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Exploring the impact of patient, physician and technology factors on patient video consultation satisfaction

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Abstract

Objective: Video consultations (VCs) were made available to the general population during the COVID-19 pandemic to compensate for the cutback of face-to-face doctor–patient interactions. However, little is known about what patient-related (e.g. age), physician-related (e.g. patient–physician relationship) and technology-related (e.g. online privacy concerns) factors contribute to video consultation satisfaction among patients. This study aims to gain a better understanding of what makes patients satisfied with video consultations.

Methods: A total of 180 patients who recently engaged in a video consultation were invited to answer questions about patient-, physician- and technology-related variables and their satisfaction with the video consultation. To examine which factors predict patient video consultation satisfaction, a multiple hierarchical regression analysis was performed.

Results: Overall, patients were satisfied with their video consultation. The final hierarchical model, including all patient-related, physician-related and technology-related factors, significantly contributed to patient video consultation satisfaction. Predictors of higher patient video consultation satisfaction were experiencing less technical issues, having higher general positive attitudes towards online communication, reporting higher importance of less travel time and being more satisfied with physicians' affective and instrumental communication.

Conclusions: Video consultations can be appropriate in a variety of situations, provided that technical issues can be minimized, patients have a positive attitude towards online communication and attach value to reduced travel time and online patient–physician interactions can be experienced as affective and instrumental. Findings from this study contribute to understanding how video consultations can be best utilized for effective patient–physician communication.

Keywords

Telemedicine, eHealth, video consultations, patient-physician communication, patient satisfaction

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Introduction

The benefits of using digital technologies such as video conferencing technologies in medical encounters have been evident for a while.[1] Using video technology in clinical care has reduced geographical barriers, travel costs and often waiting times.[2,3] While the uptake of telemedicine was generally slow due to a lack of data for the evaluation and information about the quality of video-mediated

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consultations and treatment,[1,3] the COVID-19 pandemic prompted large-scale implementation of telemedicine, including video consultations (VCs).[4] VCs are remote meetings that enable 'real-time' counselling by a healthcare provider via computer, tablet or smartphone.[2] Many patients have engaged in single VC encounters ever since, but a key prerequisite for fostering continuous engagement is that patients are satisfied with video-mediated interactions.[5,6] Hence, with the high prevalence of VCs, it has become important to understand what makes patients satisfied with VCs.

VC satisfaction represents the perceived quality of the video-mediated encounter for the patient and captures the success of implementing a new information system.[7,8] Regardless of consultations being in-person or video-mediated, high levels of patient satisfaction have been found to be positively related to other important patient outcomes, such as treatment adherence,[9] information recall[10] and, ultimately, patients' health.[1] Previous studies have shown that patients are generally (very) satisfied with VCs in various medical settings, such as oncology,[11] dermatology[12] and dentistry.[13] In fact, patients find VCs equally satisfactory as in-person visits and report interest in future engagement in VCs.[1,14]

Despite research indicating VCs' potential, it is unclear which predictors are associated with VC satisfaction.[15] Most research on VCs has focused on their adoption and acceptance by patients (e.g.[16]). From these studies we know, for instance, that younger age, higher education levels, knowing your physician and a patient's positive attitude towards online communication are associated with a greater likelihood of using telemedicine.[17,18] For VC satisfaction, however, such knowledge is currently limited. This knowledge is highly relevant, as VCs can only be adequately implemented if they are effective and if patients are satisfied.

Furthermore, research on VC satisfaction has rarely considered the variety of potentially influencing factors covering a range of perspectives (e.g. patient-, physician- and technology-related factors), let alone simultaneously. Several studies have examined the influence of age (patient-related factor, e.g.[19]), adequate communication (physician-related factor, e.g. [1]) or experiencing technical issues (technology-related factor, e.g.[20]) on VC satisfaction, but few studies have examined a set of variables related to VC satisfaction together.[14] However, we know that patient satisfaction is affected by various factors related to the patient, physician and context in which the consultation occurs.[21]

Moreover, studies on VC satisfaction lack theoretical guidance on how these various factors may contribute to satisfaction. This lack of theory-driven research may be an explanation as to why VC satisfaction research is highly fragmented, meaning that little empirical evidence exists about which different types of factors exactly contribute – and to what extent – to patient VC satisfaction. Consequently, it is currently difficult to pinpoint which factors are contributing to VC satisfaction, especially when considering different types of factors simultaneously.

To address these gaps, the current study will draw upon relevant theories and frameworks from doctor–patient communication to explain how different factors may contribute to VC satisfaction. We aim to make at least two contributions. First, by providing an extensive theoretical base on VC satisfaction and a large variety of contributing factors, we aim to decrease the highly fragmented research landscape on VC satisfaction. We do so by distinguishing between patient-related factors (i.e. demographics and socioeconomic background), physician-related factors (i.e. patient perspectives on doctor–patient communication and relationship) and technology-related factors (i.e. patient experiences and attitudes regarding the technology) that have been identified previously in theoretical and empirical studies. Second, as systematically investigating such factors simultaneously is, according to the authors' best knowledge, an approach that has not been applied to investigating VC satisfaction yet, we aim to contribute to the literature by enhancing our knowledge on the relative contribution of various factors in understanding what makes VCs satisfying for patients. Such knowledge will offer important practical guidance for clinical care regarding the conditions under which video consultations are suitable.

Factors contributing to VC satisfaction

In patient–physician communication, several aspects of the medical encounter are expected to affect patient satisfaction.[21] These aspects have been theoretically classified into patient-related, physician-related and context-related factors.[21] Patient-related factors are important because the patient is the primary focus of a medical visit. At the same time, factors related to the physician should be considered, because care cannot be provided without their presence and interaction. Finally, the context in which medical interactions occur (here: the video-mediated environment) is crucial as well, as it impacts how the care process is experienced. These factors can facilitate VC experiences (e.g. adequate physician communication may create a better patient experience[21]) but could also pose barriers (e.g. having privacy concerns can hamper willingness to self-disclose.[23]). If all factors are considered simultaneously, a comprehensive overview of how VC satisfaction can be established.

