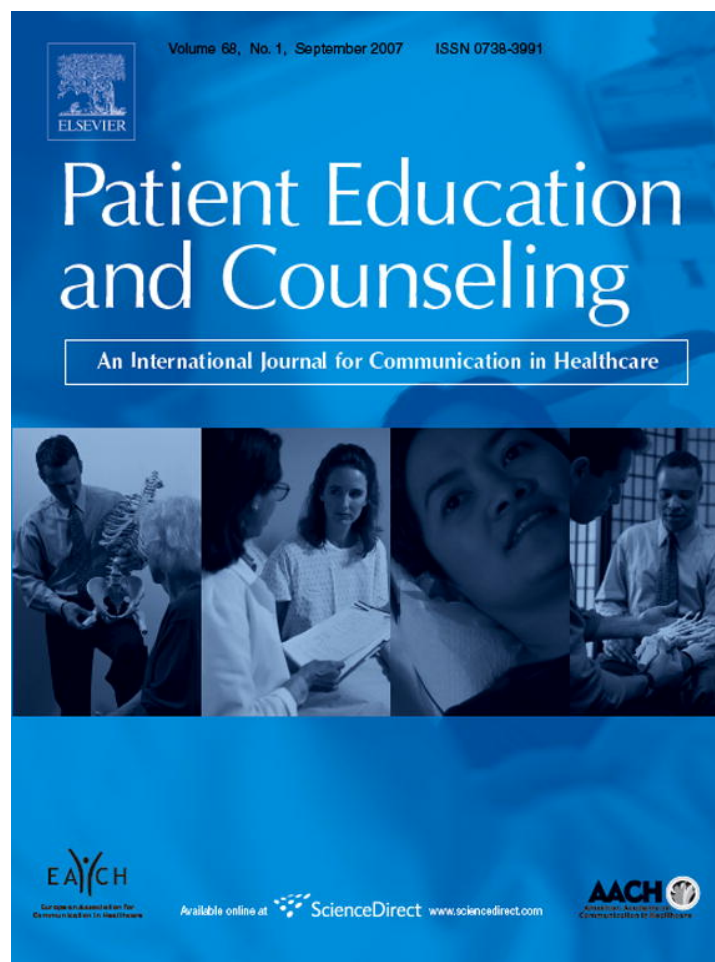


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Disentangling physician sex and physician communication style: Their effects on patient satisfaction in a virtual medical visit

Marianne Schmid Mast^{a,*}, Judith A. Hall^b, Debra L. Roter^c
^a University of Neuchatel, Department of Work and Organizational Psychology, Rue de la Maladiere 23, CH-2000 Neuchatel, Switzerland

^b Northeastern University, Boston, USA

^c Johns Hopkins University, Baltimore, USA

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Abstract

Objective: The present study aimed to investigate the effect of physician sex and physician communication style on patient satisfaction. In real medical visits, physician sex and physician communication style are confounded variables. By using the virtual medical visit paradigm, we were able to disentangle the two variables and study their separate and/or joint effects on patient satisfaction.

Method: In an experimental design, analogue patients (167 students) interacted with a computer-generated virtual physician on a computer screen. The patients' satisfaction during the visit was assessed.

Results: Depending on the sex composition of the dyad, physician communication style affected analogue patients' satisfaction differently. For instance, in male–male dyads, physician communication style did not affect the patients' satisfaction, whereas in female–female dyads, analogue patients were more satisfied when the physician adopted a caring as opposed to a non-caring communication style.

Conclusion: Sex of the physician and sex of the patient moderate how different physician communication styles affect patient satisfaction. In particular, a female–sex role congruent communication style leads to higher patient satisfaction when women see a female physician.

Practice implications: Physician communication training cannot be one size fits all. Rather female and male physicians should obtain different training and they need to be made aware of the fact that female and male patients harbor different expectations toward them.

