

# Caring and Dominance Affect Participants' Perceptions and Behaviors During a Virtual Medical Visit

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**BACKGROUND:** Physician communication style affects patients' perceptions and behaviors. Two aspects of physician communication style, caring and dominance, are often related in that a high caring physician is usually not dominant and vice versa.

**OBJECTIVE:** This research was aimed at testing the sole or joint impact of physician caring and physician dominance on participant perceptions and behavior during the medical visit.

**PARTICIPANTS AND DESIGN:** In an experimental design, analog patients (APs) (167 university students) interacted with a computer-generated virtual physician on a computer screen. Participants were randomly assigned to 1 of 4 experimental conditions (physician communication style: high dominance and low caring, high dominance and high caring, low dominance and low caring, or low dominance and high caring). The APs' verbal and nonverbal behavior during the visit as well as their perception of the virtual physician were assessed.

**RESULTS:** Analog patients were able to distinguish dominance and caring dimensions of the virtual physician's communication. Moreover, APs provided less medical information, spoke less, and agreed more when interacting with a high-dominant compared to a low-dominant physician. They also talked more about emotions and were quicker in taking their turn to speak when interacting with a high-caring compared to a low-caring physician.

**CONCLUSIONS:** Dominant and caring physicians elicit different emotional and behavioral responses from APs. Physician dominance reduces patient engagement in the medical dialog and produces submissiveness, whereas physician caring increases patient emotionality.

**KEY WORDS:** physician-patient communication; virtual medical visit; dominance; nonverbal communication.

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## INTRODUCTION

The way a physician communicates with his/her patient has been shown to affect patient satisfaction, utilization, doctor shopping, preventive practices, adherence with physicians' advice and recommendations, information recall, and health outcomes.<sup>1-4</sup> Two aspects of physician communication style, caring and dominance, have been of particular interest to many investigators.<sup>5-7</sup> Dominance is generally understood as having control over another. In the doctor-patient relationship, dominance encompasses control over such resources as information and services, visit agenda, goals, and treatment decisions.<sup>3,8,9</sup> Dominant physician communication is characterized by asking closed- as opposed to open-ended questions, failing to check for patient understanding, stressing the physician's decision-making power, and privileged access to medical knowledge.<sup>9,10</sup>

Caring or emotional responsiveness in physician communication, defined as responding to patient emotions by establishing interpersonal rapport and demonstrating empathy, has also long attracted the attention of researchers and clinicians<sup>11-14</sup> and has been linked to a wide array of positive outcomes, including higher patient satisfaction, more appropriate utilization and adherence, and better health.<sup>9,15</sup>

Low dominance and high caring are core aspects of the patient-centered care concept.<sup>6</sup> Also, Krupat and colleagues<sup>5</sup> distinguish between caring and sharing. Sharing (of information and power) is the opposite of dominance. In the same vein, Buller and Buller identified 2 aspects of physician communication style that are related to patient satisfaction: affiliation (positive) and control (negative).<sup>7</sup> Those correspond to caring and dominance, which are important because they have both been related to patient outcomes, most importantly to patient satisfaction. Patients are less satisfied with a dominant than with a nondominant physician.<sup>7,16</sup> Patient satisfaction was higher when the physician used a participatory communication style<sup>17</sup> and asked more psychosocial questions instead of biomedical questions.<sup>18</sup> To summarize, physicians' caring tends to be positively and dominance to be negatively related to patient satisfaction.

Highly dominant physicians are perceived by patients as being less caring and vice versa.<sup>5</sup> For this reason, it has been impossible to explore the independent contribution of caring and dominance to patient outcomes in natural settings. We used an experimental design to manipulate caring and dominance in the physician's communication style independently of each other and to test their sole or joint influence on patient outcomes in a simulated scenario. Most of the existing research in the physician-patient communication field is correlational and thus fails to provide information about causal

relations.<sup>19</sup> For effective physician communication training, it is important to know whether it is dominance or the lack of caring that is responsible for patient outcomes.