Patient-related factors

Patient-related characteristics, such as demographics, are known to have a considerable impact on patients' healthcare experiences.[24] However, studies often overlook the potential role of patient demographics on their satisfaction

levels regarding the consultations, also in the context of telemedicine.[25] The association between VC satisfaction and patient-related factors can be explained by central tenets of technological acceptance models (TAM; e.g. [26,27]). In these models, demographics have a prominent role in indirectly influencing people's attitude towards technology. In other words, certain demographics might make someone more or less likely to have a positive attitude towards technologies such as VCs. Since attitude and satisfaction share a similar meaning as both concepts relate to a person's overall evaluation of the technology (which can be positive, negative or neutral) and have been linked to each other oftentimes,[28] the relationship between demographics and VC satisfaction may be explained by the assumptions of the TAM.

Younger age has been repeatedly linked to higher VC satisfaction.[19,29] An often-mentioned explanation is that older people tend to be less comfortable with technology than younger people.[30,31] Studies have also linked being female to higher VC satisfaction,[32,33] but others have not shown a clear relationship between gender and VC satisfaction.[32,33] For example, higher VC satisfaction scores for men compared to women and other genders have also been found (e.g.[34,35]), as well as no relationship between gender and VC satisfaction (e.g.[12,29,36]).

Another patient-related factor for VC satisfaction is socioeconomic status (SES). SES is characterized by people's position in society relative to others and their access to resources.[37] Individual parameters, such as education level and occupation, and community parameters, such as area-based poverty rates and family income, all determine one's SES. Patients with a low SES typically have less access to healthcare, lower health literacy skills and less adequate technological knowledge,[38,39] all of which are known to affect VC satisfaction.[40] Nonetheless, research is inconclusive about the direction of the relationship between SES and VC satisfaction. On the one hand, patients with a lower SES are expected to have higher levels of VC satisfaction, because VCs may alleviate several obstacles that are related to in-person consultations, such as inflexible work hours, family obligations or being dependent on public transportation, which are especially associated with lower SES.[41] On the other hand, having a lower SES is often linked with having less adequate access to digital communication devices or internet speed,[41] which could lead to lower levels of VC satisfaction.

To understand which patient-related factors are associated with VC satisfaction, and in what direction, we propose the following research question (RQ):

RQ1: Which patient-related factors (i.e. age, gender, SES) are associated with patients' VC satisfaction and, if they do so, how?

Physician-related factors

As the medical encounter is of a dyadic nature, the physician also has a considerable impact on (patients' satisfaction with) the consultation.[21] From the large body of work on in-person consultations, it is known that patient–physician communication and relationship building are crucial intermediate endpoints of the consultation that can affect patient satisfaction.[21,42] To achieve patient satisfaction, physicians should not only provide clear medical information (instrumental communication), but they should also signal emotional support (affective communication) and show interest in discussing the patient's preferences and questions (shared decision-making: SDM[43,44]). Despite differences between VCs and in-person consultations that affect both verbal and non-verbal behaviours, such as geographical separation of patient and physician,[45] physician-related factors tend to have a similar impact on patient satisfaction in video-mediated contexts.[42,45] In general, if patients are satisfied with the physician's instrumental, affective and SDM communication, patients tend to be more satisfied with the (video) consultation.[46] For example, patients who receive clear, concise and plenty information about their health tend to be more satisfied with the instrumental communication and are thus more likely to be satisfied with their (video) consultation.[22,42] Furthermore, patients who feel heard and understood by their physician are more likely to be satisfied with the physicians' level of affective behaviour and consequently also with their (video) consultation.[22] Moreover, if the patient is satisfied with the level of SDM in a consultation, the patient tends to be more satisfied with the (video) consultation as a whole.[1,47]

Besides the communication, the patient–physician relationship may impact how satisfied a patient is with their VC. Channel expansion theory (CET) helps understand how the patient–physician relationship might impact VC satisfaction.[48,49] CET suggests that if a physician and patient have a pre-existing relationship that was established in person, having a VC may simply expand their existing communication and strengthen their relationship, leading to increasing VC satisfaction. This also means that when there is no pre-existing physician–patient relationship, having a VC provides a new opportunity for establishing a relationship and communication structure.[49] Findings from a qualitative study support this idea, as it is found that knowing your physician before a VC was associated with higher VC satisfaction.[50]

While physician-related factors as discussed above may have an important role in VC satisfaction, we do not really know how they contribute to VC satisfaction if other factors (e.g. patient-related factors) are also considered. The following RQ addresses the need for a more comprehensive understanding of the factors that shape patient VC satisfaction:

RQ2: Which physician-related factors (i.e. patient satisfaction with instrumental communication, affective communication, shared-decision making and the prior patient–physician relationship) are associated with patients' VC satisfaction and, if they do so, how?

Technology-related factors

Besides factors related to the patient and physician, the context in which the consultation takes place can contribute to patient satisfaction.[21] In the current study, the context considers the video-mediated environment, which not only brings factors directly related to the technology itself into play (i.e. the system and thus online context factors) but also the physical setting in which these VCs take place (i.e. the patient's offline context surroundings). With regard to system-related factors, VC experiences can be roughly subdivided into objective experiences of tangible technical issues with the system (e.g. internet connection issues) and subjective experiences resulting from engaging with the system (e.g. privacy concerns[20]). Regarding the physical environment of the patient, the technology-mediated environment enables the patient to conduct their consultation from home, work or elsewhere, introducing potential beneficial factors, such as reduced travel time,[51] but also potential limitations, such as not being able to have the consultation in a private space.[18] These system-related (objective and subjective experiences) and setting-related factors are expected to influence VC satisfaction.

