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Physician Communication Skills in Telemedicine: The Role of Eye Contact

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Abstract

Gaze is an important non-verbal behavior in patient-physician communication. We examine the effect of the physician's gaze direction in video consultations on their communication and interpersonal skills ratings. 51 subjects watched videos of a physician providing the same teleconsultations while (a) looking directly at the camera and (b) looking at the computer screen. After each video, the participants rated the physician's skills. The results showed that looking at the camera is perceived as making eye contact and is associated with higher ratings on two communication skill items: (1) using empathy to communicate appreciation of the patient's feelings, and (2) providing support by expressing concern, understanding, and willingness to help. The effect of eye contact depended on the content of the consultation and on the general attitude of the physician. These results highlight the role of eye contact in video consultations and its dependency on other verbal and non-verbal behaviors.

Keywords:

Telemedicine, Patient-physician communication, Nonverbal Communication

Introduction

Communication between physicians and patients is a combination of verbal and nonverbal expressions. Previous work examined the effect of various nonverbal behaviors, such as gaze and body orientation, on the quality of physician-patient communication [1]. The results of these studies were used to inform physicians on ways to improve their communication skills [2]. However, these studies focused on in-person encounters which greatly differ from telemedicine consultations that are conducted using videoconferencing tools. Indeed, previous research indicates that videoconferencing can influence our verbal and non-verbal behaviors and perceptions of one another [3]. For example, mutual gaze between patient and physician, which can be easily experienced during in-person encounters, is almost impossible to achieve during video consultations [4]. Due to differences between in-person and video consultations—and to the rapid adoption of telemedicine, which was accelerated by the recent COVID-19 pandemic [5]— the study of communication behaviors in virtual settings is necessary [6]. The results of such studies can highlight positive communication behaviors that could increase patient satisfaction with virtual care [7].

This paper examines the effect of physician gaze orientation on patient-physician communication during video-mediated teleconsultations. Gaze orientation is a non-verbal behavior that visually communicates a person's current attention and availability [8] and is commonly examined in patient-physician communication studies [9]. Previous studies targeting in-person encounters found associations between the physician's gaze and verbal behaviors such as: disclosure of psychosocial information by both the doctor and the patient [10], the physician's awareness of psychological problems [11] and psychological diagnostic abilities [12], and the patients' satisfaction [13]. These studies highlighted the importance of eye contact in patient-physician encounters, but did not establish evidence that eye contact and patient satisfaction are consistently or significantly related [14].

Recent studies targeting telemedicine encounters also suggest that eye contact may be a relevant nonverbal behavior during video consultations [15-18]. However, there is a lack of evidence that eye contact has any effect on patient-physician communication in telemedicine. To address this knowledge gap, this work aims to examine the effect of eye contact on patient-physician communication in telemedicine. As a first step, we examine the effect of the physician's gaze orientation on their interpersonal and communication skills, as rated by an observer. These skills are targeted as they were shown to affect patient satisfaction and health outcomes [19].

In summary, this work aims to answer the following research question: "Does the physician's gaze orientation during video consultations affect the rating of their communication and interpersonal skills?"

Methods

Study Design

We use a within-subject design with the physician's gaze being the independent variable and the physician's communication skills being the dependent variables. The physician's gaze is a factor with two fixed levels:

- Eye contact (EC): the physician is simulating eye contact, i.e., looking directly at the camera.
- No Eye contact (NEC): the physician is not simulating eye contact, i.e., not looking directly at the camera. Instead, the physician is looking at the patient's face on the screen.

The physician's communication and interpersonal skills are measured using items related to the physician's interpersonal, non-verbal communication, and developing rapport skills that are selected from the Global Consultation Rating Scale [20] and from the MAAS-G scale [21]. We test for the non-equivalence of the two gaze directions using two-tailed paired samples t-tests.

Video Recording Process and Setup

To examine the effect of the independent variable—

the physician's gaze—we needed to ensure that the participants' ratings are not influenced by other variables such as the content of the encounter, the physician's voice tone, facial ex-

pressions, body orientation, and other verbal and nonverbal factors. Therefore, the participants needed to be presented with two videos of the same consultation where the only difference was the physician's gaze. The only way to ensure this condition was to use two cameras and simultaneously record two videos of the physician-patient encounter.

