



Universiteit
Leiden

The Netherlands

Development and implementation of VR-simulated experiences to train communication skills

Hoek, K.

Citation

Hoek, K. (2026, September 4). *Development and implementation of VR-simulated experiences to train communication skills*. Retrieved from <https://hdl.handle.net/1887/4309192>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/4309192>

Note: To cite this publication please use the final published version (if applicable).

Section IV



Communication and Team Culture in the Operating Room

7

NONVERBAL ELEMENTS OF RAPPORT DURING ENDOSCOPIC PROCEDURES – A VIDEO ETHNOGRAPHIC STUDY

ARTICLE INFO

Authors:

Krista Hoek

Monique van Velzen

Hannah van Zweeden

Jurjen J Boonstra

Elise Sarton

Keywords:

rapport,

therapeutic communication,

endoscopy,

video-ethnography,

nonverbal communication

DOI: 10.21203/rs.3.rs-4562058/v1

Submitted

ABSTRACT

Background

Patients undergoing gastrointestinal endoscopy often experience anxiety, physical exposure, and reduced agency, making rapport particularly important in the peri-procedural phase when patients may be unable to speak or move freely. While nonverbal behaviors are known to support rapport in traditional one-to-one consultations, far less is understood about how these behaviors function in the fast-paced, team-based environment of an endoscopy unit. This study examines how healthcare professionals use nonverbal behaviors to build rapport with patients immediately before sedation.

Methods

We conducted a descriptive video-ethnographic study in a tertiary academic endoscopy department. Using ceiling-mounted cameras, we recorded eight elective endoscopic procedures and analyzed the period from patient entry into the room until loss of responsiveness under sedation. Data consisted of synchronized video and audio recordings, fieldnotes, and reflexive memos. A reflexive thematic analysis approach was used to identify patterns of nonverbal behaviors contributing to rapport.

Results

Across the dataset, clinicians demonstrated four clusters of nonverbal behaviors contributing to rapport: eye contact and gaze; comforting physical touch; open or receptive postures; and deliberate positioning relative to patient eye level and proximity. These behaviors were used dynamically in response to patient cues—including anxiety, hesitancy, or physical stillness—and supported moments of attunement between clinicians and patients despite the presence of masks, monitoring equipment, and procedural demands. Although most rapport-related behaviors occurred in dyadic moments, team members also coordinated implicitly through shared positioning and supportive actions.

Conclusions

In the pre-sedation phase of endoscopy, nonverbal behaviors play a central role in establishing rapport, possibly reducing patient anxiety, and enhancing perceived safety. Unlike standard consultation settings, clinicians in endoscopy must adapt their behaviors to patient immobility, limited facial visibility due to masks, and a multi-professional workflow. These findings highlight the need for communication training that addresses nonverbal rapport-building in technical, procedure-driven environments.

KEY MESSAGES

What is already known about this topic:

- Rapport enables effective communication among healthcare providers and patients and is crucial for patient involvement in bowel cancer screening programs.
- Nonverbal elements play an important role in enabling rapport and enhancing patient experience.
- Current knowledge on nonverbal communication for rapport mostly concerns one-to-one interactions and may not be applicable to the endoscopy department.

What this study adds:

- This video ethnographic study was able to identify key elements of periprocedural nonverbal communication techniques within the endoscopy department associated with the creation of rapport.
- The nonverbal elements included eye contact, postural open body positions, physical touch such as a soothing touch and body lean, which were also observed in one-to-one doctor–patient interactions.

How this study might affect research, practice or policy:

- This study identified key elements of periprocedural nonverbal communication techniques within the endoscopy department associated with the establishment of rapport.
- This knowledge may contribute to further development of educational programs with the objective of enhancing communication skills.
- The fit with the literature on rapport making in a one-to-one interaction between healthcare providers and patients supports the transferability of our findings to the environment of the endoscopy department.

INTRODUCTION

Modern medicine is constructed, among other things, on the groundwork of Cartesian body-mind dualism, implying a distinction of what takes place in the mind juxtaposed to what happens in the body (1). Dualism still dominates biomedical analytical methods and lays the groundwork for positivism, which means a logical thought based upon unbiased, impersonal and empirical observations and measurements (2). Healing by technological interventions became the gold standard, and randomized controlled trials (RCTs) were judged as the only legitimate means of measuring their effectiveness (3-5).

Currently, our understanding of human beings and their health has changed toward the consideration of complex systems in permanent interactions with the environment. The clinical setting, the cognitive-affective communication of clinicians and the rituals used to administer treatments influence the clinical outcome of patients (6). In general, the benefits of effective physician–patient communication are clear, and most healthcare professionals acknowledge the importance of improving patient–physician relationships (7, 8). Contextual factors encompass the combination of different psychological, social and physical elements characterizing a therapeutic encounter and influencing the lived experience of a patient (6, 9-11). A negative therapeutic context involving negative sensory and social stimuli may negatively affect patient-reported outcomes such as patient satisfaction. There is empirical evidence that contextual factors, such as pain and anxiety, impact clinical outcomes and influence the use of analgesic and anxiolytic medication (9-11).