Regarding system-related factors, objective technological factors have mainly been operationalized as the experiencing of technical issues, including dealing with a 'laggy' system, unsynchronized or delayed audio and video, and the loss of an internet connection.[52] Experiencing such problems can be frustrating, as it impacts the ability to participate in the consultation: in other words, the appointment flow.[20,53] For example, in studies where patients experienced connectivity and video-quality problems, patients rated the quality of the interaction with the physician as poor and were dissatisfied with the VC.[54]

In addition, several subjective system-related parameters are expected to influence VC satisfaction.[55] These may include patients' skills, attitudes and prior experiences with technology. For starters, a patient's digital literacy skills are important when it comes to how the quality of telemedicine is perceived, which is often expressed in terms of satisfaction.[18,55,56] Digital literacy entails the ability to perform digital tasks and use of digital tools to achieve certain goals.[57] In the context of VCs, one could think of skills like connecting to the internet and calibrating computer hardware components such as camera, microphone and speakers. If patients struggle performing such tasks, they may be less satisfied with VCs.[56]

Apart from digital skills, attitudes towards technology are expected to influence VC satisfaction. For example, privacy concerns, which refer to an individual's worries or issues related to the protection of one's personal data, may negatively impact the VC satisfaction.[58] During VCs, patients most likely need to disclose sensitive (medical) information,[59] but if they have concerns about their privacy, they may be less comfortable in doing so which can lead to lower levels of VC satisfaction.[60] Furthermore, VC satisfaction levels may be impacted by a patient's general attitude towards online communication. Such attitude reflects an individual's overall sentiment or opinion about interacting with others via digital means.[61] Having a negative attitude can cause resistance to using certain technologies, hereby impacting the level of satisfaction with such technologies.[62] In the context of telemedicine, little research has been done to link a patient's general attitude towards online communication with VC satisfaction,[63] but studies in the area of e-learning have demonstrated that the success of introducing a new technology largely depends on the attitude of students, such that positive attitudes lead to higher satisfaction.[64]

Besides patients' digital skills and attitudes, their prior video calling and/or video consultation experiences may also affect VC satisfaction. Such prior experiences might influence one's comfortability with using technology which, in turn, influences VC satisfaction. Research has shown that patients who had prior video calling experience were approximately six times more likely to prefer VCs over in-person consultations than those who had no prior experience using such technologies.[39] As such, video calling and video consultation experiences might be positively associated with VC satisfaction.

Apart from these system-related objective and subjective technological factors, factors related to the physical environment of the patient (i.e. setting-related) might play a role due to the at-home setting in which VCs take place. For example, VCs introduce the benefit of having less travel time.[50] Reduced travel time is often referred to as the most important advantage of VC and hence positively impacts VC satisfaction.[14,65] At the same time, however, the at-home setting may create a less beneficial situation for patients, as it introduces the possibility of other people being around and thus not having a private space to discuss health-related matters with the physician. This could negatively affect patients' comfort level,[18,51] which may accordingly impact VC satisfaction.

From the literature, we can thus deduce that objective and subjective system-related factors as well as setting-related factors can have an impact on VC satisfaction. A visual representation of the various (sub)categories of the technology-related factors can be found in Figure 1. In telemedicine research, technology-related factors are even the most commonly measured aspects related to VC satisfaction.[14,20] However, we do not know if these technology-related factors are associated with VC satisfaction if they are considered next to patient- and physician-

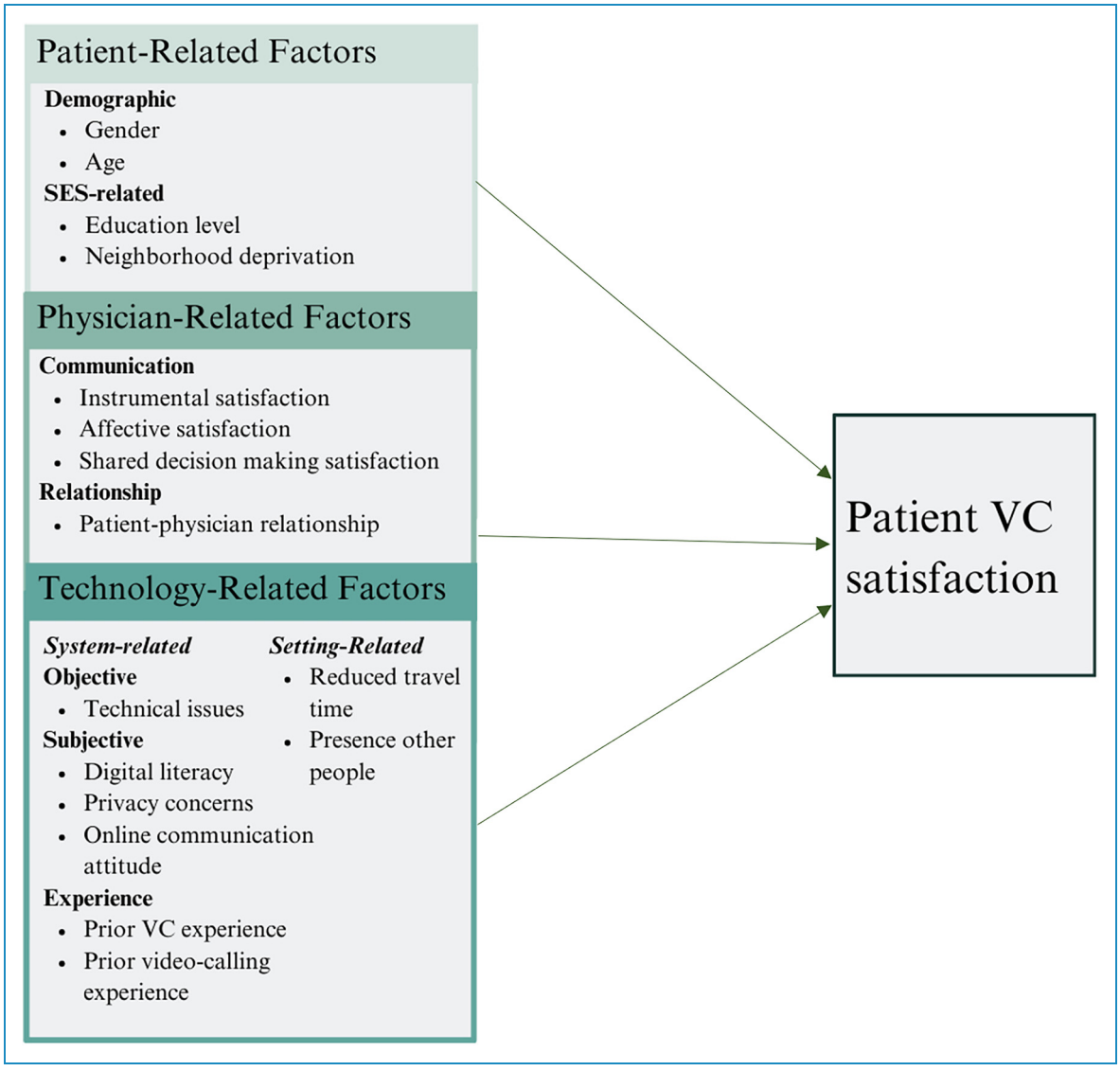

Figure 1. Visual overview of the factors related to patient VC satisfaction.