The video-recording process and setup are shown in Figure 1. Through the videos, two conditions were simulated: (i) the physician is making eye contact by looking directly at the webcam, and (ii) the physician is looking at the center of the screen where the patient's face is displayed. To do so, two cameras (webcam *a* and webcam *b*) were positioned with a vertical distance equal to the distance between the webcam and the center of a 15-inch laptop screen, with the lower camera (camera *b*) positioned at the same level as the actor's eyes.

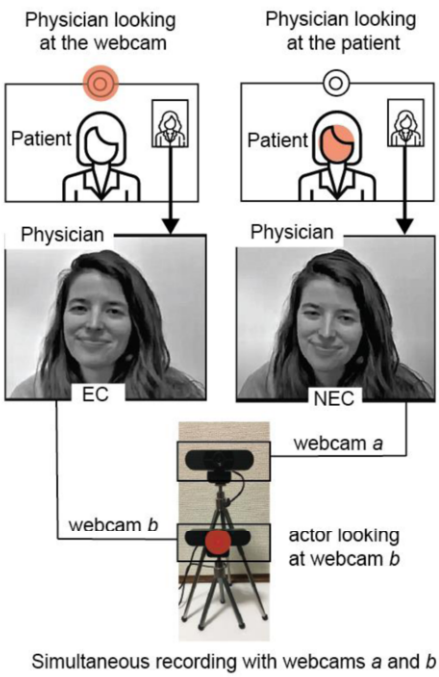

Figure 1 Video recording process

While recording the videos, the actor simulating the physician was asked to continuously look at the lower camera (webcam *b*). This process resulted in two videos for the same encounter: a video simulating eye contact captured by webcam *b,* and a video simulating the physician looking at the patient's face on the screen captured by webcam *a*.

The content of the encounters

Our early stages of experimentation highlighted that the content of the encounter and the general attitude of the physician can majorly affect the ratings of their interpersonal and communication skills. To ensure that the results of the experiment are not biased by the type of encounter, we simulated two different encounter scenarios. In scenario 1, the actor was asked to be very attentive and caring. In scenario 2, the actor was asked to seem slightly tired and distracted.

Scenario 1 starts with the physician and the patient checking that they can see and hear each other. Then, the physician reassures the patient about their test results, asks about the patient's experience with their medication, reassures them that their experienced side effects are normal, and offers them a solution. The encounter ends with the physician asking the patient if they have extra questions or concerns and both of them saying goodbye before ending the video call.

Scenario 2 starts with the physician asking the patient about their stomach pain complaint. Then, the physician tells the patient that they are probably experiencing gas pain and that they should wait 24 hours and get back in touch in case the pain persists.

Data Collection and Analysis

The data collection methods are shown in Figure 2. The experiments in this study were conducted in accordance with the Helsinki Declaration.

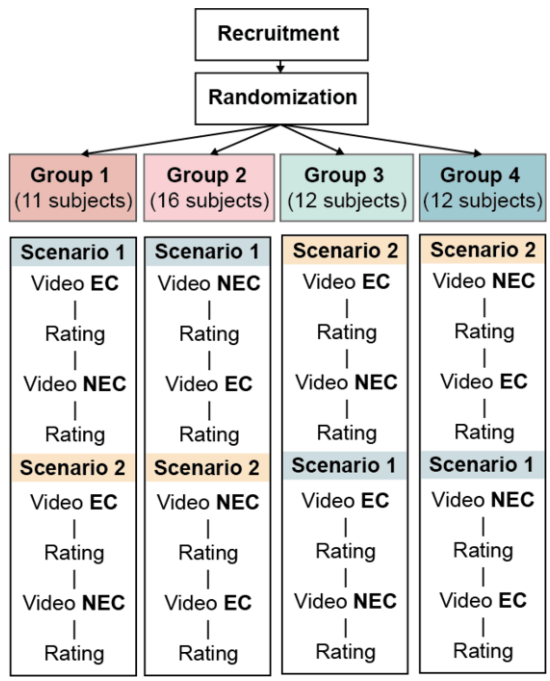

Figure 2 Data collection

51 subjects were randomly recruited through announcements on social media initiated by the authors of this study. All participants digitally provided written informed consent prior to their participation in the study. To minimize order effects, counterbalancing was used and the participants were randomly assigned to four groups for which the order of the scenarios and the gaze directions were switched. The EC and NEC videos corresponding to the same scenario were played consecutively to generate results that highlight the difference between gaze directions and not the scenarios themselves.

