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Perceptions of Doctors' Empathy and Patients' Subjective Health Status at an Online Clinic: Development of an Empathic Anamnesis Questionnaire

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ABSTRACT

Objective: Medical doctors' empathy is known to support patients' health status after face-to-face clinical visits. However, the role of doctors' empathy in chat-based encounters is not yet well understood. This study investigates whether patients' evaluations of doctors' empathy are associated with their health perceptions after a meeting at an online clinic and whether experiences of empathy could be enhanced by augmenting an automated anamnesis questionnaire completed before the visit.

Methods: A total of 209 adult patients agreed to participate in the study. First 103 patients filled out the regular version of the questionnaire (June–August 2019) and then 106 filled out the augmented version of the online anamnesis questionnaire (August–November 2019). Patients' perceptions of doctors' empathy were measured with the Consultation and Relational Empathy questionnaire. Patients' self-perceived health status, potential confounders, and demographic background information were measured via questionnaires.

Results: Patients' perceptions of doctors' empathy during a chat-based encounter were associated with patients being less concerned about their symptoms (estimated odds ratios varied between 0.45 and 0.55 depending on the model, p values $< .003$) and considering their symptoms as less severe (estimated odds ratios = 0.54–0.61, p values $< .007$), as well as a higher probability of alleviation of symptoms as rated by the patients (estimated odds ratios = 2.16–2.24, p values $< .001$). Augmenting the anamnesis questionnaire did not affect patient reports on doctors' overall empathy, but it did have positive effects on specific areas of doctors' empathy covered by the questionnaire.

Conclusions: These results show that patients' experience of doctors' empathy not only is important during face-to-face encounters but also supports patients' perceptions of health when the interaction is text based. The results also encourage further development of means to support patients' experiences of empathy during online interaction with medical doctors.

Key words: empathy, doctor-patient interaction, chat-based interaction, self-perceived health status, CARE, digital health care.

INTRODUCTION

Empathy has an important role in doctor-patient encounters. A systematic review of studies published from 1995 to 2011 reported that medical doctors' empathy supports patient satisfaction, psychological well-being, and better clinical outcomes (1), and later research has been in line with these results (2–9). However, contrasting findings also exist (10).

The shift toward online medical consultations has brought new challenges for supporting empathy in medical practice (11). The role of telemedicine has become an especially important topic because of the current COVID-19 pandemic (12), which has stressed the importance of remote contacts as a means to reduce contagion

and provide safe ways to treat symptoms that do not require a face-to-face visit to a health center.

Although chat is promising because of its independence of time and place and quick access to medical professionals, a concern has been raised over the possibility of conveying empathy in computer-mediated clinical practice (13). A study by Liu and colleagues (14), for example, showed that doctors' use of empathic words was significantly lower in telemedicine as compared with face-to-face consultations. Possibilities to convey emotional responses are limited because of the lack of physical presence and thereby non-

CARE = Consultation and Relational Empathy, RQ = research question, SD = standard deviation

SDC Supplemental Digital Content

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Received for publication May 20, 2020; revision received September 15, 2021.

DOI: 10.1097/PSY.0000000000001055

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verbal communication (15–17). It is not yet understood what the role of doctors' empathy in a chat-based encounter is and how empathy could be encouraged in this environment.

In this article, we investigate medical doctors' empathy during a patient encounter in a Finnish private healthcare provider's chat service to find out whether empathy as rated by these patients supports the patients' self-perceived health status. Furthermore, we describe an augmented anamnesis questionnaire with an aim of increasing patients' perceptions of empathy in online interaction and test it for the first time among patients in an online healthcare setting.

Digital Anamnesis Questionnaire

The anamnesis is a standard part of doctor-patient encounters with questions that seek details on the current symptoms. An accurate anamnesis provides an invaluable basis for correct diagnosis and appropriate care, and mistreatment can result from insufficient knowledge of the patient's symptoms. Digitalizing the anamnesis interview is a way to reduce human error and reliably attain the information needed for high-quality care. Accordingly, many clinics use online forms for patients. Also, chatbots for gathering anamnesis and other medical information already exist (18), although patients may still hesitate to use them (19).