In particular, during endoscopy, patients may feel in an inferior position, emphasizing the importance of effective communication skills among endoscopy staff (12). This experience of feeling inferior or exposed has also been described in recent qualitative work, underscoring that comfort, vulnerability and communication are tightly linked in endoscopic care.

Rapport is the close and meaningful relationship between people; an understanding of one other point of view implicates verbal and nonverbal involvement (17, 18). The use of elements of therapeutic communication can increase patients' knowledge and understanding, enhance trust and self-health skills, increase adherence, provide comfort and facilitate the management of emotions that are key to patients' health and wellbeing (16, 19). Rapport seems to be highly relevant for patients in more stressful clinical contexts, such as gastrointestinal endoscopies (20). Endoscopy is therefore an appropriate setting for examining nonverbal behaviors that contribute to rapport, particularly because patients may not be able to rely on their own nonverbal cues once positioned for the procedure.

Colorectal cancer is the third most common cancer worldwide, and its prognosis relies heavily on early diagnosis (21). Early detection, by colonoscopy, holds significant societal importance. Patient experience is a critical factor in determining patient involvement in bowel cancer screening programs and has an impact on whether patients choose to attend repeat disease surveillance procedures (22). More broadly, patient experience before sedation is a determinant of perceived safety and willingness to return for future procedures, underscoring the importance of rapport-building behaviors.

Although extended literature exists on the nonverbal elements of the creation of rapport in healthcare providers and patient interactions, this research generally focuses on communication in a one-on-one interaction during a medical interview or in an examination room (23-30). Far fewer studies have examined how rapport is built nonverbally in dynamic, procedure-driven environments involving multiple clinicians and limited patient agency.

The aim of the current study was to analyze the nonverbal elements used to create rapport by healthcare providers working at the endoscopy department.

For this purpose, we recorded video footage from healthcare providers interacting with patients undergoing elective endoscopy under sedation. An overarching study sought to investigate the effects of training in therapeutic language and communication among healthcare providers and patients. However, the present analysis is descriptive only and does not examine training-related effects.

The research question was as follows: Which nonverbal communication techniques are used by healthcare providers to create rapport in the perioperative setting of an endoscopy department?

Our secondary research question was as follows: How do the nonverbal behaviors we observed compare with what is already known from one-to-one rapport-building literature?

METHODS

This research was carried out at Leiden University Medical Center (LUMC), a large tertiary academic teaching hospital situated in Leiden, the Netherlands. The protocol was approved by the Institutional Science Committee, which received a waiver to be performed by the Institutional Review Ethics Committee (METC Leiden the Hague Delft, Leiden, the Netherlands) and adhered to GCP regulations. Written informed consent was obtained from all participants. Participants received no financial compensation. The data were collected and recorded between May 2021 and June 2022. Recordings started when the patient entered the operating room and were analyzed until the sedation practitioner started deep sedation. Because the focus of this study was explicitly on the pre-sedation phase, no data were collected after patients became unresponsive.

Study design

The present exploratory research used an ethnographic phenomenological approach. Ethnographic research can provide insight into the behaviors, thoughts, behaviors, norms and feelings of a group (31). Video ethnography of healthcare providers interacting with patients undergoing an endoscopic procedure (gastro- or colonoscopy) was used to study patterns of behavior, insiders' perspectives, (nonverbal) communication, and actions in a natural setting over a period of time (32). The researchers (HZ, KH) immersed themselves in the research population for an extended period of time, observing behavior, and making field notes while interacting minimally with the healthcare providers, adapting a go-along ethnographic approach (33). The researchers were nondirective and naturalistic; they did not express preferences, stepped back from action, and attempted not to interfere with regular care. Following the data collection, a reflexive thematic analysis was performed to convert the range of retrieved data into reliable units. The data were retrieved without sampling size and pursuing data saturation; that is, until the researchers were empirically confident, additional data would not lead to any new emergent input (34, 35).

Participants and consent

The study included sedation practitioners, endoscopists, nurses and patients. Hospital staff were recruited via e-mail or informal medical gatherings from the endoscopy department. At these gatherings, healthcare providers were informed about the research project with the aim of recruiting as many healthcare providers as possible. Initially, they were informed that videos were taken to analyze anxiety among patients, without specifying that the videos would also be useful for analyzing the behavior of healthcare providers.