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Keywords: Physician–patient communication; Sex; Patient-centered care

1. Introduction

Physician communication is an important part of the medical visit and affects how satisfied patients are with the physician [1,2]. Physicians differ in the way they interact and communicate with their patients and there are well-documented sex differences in physician communication [3]. Patients behave differently toward female and male physicians [4]. To date, it remains unclear how physician sex and physician communication style affect patient satisfaction because existing results are very mixed. More specifically, it is unknown whether patients are affected by the fact that the physician is a female or a male or rather by differences in communication style (or both). Moreover, how patient sex influences the relations between physician sex, physician communication style and patient satisfaction is

unknown. The goal of the present research was to disentangle the effects of physician sex, patient sex, and physician communication style on patient satisfaction.

1.1. Physician sex and physician communication

Women and men are known to communicate differently [5–7]. Women have a more socioemotional communication style, characterized by nonverbal warmth and engagement, by expressing more emotions [8–10], and higher levels of self-disclosure [11], whereas men's communication style is more directive [12]. One might assume that for physicians, these sex differences disappear either through selection or the long years of medical training. This is, however, not the case. Female physicians differ in their communication style from male physicians in very much the same way the sex difference is evident in the normal population. Roter et al. [3] showed in their meta-analysis that although there is no difference in the amount of information given to patients between female and male

* Corresponding author. Tel.: +41 32 718 1394; fax: +41 32 718 1391.
E-mail address: marianne.schmid@unine.ch (M. Schmid Mast).

physicians, female physicians have more positive talk (e.g., reassurance, encouragement), show more partnership building behaviors (e.g., eliciting rationale for visit and shared decision making), ask more psychosocial questions (e.g., how the disease affects the patient's daily activities), and focus more on emotions (e.g., empathy, eliciting patient concerns).

The way female physicians communicate comes very close to what is known as the patient-centered communication style in medical care. Patient-centered communication can be characterized by low physician dominance and high physician caring [13–16]. We define physician dominance as a pronounced power difference between physician and patient with the physician not sharing information with the patient, and with a generally paternalistic physician interaction style. Physician caring is understood as the physician's concern about the patient and as physician's empathy towards the patient.

Physician communication style affects patients' outcomes. For instance, patients are less satisfied with a dominant physician than with a non-dominant physician [17,18]. In the same vein, primary care physicians who were never sued by patients were found to adopt a less dominant interaction style than physicians who were sued [19,20]. Physicians who were never sued encouraged patients to voice their opinions, encouraged patients to talk, and informed patients about the structure of the visit [20].

But not only physicians' dominance affects patients, physician caring does too. It has been shown, for instance, that factors such as partnership and positive doctor approach are associated with more patient satisfaction [21]. Also, physicians' participatory communication style was positively related to patient satisfaction [22] and patients are more satisfied when physicians ask more psychosocial questions instead of biomedical questions [23] and when physicians have better nonverbal sensitivity [24].

In sum, research has shown that physicians' caring is positively related to patient satisfaction and that physicians' dominance is negatively related to patient satisfaction. Indeed, Buller and Buller [17] identified two aspects of physician communication style that are related to patient satisfaction: affiliation (positively) and control (negatively). The two dimensions of affiliation and control can easily be mapped onto the dimensions we focus on in the present research: caring and dominance.

1.2. The paradox

We have reviewed that there is ample evidence to the fact that a physician who communicates in an emotional and in a non-dominant way elicits more patient satisfaction. High physician caring and low physician dominance are also typical characteristics of a female physician's communication style [3]. As a logical consequence, patients should be more satisfied when seeing a female physician. However, an overview of the studies that provided data on whether patients were more satisfied with female or with male doctors yielded inconclusive results [25]. Some studies found more

satisfaction with female physicians whereas other studies found patients to be more satisfied with male physicians or did not find a difference in satisfaction with female versus male physicians.