In addition to acquiring medical information, interviewing for the anamnesis can be an opportunity for positive doctor-patient interaction and expression of empathy. Research has shown that it is possible to convey empathy through completely automated interaction (20). If empathy could be conveyed through a digitalized anamnesis, it could respond to both the need for accurate information and the need for patients to be met with empathy.

The Intervention

In this study, we investigate the effects of patient-centered augmentations to an online anamnesis questionnaire already in use by the Finnish private healthcare provider Mehiläinen. The aim of this intervention is to support the patients' experiences of an empathic encounter before chatting with the doctor.

Previous studies have found that empathic behavior and empathy-related responses can be enhanced by priming individuals with empathy-evoking stimuli, including various kinds of media (21). More specifically, exposure to religious (22) and emotion-related words (23), listening to songs with prosocial lyrics (24), and exposure to altruism quotes (25) have been found to increase prosocial behavior. Playing prosocial video games has decreased response times to empathy-related words, indicating that their availability in the mind was enhanced after playing (26). In some studies, the activation spreading theory is used to explain the mechanism of priming (23,25). The thought is that activation of a concept in the mind is not isolated but distributed across a network of associated concepts. It is possible that exposure to empathy-related concepts in a questionnaire could prime patients' thinking for empathy-related signals and behavior in an ensuing interaction context.

By enhancing patients' experiences of empathy, the care process and patients' health perceptions could also be supported. Previous studies have shown that patients' experiences of empathy are associated with both subjectively (27) and objectively (9,28,29) measured health status. Various mechanisms might explain this connection: it is shown that patients of empathic doctors experience less anxiety (9,30), adhere better to the treatment (31), feel better able to cope with

their symptoms (4), and have improved self-efficacy and sleep quality (9), all of which might result in more positive health perceptions.

Based on previous literature, we hypothesized that adding the following three elements to the questionnaire could foster the patients' experiences of empathy during the digital doctor-patient encounter:

- 1) Using personal pronouns and addressing the patients by their first name (32)
- 2) Including a question about how concerned the patient is about their medical situation and responding to this concern (33,34)
- 3) Assessing the level of medical knowledge of the patient (35)

A detailed rationale and description of the added elements is given in Supplemental Digital Content 1, <http://links.lww.com/PSYMED/A816>.

Research Questions and Hypotheses

The following research questions (RQs) were posed regarding the role of empathy in digital doctor-patient encounters in general and the anamnesis questionnaire.

RQ1: Will patients' evaluations of doctors' empathy during chat interaction affect patients' perceptions of their symptoms, concern, and health status after the encounter?

To study this, we measured patients' health perceptions and concern twice: up to 2 weeks after the encounter and 2 to 4 weeks after the encounter to see if the potential association between perceived empathy and subjective health status remains over a longer time period and to be able to focus also on the potential alleviation of symptoms that might not be visible a short time after the appointment.

Based on the previous research (1–9), we hypothesized that doctors' empathy is positively associated with patients' perceptions of their health and alleviation of symptoms.

RQ2: Do patients' initial level of concern about their symptoms explain the potential association between doctors' empathy and patients' level of concern after the digital encounter?

If patients' evaluations of doctors' empathy are associated with their level of concern after the encounter, one might ask, "What is the direction of this association?" Do doctors' empathy skills affect patients' concerns or do patients who are initially less concerned tend to rate their doctors' as more empathic? To answer RQ2, we study the associations of patients' initial concerns with their ratings of doctors' empathy and also adjust our analyses regarding patients' concern after the encounter with the patients' initial concern. Based on previous findings (29), we hypothesized that patients' feelings of concern before the encounter will not be associated with their experiences of doctors' empathy.

RQ3: Will augmenting the digital anamnesis questionnaire affect patients' perceptions of doctors' empathy, and/or patients' perceptions of their symptoms, concern, and health after the encounter?

Based on previous research on the added elements to the anamnesis questionnaire (32,33,35), we hypothesized that the changes made to the anamnesis questionnaire might prompt patients to evaluate the doctors as more empathic when compared with a group of patients filling in a regular version of the questionnaire already in use at the online clinic.