All participants first signed an informed consent form. This approach was taken to minimize any potential changes in behavior among healthcare providers and was approved by the institutional review board. Halfway through the study, all healthcare providers were fully informed about the research questions and therapeutic communication training. They then signed a second consent form, reaffirming their agreement to participate in the study. Staged disclosure was used only to reduce Hawthorne effects; all participants ultimately received full information before the study period ended.

Patients were recruited via telephone or e-mail. All recruited subjects agreed to participate, and all enrolled patients signed an informed consent form. The participants were informed of all the research questions and objectives of the study from the start of the study. Only the period before deep sedation was analyzed; patients remained responsive during the entire analytical window.

At the start of each day, the researcher ensured that all healthcare providers had signed the informed consent forms or would ask the healthcare provider to do so if they had not previously consented. Failure to secure consent would result in the cancellation of recording and study participation for that day; the latter never occurred.

Video ethnography and reflexivity

The preparation of the data collection involved checking the video equipment and environment. The existing camera of the endoscopy room was chosen for pragmatic reasons. These cameras, situated at the ceiling, were able to film the whole endoscopy room from a large angle. Additionally, a camcorder would have made a 'Fly on the Wall' approach more challenging (36), as it is far more visible for all participants.

The researchers (KH, HZ) did not work in the perioperative department and used a transcendental approach, putting aside their own knowledge and theories during the retrieval of qualitative data (37). The transcendental approach, largely developed by Husserl, is a philosophical approach to qualitative research methodology seeking to understand human experiences (38); "description is to be performed from a first person point of view, to ensure that the respective item is described exactly as is experienced, or as intended, by the subject" (39). In this regard, promptly, researchers prepare any reflexive notes. Additionally, all the researchers kept fieldnotes and regularly discussed their experiences within the research team.

Video data allowed repeated viewing, enabling deeper visual analysis of nonverbal behaviors including gaze, positioning, posture, and touch, which could not be captured through audio transcription alone.

Data analysis

Qualitative content analysis was used to reveal themes and categories using ATLAS.ti software. The validation criteria of qualitative research, such as generalizability, reliability, and verifiability, were used (35). The data were transcribed verbatim, and identifiers were removed to preserve the confidentiality of the transcripts. All the data were kept in password-protected files with limited access to protected hospital network drives. Transcription included all audible speech; however, video served as the primary data source, particularly for encoding gaze, posture, body positioning, and physical touch. Nonverbal behaviors were coded directly from video, not inferred from transcripts.

The data were analyzed using an applied thematic analysis with an inductive process based on the six phases of thematic analysis outlined by Braun and Clarke (40): data familiarization, code generation, theme development, theme revision, theme definition and report production (40). A codebook was developed as themes emerged by two coders independently (KH and HZ) before they were discussed together until consensus was reached. The analysis continued with the clustering of codes into emergent categories and then structuring and grouping into overarching themes. The final validation of the codes against the data extracts was completed by the researchers (KH, ES) to ensure consistent representation of the categories and themes of the entire dataset, ensuring data generalizability. The overarching study also used other types of data that will not be described in this article.

RESULTS

Sample characteristics

The analyzed video tapes included sedation practitioners, endoscopists, nurses and patients. The demographic data of the healthcare providers before and after the training were comparable. Most healthcare providers were female and worked in the endoscopy department as endoscopy nurses. The details are shown in **Table 1**. All the patients had previously undergone an endoscopy; the majority were female, with mean ages of 65 (female) and 45 (male) years, as shown in **Table 2**.

The total taping time ranged between 15 minutes and 5 hours, for a total of almost 16 hours. Analyses were performed from the moment the patients entered the endoscopy room until sedation started and the patient did not respond to the cues.

Table 1. Demographics of healthcare providers

	Before (4 cases)	After (4 cases)
Nurse/Endoscopists/Sedation Practitioner	9/4/4	8/3/4
Male/Female	3/14	5/10

Table 2. Patient demographics

	Before (4 cases)	After 4 cases)
Sex (female)	100%	50%
Age (range)	45 (34 - 64)	65 (56 - 76)
Colonoscopy/Gastroscopy/Both	2/1/1	4/0/0
Previous endoscopy	4	4

Reflexivity

Before the commencement of the study, the researchers performed fieldwork by walking alongside the endoscopy nurses, sedation practitioners, and endoscopists to be able to blend in with the team. Additionally, this approach created a more naturalistic posture for the researchers, as shown in the fieldnote below:

Fieldnote 1 August 2021, HZ
“At first, I did not know the significance of all the monitoring present, nor did I know where to stand at some moments of the procedure.”

Along the way, the researchers (KH, HZ) considered themselves more and more as ‘Insiders’ as the fieldnote below states:

Fieldnote 2 July 2021, KH
“I had a good day today. I can see the team knows who I am now, and what the purposes are of the study. It makes me feel more relaxed, as they seem to think of me, more like a member of the team.”