It seems paradoxical that patients are not more satisfied with female physicians because the female physicians provide – on average – a communication style that patients clearly prefer. This state of affairs suggests that additional variables play a role. The same physician communication style is maybe perceived differently depending on whether it stems from a female or a male physician and/or whether a female or male patient perceives it. Characteristics of the physician and of the patient – of which sex is just one example – might moderate the relation between physician communication style and patient satisfaction. To illustrate, there is evidence that stereotypes and sex-role expectations concerning the physician affect patient outcomes. Being a physician is usually associated with being male [26]. Also, “humaneness” (or caring) was found to be a stereotype for female more than for male physicians [27]. So maybe only if there is a match between sex and sex-role typical behavior of the physician are patients satisfied. There is some support for this assumption stemming from a study by Burgoon et al. [28] who found that whether a male physician is verbally aggressive or not does not affect patient compliance whereas for female physicians, the more verbally aggressive they are, the less satisfied and the less compliant the patients become.

The relative contribution of physician communication style and physician sex to patient outcome is difficult to study because in real life interactions, physician sex and physician communication style are “naturally” confounded variables. In order to disentangle the specific contribution of physician sex and physician communication style, an experimental approach is needed which makes it possible to manipulate each of the two variables independently from each other and therefore to test their respective and/or joint influence on patient satisfaction. This is possible with the *virtual medical visit paradigm*. The virtual medical visit paradigm is a tool that enables researchers to systematically alter a specific physician characteristic while holding constant all other characteristics. In a virtual medical visit, the participant takes on the role of a patient who sees a doctor for a specific health problem. The doctor is not a real person; he/she is a virtual physician. The virtual physician is a three-dimensional digital human representation that looks and acts similar to a real human and whose verbal and nonverbal behavior can fully be controlled experimentally. In the present study, the virtual human is an embodied agent, meaning that a preset computer algorithm completely controls the virtual physician. Moreover, the virtual physician possesses the face of a real human (rendered from photographs of a real human) and can talk with a (prerecorded) human voice while moving his/her lips in synchrony. How exactly the participant interacted with the virtual physician in our study is described in more detail in the Method section. Data as to the validity of the virtual medical visit paradigm have been provided elsewhere [29].

2. Methods

2.1. Participants

One hundred and sixty-seven students (80 males and 87 females) from the University of Zurich (majoring in different areas) participated in this study. They were recruited in classes and participated individually in the 1-h experiment. On average, they were 26.5 years old (range: 19–45).

2.2. Procedure

Participants engaged in an interaction with a virtual physician. Because the virtual medical visit paradigm is described in detail elsewhere [29], we only give a brief overview of the paradigm. Participants were asked to imagine that they were seeing their doctor for recurrent headaches. They were briefed about their symptoms, told that they were seeing this doctor for the second time, and told that the goal of the consultation was to talk about the symptoms, discuss the lab results from the last visit, and make a treatment decision.

The physician communication style was varied along the dominance dimension and along the caring dimension. Moreover, the participant either saw a female or a male physician. This resulted in a 2 (physician dominance: high versus low) by 2 (physician caring: high vs. low) by 2 (physician sex) design. Participants were randomly assigned to one of the 8 experimental conditions. They then interacted with a computer-generated, virtual physician who appeared on a computer screen. The virtual physician communicated with prerecorded statements in a human voice every time the participant hit a certain key on the keyboard. The participant replied to what the physician said according to prompts on cards that were handed to the participant. The participant was asked to put the information on the prompt card in his/her own words. There were 16 sequences of the physician input (see Ref. [29]) and the consultation lasted about 15 min. Participants were videotaped during the interaction. After the consultation, participants were asked to fill in different questionnaires measuring patient satisfaction, perceived physician caring and dominance, their computer and computer game experience, their age, their self-reported health status, and their self-reported experience with physicians.