METHODS

The Online Clinic

The study was conducted at a Finnish private healthcare provider Mehiläinen's online service "Digiklinikka." The online service can be used to treat symptoms and diseases that do not require a physical examination, such as cold, eye, allergy and skin symptoms, stomach issues, and urinary tract infection in women. The doctors, providing care through the online service, can access the patients' previous medical records, write prescriptions, and invite the patient to a face-to-face checkup if needed. The interaction is text based, but the patients can also send photographs to the doctor, if needed.

The patients signing into the service are appointed randomly to the doctors working at the online clinic; in case the patient has further questions regarding their visit during the same day, they are directed to the same doctor when possible.

Development History of the Anamnesis Questionnaire

The online anamnesis questionnaire has been used at the Mehiläinen online clinic since May 2018. The questionnaire was developed by the online clinic professionals at Mehiläinen and was based on their expertise.

The questionnaire content has been validated in practice and has been subject to continuous development to ensure an optimal patient counseling. Apart from the augmentations reported in this article, the anamnesis questionnaire content remained unchanged during the entire period of this study.

Study Design

To study the potential effects of the augmented anamnesis questionnaire to the patients' perceptions of the encounter with the doctor, the two versions of the questionnaire (regular and augmented) were presented sequentially to two separate groups of patients and the experiences of these two groups were compared with each other. The data collection was ongoing from June to November 2019. The regular version of the questionnaire was in use from June to August 2019, and the augmented anamnesis questionnaire was in use from August to November 2019.

The empathic and regular versions of the anamnesis questionnaire were not randomly presented to patients, because the needed alterations to the system would have been substantial and because the augmentations represented a change in the care process that the doctors needed to be aware about as discussed in the Protocol section.

Participants

Altogether, 219 Finnish speaking adults participated in the study (Figure 1), 10 of the participants were excluded from further analyses for using the service on behalf of their children. Of the 209 included patients, 103 completed the regular anamnesis questionnaire (referred to as the control group) and 106 completed the augmented version of the questionnaire (referred to as the intervention group).

Of these participants, 176 filled out the first follow-up questionnaire (time 1) within 2 weeks of the online encounter with the doctor (mean [standard deviation {SD}] = 4.9 [3.5] days) and 167 filled out the second follow-up questionnaire (time 2) between 2 to 4 weeks after the encounter (mean [SD] = 18.2 [3.4] days). The participants exceeding these time limits were not included in the analyses of the corresponding time point.

For the doctors, participation was anonymous, and no background data were collected to not interfere with clinical work and to prevent selection bias where only doctors more interested in the topic might participate.

In general, at the time of the data collection, 54 doctors (20 women and 34 men) were working at the online clinic; the age range of the doctors was approximately 35 to 40 years. Of these doctors, 31 were involved in the discussions with the patients participating in this study. The average number of discussions per doctor was 5.7 (SD = 5.6; range, 1–30).

Most of the doctors working in the clinic during data collection were experienced general practitioners or occupational physicians; a few of the doctors were also specialized in pediatrics, otorhinolaryngology, and gynecology. All had previous experience of online clinic work. The doctors had not received communication training before the study by the healthcare provider.

Protocol

Permission to be contacted by a researcher about the study was inquired at the end of the online anamnesis questionnaire that the patients filled out before the chat encounter with the doctor. If the patient gave permission to be contacted, they received an informed consent form by email to be signed using their online banking codes.

If the patient gave consent to participate, they were sent an online questionnaire to be filled out after the encounter with the doctor (first follow-up, time 1). Two weeks after the encounter, the patients were sent another follow-up questionnaire also to be filled out online (second follow-up, time 2). The questionnaires were filled out using anonymous study identifiers. With the patients' consent, the chats were recorded to study the length of the encounter.