After watching each video, the participants were asked to rate the communication and interpersonal skills of the physician using 6 items from the Global Consultation Rating Scale [20] and from the MAAS-G scales [21]. The items were rated on a 7-point Likert scale ranging from "0 = Not at all" to "6 = Very much." The polarity of the questions was adjusted so that a higher score would always imply better skills. The items and their code names are listed below. The code names will be used in the subsequent sections to save space.

- Item 1- Eye contact
  "Makes eye contact with the patient"
- Item 2- Attentiveness
  "Does not appear distracted"

- Item 3- Appropriate non-verbal behavior
  "Demonstrates appropriate non–verbal behavior, e.g., eye contact, posture, position, movement, facial expression, use of voice"
- Item 4- Acknowledgment
  "Acknowledges patient's views and feelings; is not judgmental"
- Item 5- Empathy
  "Uses empathy to communicate appreciation of the patient's feelings"
- Item 6- Support and understanding
  "Provides support: expresses concern, understanding, willingness to help"

Participants were also asked to choose their preferred gaze direction using a two-choice question (eye contact or non-eye contact) with image vignettes showing both gaze conditions. In addition, they were asked to explain why they think the physician should adopt that gaze direction.

Results

Participants

The youngest participant was 19 and the oldest was 56 years old. The median age was 30 years old. All the participants identified as either female (54.9%) or male (45.1%). 35 (68.6%) participants work in healthcare and 16 (31.4%) work in other fields. In terms of previous experience with video consultations, 41 (80.4%) participants had no previous experience; 7 (13.7%) already had 1 to 5 video consultations; and 2 (3.9%) had 5 to 10 video consultations. Only 1 participant, who works as a dietitian, had done more than 10 video consultations.

Effect of Gaze Direction on the Rating of the Physician's Communication Skills

A two-way MANOVA showed that there was no significant interaction effect between gaze direction and type of scenario on the rating of the physician's communication skills combined, $F(6, 195) = 0.898$, $p = 0.497$; Wilks' $\Lambda = 0.973$.

A series of two-way ANOVAs were conducted to examine the main and interaction effects of gaze and scenario on the communication skill items individually. The analysis showed significant differences in the ratings of physician communication skills between scenario 1 and scenario 2. The participants rated all the communication and interpersonal skills of the physician in scenario 1 significantly higher than in scenario 2 ($p < 0.001$). The differences between the scenarios are out of the scope of this work; however, due to the significant difference between the scenarios, we consider each scenario separately when comparing the effect of gaze direction on the physician's communication skills.

A series of two-tailed paired samples t-tests were conducted to compare the physician's communication skills ratings for the two conditions of gaze direction: eye contact (EC) and no eye contact (NEC). The results of these tests are shown in Table 1. The difference between the EC and NEC conditions are shown separately for each communication skill item. We consider p values less than 0.05 to be statistically significant.

Table 1–Paired two-tailed t-tests for the physician's skills rating with eye contact (EC) versus no eye contact (NEC)