related factors, and how much they precisely contribute to explaining VC satisfaction. Therefore, we propose the following RQ:

RQ3: Which technology-related factors (i.e. technical issues, digital literacy, privacy concerns, online communication attitudes, prior video calling and VC experiences, importance of travel time, presence of other people) are associated with patients' VC satisfaction and, if they do so, how?

Method

Study design and setting

We conducted an explorative survey study to assess patients' VC satisfaction and its potential contributing factors. Based on previous literature and input from three healthcare professionals (neurologist, paediatrician and a training advisor) from Elisabeth-Tweesteden Hospital (ETZ), an online questionnaire was designed. Data were collected between January and August 2021. During this period, the Netherlands was in a lockdown situation due to the COVID-19 pandemic. Hospitals were overburdened at that time, resulting in strain on the healthcare system. To provide a means of safely accessible care, VCs became rapidly more prevalent in the Netherlands.[66] To ensure safe and effective implementation and utilization of VCs, agreements were made between providers, insurers and the Dutch Healthcare Authority to replace outpatient consultations with VCs wherever feasible.[66]

Patients were eligible to take part in the study if they recently had a VC with their practitioner (i.e. <1 week

ago) and if they were 18 years or older. During data collection, we observed that less than 2% of the consultations concerned a specialty other than medical psychology or psychiatry. Hence, we decided to only focus on these specialties due to the specificness of these fields (i.e. medical specialty that typically focuses on mental health as opposed to physical health). Ethical approval was obtained from the local feasibility advisory committee of the hospital and the medical ethical committee [NW2020-44].

Procedure

Patients from ETZ that had a VC received an email within 5 days after their VC took place. Initially, patients from various specialties were emailed (e.g. cardiology, surgery, gynaecology). However, as we observed a disproportionately large number of patients in our sample that took part in mental healthcare consultations, we decided to focus solely on medical psychology and psychiatry consultations in our sampling procedure from June 2021 onwards. Invited patients received information about the study and a link to the online questionnaire. They were told that participation was voluntary and anonymous and that participating would not influence their treatment in the hospital. The first page of the questionnaire contained additional information about the study and a consent statement. After giving consent, participants answered questions regarding patient-related (e.g. age), physician-related (e.g. satisfaction with instrumental communication) and technology-related (e.g. online communication attitude) factors. The median completion time for the questionnaire was 11.3 minutes[1].

Measurements

To examine which factors were associated with VC satisfaction, patient-, physician- and technology-related factors were measured using single-item questions and various scales (see Appendix A for an overview of all items). The factorability of all scales was examined using a confirmatory factor analysis (CFA). The CFA was run in AMOS 26. Due to missing data, no bootstrapping was performed, no modification indices were calculated and interpreted and no calculation of standardized root mean square (SRMR) was possible. Means and intercepts were estimated using maximum likelihood estimation. According to common fit indices,[67] CFA indicated a good model fit, χ^2 (377) = 619.19, $p < .001$, CFI = .930, TLI = .913, RMSEA = .060.

Dependent variable. **Satisfaction with the video consultation.** To assess the dependent variable, three items were retrieved from the Telemedicine Satisfaction Questionnaire (TSQ[68]). All items were adapted to the video consultation setting, such as 'The video consultation could meet my health needs'. Answers were given on a 5-point Likert scale ranging from 1 = *totally disagree* and 5 = *totally agree*. The items were averaged into one scale (Cronbach's $\alpha = .84$), with higher scores indicating higher VC satisfaction.

Patient-related factors. Patients' age, gender, education and neighbourhood deprivation were assessed. Age was assessed with an open-ended question and included as a continuous variable in the analysis. Gender was measured with the answer options *male*, *female*, *other* and *I rather not say*¸ but only the male and female answer options were picked by our sample. Hence, gender was dummy coded with 0 = *male* and 1 = *female*. Patients' education level was assessed by asking about their highest completed education level, with the answer options: *no education completed*, *primary school*, *pre-vocational education*, *lower vocational education*, *senior secondary vocational education*, *senior general secondary education*, *pre-university education*, *higher vocational education*, *university education*, and *other*.

Neighbourhood deprivation was measured by status scores derived from patients' postal codes. Status scores reflect the social status of a postal code area in the Netherlands.[69] These scores are based on the mean income in a neighbourhood, the percentage of people with a low income, the percentage of people with a low education level and the percentage of people without a job. The following thresholds determine the level of area-level deprivation: lower than 0.01 indicating a low neighbourhood levels, scores between 0.01 and 0.33 indicating middle neighbourhood levels, and scores of 0.34 and higher indicating high neighbourhood levels.[69] Status scores were included in the analysis as a continuous variable.

Physician-related factors. **Satisfaction with instrumental communication.** To measure patient satisfaction with the physicians' instrumental communicative behaviour, four items were derived from Tates et al.,[1] including 'The physician explained my health issues clearly and understandably'. All items were assessed on a scale ranging from 1 = *totally disagree* to 5 = *totally agree*. All four items were combined into one scale with good reliability (Cronbach's $\alpha = .80$). Higher instrumental communication satisfaction was indicated by higher scores on this scale.

Satisfaction with affective communication. Patient satisfaction with the physicians' affective communicative behaviour was also derived from Tates et al.[1] and measured with four items, such as 'The physician was empathic during our interaction'. Response categories ranged from 1 = *totally disagree* to 5 = *totally agree*. Again, all questions were combined into one scale (Cronbach's $\alpha = .73$), with higher scores on this scale indicating higher levels of patient satisfaction with the physician's affective communication.