In the present study, we used virtual reality technology to further explore these issues. In the virtual medical visit paradigm, the participant takes on the role of a patient who “interacts” with a virtual physician—a computer-generated representation of a real human. As a result, the social interaction partner is completely standardized (high experimental control). At the same time, virtual reality technology provides higher ecological validity than most laboratory experiments because the virtual environment looks realistic and the participant is involved in an actual interaction.<sup>20</sup> The use of role-playing participants (so-called analog patients) has a long tradition in the study of physician–patient interactions and provides researchers with a proxy for actual patient perception, judgment, and behavior.<sup>21–23</sup>

We predicted that analog patients would be able to distinguish both dominance and caring dimensions of the virtual physician’s communication. Both dominance and caring have been linked to behavioral consequences for interaction partners in non-health-related exchanges. For instance, dominant people talk more than nondominant people<sup>24</sup> and people talk less when conversing with a higher- compared with a lower-status person.<sup>25</sup> Individuals gaze more at their interaction partner when relating to a highly emotional speaker,<sup>26</sup> when they are more fully engaged in an interaction,<sup>27</sup> and when they have greater interest and liking of the interaction partner.<sup>28</sup> Based on these findings, we hypothesized that: (a) the analog patients would talk less when with a high- compared with a low-dominant physician or with a low- compared with a high-caring physician; (b) the analog patients would be quicker to take their turn when speaking (shorter speech latencies) when interacting with a low- compared with a high-dominant physician or with a high- compared with a low-caring physician; (c) the analog patients would gaze and smile more when with a low- compared with a high-dominant physician or with a high- compared with a low-caring physician.

## METHOD

### The Virtual Physician

The virtual physician (VP) is a 3-dimensional digital virtual human controlled by a preset computer algorithm designed to look and act similar to a human being (Fig. 1). The VP moves and speaks in a human-like manner, possesses a human face (rendered from photographs) and talks with a (prerecorded) human voice while moving his/her lips in synchrony. He/she can walk around the 3-dimensional exam room, move his/her body, head, and face, and appears to establish eye contact. Although the face of the VP had movement, his/her expression was neutral with respect to expressed emotion. Regardless of the communication style and gender of the VP, his/her nonverbal behavior and emotional expression were identical.

### Analog Patients

Because the focus of this study was to uncover the causal relations between different types of physician communication and patient outcome, rather than to test which patient vari-



Figure 1. Screenshot of virtual physician.

ables (e.g., age, gender, educational level, health status) affect such relations, we selected a relatively homogeneous group of participants. Participants who agreed to be analog patients (APs) were 167 graduate and undergraduate students (80 males and 87 females, average age 26.5).

### Procedures

The APs were randomly assigned to 1 of 8 experimental conditions in a 2 (high or low-caring) by 2 (high or low-dominant) by 2 (VP gender) between-subjects design. They were briefed about their symptoms. Recurrent headaches were chosen as the primary symptom because headaches are common and most people can readily relate to its symptoms. Headache is also widely recognized as having a psychosocial component, making it plausible to talk about such aspects in the simulation.

The AP sat in front of a computer screen and saw the VP enter a 3-dimensional consultation room. The VP walked up directly in front of the viewer (Fig. 1). The simulation lasted 15 minutes. All APs were videotaped while communicating with the VP. After the simulation, they were asked to answer questions about the VP and to complete a questionnaire.

### Communication with the Virtual Physician

The AP was asked to respond verbally to the VP in accord with instructions provided on a prompt card (e.g., “Your headaches have become more frequent during the past 2 weeks”). APs were encouraged to convey the information in their own words and to add information as they thought appropriate, but were directed not to ask any questions. The prompts referred to a statement the VP just said and were used to ensure that the conversation was meaningful.

### Physician Communication

The authors created 4 scripts (appendix can be viewed online) to reflect the phases and functions of a medical encounter (including greetings, history, patient education and counseling, decision making, and closing) while varying the communication dimensions of caring (high and low) and dominance

(high and low). The amount of information provided by the VP was held constant across the experimental conditions. The scripts were reviewed by 5 physicians (4 general practitioners and 1 headache specialist), and several minor changes were suggested and subsequently incorporated.