2.3. Manipulation of physician communication style

The authors created a script of a typical physician–patient interaction (including all the phases and functions of a medical visit: opening, data gathering, patient education and counseling, and decision making) and varied it along the dimensions of caring (high and low) and dominance (high and low). This resulted in four scripts identical in content and particularly in information provision but different in interaction style. The high caring version was characterized by the physician's expression of concern, empathy, and reassurance whereas the low caring version was characterized by the absence of the above. The low dominance version was characterized by asking

open questions, asking the patient's opinion, asking the patient's permission, partnership statements, and shared decision making whereas the high dominance version was characterized by closed questions, the absence of asking patient opinion or permission, and absence of partnership statements. The validity of the four scripts in conveying high or low physician dominance and high or low physician caring is documented elsewhere [29].

2.4. Patient satisfaction questionnaire

Patient satisfaction was measured with a questionnaire encompassing 36 items (17 items were reversed scored). Items were based on existing measures of patient satisfaction [30]. Sample items are “I would recommend this physician to others,” “I am satisfied with this physician,” or “This physician did not understand me” (reversed scored). Participants indicated how much they agreed with each statement on a scale from 0 (not at all) to 5 (very much). Item scores were averaged ($M = 3.24$, $S.D. = .84$) and resulted in a reliable patient satisfaction measure (Cronbach's alpha = .98). Higher values indicate more satisfaction.

2.5. Additional variables

We asked participants to rate their experience with computers and with computer games each on a scale from 0 (no experience at all) to 5 (a lot of experience). Because the two items were significantly related to each other, $r(165) = .47$, $p = .0001$, we averaged the ratings across the two questions to obtain a measure of experience with computers and computer games ($M = 2.90$, $S.D. = 1.09$). Higher values indicate more experience with computers and computer games. Additionally, we assessed participants' age, health status (on a scale from 1 = very bad to 5 = very good, $M = 3.28$, $S.D. = .68$), and self-reported experience with physicians (on a scale from 0 = not much experience to 5 = much experience, $M = 2.75$, $S.D. = 1.22$).

3. Results

We conducted a 2 (physician sex) by 2 (physician caring: high versus low) by 2 (physician dominance: high versus low) by 2 (patient sex) ANOVA. To control for participants' age, participants' health status, participants' experience with physicians, and participants' experience with computers and computer games, we added those variables as covariates in the analyses. None of these latter variables affected the results, meaning that ANOVAs without controlling for analogue patient age, health status, and experience with physicians, and experience with computers and computer games yielded the same results. This is not surprising because the participants were very homogeneous with respect to these variables.

Results showed a significant main effect of physician caring, $F(1, 145) = 6.96$, $p = .009$, with participants being more satisfied with the high caring ($M = 3.39$) as compared to the low caring ($M = 3.06$) physician. There were no main effects of physician sex, $F(1, 145) = .01$, $p = .91$, patient sex, $F(1, 145) = 1.61$,

Table 1

Patient satisfaction according to sex composition of dyad and physician communication style (high and low caring combined with high and low dominance)

Sex composition of dyad	Physician communication style			
	High caring		Low caring	
	Low dominance	High dominance	Low dominance	High dominance
Male physician–male participant	3.25	3.03	3.15	3.03
Female physician–male participant	2.98	3.54	3.22	2.96
Female physician–female participant	3.82	3.80	2.61	2.88
Male physician–female participant	3.03	3.75	3.59	2.93

Note. Entries are means. The satisfaction scale ranged from 0 (not at all) to 5 (very much).

$p = .21$, and physician dominance, $F(1, 145) = .01$, $p = .96$. There were, however, several significant interaction effects. The significant main effect of caring and the interaction effects were, however, all qualified by a 4-way interaction with physician sex, physician dominance, physician caring, and patient sex, $F(1, 145) = 5.62$, $p = .019$. To understand the 4-way interaction, we looked at the results separately for each sex composition of the dyads (means can be found in Table 1).