Variable	EC MEAN (95% CI)	NEC MEAN (95% CI)	EC-NEC MEAN (95% CI)	t	*p*	Cohen's d (95% CI)
Scenario 1						
Item 1- Eye contact	4.76 (4.39–5.14)	4.27 (3.78-4.77)	0.49 (0-0.98)	2.03	**0.048**	0.284 (0.01-0.56)
Item 2- Attentiveness	4.98 (4.65-5.31)	4.8 (4.51-5.1)	0.176 (-0.1-1.46)	1.26	0.211	0.178 (-0.1-0.45)
Item 3- Appropriate non-verbal behavior	4.63 (4.27-4.98)	4.39 (4.01-4.77)	0.235 (-0.13-0.6)	1.30	0.199	0.182 (-0.1-0.46)
Item 4- Acknowledgment	4.71 (4.37-5.04)	4.55 (4.2-4.9)	0.157 (-0.15-0.47)	1.02	0.314	0.142 (-0.13-0.42)
Item 5- Empathy	4.86 (4.58-5.15)	4.76 (4.48-5.05)	0.098 (-0.21-0.41)	0.64	0.527	0.089 (-0.2-0.36)
Item 6- Support and understanding	4.51 (4.2-4.81)	4.67 (4.37-4.97)	-0.157 (-0.49-0.18)	-0.94	0.351	-0.132 (-0.4-0.14)
Scenario 2						
Item 1- Eye contact	3.24 (2.9-3.57)	2.67 (2.28-3.05)	0.569 (0.21-0.93)	3.2	**0.002**	0.448 (0.16-0.73)
Item 2- Attentiveness	3.06 (2.71-3.4)	2.92 (2.52-3.33)	0.137 (-0.24-0.52)	0.72	0.473	0.101 (-0.17-0.38)
Item 3- Appropriate non-verbal behavior	2.94 (2.57-3.32)	2.59 (2.2-2.97)	0.353 (-0.05-0.76)	1.75	0.086	0.245 (-0.04-0.52)
Item 4- Acknowledgment	2.75 (2.33-3.16)	2.53 (2.1-2.96)	0.216 (-0.18-0.62)	1.09	0.283	0.152 (-0.13-0.43)
Item 5- Empathy	2.92 (2.5-3.34)	2.45 (2.02-2.88)	0.471 (0.1-0.85)	2.52	**0.015**	0.353 (0.07-0.64)
Item 6- Support and understanding	2.51 (2.11-2.91)	2.14 (1.74-2.54)	0.373 (0.45-0.70)	2.28	**0.027**	0.320 (0.04-0.6)

The results show that there is a significant difference between the EC and the NEC conditions in terms of perceived eye contact in both scenario 1 ($p = 0.048$) and scenario 2 ($p = 0.002$). This means that the physician was indeed perceived to make more eye contact when they looked directly towards the camera. This difference was more significant in scenario 2 where the general attitude of the physician was perceived as worse. Interestingly, the participants did not perceive a complete lack of eye contact in the NEC condition, even though the physician never looked straight at the camera in the NEC videos.

In scenario 1, even though there was a difference in perceived eye contact between the EC and NEC video, there was no difference in the ratings of the other skill items.

On the other hand, in scenario 2, the physician in the EC video was rated significantly higher than the physician in the NEC video in terms of (i) using empathy to communicate appreciation of the patient's feelings ($p = 0.015$) and (ii) providing support: expressing concern, understanding, and willingness to help ($p = 0.027$).

These results show that eye contact has an effect on certain aspects of communication in telemedicine. However, this effect is dependent on other factors such as the content of the consultation and the general attitude of the physician.

Participant opinions

When asked directly about their preferred gaze direction, 46 (90.2%) participants chose the EC condition. A content analysis of their responses showed that when the physician makes eye contact, they are perceived as more trustworthy, having a closer personal relationship with the patient, showing a higher level of interest in the conversation, actively listening, being less patronizing and less robotic, caring, focused, attentive, and inspiring confidence. The participants also highlighted some positive effects that perceived eye contact can have on the patient's feelings. They noted that the patient may feel more involved in their care, secure, safe, comfortable, and both physically and emotionally closer to their physician.

Only 5 (9.8%) preferred the NEC condition. In their explanation of why they thought it is better that the physician looks at the screen (NEC) instead of the camera (EC), they highlighted that the patient's eyes are on the screen, and therefore looking into the patient's eyes would mean looking at the screen rather than the camera. They also noted that if the physician looks at the camera, some patients can sense that they are not looking at their face. Furthermore, the physician would not be able to see the patient's expressions and body language, and consequently would not be able to understand how they are feeling.

Discussion

We conducted an experiment with 51 subjects to examine whether looking straight at the camera during video consultations affects the rating of physicians' communication and interpersonal skills. We explored two video consultation scenarios in which the general attitude and behavior of the physician significantly differed.