Satisfaction with SDM. For measuring patient satisfaction with SDM, the collaboRATE scale was used.[70] This scale included three items all starting with 'On a scale from 1 (very little effort) to 10 (very much effort), could you give a number to your experience regarding…' An example item reads: '…how much effort was put into helping you understand your health situation?' The three items were combined into one scale (Cronbach's $\alpha = .92$), where higher scores reflected higher patient satisfaction with SDM.

Patient–physician relationship. To measure whether the patient and physician had a pre-existing relationship, the following question was asked: 'Did you have previous medical encounters with the physician you just had a video consultation with?' Answer options were: *No, this was the first time*; *Yes, one time before*; *Yes, multiple times*; *Yes, many times*. The response categories were dummy coded with 0 = *no relationship* and 1 = *pre-existing relationship*.

Technology-related factors. **Technical issues.** Patient's perceived image and sound quality of the consultation and potential technical problems were measured with four items based on Fatehi et al.,[71] such as 'I experienced technical difficulties during the video consultation'. Items were measured on a 5-point Likert scale ranging from 1 = *totally disagree* and 5 = *totally agree*. These items were combined into one reliable scale (Cronbach's $\alpha = .73$). A higher score indicated less technical problems.

Digital literacy. Digital literacy was measured by adopting four items from the technological efficacy scale.[72] All items started with 'For all items, can you indicate how confidently you can carry out the following internet-activity?' An example items reads: 'Fixing problems with my internet connectivity'. All items were answered on a 5-point Likert scale ranging from 1 = *very little confidence* and 5 = *very much confidence*. The four digital literacy items were combined into a mean scale, where higher scores indicated higher levels of digital literacy (Cronbach's $\alpha = .83$).

Privacy concerns. For measuring the experienced privacy concerns during the VC, four items were adopted from Bol and Antheunis.[23] Questions all started with 'To what extent are you concerned with …', and an example item was 'personal information that I shared during the video consultation being seen or heard by others'. Answers were given on a 5-point Likert scale ranging from 1 = *totally disagree* and 5 = *totally agree*. The four privacy concern items were averaged into one scale (Cronbach's $\alpha = .96$), with higher scores indicating higher privacy concerns.

Online communication attitude. Patients' general attitude towards online communication was measured with four items from the revised Computer-Mediated Communication Questionnaire.[73] The items were rated on a 5-point Likert scale with 1 = *totally disagree* and 5 = *totally agree*. Questions included 'I can easily express myself using online communication'. The four items were used to create one online communication attitude scale, generating an alpha of .86. A higher score indicated a higher online communication attitude.

Previous video calling experience. Patients were also asked whether they had experience with video calling in their personal life. This was measured with the item: 'How much experience do you have with video calling in your daily life?' Answer options were measured on a scale with 1 = *no experience* to 5 = *very much experience*.

Previous video consultation experience. To determine whether it was the first VC for the patients, we asked 'How many video consultations have you had before this one?' Response options ranged from 1 = *none, this was my first video consultation* to 5 = *5 (or more) video consultations*. These categories were dummy coded with 0 = *no experience* and 1 = *previous experience*.

Importance of saved travel time. We measured 'How important is less travel time for you?'. Responses could be given on a scale with 1 = *highly unimportant* and 5 = *highly important*.

Presence of other people. The presence of other people during the VC was measured with the following question: 'Were there, apart from you and the physician, other people present at your VC?' Answer options were: *No, I was alone*; *yes, my partner*; *yes, my children*; *yes, my partner and children*; *Yes, a friend*; and *Yes, other*. For the analysis, the responses were dummy coded with 0 = *alone* and 1 = *not alone*.

Statistical analyses

All analyses were performed using SPSS version 28. Descriptive data were used to describe the study population. All data were visually explored using the histograms, P-P plots and scatterplots. Although scales sometimes skewed right (e.g. VC satisfaction), assumptions of normality (visual inspection of P-P plots), homogeneity (visual inspection of scatterplots), independence of errors (Durbin–Watson = 2.06) and multicollinearity (VIF < 10) were met for all variables. To examine which factors were associated with VC satisfaction, a multiple hierarchical regression analysis was performed. The following sets of variables were entered as separate blocks: (1) patient-related factors, (2) physician-related factors and (3) technology-related factors.

Results

Sample descriptives

A total of 1652 patients were invited to take part in this study, and a proportion of 16.6% ($n = 267$) started the questionnaire. Of these, 87 participants were excluded due to not

Table 1. Descriptive statistics of patient-related, physician-related and technology-related factors for all patients ($n = 180$).

Variable	*n*	%
Patient-related factors		
Gender		
Male	51	28.3
Female	129	71.7
Age (*M*; *SD*)	47.67; 13.61	
Education level		
Pre-vocational education	16	8.9
Lower vocational education	6	3.3
Secondary vocational education	48	26.7
Senior general secondary education	8	4.4
Pre-university education	1	0.6
Higher vocational education	71	39.4
University education	27	15.0
Neighbourhood deprivation		
Low area level	83	46.1
Medium area level	26	14.4
High area level	59	32.8
Physician-related factors		
Satisfaction with instrumental communication (*M*; *SD*)	4.27; 0.57	
Satisfaction with affective communication (*M*; *SD*)	3.98; 0.70	
Satisfaction with SDM (*M*; *SD*)	8.18; 1.35	
Patient-physician relationship		
No relationship	90	50.0
Pre-existing relationship	90	50.0
Technology-related factors		
Technical issues (*M*; *SD*)	3.90; 0.91	
Digital literacy (*M*; *SD*)	4.20; 0.80	

(continued)

Table 1. Continued.