Themes and subthemes

The analyses resulted in the identification of 4 major themes divided into 9 subthemes, as shown in **Table 3, Figure 1, and Figure 2**. The nonverbal techniques and gestures used to create rapport in our study included facial expressions, physical touch, postural changes, and body position. We decided to analyze the data before and after the implementation of TLC training to obtain a wider sample. We observed signs of the presence of rapport

and a lack of rapport in both cohorts; however, for the purpose of this study, we did not compare the two cohorts.

Each theme reflects observable, repeated patterns of behavior representing interactional processes in which clinicians actively responded to patient cues. Themes were therefore defined by their *relational function* rather than by the isolated behavior alone.

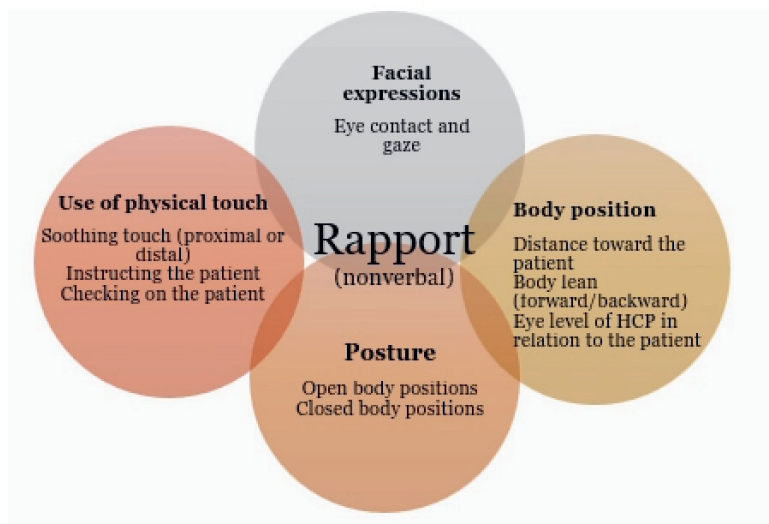


Figure 1.1. Themes and subthemes in a Venn diagram



Figure 1.2. Word cloud of themes and subthemes according to their appearance and importance throughout the dataset.

Table 3. Themes and subthemes in making rapport

1.Facial expressions	1.1Eye contact and 1.2 Gaze
2.Use of physical touch	2.1 Soothing touch 2.1.1 proximal 2.1.2. distal 2.2 Instructing the patient 2.3 Checking on the patient
3.Posture	3.1 Open body positions 3.2 Closed body positions
4.Body position	4.1 Distance toward the patient 4.2 Body lean (forward/backward) 4.3 Eye level of HCP in relation to the patient

3.4 Facial expressions

Eye contact is defined as the extent to which a healthcare provider investigates the patient’s face and can be critical for enhancing rapport (23). The eye contact in the video recordings varied from ‘brief’ eye contact episodes from a few seconds to ‘sustained’ eye contact from almost a whole minute, where a healthcare provider is constantly following the patient’s facial expressions and movements. Two examples of differences in eye contact are presented below:

Example 1 – ‘brief’ eye contact (video 8, SPS 5, patient 8)
Arriving at the OR the patient lays in the hospital bed with the head end up, facing the sedation practitioner who is reviewing the patient’s chart at the opposite end of the hospital bed. As the patient begins to tell the sedation practitioner their story of a previous bad experience of the last hospital visit, the sedation practitioner is seen walking across the OR looking for something, not looking toward the patient who continues the story. The patient is expressing their feelings of anxiety and narrating things that could go wrong during the procedure. While the sedation practitioner is preparing, occasionally looking directly at the patient, their responses consist of “yeah?” and “hmm okay” or sometimes even saying nothing at all.

Example 2– ‘sustained’ eye contact (video 4, doctor 4, patient 4)
Arriving at the OR, the patient lays in the hospital bed with the head end up, facing the doctor, nurse, and sedation practitioner. The doctor walks toward the patient, greets the patient, proceeds to ask several safety questions, moves to the right side of the patient to face the patient at a comfortable distance, makes eye contact with the patient and listens attentively by nodding the head up and down. The patient begins to express their feelings of anxiety and says they are not feeling very well. The doctor verbalizes they are in good hands. Furthermore, the doctor steps one step closer toward the patient, bends their upper body a little toward the patient and touches shortly the

arm of the patient, while making directly eye contact. The interaction continues with doctor 'looking' and 'listening' to patient; and the patient 'looking' and 'talking' to the doctor.

In our data, sustained eye contact appeared to function as a signal of availability and attentiveness, helping patients feel seen and acknowledged. In contrast, brief or absent eye contact often coincided with patient narratives that remained unsupported or unreciprocated, reducing the likelihood of rapport formation.