In male–male dyads, communication style did not matter for patient satisfaction. There was no significant effect of dominance or caring and no interaction effect (all F s < .30, all p s > .59). The same was true for female physicians interacting with male participants. There was no significant effect of dominance or caring and no interaction effect (all F s < 2.08, all p s > .15). Thus, for male participants (regardless of whether seeing a female or a male physician), communication style did not influence satisfaction.

In female–female dyads, however, there was a significant main effect of physician caring, $F(1, 34) = 10.45$, $p = .0001$, showing that female participants were more satisfied with a female physician who adopted a caring communication style ($M = 3.81$) than with a female physician who adopted a non-caring communication style ($M = 2.75$). There was no significant effect for physician dominance and there was no significant interaction effect (both F s < .41, both p s > .52).

When a male physician interacted with a female participant, there was no significant physician dominance or caring effect (both F s < .31, both p s > .58) but there was a significant interaction effect, $F(1, 37) = 8.74$, $p = .005$. The means in Table 1 indicate that female participants were less satisfied with a male physician who adopted a non-caring and dominant communication style. This is not surprising because non-caring and dominant can be seen as characteristics of a non-patient-centered communication style. Interestingly, female participants were also less satisfied with a male physician who adopted a caring and non-dominant communication style. This combination is indicative of a very patient-centered communication style and yet it produces relatively low levels of satisfaction in female participants. Female participants were more satisfied with a male physician of an intermediate level of patient-centered communication (either high dominance and high caring or low dominance and low caring).

4. Discussion and conclusion

4.1. Discussion

The goal of the present study was to disentangle the effects of physician sex, patient sex, and physician communication style on patient satisfaction. The paradox that patients are not always more satisfied with female physicians although female physicians adopt in general a communication style that is related to patient satisfaction can only be understood if we examine the effects of physician sex and physician communication style independent of each other. Similar to what has been documented in the literature [25] we did not find a main effect for physician sex on patient satisfaction. Inspection of Table 1 shows that sometimes satisfaction was higher for male physicians, sometimes the reverse, and sometimes there was no difference. Also, as documented in the meta-analysis of Hall and Dornan [31], we did not find a patient sex main effect for satisfaction. Our analyses make it clear that patient satisfaction is not simply a function of physician or patient sex but that the sex combination of the dyad in addition to the type of physician communication determines patient satisfaction.

In male–male dyads, the physician's communication style did not affect satisfaction of the male participants. However, caring of the physician communication style affected patient satisfaction in female–female dyads. Female participants were more satisfied with a caring female physician than with a non-caring female physician. Burgoon et al. [28] found that male physicians have more freedom to behave how they want to whereas female physicians are subject to a more restrictive behavioral repertoire to elicit satisfaction in their patients. We found a very similar result in our study with regard to same-sex dyads. In male–male dyads, patient satisfaction was not affected by how the physician communicated. In female–female dyads, however, patients were more satisfied when the physician communicated high on caring as compared to low on caring. In other words, female participants were most satisfied when the female physicians communicated in a sex-congruent way. This result is reminiscent of the finding from the leadership literature showing that women in leadership positions are evaluated particularly negatively when they adopt a sex-incongruent leadership style (i.e., directive leadership style [32,33]).

Among men, caring and dominance in the physician communication style did not affect patient satisfaction. Maybe another aspect of the physician communication would affect satisfaction like, for instance, competence. Men might think to themselves: “I don’t care how caring or dominant he is, I care about whether he knows what he is doing!” Among women, sex-congruent communication in terms of caring resulted in more patient satisfaction. Women might think to themselves: “Despite her (male) profession, I still want her to be a woman!” There is evidence that being a physician is associated more with being male than with being female [26]. Maybe patients generally expect to see a male physician and when they encounter a female doctor the sex of the physician becomes salient and as a consequence, female sex role expectations in terms of behavior are activated. However, we found this pattern only in female participants and not when male participants interacted with female physicians. This suggests that women and men harbor different expectations about female and male physicians and it seems that women in particular expect female physicians to behave in a sex-congruent way. More research is needed to address the question of how expectations about female and male doctors affect our interactions with them.