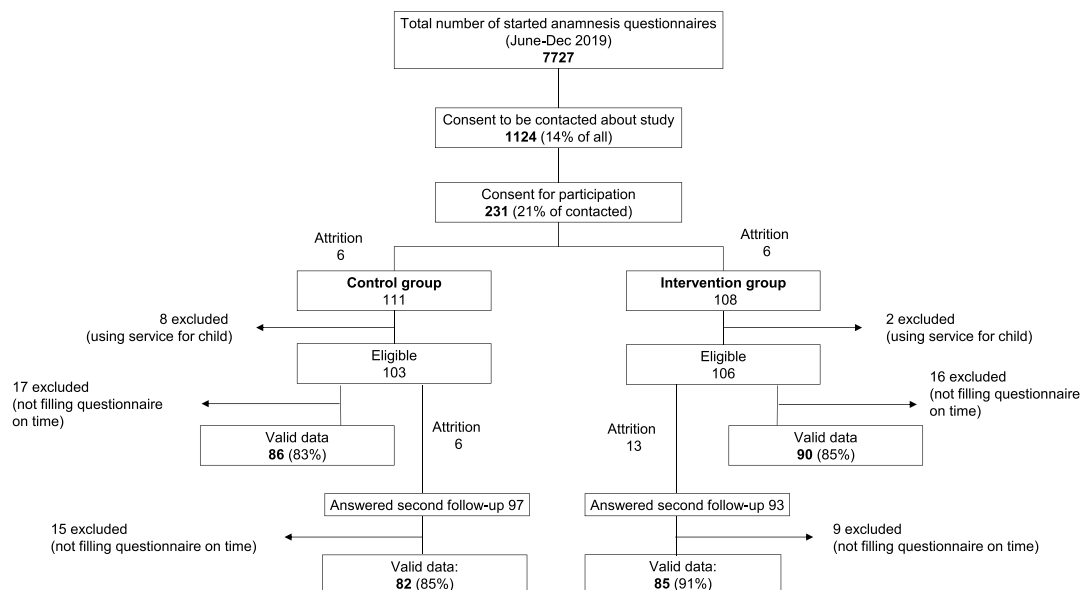


FIGURE 1. Study profile.

Before the augmented questionnaire was taken into practice, a 1-hour session was provided to the doctors working with the online service explaining the changes that would be made to the anamnesis questionnaire. In addition, all doctors working in the online clinic received an email containing information about the upcoming changes to the questionnaire and asked to take, in a way they found suitable, the new information provided by the questionnaire into use during the chat with the patient.

The University of Helsinki Ethical Review Board in the Humanities and Social and Behavioural Sciences approved the study protocol.

Questionnaires

At the first follow-up, patients' perceptions of the doctors' empathy were inquired using a Finnish translation of the Consultation and Relational Empathy (CARE) questionnaire (36). The patients answered 10 questions on the doctors' ability to convey empathy on a 5-point scale (0, poor; 1, fair; 2, good; 3, very good; 4, excellent), they also had a possibility to state that the question did not apply to the situation. Internal consistency of the scale was found to be excellent (Cronbach $\alpha = .97$). A mean empathy score was calculated for participants who considered at least 3 of 10 of the questions as applicable ($n = 161$; 91.5% of the included participants at time 1; Figure, Supplemental Digital Content 2, <http://links.lww.com/PSYMED/A817>, which shows the distribution of the mean empathy variable).

Following the study by Rakel and colleagues (29), we measured the patients' quality of life, stress, and optimism as potential covariates. In line with Rakel and colleagues' hypothesis, these factors might affect the patients' answering style in the CARE questionnaire (27) and might also be related to the patients' perceptions of their symptoms and well-being (37–39), thus making them potential confounders in the analyses.

Quality of life was measured with the Finnish version of the Quality of Life Indicator (40). Stress was measured with the Perceived Stress Scale (41), and optimism was measured by the Life Orientation Test (42). Furthermore, we asked the patients to describe their symptoms, for which they were seeking help, and diagnoses if they were given any. The patients also filled out basic demographic information on their educational level, income, sex, and age, and estimated how much time they usually spent using instant messaging services.