Physical touch

The use of physical touch varied from checking the patient to instructing the patient and soothing the patient. Checking the patient was mostly used to determine whether the patient was still responsive after the start of deep sedation. We defined 'instructing the patient' as every touch that functions as an instruction or guidance. Finally, soothing was defined as a touch not used for the abovementioned purposes, with the purpose of soothing, of enhancing patient comfort.

All the videos were checked on the patient, and the patient was instructed about the patient during the initial phase of the start of deep sedation, as described previously **Figure 3**.

Soothing touches were often seen as a reaction to the behavior of the patient. For example, in **Figure 3**, the patient was seen fumbling with her fingers. This was followed by a physical palpation by the endoscopist.

Soothing touch functioned as a bidirectional regulatory cue, often used when patients displayed visible anxiety or bodily tension.



Figure 2. Examples of nonverbal elements of rapport

Posture

The observed postural behaviors included opening and closing the body. Body openness was defined as the absence of folded arms or crossed leg positions (41), also seen in **Figure 3**.

The closed body positions included the folded arms shown in **Figure 3**. Additionally, frequent akimbo positioning of the arms was observed, with hands on the hips and elbows turning outward, as shown in **Figure 3**.

Open postures tended to occur during greeting, reassurance, or explanation and aligned with moments in which patients appeared more verbally engaged. Closed or akimbo postures often coincided with task-focused behavior and reduced relational attunement. While not inherently negative, these postures appeared to limit opportunities for rapport.



Figure 3. Examples of nonverbal elements of rapport

Body position

Body position was used differently throughout the observation period. The physical distance toward the patient was often reduced at moments when patients expressed signs of anxiety, as in the example of **Figure 2** where the endoscopist positioned themselves closer to the patient who was fidgeting her fingers. Often, healthcare professionals use a forward body lean toward the patient.

Finally, healthcare providers positioned themselves differently in relation to the eye level of the patients. As the patients laid on the operating table, they were placed in a standard operational position. However, in 6 out of the 8 videos, healthcare providers kneel down to reach the same eye level as the patient (**Figure 3**).

Body positioning often involves **sequential coordination**. When one clinician leaned forward or lowered themselves to the patient's level, others tended to pause their activity or adjust their position to avoid crowding the patient. These micro-adjustments suggest that rapport-building in endoscopy emerges not solely from one-to-one interaction but from a collective.

DISCUSSION AND CONCLUSION

Discussion

This video ethnographic study was able to identify key elements of periprocedural nonverbal communication techniques within the endoscopy department that are associated with the creation of rapport (18, 23-28). To our knowledge, this is the first study to examine nonverbal communication techniques in a periprocedural setting, such as in the endoscopy department.

Eye contact in the video recordings varied from brief eye contact episodes from a few seconds to sustained eye contact from almost a whole minute, during which a healthcare provider constantly followed the patient's facial expressions and movements. The importance of eye contact has been described by Gorawa as critical for enhancing rapport (23). It serves as a salient factor in therapeutic communication improving adherence.

The use of physical touch was also observed as a frequent tool used by healthcare providers, varying between checking the depth of sedation, instructing the patient and touching for a soothing purpose. Touch can be perceived as comforting and healing (27) and is often performed by healthcare providers when a patient shows signs of anxiety or pain.

Posture analysis revealed the use of open and closed body positions. Open body positions commonly indicate and facilitate rapport and empathy. In contrast, closed body positions such as the use of arms in the akimbo position have been described as imperious, cold and immodest, hindering the creation of rapport (26). Last, body positioning, such as leaning forward, is often perceived as more empathic (24). Looking down on a patient can be intimidating; frequently sitting down or kneeling down may be used to enhance connection (25).

Findings from our data confirm the literature on nonverbal elements for the creation of rapport in wider medical settings, such as one-to-one interactions between a doctor and a patient (23, 24, 42, 43).

Classic one-to-one doctor-patient communication commonly involves two people interacting with each other without a facemask. This leads to more elaborate distinctions in facial expressions. In our study, due to sterility issues during endoscopic procedures, the facial expressions of healthcare providers were partly invisible due to the use of face masks, limiting analysis to eye contact and gaze only in our study.

We clarify that the nonverbal behaviors identified did not function as isolated techniques but formed interactional sequences aimed at supporting patient comfort. For example, clinicians frequently combined eye contact, forward lean, and brief soothing touch when

patients expressed anxiety, suggesting that rapport-building is a multi-modal process rather than a single behaviour.

Additionally, although the results appeared primarily dyadic, several episodes demonstrated that rapport in endoscopy is influenced by **team choreography**. When one clinician leaned forward to reassure a patient, others often paused, stepped back, or adjusted positioning to avoid crowding the patient. These subtle coordinated behaviours indicate that rapport-building is embedded in team flow rather than individual performance.