Our results confirmed that regardless of the consultation's content, looking at the camera during video consultations is perceived as making more eye contact. Moreover, looking at the camera was associated with significantly higher ratings of two interpersonal and communication skills:

1. Using empathy to communicate appreciation of the patient's feelings
2. Providing support by expressing concern, understanding, and willingness to help

However, looking at the camera during the video consultation was not associated with higher ratings of attentiveness, even though gazing towards a person communicates attention and availability during in-person encounters. These results confirm the importance of eye contact in video consultations and its potential role in virtual patient-physician communication and relationships—a role that might be different than the one it plays during in-person encounters.

Our results also showed that the effect of eye contact was only significant in the scenario where the overall attitude of the physician was perceived as worse. This implies that the effect of eye contact is dependent on—and can be overshadowed by—other factors such as the content of the consultation and the physician's other verbal and non-verbal behaviors. However, these results present an easy and practical solution for physicians who suspect that their communication skills during video consultations are not optimal and want to improve them: increase eye contact with patients by looking straight at the camera.

The role of eye contact was also highlighted by the participants when they were asked about their preferred physician gaze direction. The vast majority (90.2%) chose the eye contact condition and described how perceived eye contact can positively reflect on the physician's communication and interpersonal skills and how it may positively impact the patients' feelings. On the other hand, the participants who preferred the physician looking at the screen rather than the camera highlighted an important limitation of our current video conferencing technology: the inability to gaze into a person's eyes and appear that you are making eye contact, and the inability to achieve mutual gaze. An optimal solution would allow the physician and patient to look at the camera—or seem like they are—while looking at each other's faces on the screen. Previous work on video consultations has tried to achieve this; however, the currently available solutions are workarounds [18] that do not offer the levels of usability and usefulness needed for seamless virtual interaction. Other promising solutions include real-time gaze correction methods that automatically adjust the gaze by modifying their shape [22; 23].

It is important to note that only looking towards the screen was not perceived as a complete lack of eye contact. Even though the physician never looked towards the camera in the NEC condition, the participants perceived them as making eye contact. These results confirm our ability to learn to interpret gaze direction even when it is targeted towards the screen.

Limitations and future work

A first limitation of this study is the use of videos that simulate video consultations rather than videos of real teleconsultations. Future work examining the role of eye contact in video consultations can record videos of real teleconsultations using a setup similar to the one described in the methods to simultaneously record videos with different gaze directions. In addition, the videos that were created and used in this work are available from the corresponding author on reasonable request.

Second, in this study we only examined the effect of the physician's gaze and considered two discrete conditions: continuously looking at the camera or at the screen. Future work can examine the effect of the patient's gaze and other gaze conditions, such as alternating between the camera and the screen.

Third, in our experiment we asked the participants to put themselves in the patient's shoes and rate the physicians' communication skills. However, some participants noted that it would be unnatural and uncomfortable for the physician to look at the camera rather than the screen. Therefore, it is also important to examine the perceptions and experiences of the person who is simulating the eye contact by looking at the camera.

Finally, in this work we consider that the physician's interpersonal and communication skills can be viewed as a proxy for patient-physician communication quality. Future work can go beyond examining the physician's perceived interpersonal and communication skills and look into the effect of eye contact on the overall quality of the virtual patient-physician communication and relationship. To enable such studies on a large scale, validated computational ethnography tools that could automatically and accurately detect verbal and non-verbal behaviors [9; 24] could prove useful.

Conclusion

We examined the effect of the physician's gaze direction during video consultations on their communication skills ratings. Our results showed that when physicians look straight at the camera, they are perceived as making more eye contact with their patient. In addition, they are rated higher on their use of empathy to communicate appreciation of the patient's feelings, and on providing support by expressing concern, understanding, and willingness to help. These results seem to depend on the content of the encounter and the general attitude of the physician —the effect of eye contact seemed to be more important when the physician's verbal and non-verbal behaviors were generally worse. These results highlight the important role that eye contact plays in video consultations and the dependency of this role on other verbal and non-verbal behaviors. Physicians aiming to improve their communication with their telemedicine patients can increase their eye contact by looking straight at the camera.

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