At the first follow-up, the patients answered three questions about their concern, symptom severity, and perceived general health on a 7-point scale in Finnish: "How concerned were you about your health situation and symptoms immediately after the encounter?" "How serious did you consider your symptoms immediately after the encounter?" "In general, how healthy did you find yourself immediately after the encounter?"

At the second follow-up, patients answered the same three questions about their concern, symptom severity, and perceived health evaluated at the point of answering. The patients also answered how their symptoms had changed after the encounter on a 7-point scale (1, clearly aggravated; 4, stayed the same; 7, clearly alleviated).

Statistical Analyses

χ^2 Tests, t tests, and Mann-Whitney U tests were used to compare descriptive statistics between the control and intervention groups depending on the type of the variable (shown in Table 1). Spearman correlations were used to assess the potential correlation between words written by doctors and patients during the chat and patients' evaluations of doctors' empathy.

Ordinal regression analyses were used to study whether patients' perceptions of doctors' empathy (mean empathy score as an independent variable) were associated with patients' perceived concern, symptom severity, and general health after the encounter at time 1 and time 2 (RQ1). Logistic regression was used to study whether patients' perceptions of doctors' empathy was associated with alleviation of symptoms (scored 0 for "clearly aggravated" to "stayed the same," and 1 otherwise). The analyses were run both unadjusted (model 1) and adjusted for the following potential covariates: age, sex, optimism, stress, quality of life, education, income, and time difference between the encounter and answering the questionnaire (model 2).

To answer RQ2, we studied the Spearman correlations between the patients' concern about their symptoms both before and after the encounter, and the patients' ratings of the doctors' empathy among the intervention group. To find out whether the potential association between the patients' perceptions of doctors' empathy and their concern after the encounter would be explained by the patients' concern before the meeting, we ran the ordinal regression related to RQ1 also adjusted by the patients' concern before the encounter along with the other covariates. These analyses were not conducted among the control group because we did not have data on their concerns before the encounter, as this question was part of the added elements to the augmented anamnesis questionnaire.

Linear regression analyses were used to study whether the control and intervention groups differed in their ratings of doctors' empathy (RQ3). Group status was used as an independent variable (scored 1 for the control group and 0 for the intervention group), and the mean empathy score was used as a dependent variable. In addition, ordinal regression analyses were used to further study whether the individual items of the CARE questionnaire or patients' perceived concern, symptom severity, and health after the encounter were different between the control and intervention groups. Because it was found that the patients in the intervention group reported a higher prevalence of respiratory symptoms (Table 1), all analyses were run both unadjusted (model 1) and adjusted for the patient-reported respiratory symptoms (model 2) to take this difference into account.

To fulfill the proportional odds assumption for the ordinal regression analyses (43), the following categories were collapsed to form variables with three levels: symptom severity and concern, categories 1 to 2, 3 to 4, and 5 to 7; general health at time 1, categories 1 to 3, 4 to 5, and 6 to 7; and general health at time 2, categories 1 to 4, and 6 to 7. For analyses of the individual items of the CARE questionnaire, the two lowest categories ("poor" and "fair") were also collapsed. With these adjustments, all analyses were found to meet the proportional odds assumption (p values $> .05$).

RESULTS

The control and intervention groups did not differ from each other in sex, age, socioeconomic status, use of instant messaging services, self-rated quality of life, stress, or optimism (p values $> .18$). The patients in the intervention group reported a higher prevalence of respiratory symptoms ($p < .001$), but there were no differences in the other most commonly reported symptoms (p values $> .32$; Table 1).

Data from 168 chat conversations were available for computing the number of words written by both the doctors and the patients. During the chat, average number of words written by the doctors was 57.5 (SD = 34.2; range, 6–164), and average number of words by the patients was 37.6 (SD = 36.7; range, 0–212). In five cases, the doctors wrote their recommendations based on the clients' answers to the anamnesis questionnaire, and the clients did not respond at all. The number of words written by the doctors or by the patients was not associated with the patients' perception of doctors' empathy after the encounter (Spearman $r = 0.11$ and -0.07 , $p = .15$ and $.36$, respectively).