While eye contact, open posture, touch, and proximity are widely described in general medical communication, the context of endoscopy amplifies their importance: patients lie supine, may already feel physically exposed, and have limited capacity to use their own posture or movement as communicative tools. Thus, clinicians' nonverbal responsiveness may serve as a compensatory relational mechanism in a setting where the patient's expressive freedom is constrained.

That said, achieving matching positioning and body postures naturally seems to be more challenging, given that the patient is lying down on the operating table while healthcare providers need to be in an upright position to perform the endoscopic procedure and provide sedation. Interestingly, as often observed in these videos, healthcare providers tend to mirror and adapt their body positions when they deem this necessary for their connection with the patient.

Moreover, given that many endoscopy units—especially in Northern Europe—perform procedures without sedation, we acknowledge that our findings reflect a subset of endoscopy practice. In unsedated contexts, patient facial expression and body movement would likely be more observable, and rapport-building dynamics may differ. Therefore, transferability applies primarily to sedated or pre-sedation endoscopy sequences.

Notably, complex interactions and continuous processes exist between healthcare providers and patients. Crucial components of nonverbal communication, such as eye contact, body posture and position and the use of physical touch, may be interpreted differently among patients depending on contextual factors such as cultural background, sex, and age. For example, acceptance of comforting touch depends on the location of the touch, familiarity with healthcare providers and sex (27). Eye contact and gaze are interpreted differently between Western and Arabic or Asian cultures (28).

Two researchers were present during the data collection, adapting go-along ethnography (33), a choice of a transcendental approach during the data analysis based on the epistemological assumptions of the Husserlian approach, thus enhancing the internal validity of our findings. The data on which this study is based involved several months of

fieldwork, carried out by the researchers, using a video ethnographic method. Video footage enhanced our research, as the data could be observed repeatedly, at greater depths, providing new insights (44). Employing thematic analysis of the qualitative data permitted identification, analysis and reporting of patterns within the dataset, facilitating the creation of a rich description of the subject matter. Following the standards of qualitative research, validation criteria, such as generalizability, reliability, and verifiability, were used (35).

Nonetheless, video analysis is susceptible to social desirability bias. At first, healthcare professionals may adapt their behavior knowing that they are filmed (Hawthorne effect). Nonetheless, as time passes, people tend to return to natural behavior (45). Video ethnography is a discrete and nondirective technique for recording naturalistic everyday behavior in clinical settings. It is useful to obtain firsthand insights into how healthcare professionals account for patient comfort in ways other methods may not detect. It has ecological validity, that is, it has a predictive relationship with behavior in a real-world setting (46).

Conclusion

This paper provides a thorough description of the nonverbal techniques employed to create rapport. Observations included facial expressions, postural changes, physical touch and body positioning. The fit with the literature on rapport making in a one-to-one interaction between healthcare providers and patients supports the transferability of our findings to the environment of the endoscopy department.

In conclusion, providing comfort and facilitating the management of emotions are key to patients' well-being, and the findings of this study may contribute to further research and programs with the objective of enhancing the therapeutic language and communication skills of healthcare providers in a broader setting.

To increase conceptual coherence, we clarify here that our conclusions pertain specifically to **nonverbal behaviors contributing to rapport**, rather than to therapeutic language more broadly. Our findings highlight how clinicians working in highly technical procedural environments can rely on subtle nonverbal behaviors to enhance patient comfort and relational safety, particularly in the vulnerable pre-sedation phase.

Future directions

Our findings indicate the potential transferability of nonverbal rapport elements observed between the classical consultation context and the endoscopy department. However, our study did not quantify these elements, presenting an intriguing opportunity for future investigation using an objective coding scheme to systematically classify and measure these nuances.

Second, the video cameras were not positioned close enough to capture or encode microexpressions on the faces of the participants. Additionally, the study of microexpressions requires coders to have professional knowledge of action unit coding (47), which might be an interesting field of future research in this context.

Additionally, the incorporation of video-reflective ethnography represents a promising avenue for future exploration. Utilizing this technique in the perioperative setting, such as in the endoscopy department, could offer a more comprehensive and nuanced understanding of rapport dynamics, providing valuable insights into the intricacies of these interactions.

Future studies should also examine unsedated endoscopy populations, where patients' own nonverbal behaviors may be more accessible, allowing a fuller analysis of interactional reciprocity. Comparative research across sedated and unsedated settings would help refine understanding of context-dependent rapport-building practices.

Declarations

Ethics approval and consent to participate and publication

The protocol was approved by the Institutional Science Committee, which received a waiver to be performed by the Institutional Review Ethics Committee (METC Leiden the Hague Delft, Leiden, the Netherlands) and adhered to GCP regulations. Written informed consent was obtained from all participants.