Variable	*n*	%
Privacy concerns (*M*; *SD*)	2.10; 0.93	
Online communication attitude (*M*; *SD*)	3.47; 0.83	
Previous video calling experience (*M*; *SD*)	3.43; 1.23	
Previous video consultation experience		
No experience	124	68.9
Previous experience	56	31.1
Importance of saved travel time (*M*; *SD*)	2.89; 1.15	
Presence other people		
Alone	151	83.9
Not alone	29	16.1

Note. Not all numbers add up to 180 patients due to missing data.

completing the questionnaire ($n = 70$) and because of not having a medical psychology or psychiatry consultation ($n = 17$). This resulted in a final sample size of $n = 180$. Regarding the type of consultation, 138 patients (76.7%) had a consultation with a medical psychologist, and 42 patients (23.3%) participated in a VC with a psychiatrist.

Factor characteristics

Regarding the descriptives of patient-related factors, respondents were on average 47.67 years old ($SD = 13.61$, $range = 19–83$), and 71.7% were female. Regarding education level, 22 patients (12.4%) had a low education level, 57 patients (32.2%) a medium education level and 98 patients (55.4%) a high education level. Status scores for neighbourhood deprivation ranged from −3.12 to 2.00 and was on average 0.02 ($SD = 0.97$). Regarding physician-related factors, 90 patients (50%) had met with the physician previously, and 90 patients (50%) had not met the physician previously and, thus, met the physician for the first time during the VC. Descriptives for the technology-related factors showed that in 124 (68.9%) cases, this VC was the patient's first VC in general. A total of 56 (31.1%) patients reported to have VCs previously. Regarding the presence of other people, 151 (83.9%) patients reported being alone with their physician during their VC, and 29 (16.1%) reported not being alone. In Table 1, a detailed overview of the patient-, physician- and technology-related characteristics is presented including descriptive statistics for all factors.

Predictors of VC satisfaction

Overall, respondents were satisfied with their VC. On average, they scored 3.86 on a 5-point scale ($SD = 0.88$). In predicting patient VC satisfaction, the first block included patient-related factors (RQ1), which did not significantly contribute to patient VC satisfaction ($R^2_{adj} = .023$, $R^2_{change} = .047$, $p = .100$) (see Table 2). Patients' age ($\beta = .03$, $p = .686$), education level ($\beta = .11$, $p = .181$) and neighbourhood deprivation ($\beta = .03$, $p = .710$) were not significantly associated with VC satisfaction. Gender, however, was a significant predictor ($\beta = .19$, $p = .025$): women were more satisfied with their VC than men.

The second block included physician-related factors (RQ2), which significantly contributed to predicting VC satisfaction ($R^2_{adj} = .330$; $R^2_{change} = .315$, $p < .001$). Higher levels of patient satisfaction with the physician's instrumental ($\beta = .22$, $p = .020$) and physician's affective communication ($\beta = .42$, $p < .001$) were both associated with higher VC satisfaction. No significant relationship was found between SDM satisfaction and VC satisfaction ($\beta = -.01$, $p = .859$). Furthermore, the patient–physician relationship was not associated with patient VC satisfaction ($\beta = .03$, $p = .620$). The relationship with gender that was found in Block 1 disappeared when introducing the physician-related factors ($\beta = .06$, $p = .359$).

The third and final block, which included technology-related factors (RQ3), also significantly contributed to explaining VC satisfaction ($R^2_{adj} = .563$, $R^2_{change} = .243$, $p < .001$). The less technical problems were experienced, the more patients were satisfied with the VC ($\beta = .40$, $p < .001$). Furthermore, a more

Table 2. Hierarchical multiple regression analysis of VC satisfaction ($n = 180$).

Block				Model 1				Model 2				Model 3			
Predictor	R^2_{adj}	R^2_{ch}	*p*	*b*	*SE*	β	*p*	*b*	*SE*	β	*p*	*b*	*SE*	β	*p*
(1) Patient-related factors	.023	.047	.100												
Age				0.00	.00	.03	.686	−0.00	.00	−.04	.530	0.01	.00	−.08	.194
Gender[a]				0.37	.16	.19	**.025**	0.13	.14	.06	.359	0.05	.12	.03	.666
Education				0.06	.04	.11	.181	0.05	.04	.09	.183	0.03	.03	.06	.328
Neighbourhood deprivation				0.03	.07	.03	.710	−0.08	.06	−.08	.205	−0.07	.05	−.08	.159
(2) Physician-related factors	.330	.315	**<.001**												
Instrumental satisfaction								0.34	.15	.22	**.020**	0.27	.11	.17	**.029**
Affective satisfaction								0.53	.12	.42	**<.001**	0.26	.11	.20	**.017**
SDM satisfaction								−0.01	.05	−.01	.859	0.08	.05	.12	.104
Patient–physician relationship[b]								0.06	.12	.03	.620	−0.02	.11	−.01	.849
(3) Technology-related factors	.563	.243	**<.001**												
Technical issues												0.39	.05	.40	**<.001**
Digital literacy												−0.08	.08	−.07	.337
Privacy concerns												−0.01	.06	−.01	.897
Online communication attitude												0.22	.07	.21	**.002**
Video calling experience												−0.03	.05	−.04	.573
Video consultation experience[c]												0.12	.12	.06	.306
Importance reduced travel time												0.13	.05	.16	**.007**
Presence of other people[d]												0.21	.14	.08	.136

Note. Bold text indicates significant values. [a]Dummy coded variable with 0 = male and 1 = female. [b]Dummy coded variable with 0 = no relationship (i.e. first consultation) and 1 = pre-existing relationship (i.e. patient and physician have had a consultation(s) together before the VC). [c]Dummy coded variable with 0 = no VC experience and 1 = previous experience with VCs. [d]Dummy coded variable with 0 = no presence of other people and 1 = presence other people.

positive attitude towards online communication was associated with higher levels of VC satisfaction (β = .21, $p = .002$), and the more important less travel time was for the patient, the more satisfied they were with the VC (β = .16, $p = .007$). No associations were found between VC satisfaction and digital literacy (β = −.07, $p = .337$), privacy concerns (β = −.01, $p = .897$), video calling experiences (β = −.04, $p = .573$), video consultation experiences (β = .06, $p = .306$) and the presence of other people during the VC (β = .08, $p = .136$).