The scripts were coded with the Roter Interaction Analysis System, RIAS.<sup>29</sup> The RIAS coding categories of concern, empathy, and reassurance were used as an indicator of *caring*, whereas open questions, asking for opinion, and use of partnership statements were taken as indicators of *low dominance*. The 4 scripts differed from each other in the intended way (Table 1).

### Analog Patients' Verbal Behavior

The content of the APs' conversation with the VP was coded using the RIAS.<sup>29</sup> Not all RIAS codes appeared in the APs' conversations so the analysis was simplified to reflect 3 broad areas of interaction: medical information (e.g., the pain is behind the right eye), emotional statements (e.g., it really frightens me that I am not getting better), and statements of agreement (e.g., Ok, I see what you mean) (reliabilities: mean  $r$ 's between .88 and .98).

### Analog Patients' Nonverbal Behavior

Four nonverbal behaviors were assessed. Speaking time, elapsed time before speaking (speech latency), and gazing were timed (in seconds) with a stopwatch. In addition, smiles were counted. Speaking time was defined as any speech stream greater than 1 word, and it averaged a little more than 3 1/2 minutes over the entire simulation. Speech latency was defined as the time between the end of a VP statement and the beginning of the AP statement ( $M=46$  seconds, prolonged because after the VP's utterance, APs read the prompt cards with the information about what to say next before starting to speak). Gazing was defined as the amount of time the AP spent looking at the VP on the computer screen; this measure averaged almost 2 minutes. Smiles were counted and found to occur on average 4 times over the simulation.

### Perceptions of the Virtual Physician

*Perceived physician caring* was assessed with 6 items (friendly, empathic, interested, respectful, attentive, partnership-oriented) and *perceived physician dominance* with 3 items (dominant, assertive, and intimidating) on a scale from 0 (not at all) to 9 (very much). Item scores were averaged (Cronbach's  $\alpha=0.86$  and  $0.82$ , perceived physician caring and dominance, respectively).

Table 1. RIAS Coding of Scripted Physician Statements

Physician communication style	High caring		Low caring	
	Low dominant	High dominant	Low dominant	High dominant
	RIAS-coded statements			
High-caring	19	19	2	2
Low-dominant	17	2	17	2

Entries are frequencies.

Because the experimental manipulation was directed to test the effect of *how* (and not *what*) the VP communicated, we scripted the conversation to differ only on the dimensions of dominance and caring, not on the content of the information provided by the VP. As a check, APs answered evaluative questions regarding the VPs' *competence* and *information given* (How was the consultation with Doctor Miller? What do you think about Doctor Miller and the way he/she treated you? Is there anything Doctor Miller said you particularly liked or disliked?) directly to the video camera at the end of the simulation. Three raters (blinded to the simulation condition) watched the answers and assessed perceived physician competence (mean  $r=.71$ ) and information given (mean  $r=.80$ ) on a scale from 0 (not at all) to 10 (very).

### Additional Variables

*Presence* described the degree to which the AP was engaged in the virtual world (e.g., "I felt like the physician was really talking to me"). This was assessed by 5 items (Cronbach's  $\alpha=0.67$ ). *Engagement* was defined as the degree to which the AP appeared to have identified with the role of the patient, as assessed by a rater on a 10-point scale after watching the AP videotape (pre-established interrater reliability on a subset of the videotapes of  $r=.70$ ).

Analog patients' age, self-reported health status (on a scale from 1 = very bad to 5 = very good), and self-reported experience with physicians (on a scale from 0 = not much experience to 5 = much experience) were collected.

## RESULTS

As anticipated, simulations scripted to convey high caring were perceived by APs to be more caring than simulation scripts characterized by low caring,  $t(164)=4.65$ ,  $p=.0001$ , effect size  $r=.34$ . Simulations scripted to convey high dominance were perceived as being more dominant than those scripted to convey low dominance,  $t(164)=4.87$ ,  $p=.0001$ , effect size  $r=.36$ .