For a female physician interacting with a male participant, there was no effect of physician communication style on satisfaction. Because the female physician-male patient interaction is still relatively uncommon in the realm of general practitioners, male participants might have a lack of experience in how to assess a female physician in terms of how satisfied they are with her and they might not feel at ease in the presence of a female physician and therefore assess her in a way unrelated to her communication style. In line with this thinking, research has shown that when male patients interact with female physicians, their interaction develops less smoothly [34].

In male physician and female participant dyads, both dominance and caring in the male physician communication affected the female participants. Female participants were less satisfied with a not at all or with a very patient-centered communication style and were more satisfied with an intermediate level of patient-centeredness. This seems to be the most common type of physician-patient interaction because many more women seek doctors’ advice and a general physician is still more likely to be male than female. According to expectation, our findings show that a non-patient-centered communication style (high dominance and low caring) results in low patient satisfaction. But why did high patient-centeredness entail less patient satisfaction than a medium level of patient-centeredness? We think that it is because of the specific nature of the symptoms the participants presented. Because headache is a very common symptom that most likely everybody has experienced (which was the very reason we selected it), it might not necessitate a particularly patient-centered communication style. Being low in dominance *and* high in caring might just have been too much, overdoing it and therefore causing a sort of reactance in the patient. This interpretation also highlights the importance of the disease and symptoms when it comes to what communication style patients prefer in their physicians.

Following from the above, one limitation of this study is that it addresses only one type of medical problem (headaches) in a very homogeneous group of people. Future research needs to address whether the findings presented here remain the same when, for instance, the patients see the doctor for a chronic illness or a life-threatening disease or whether age and/or race affect the results.

The exclusive use of university students as analogue patients is certainly a limitation of the present research. We do not know how older, sicker, and less educated subjects would perform in the simulation. For instance, younger and better educated individuals generally prefer a more egalitarian and less dominant physician communication style [15]. Because the focus of this study was to uncover the causal relations between different types of physician communication style, sex, and patient satisfaction, rather than to test which patient variables (e.g., age, educational level, health status) affect such relations, we selected a relatively homogeneous group of participants.

The use of an experimental setting has distinct advantages – which is why we used it – but of course also drawbacks. The main asset of using an experiment is that the researcher is able to draw causal inferences on the relation between the manipulated and the dependent variables. This is not possible in more naturalistic settings in which many other variables covary with the ones manipulated. The drawback of an experiment is its low ecological validity. If the researcher wants to hold constant all the variables except the ones manipulated, the only option is to conduct a laboratory study in which such experimental control can be accomplished.

In laboratory studies of interpersonal communication, researchers often have participants read vignettes or watch videotapes of a physician-patient interaction [35–37]. In these studies, participants are asked to put themselves in the shoes of the patient and imagine and indicate how they would judge the physician or how they would interact with the physician. Although experimental control is high, such indications of hypothetical behavior are very low in external validity because people are not always aware of how they act. Using virtual reality technology offers a possibility to enhance ecological validity without sacrificing experimental control [38]. The interaction partner is a standardized avatar (high experimental control) but the participant still “interacts” with the virtual human (higher ecological validity than when reading vignettes or watching videotaped interactions and indicating anticipated behavior). It allows for the observation of actual behavior of analogue patients and is more valid than simply reporting what one most likely would have done or how one would have reacted to a specific interaction style. Using virtual reality technology cannot replace the study of real physician-patient interactions but it can advance our understanding of whether certain characteristics relevant in the physician-patient interaction (e.g., physician communication style) are causally responsible for outcome variables (e.g., patient satisfaction). The successful manipulation of physician style elements allowed for the disentanglement of naturally co-varying variables in a way that would otherwise be impossible.