Discussion

Our study's main aim was to explore which factors related to the patient, physician and technology contribute to

patient satisfaction with VCs. While drawing upon relevant theories and frameworks from patient–physician communication (e.g. [21,48]), we identified various factors that explain how VC satisfaction is established. By including a range of variables simultaneously, we aimed to contribute to the highly fragmented VC satisfaction research landscape. Since it is likely that VCs will continue to play an important role in healthcare,[4] it is crucial to understand what contributed to a satisfying VC. By distributing a questionnaire across mental health patients measuring aspects related to VC satisfaction and the patient, physician and technology, we were able to answer three related RQs and provide much-needed, systematic empirical evidence on what makes VCs satisfying for patients.

The first RQ addressed how patient-related factors contribute to patient VC satisfaction. Our results showed no associations between patient demographics and socioeconomic background and VC satisfaction. Although women seemed to be more satisfied than men in general, this distinction disappeared when physician- and technology-related factors were introduced in the analyses. Finding no patient-related differences in VC satisfaction also means that we have no convincing evidence for reduced VC satisfaction among populations that tend to struggle more with digital innovations (e.g. lower-educated people, older people[30]). However, it is vital to acknowledge that the absence of patient-related differences in VC satisfaction might be a result of a sampling bias, as we might have not been able to reach those who lack technology access, digital skills and motivation. Hence, although our data showed that patients seem to be satisfied with VCs regardless of patient-related factors, we should approach these findings with caution, as the absence of patient-related differences might be impacted by the limitations in our sampling and survey methods.

RQ2 explored which and how physician-related factors were associated with patient VC satisfaction. In line with patient–physician communication research in offline contexts (e.g. [45]), we found that patient satisfaction with physicians' instrumental and affective communication relates to how satisfied patients were with the consultation in a video-mediated context. This implies that patients have similar communication needs regarding VCs as in-person consultations.[22] While it may be challenging to provide adequate instrumental and affective communication in virtual environments due to reduced non-verbal cues,[1] this study demonstrates that the more satisfied patients were with the level of such communication, the more likely it was they had a satisfactory VC.

Other physician-related factors, i.e. the process of SDM and having a pre-existing patient–physician relationship, were not associated with patients' satisfaction levels. Regarding the patient–physician relationship, this null finding arguably highlights the importance of adequate communication skills – specifically during VCs – of physicians even more. We could speculate that in the case of VCs, patients may be more focused on the quality of the communication and support they receive during the VC, rather than on the existing relationship with their physician because VCs are a less rich medium. The previously discussed CET might provide an explanation for this idea. For patients meeting their physician for the first time, adequate communication might be extra important as it is the first opportunity for the patient and physician to establish a relationship.[49] This idea might explain why satisfaction with physicians' instrumental and affective communication predicts VC satisfaction more than a relationship does. However, future research using more qualitative approaches (e.g. interview studies) is needed to better understand the impact of patient–physician relationships on VC satisfaction, as contrasting results have been found so far[50] and qualitative studies are particularly fitting for exploring such relationships more in depth. In addition, such qualitative approaches are also able to explore staff and patient experiences on a more system-wide level, offering more contextually focused insights (e.g.[74]).

Finally, our third research question intended to answer how technological-related factors were associated with VC satisfaction. The technology-related factor that had most impact on VC satisfaction was experiencing technical issues – an objective technology factor. Experiencing technical issues has been repeatedly recognized as a primary barrier to VC satisfaction,[75] which our findings provide further evidence for. Even when studied simultaneously with other (technology-related) factors, experiencing technical issues appeared to be the strongest predictor of VC satisfaction. Furthermore, while it has been demonstrated that patients consider reduced travel time as the most important advantage of VCs,[14] our findings suggest that the importance of reduced travel time also plays a role in fostering satisfaction with the VC. This result sheds a light on the benefits of reduced travel time, beyond simply convenience.

Regarding subjective technology-related factors, our analysis only revealed a contribution to patient VC satisfaction of patients' general attitude towards online communication. Limited work has been done on how general online communication attitudes possibly impact patients' experience of VCs.[63] We suspect that having a more positive attitude may allow for higher levels of comfort and confidence with video-mediated technologies, making patients feel more at ease using the technology, hereby impacting their satisfaction. Our finding that general online communication attitudes are related to VC satisfaction contributes to an understanding of how such attitudes are valuable in new technological innovations such as VCs. Interestingly, we were unable to discover any associations for more commonly explored subjective technology-related factors in relationship to VC satisfaction, such as digital literacy and privacy concerns. While it is important to note that

patients' digital literacy and privacy concerns are still important factors to consider in relation to VCs, as they, for example, may impact patients' willingness to use telemedicine services altogether,[27] our null findings suggest that there may be a more complex relationship between digital literacy and privacy concerns on the one hand and VC satisfaction on the other. For instance, it is still plausible that patients' digital literacy and/or privacy concerns contribute to VC satisfaction, but do not contribute significantly more than other patient-, physician- and technology-related variables when considered simultaneously. This highlights the importance of further exploring the relationship between these more subjective technology-related factors.

Implications for theory and practice

The main theoretical strength of this study lies in its comprehensive approach of including various factors drawn from patient–physician communication theories (e.g.[48]) and frameworks.[21] Although some variables had been studied previously in relation to VC satisfaction (e.g.[14]), the full range of patient-, physician- and technology-related factors had, at least to the best of our knowledge, not been studied together in a multivariate analysis. By analysing a wide range of variables simultaneously, this study was able to provide new insights into how these factors relate to VC satisfaction while controlling for others, hereby able to identify which factors correlate most strongly with patient VC satisfaction. For instance, in certain cases, no evidence was found for factors previously associated with VC satisfaction, such as age (e.g.[19]) or privacy concerns (e.g.[60]). Although we do not deny the presence of such relationships, we do believe that other factors might play a more important role. The full complexity of the relationships between all these different factors and VC satisfaction still needs researching. For example, future research could disentangle how patient-, physician- and technology-related factors interrelate and whether some interdependencies differently explain VC satisfaction.