Patients' Perceptions of Doctors' Empathy and Self-Reported Symptoms (RQ1)

Patients' perceptions of doctors' empathy were negatively associated with patients' self-rated concern and symptom severity both in the unadjusted and adjusted models at times 1 and 2 (p values $< .007$). Patients' perceptions of doctors' empathy were not associated with self-reported general health at time 1 or time 2 (p values $> .071$; Table 2).

TABLE 1. Descriptive Statistics

Variable	Control Group	Intervention Group	<i>p</i>
<i>n</i>	103	106	
Women, <i>n</i> (%)	68 (66.0)	73 (68.9)	.66 ^a
Age, mean (SD), y	44.1 (13.3)	42.0 (11.8)	.23 ^b
Education, median ^c , interquartile range	Bachelor's degree (2)	Bachelor's degree (2)	.34 ^d
Income, median ^e , interquartile range, €	3000–4000 (2)	3000–4000 (2)	.70 ^d
Average time spent using messaging services daily, mean (SD), min	119.1 (104.8)	129.0 (96.9)	.48 ^b
Quality of life, mean (SD)	23.3 (5.6)	23.2 (4.5)	.95 ^b
Stress, mean (SD)	9.3 (3.3)	9.5 (3.0)	.65 ^b
Optimism, mean (SD)	15.2 (5.2)	14.3 (4.7)	.19 ^b
Time from encounter to time 1 (<i>n</i> = 173) ^f	5.0 (3.5)	4.8 (3.5)	.79 ^b
Time from encounter to time 2 (<i>n</i> = 169) ^f	18.1 (3.5)	18.3 (3.3)	.75 ^b
Most common symptoms described by patients, <i>n</i> (%)			
Respiratory	9 (8.1)	28 (25.9)	<.001 ^a
Musculoskeletal	18 (16.2)	18 (16.7)	.93 ^a
Urinary	18 (16.2)	16 (14.8)	.64 ^a
Eye	13 (11.7)	11 (10.2)	.61 ^a
Skin	6 (5.4)	10 (9.3)	.33 ^a
Digestive system	6 (5.4)	5 (4.6)	.72 ^a

SD = standard deviation.

^a χ^2 Test.^b *t* Test.^c 1 = secondary school, 2 = high school, 3 = vocational school, 4 = bachelor's degree, 5 = master's degree, 6 = licentiate, 7 = doctoral degree.^d Mann-Whitney *U* test.^e Monthly salary before taxes: 1 = 0€–1000€, 2 = 1001€–2000€, 3 = 2001€–3000€, 4 = 3001€–4000€, 5 = 4001€–5000€, 6 = 5001€–6000€, 7 = 6001€–7000€, 8 = 7001€–8000€, 9 = 8001€–9000€, 10 = more than 9000€.^f Time difference is calculated for participants included in the analysis of the corresponding time point.

Figure 2 shows that patients who rated their doctors as more empathic were more likely to evaluate that their symptoms had alleviated at time 2. Logistic regression analyses further revealed that the odds ratio for alleviated symptoms per 1-unit

increase in the mean empathy score was 2.16 in the unadjusted model (95% confidence interval = 1.43–3.27, $p < .001$) and 2.24 in the adjusted model (95% confidence interval = 1.41–3.56, $p < .001$).

TABLE 2. Patients' Perceptions of Doctors' Empathy and Their Self-Perceived Concern, Symptom Severity, and General Health After the Encounter

Dependent Variable	Model 1			<i>p</i>	Model 2			<i>p</i>
	Estimated Odds Ratio ^a	95% Confidence Interval			Estimated Odds Ratio ^a	95% Confidence Interval		
Time 1								
Concern	0.50	0.37	0.69	<.001	0.45	0.32	0.63	<.001
Symptom severity	0.61	0.45	0.83	.001	0.57	0.41	0.79	.001
General health	1.31	0.98	1.75	.072	1.29	0.94	1.77	.11
Time 2								
Concern	0.53	0.38	0.75	<.001	0.55	0.37	0.82	.003
Symptom severity	0.54	0.38	0.77	.001	0.58	0.39	0.86	.007
General health	1.18	0.88	1.59	.27	1.30	0.89	1.90	.17

Model 1: unadjusted; model 2: adjusted for sex, age, income, education, quality of life, stress, optimism, time difference between doctor-patient encounter and answering the questionnaire.

