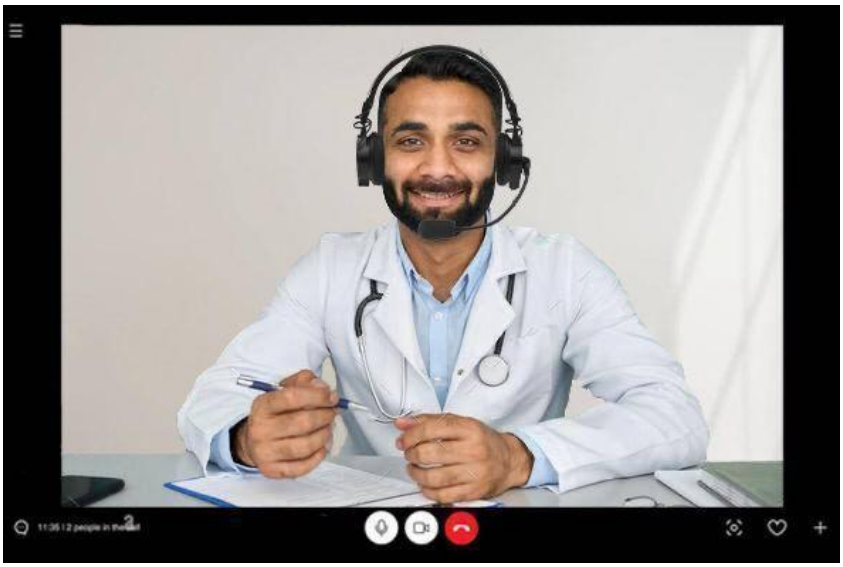
		Auditory environment regulation	
		Present	Absent
Visual environment regulation	Present	You notice that the doctor installed his video camera such that you can see his entire office behind him, including who is in it during your video consultation. In	You notice that the doctor installed his video camera such that you can see his entire office behind him, including who else is in it during your video consultation. In addition,

		addition, the doctor will use headphones while you are speaking with him.	the doctor will use a computer speaker while you are speaking with him.
	Absent	You notice that the doctor installed his video camera such that you can only see a wall in his background. In addition, the doctor will use headphones while you are speaking with him.	You notice that the doctor installed his video camera such that you can only see a wall in his background and not who else is in it during your video consultation. In addition, the doctor will use a computer speaker while you are speaking with him.

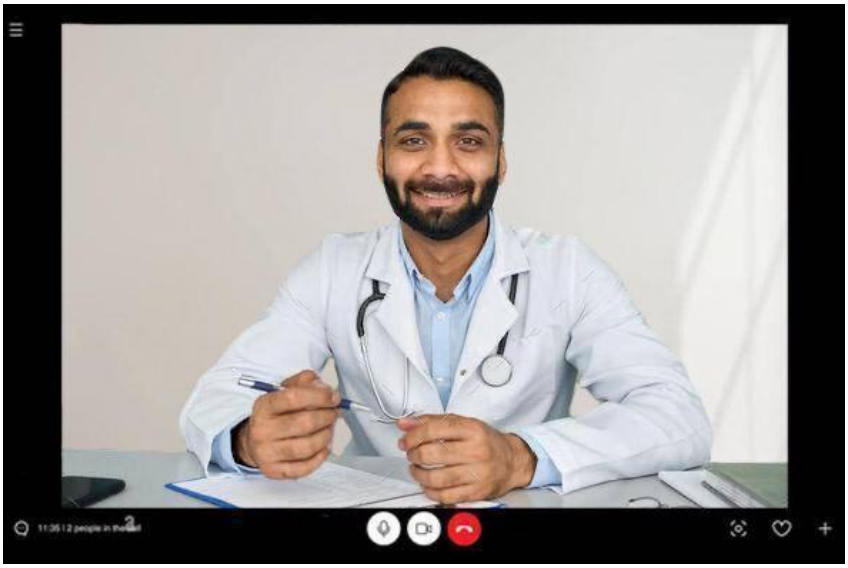
Picture stimuli

Stimuli for condition 1 (Auditory environment regulation: absent) & (Visual environment regulation: present)

Stimuli for condition 2 (Auditory environment regulation: present) & (Visual environment regulation: present)



Stimuli for condition 3 (Auditory environment regulation: present) & (Visual environment regulation: absent)



Stimuli for condition 4 (Auditory environment regulation: absent) & (Visual environment regulation: absent)

Appendix B

Concepts	Items
Territory privacy concerns	1. I am afraid that the doctor's office can be accessed by other people during our online video consultation. 2. I am concerned that I cannot control who is present in the doctor's office during our online video consultation. 3. I am afraid that the doctor's office can be invaded by other people during our online video consultation without my awareness. 4. I am concerned that I cannot regulate who has access to the doctor's office in which we have our online video consultation.
Informational privacy concerns	1. I am afraid that my medical information that I consider private may become available to other people when having an online video consultation. 2. I am afraid that my medical information that I consider private may be overheard or seen by people I don't know during an online video consultation. 3. I am afraid that the medical information that I share with the doctor and consider private may be misused by people I don't know when having an online video consultation. 4. I am concerned that I cannot control who can see and hear my personal information, which I share with the doctor during an online

	video consultation.
Willingness to self-disclose	How likely are you to share the following personal information via a video consultation? 1. Information about your body, such as your height and weight. 2. Information about your physical condition and fitness, such as your physical activity. 3. Information about your nutrition or diet. 4. Information about your lifestyle, such as your alcohol consumption and smoking behavior. 5. Information about your vital functions, such as your blood pressure and heart rate 6. Your medical history. 7. Your diagnosis. 8. Medical test results. 9. Your physical complaints. 10. Your concerns and fears related to your health situation.