Data availability

The datasets used during and/or analyzed during the current study are available from the corresponding author upon reasonable request. Video footage and original audio files are unavailable due to privacy restrictions.

Competing interests

The authors declare no competing interests.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. We have no competing interests to declare.

Contributions

KH had the original idea for the study. She wrote the original draft, methodology and final article. ES and MvV contributed to the conceptualization. HZ and KH contributed to the data collection. HZ and KH transcribed and analyzed the data. ES and JB contributed to

supervision and editing of the manuscript. All the authors have read and approved the final manuscript.

Acknowledgements

The researchers would like to acknowledge the healthcare professionals and patients who participated in this research. We thank you for their time and effort in contributing to this research project. The medical work environment and implicit rationing of care were respected during this study.

Authors' information

K. Hoek, MD, PhD candidate at the Anesthesiology Department of the Leiden University Medical Center and anesthesiologist. Her research focuses on the educational challenges of acquiring communication skills among healthcare providers.

H. van Zweeden was a trainee in applied psychology at the time of this study.

M. van Velzen, MD, PhD, is an educationalist, clinical research coordinator, and assistant professor at the Department of Anesthesiology of the Leiden University Medical Center.

J.J. Boonstra, is a senior medical specialist in endoscopy .

E. Sarton, MD, PhD, is the Head Department of Anesthesia and Head Board Division at the Leiden University Medical Center. She was the former director of Education Master Medical School and former chair of the Dutch Society of Anesthesia. Her research has evolved around education in medical training.

Consent to Publication

All patients and healthcare providers who participated during this study were informed and consented study participation and publication. Persons identifiable in the Figures have been informed and signed a consent for publication form after reading the manuscript.

REFERENCES

1. Switankowsky I. Dualism and its importance for medicine. *Theor Med Bioeth.* 2000;21(6):567-80.
2. Mehta N. Mind-body Dualism: A critique from a Health Perspective. *Mens Sana Monogr.* 2011;9(1):202-9.
3. Kaptchuk TJ. Powerful placebo: the dark side of the randomized controlled trial. *Lancet.* 1998;351(9117):1722-5.
4. Di Blasi Z, Kleijnen J. Context effects. Powerful therapies or methodological bias? *Eval Health Prof.* 2003;26(2):166-79.
5. Deaton A, Cartwright N. Understanding and misunderstanding randomized controlled trials. *Social Science & Medicine.* 2018;210:2-21.
6. Di Blasi Z, Harkness E, Ernst E, Georgiou A, Kleijnen J. Influence of context effects on health outcomes: a systematic review. *Lancet.* 2001;357(9258):757-62.
7. Klitzman R. Improving education on doctor-patient relationships and communication: lessons from doctors who become patients. *Acad Med.* 2006;81(5):447-53.
8. Lin LY, Wang RH. Abdominal surgery, pain and anxiety: preoperative nursing intervention. *J Adv Nurs.* 2005;51(3):252-60.
9. Dutt-Gupta J, Bown T, Cyna AM. Effect of communication on pain during intravenous cannulation: a randomized controlled trial. *Br J Anaesth.* 2007;99(6):871-5.
10. Richter M, Schroeter C, Puensch T, Straube T, Hecht H, Ritter A, et al. Pain-related and negative semantic priming enhances perceived pain intensity. *Pain Res Manag.* 2014;19(2):69-74.
11. Lang EV, Hatsiopoulou O, Koch T, Berbaum K, Lutgendorf S, Kettenmann E, et al. Can words hurt? Patient-provider interactions during invasive procedures. *Pain.* 2005;114(1-2):303-9.
12. Dubois H, Creutzfeldt J, Törnqvist M, Bergenmar M. Patient participation in gastrointestinal endoscopy - From patients' perspectives. *Health Expect.* 2020;23(4):893-903.
13. Lang E. Comfort Talk®: From the Waiting Room to the Treatment Suite. *Dtsch Z Zahnarztl Hypn.* 2019;25(1):22-4.
14. Hoek KB. Patient-embodied virtual reality as a learning tool for therapeutic communication skills among anaesthesiologists: A phenomenological study. *Patient Education and Counseling.* 2023;114.
15. Koyama T. Effective doctor-patient interaction and communication: psychiatric point of view. *Hokkaido Igaku Zasshi.* 1994;69(5):1081-5.
16. Street RL, Jr., Makoul G, Arora NK, Epstein RM. How does communication heal? Pathways linking clinician-patient communication to health outcomes. *Patient Educ Couns.* 2009;74(3):295-301.
17. English W, Gott M, Robinson J. The meaning of rapport for patients, families, and healthcare professionals: A scoping review. *Patient Educ Couns.* 2022;105(1):2-14.
18. Leach MJ. Rapport: a key to treatment success. *Complement Ther Clin Pract.* 2005;11(4):262-5.
19. Ranjan P, Kumari A, Chakrawarty A. How can Doctors Improve their Communication Skills? *J Clin Diagn Res.* 2015;9(3):Je01-4.
20. Yang C, Sriranjana V, Abou-Setta AM, Poluha W, Walker JR, Singh H. Anxiety Associated with Colonoscopy and Flexible Sigmoidoscopy: A Systematic Review. *Am J Gastroenterol.* 2018;113(12):1810-8.
21. WHO. Colorectal cancer 2023 [Available from: <https://www.who.int/news-room/fact-sheets/detail/colorectal-cancer>].

22. Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ Open*. 2013;3(1):e001570.
23. Gorawara-Bhat R, Cook MA. Eye contact in patient-centered communication. *Patient Educ Couns*. 2011;82(3):442-7.
24. Haase RF, Tepper DT. Nonverbal components of empathic communication. *Journal of Counseling Psychology*. 1972;19(5):417-24.
25. Koutoukidis GS, K. Tabbner's Nursing Care: Theory and Practice. 8 ed: Churchill Livingstone Australia; 2008 november 3, 2020.
26. Kraft-Todd GT, Reinero DA, Kelley JM, Heberlein AS, Baer L, Riess H. Empathic nonverbal behavior increases ratings of both warmth and competence in a medical context. *PLoS One*. 2017;12(5):e0177758.
27. Osmun WE, Brown JB, Stewart M, Graham S. Patients' attitudes to comforting touch in family practice. *Can Fam Physician*. 2000;46:2411-6.
28. Uono S, Hietanen JK. Eye contact perception in the West and East: a cross-cultural study. *PLoS One*. 2015;10(2):e0118094.
29. Ruben MA, Blanch-Hartigan D, Hall JA. Communication Skills to Engage Patients in Treatment. *The Wiley Handbook of Healthcare Treatment Engagement* 2020. p. 274-96.
30. Peck BM, Conner S. Talking with Me or Talking at Me? The Impact of Status Characteristics on Doctor-Patient Interaction. *Sociological Perspectives*. 2011;54(4):547-67.
31. Strudwick RM. Ethnographic research in healthcare - patients and service users as participants. *Disabil Rehabil*. 2021;43(22):3271-5.
32. Reeves S, Kuper A, Hodges BD. Qualitative research methodologies: ethnography. *Bmj*. 2008;337:a1020.
33. Kusenbach M. The Go-Along as Ethnographic Research Tool. *Ethnography*. 2003;4(3):455-85.
34. Birks MM, J. Grounded Theory: a practical guide. London, UK Sage Publications 2015.
35. Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant*. 2018;52(4):1893-907.
36. Rietmeijer CBT, Deves M, van Esch SCM, van der Horst HE, Blankenstein AH, Veen M, et al. A phenomenological investigation of patients' experiences during direct observation in residency: busting the myth of the fly on the wall. *Adv Health Sci Educ Theory Pract*. 2021;26(4):1191-206.
37. Langdridge D. Phenomenological Psychology: Theory, Research and Method. Harlow, UK: Pearson Education; 2007.
38. Moustakas C. Phenomenological research methods. Thousand Oaks, California 1994. Available from: <https://methods.sagepub.com/book/phenomenological-research-methods>.
39. Given L. Constructivism. *The SAGE Encyclopedia of Qualitative Research Methods*. 2008;0:116-20.
40. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77-101.
41. Park SG, Park KH. Correlation between nonverbal communication and objective structured clinical examination score in medical students. *Korean J Med Educ*. 2018;30(3):199-208.
42. Barnett PB. Rapport and the hospitalist. *Am J Med*. 2001;111(9b):31s-5s.
43. Roter DL, Frankel RM, Hall JA, Sluyter D. The expression of emotion through nonverbal behavior in medical visits. *Journal of General Internal Medicine*. 2006;21(1):28-34.
44. Luff P, Heath C. Some 'technical challenges' of video analysis: Social actions, objects, material realities and the problems of perspective. *Qualitative Research*. 2012;12:255-79.

45. Bajkiewicz TE. Book Review: Video ethnography in practice: Planning, shooting and editing for social analysis. *Electronic News*. 2017;11(3):187-9.
46. Chaytor N, Schmitter-Edgecombe M. The ecological validity of neuropsychological tests: a review of the literature on everyday cognitive skills. *Neuropsychol Rev*. 2003;13(4):181-97.
47. Dong Z, Wang G, Lu S, Li J, Yan W, Wang SJ. Spontaneous Facial Expressions and Micro-expressions Coding: From Brain to Face. *Front Psychol*. 2021;12:784834.