^a Estimated odds ratio, Exp(estimate), indicates the change in odds for being in a higher category for the dependent variable per 1-unit increase in the mean empathy score (ordinal regression).

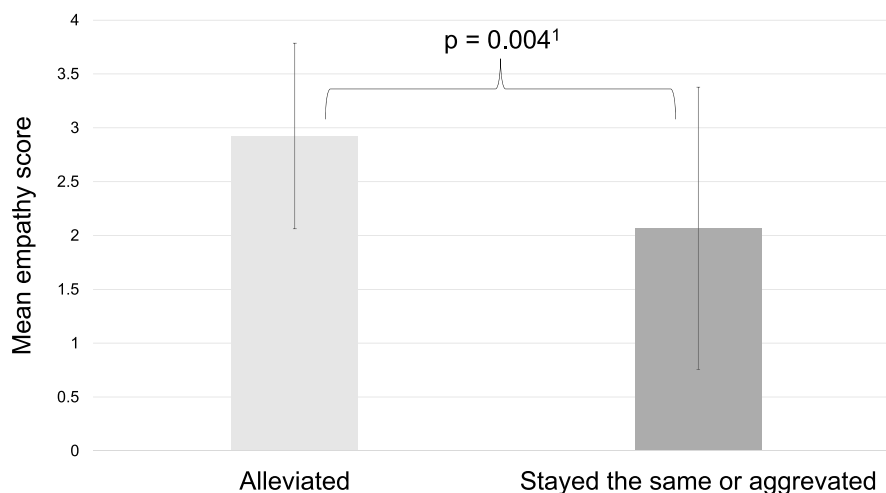


FIGURE 2. Mean empathy score (CARE questionnaire) according to patients' evaluations of their symptoms at time 2. ¹ *t* Test. CARE = Consultation and Relational Empathy.

Patients' Perceived Concern Before and After the Online Encounter and Their Perceptions of Doctors' Empathy (RQ2)

The patients' concern about their symptoms before the doctor-patient encounter was not associated with the patients' evaluations of the doctors' empathy after the online visit (Spearman $r = 0.011$, $p = .93$), whereas evaluations of doctors' empathy were significantly associated with decreased concern about symptoms after the encounter (Spearman $r = -0.375$, $p < .001$).

Furthermore, ordinal regression analysis revealed that patients' perceptions of doctors' empathy were associated with patients' concern after the encounter also when the patients' concern before the encounter (along with the other potential covariates) was taken into account (estimated odds ratio = 0.47, 95% confidence interval = 0.28–0.80, $p = .006$).

Anamnesis Questionnaire, Patients' Perceptions of Doctors' Empathy, and Self-Reported Symptoms (RQ3)

The patients in the intervention group did not differ from the control group in their ratings of the doctors' overall empathy (model 1: mean difference = 0.22 points, 95% confidence interval = -0.10 to 0.53 points, $p = .17$; model 2: mean difference = 0.21 points, 95% confidence interval = -0.12 to 0.53 points, $p = .20$).

However, when looking at the individual CARE questionnaire items (Table 3), the patients in the intervention group reported higher scores regarding how good the doctor was at "fully understanding your concerns" and "showing care and compassion" in both the unadjusted and adjusted models (p values < .028), they were also more positive about how good the doctor was at "being interested in you as a whole person" (adjusted p value = .042), although this association was not significant before taking into account the difference in the prevalence of respiratory symptoms between the groups (unadjusted p value = .062). Furthermore, they considered the doctors better at "helping you to take control" ($p = .034$), but this association did not remain significant in the adjusted model (adjusted p value = .052).