As noted, the 4 physician communication styles were scripted not to affect perceived competence, information given, presence, and engagement. To test this, a 2 (physician dominance: high vs low)  $\times$  2 (physician caring: high vs low) ANOVA was conducted for each measure separately. Results showed no significant effects for perceived physician competence (all  $F$ 's  $< 1.44$  and all  $p$ 's  $> .23$ ), perceived physician information given (all  $F$ 's  $< 1.72$  and all  $p$ 's  $> .19$ ), presence (all  $F$ 's  $< 2.75$  and all  $p$ 's  $> .10$ ), and engagement (all  $F$ 's  $< 1.65$  and all  $p$ 's  $> .20$ ), suggesting that regardless of simulation condition APs perceived the doctors to be equally competent and that APs were equally "drawn into" the interaction.

For each of the AP's verbal and nonverbal behaviors, a 2 (physician caring: high vs low)  $\times$  2 (physician dominance: high vs low) ANOVA was conducted, including VP gender, AP gender, age, health status, and experience with physicians as covariates (means in Table 2). None of the covariates appreciably affected the results presented here. This means that ANOVAs without controlling for VP gender, AP gender, age, health status, and experience with physicians yielded the same results for the caring and dominance main effects as well as the interaction between caring and dominance. Gender effects from both VPs and APs are described in detail elsewhere<sup>30</sup> and

**Table 2. AP Behavior According to Physician Communication Style**

AP behavior	Physician communication style			
	High-caring		Low-caring	
	Low dominant	High dominant	Low dominant	High dominant
<b>Verbal</b>				
Providing medical information (frequency)	34.74	27.22	32.76	27.99
Emotional statements (frequency)	20.59	17.28	15.35	14.82
Agreement (frequency)	8.87	10.59	8.38	11.04
<b>Nonverbal</b>				
Speaking time (s)	259.54	298.11	218.68	198.02
Speech latency (s)	42.58	40.24	53.51	47.51
Gazing (s)	130.58	114.27	115.70	96.54
Smiling (frequency)	4.37	3.78	4.12	3.84

Entries are means.

AP= analogue patient, s= seconds

we do not discuss them any further because they were not the focus of the present paper.

There was a significant main effect for physician dominance on *medical information*,  $F(1, 151)=12.35$ ,  $p=.001$ , effect size  $r=.27$ , with APs conveying more medical information to the low-rather than to the high-dominant VP (no significant caring main or interaction effect).

Caring showed a main effect on *emotional statements*,  $F(1, 151)=10.05$ ,  $p=.002$ , effect size  $r=.25$ , with APs making more of this type of statements when interacting with a high-compared with a low-caring VP (no significant dominance main or interaction effect). APs *agreed* more with a high- than with a low-dominant VP,  $F(1, 151)=16.98$ ,  $p=.0001$ , effect size  $r=.32$  (no significant caring main or interaction effect).

A significant main effect was found for physician dominance on *speaking time*,  $F(1, 151)=7.90$ ,  $p=.006$ , effect size  $r=.22$ , with APs speaking more when with a low- compared to when with a high-dominant VP (no significant caring main or interaction effect).

Physician caring showed a significant main effect for *time elapsed before speaking*,  $F(1, 151)=4.00$ ,  $p=.047$ , effect size  $r=.16$ , indicating that APs waited longer to start speaking when with a low- compared to when with a high-caring VP (no significant dominance main or interaction effect).

There were no significant main effects or interaction effects for APs' *gazing* or *smiling* (all  $F$ 's < 2.46 and all  $p$ 's > .11). A contrast calculation<sup>29</sup> between what we assume to be the "best" (high-emotional and low-dominant) and the "worst" (low-caring and high-dominant) physician communication style for *gazing* yielded a significant difference,  $t$  contrast (157)=2.22,  $p<.01$ , effect size  $r=.17$ , suggesting that APs gazed more at the high-caring and low-dominant VP than at the low-caring and high-dominant VP.