This study's more nuanced approach to the factors that contribute to VC satisfaction can support both policymakers and physicians, as it provides insights into the various factors that may positively or negatively contribute to VC satisfaction. Specifically, variables that are hard (or even impossible) to change, like patient-related factors such as age, are arguably less important in predicting VC satisfaction, which is favourable. This means that developers can focus on improving aspects that are actionable, such as optimizing the online environment, which could possibly help improve patients' online communication attitudes and reduce technical issues. Alternatively, policymakers could create clinical guidelines for physicians to ensure adequate online communication. Such factors, when translated into clinical guidelines, have the potential to improve overall VC experiences.

Furthermore, this study offers an important practical implication by revealing the importance of communication satisfaction by patients, and thus the importance of how adequately physicians provide instrumental and affective communication. Adequate communication contributes to VC satisfaction in a similar way as it does for in-person consultations but might be even more crucial in video-mediated contexts as physicians do not have access to the same physical examination tools and lack non-verbal cues in VCs.[13,45] We thus urge practitioners to obtain – and use – adequate instrumental and affective communication skills in virtual settings, as this can positively influence patients' VC experience.

Limitations and suggestions for future research

Although our study gave new insights into the factors contributing to patient VC satisfaction, we recognise that our study has some limitations. First, we acknowledge there are still a variety of factors this study was not able to capture. For example, variables such as the severity of the disease, a patient's need for a VC or the medium used for conducting a VC might all contribute to our understanding of VC satisfaction. Since the context in which healthcare and technology operate is continually subject to change, factors contributing to VC satisfaction are likely as well. This study was able to capture a substantial number of variables, but considering a broader range of variables should be part of future research to gain an even more comprehensive and nuanced understanding of VC satisfaction.

Second, only including medical psychology and psychiatry patients limits the generalizability of our results to other medical specialties. Medical psychology and psychiatry are specific fields within healthcare that have a strong(er) emphasis on the therapeutic relationship and the psychological and emotional aspects of the patient.[4] This is in contrast with medical specialties that require more physical contact, such as dermatology[12] or wound care.[5] Furthermore, our sample was obtained through an email-based questionnaire invitation, which fully relies on voluntary participation.[76] Hence, there is a possibility that the respondents in this study represent a specific group of patients who might be more tech-savvy and willing to participate in research. Additional research is needed to understand the factors that contribute to VC satisfaction in more diverse patient populations. Using other data collection techniques, such as face-to-face recruitment, might be valuable here.

Third, similar to previous research (e.g.[32]), this study also found high VC satisfaction levels. This could be explained by the study being conducted during COVID-19, as patients might have been more grateful for the opportunity to have a consultation, even if it is online.

Nonetheless, studies have found high levels of VC satisfaction even before COVID-19 (e.g. [1,33]). It therefore remains unclear whether COVID-19 had an effect on satisfaction levels in this study. Moreover, while it is promising to find such high satisfaction levels, it also means that there is a lack of variability in our outcome measure. If there had been a wider range of satisfaction levels, including dissatisfied patients, it would have been possible to gain a deeper understanding of potential factors specifically contributing to VC dissatisfaction.

Conclusion

This study aimed to explore and understand which patient-, physician- and technology-related factors contributed to patient VC satisfaction. By providing an extensive theoretical base on VC satisfaction and systematically investigating a large variety of potential contributing variables simultaneously, we aimed to contribute to enhancing the highly fragmented research landscape on VC satisfaction. Findings of this study showed that patient factors such as age, gender and SES did not contribute, whereas physician and technology factors did. Higher patient satisfaction with physicians' instrumental and affective communication was associated with higher VC satisfaction. Furthermore, experiencing no or less technical issues, having general positive attitudes towards online communication and finding reduced travel time were important contributors to patient VC satisfaction. We urge physicians to prioritize adequate communication during VCs as this can enhance patients' VC experience. Overall, the findings contribute to a better understanding of the full multifaceted nature of VC satisfaction and how VCs can best be utilized to counteract inequality in healthcare.

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Note

Due to outliers, for example, people who took multiple days to complete the questionnaire, we report the median.

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Appendix A

Overview of questionnaire items of measurement scales (translated from Dutch to English).

Satisfaction with the video consultation (based on TSQ[68])

1. The video consultation could meet my health needs.
2. It was easy to talk with my physician with a video consultation.

3. The overall quality of my video consultation was satisfactory.

Satisfaction with instrumental communication (based on Tates et al.[1])

1. The physician explained my health issues clearly and understandably.
2. I have been able to ask questions about my health condition and/or treatment.
3. I felt comfortable asking questions to the physician.
4. The physician seemed to not understand the information I provided about my medical issues.

Satisfaction with affective communication (based on Tates et al.[1])

1. The physician was empathic during our interaction.
2. It was possible to talk to the physician about personal matters.
3. The tone of the conversation during the video consultation was more formal than I am used to.
4. I thought it was difficult to get an emotional connection with my physician.

Satisfaction with SDM (collaboRATE[70])

Could you give a number on a scale from 1 to 10 to your experience regarding how much effort was put into…

1. Helping you understand your health situation?
2. Listening to the things that are important to you regarding your health situation?
3. Considering the things that are important to you in choosing the next step?

Technical issues (based on Fatehi et al.[71])

1. I experienced technical difficulties during the video consultation.
2. I was satisfied with the image quality of the video consultation.
3. I was able to have the video consultation without any interruptions.
4. I was satisfied with the sound quality of the video consultation.

Digital literacy (based on the Technology Efficacy Scale[72])

For all items, can you indicate how confidently you can carry out the following internet activities?

1. Fixing problems with my internet connectivity.
2. Using the internet to find information.
3. Communicating online with others (e.g. Facebook, email).
4. Using an online service or app.

Privacy concerns (based on Bol and Antheunis[23])

Please rate the extent to which you are concerned with personal information that you shared during the video consultation…

1. Being seen or heard by others.
2. Being further disseminated to other parties.
3. Not being stored safely.
4. Being misused by others.

Online communication attitude (based on Computer-Mediated Communication Questionnaire[73])

1. I feel comfortable with the way you can communicate via the internet.
2. I can easily express myself using online communication.
3. My computer skills make me feel comfortable with online communication.
4. I feel that online communication is a social way of communicating.