4.2. Conclusion

This research showed that the paradox (of patients not necessarily being more satisfied with women doctors although women doctors are more likely to show the interaction style patients prefer) is most likely related to differences in expectations patients harbor towards female and male doctors. For one thing, people expect in general a doctor to be a man rather than a woman [26]. Moreover, patient sex also plays a role; thus it is the interplay between physician sex, patient sex, and physician communication style that affects patient satisfaction. The results are of particular interest because physician communication training has so far not paid much attention to the issue of physician and patient sex. Our results show that for female physicians, adopting a sex-congruent communication style (high caring) might be beneficial in terms of patient satisfaction, at least for female patients. For male physicians, it seems that their communication behavior affects patient outcomes to a lesser degree.

4.3. Practice implications

The relative complexity of the results suggests the necessity of tailoring physician communication to the particular needs or expectations of the patients. It is not enough to propagate a patient-centered communication style because our results showed that there is no “one size fits all” approach when it comes to how a physician best communicates to his or her patient. The results from our study are a first step in the direction of tailoring physician communication training more effectively.

References

- [1] Bertakis KD, Callahan EJ, Helms LJ, Azari R, Robbins JA, Miller J. Physician practice styles and patient outcomes: differences between family practice and general internal medicine. *Med Care* 1998;36: 879–91.
- [2] Roter D, Hall JA, Katz NR. Relations between physicians' behaviors and simulated patients' satisfaction, recall, and impressions. *Med Care* 1987;25:437–49.
- [3] Roter DL, Hall JA, Aoki Y. Physician sex effects in medical communication. *J Am Med Assoc* 2002;288:756–64.
- [4] Hall J, Roter DL. Do patients talk differently to male and female physicians? A meta-analytic review. *Patient Educ Couns* 2002;48: 217–24.
- [5] Aries EJ. Men and women in interaction. Reconsidering the differences. New York: Oxford University Press; 1996.
- [6] Lakoff R. Women's language. *Lang Style* 1977;10:222–47.
- [7] Tannen D. You just don't understand: women and men in conversation. New York: Ballantine; 1990.
- [8] Hall JA. Nonverbal sex differences: communication accuracy and expressive style. Baltimore: Johns Hopkins University Press; 1984.
- [9] Hall JA. How big are nonverbal sex differences: the case of smiling and sensitivity to nonverbal cues. In: Canary DJ, Dindia K, editors. Sex differences and similarities in communication: critical essays and empirical investigations of sex and sex in interaction. Mahwah: Erlbaum; 1998. p. 155–77.
- [10] Hall JA, Carter JD, Horgan TG. Sex differences in nonverbal communication of emotion. In: Fischer AH, editor. Sex and emotion: social psychological perspectives. Cambridge: Cambridge University Press; 2000. p. 97–117.
- [11] Dindia K, Allen M. Sex differences in self-disclosure: a meta-analysis. *Psychol Bull* 1992;112:106–24.
- [12] Eagly AH, Johnson BT. Sex and leadership style: a meta-analysis. *Psychol Bull* 1990;108:233–56.
- [13] Ballard-Reisch DS. A model of participative decision making for physician-patient interaction. *Health Commun* 1990;2:91–104.
- [14] Emanuel EJ, Emanuel LL. Four models of the physician-patient relationship. *J Am Med Assoc* 1992;267:2221–6.
- [15] Roter DL, Hall JA. Doctors talking with patients/patients talking with doctors: improving communication in medical visits. Westport, CT: Auburn House/Greenwood Publishing Group Inc.; 2006.