## DISCUSSION

We addressed how 2 aspects of physician communication style, dominance and caring, affect analog patients' (AP)

judgments and behavior while holding a third aspect, competence and information given, constant. Because physician dominance and caring covary to such a great degree under usual circumstances we used an experimental setting with APs in a standardized medical encounter situation, the virtual medical visit paradigm.

As predicted, APs were sensitive to the simulation manipulations; the virtual physicians (VPs) scripted to convey dominance or caring or both were perceived as such. Moreover, there was no evidence that the APs perceived an informational trade-off with dominance or caring. This finding is of particular note. Physicians need not fear that caring or lowered dominance would be interpreted by patients as a lack of competence or knowledge.

APs responded to higher physician dominance by agreeing more, speaking less during the interaction, and providing less medical information. Their response to physician caring was quite different. In the presence of a more caring physician, APs were quicker to begin talking and made more emotional statements. APs also gazed more at physicians who were scripted to convey the combination of high caring and low dominance. The results are consistent with findings outside of the medical sphere, demonstrating that dominance elicits submission, whereas emotionality creates reciprocity in dyadic social interactions.<sup>31</sup> APs responded to a dominant physician by taking a submissive communication position—talking less and agreeing more, whereas emotional communication was responded to with reciprocated emotion and interaction ease.

Although the increased talking time and medical information provided by patients with a nondominant physician was most likely owing to an important characteristic of the nondominant communication style, namely asking more questions (and in particular open questions), it is important to show that patients profit from it.

## Limitations

One limitation of the study was the exclusive use of university students as APs. We do not know how older, sicker, and less educated participants would perform in the simulation and the extent to which the AP responses would be replicated. Furthermore, the study results might look very different if a more serious or life-threatening health condition was used.

Another limitation is that a VP, of course, cannot replace an actual real physician. The advantage, however, of using a virtual medical visit paradigm is that it enables the investigator to explore causal relations that are largely impenetrable in reality. The disadvantage is the relative loss of ecological validity. Because the goal of the current study was not to describe how people react to a specific physician interaction style in an absolute sense but rather to explore how changes in physician communication style can elicit varying behavioral responses, the virtual paradigm worked well. We would expect that patients react to real physicians' differences in physician communication style in the same way they did in the experiment.

Note that the use of VPs increases our confidence that the study effects we found can be attributed completely to the differences in the physician's communication style and not to differences in the physician's nonverbal behavior or facial expression because we used a standardized VP.



## Conclusion and Practice Implications

Both the dominance and caring aspects of physician communication that we studied affected how APs perceived their physicians and how they interacted with the VP. Physician dominance led to patient submissiveness and reduced engagement as expressed by speaking less, agreeing more, and providing less medical information, whereas physician caring elicited patient emotionality and higher engagement by their more rapid initiation of speaking turns and more emotional expression.

These results have important implications for both future research and physician training. The finding that a highly dominant physician elicits less patient disclosure and less engagement overall has implications for diagnostic accuracy, treatment success, and interpersonal rapport. Dominance may make physicians more vulnerable to malpractice litigation.<sup>32</sup> Finally, our findings demonstrate that nondominant and caring physician communication can be disentangled and that these dimensions of physician style can be considered independent of judgments related to competence and informativeness. This suggests that physicians need not fear that the expression of emotion, or the lowering of professional dominance, will be negatively interpreted by patients as a lack of competence or knowledge.

As information was held constant in the physician style manipulations, it is intriguing to consider the possibility that patients may be more receptive and responsive to the cognitive tasks demanded of them when a physician adopts a low dominance/high caring style. This may result in greater recall and understanding of complex information, higher attributions of credibility and trust, and greater likelihood of adherence with recommendations when communicated with a particular style. Future studies may explore these types of outcomes. The latter is a different aspect of physician communication, which does not affect how much information is forthcoming but how much at ease the patient feels during the medical encounter. Physician training should therefore focus mainly on avoiding dominance.

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**Conflict of Interest:** None disclosed.

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