- [16] Roter DL, Stewart M, Putnam SM, Lipkin M, Stiles W, Inui TS. Communication patterns of primary care physicians. *J Am Med Assoc* 1997;277:350–6.
- [17] Buller MK, Buller DB. Physicians' communication style and patient satisfaction. *J Health Soc Behav* 1987;28:375–88.
- [18] Burgoon JK, Pfau M, Parrott R, Birk T, Coker R, Burgoon M. Relational communication, satisfaction, compliance-gaining strategies, and compliance in communication between physicians and patients. *Commun Monogr* 1987;54:307–23.
- [19] Ambady N, LaPlante D, Nguyen T, Rosenthal R, Chaumeton N, Levinson W. Surgeons' tone of voice: a clue to malpractice history. *Surgery* 2002;132:5–9.
- [20] Levinson W, Roter DL, Mullooly JP, Dull VT, Frankel RM. Physician-patient communication: the relationship with malpractice claims among primary care physicians and surgeons. *J Am Med Assoc* 1997;277: 553–9.
- [21] Little P, Everitt H, Williamson I, Warner G, Moore M, Gould C, Ferrier K, Payne S. Preferences of patients for patient centred approach to consultations in primary care: observational study. *Brit Med J* 2001;322:1–7.
- [22] Speedling EJ, Rose DN. Building an effective doctor-patient relationship: from patient satisfaction to patient participation. *Soc Sci Med* 1985;21: 115–20.
- [23] Bertakis KD, Roter D, Putnam SM. The relationship of physician medical interview style to patient satisfaction. *J Fam Practice* 1991;32: 175–81.
- [24] DiMatteo MR, Taranta A, Friedman HS, Prince LM. Predicting patient satisfaction from physicians' nonverbal communication skills. *Med Care* 1980;18:376–87.
- [25] Hall JA, Irish JT, Roter DL, Ehrlich CM, Miller LH. Satisfaction, sex, and communication in medical visits. *Med Care* 1994;32:1216–31.
- [26] Lenton AP, Blair IV, Hastie R. Illusions of sex: stereotypes evoke false memories. *J Exp Soc Psychol* 2001;37:3–14.
- [27] Fennema K, Meyer DL, Owen N. Sex of physician: patients' preferences and stereotypes. *J Fam Practice* 1990;30:441–6.
- [28] Burgoon M, Birk TS, Hall JR. Compliance and satisfaction with physician-patient communication: an expectancy theory interpretation of sex differences. *Hum Commun Res* 1991;18:177–208.
- [29] Schmid Mast M, Hall JA, Roter DL. Effects of physician communication style during a virtual medical visit, submitted for publication.
- [30] Langewitz W, Keller A, Denz M. Patientenzufriedenheits-fragebogen (pzf): Ein taugliches mittel zur qualitätskontrolle der arzt-patient-beziehung? *Psychother Psych Med* 1995;45:351–7.
- [31] Hall JA, Dornan MC. Patient sociodemographic characteristics as predictors with medical care: a meta-analysis. *Soc Sci Med* 1990;30:811–8.
- [32] Eagly AH, Karau SJ. Role congruity theory of prejudice toward female leaders. *Psychol Rev* 2002;109:573–98.
- [33] Eagly AH, Makhijani MG, Klonsky BG. Sex and the evaluation of leaders: a meta-analysis. *Psychol Bull* 1992;111:3–22.
- [34] Hall JA, Irish JT, Roter DL, Ehrlich CM, Miller LH. Sex in medical encounters: an analysis of physician and patient communication in a primary care setting. *Health Psychol* 1994;13:384–92.
- [35] Fogarty LA, Curbow BA, Wingard JR, McDonnell K, Somerfield MR. Can 40 s of compassion reduce patient anxiety? *J Clin Oncol* 1999;17:371–83.

- [36] Schmid Mast M, Kindlimann A, Langewitz W. Patients' perception of bad news: how you put it really makes a difference. *Patient Educ Couns* 2005;58:244–51.
- [37] Shapiro DE, Boggs SR, Melamed BG, Graham-Pole J. The effect of varied physician affect on recall, anxiety, and perceptions in women at risk for breast cancer: a simulated study. *Health Psychol* 1992;11:61–6.
- [38] Blascovich J, Loomis J, Beall AC, Swinth KR, Hoyt CL, Bailenson JN. Immersive virtual environment technology: just another methodological tool for social psychology? *Psychol Inq* 2002;13:146–9.