The control group reported better general health (unadjusted p value = .003), but this difference did not remain significant after adjusting for respiratory symptoms (adjusted p value = .079). No

differences between the groups were found at time 2 in patients' concern, symptom severity, or general health (p values > .27) or in patient-reported alleviation of symptoms (model 1: odds ratio = 0.13, 95% confidence interval = 0.50–2.60, $p = .76$; model 2: odds ratio = 0.002 points, 95% confidence interval = 0.43–2.32, $p = .996$).

DISCUSSION

In line with the findings from a wealth of face-to-face studies (1–9), we found that doctors' empathy as rated by the patients was consistently associated with less concern about symptoms and a perception of less severe symptoms after an online encounter. We also found that patients who rated their doctors as more empathic were more likely to report that their symptoms had alleviated.

Patients' concern about their symptoms before the online encounter was not associated with their ratings of doctors' empathy, implying that initially less concerned patients do not assess their doctors more positively. Rather, the experience of empathy itself seems to affect the patients' concern after the encounter. To our knowledge, this finding shows for the first time that the positive effects of empathy on patients' self-perceived health status are not only restricted to face-to-face consultations.

Because of the nature of the study, the doctors were informed that the study was about empathy, which may have affected the doctors' communication style. However, we were still able to find significant variation in the patients' responses to the CARE questionnaire, indicating that no ceiling effect was reached. Interestingly, there is much more variation from the perfect CARE score in our results when compared with the face-to-face study by Rakel et al. (27). This implies that patients may generally consider doctors as less empathic during online interaction as compared with face-to-face interaction. Indeed, the participants and their symptoms were different in these two studies, but this observation nevertheless underlines the importance of supporting experiences of empathy especially in online environments.

We also found that patients' perceptions of doctors' empathy were not associated with their self-reported general health after the encounter. This indicates that perceived general health is a broader and more stable concept than the acute symptoms for

TABLE 3. Effects of the Augmented Anamnesis Questionnaire on Patients' Perceptions of Doctors' Empathy (CARE Questionnaire), Their Symptoms, Concern, and General Health

Variable	Model 1			Model 2				
	Estimated Odds Ratio ^a	95% Confidence Interval	<i>p</i>	Estimated Odds Ratio ^a	95% Confidence Interval	<i>p</i>		
Time 1								
How good was the practitioner at...								
1. Making you feel at ease	1.61	0.90	2.87	.11	1.70	0.93	3.12	.083
2. Letting you tell your "story"	1.12	0.60	2.09	.72	1.05	0.55	1.99	.89
3. Really listening	1.30	0.71	2.39	.39	1.31	0.70	2.46	.39
4. Being interested in you as a whole person	1.84	0.97	3.49	.62	2.00	1.02	3.92	.042
5. Fully understanding your concerns	1.97	1.07	3.63	.030	2.05	1.08	3.86	.027
6. Showing care and compassion	1.97	1.09	3.55	.025	2.15	1.16	3.97	.015
7. Being positive	1.38	0.76	2.50	.29	1.52	0.82	2.83	.19
8. Explaining things clearly	1.44	0.81	2.58	.21	1.43	0.78	2.61	.24
9. Helping you to take control	2.13	1.06	4.28	.034	2.09	0.99	4.41	.052
10. Making a plan of action with you	1.08	0.56	2.09	.82	0.98	0.49	1.96	.95
Concern	1.18	0.66	2.11	.58	1.23	0.67	2.25	.51
Symptom severity	1.04	0.59	1.85	.89	1.03	0.57	1.87	.92
General health	0.41	0.23	0.74	.003	0.58	0.31	1.07	.079
Time 2								
Concern	0.78	0.40	1.51	.46	0.82	0.41	1.62	.57
Symptom severity	0.76	0.38	1.54	.45	1.14	0.42	3.09	.80
General health	0.73	0.41	1.29	.28	0.72	0.40	1.30	.28

CARE = Consultation and Relational Empathy.

Model 1: unadjusted; model 2: adjusted for patient-reported respiratory symptoms.

^a Estimated odds ratio, Exp(estimate), indicates the change in odds for being in a higher category for the variable when comparing the intervention to control groups; values >1 indicate increased values for the intervention group; ordinal regression).

which the patients contacted the doctor in the first place. Thus, empathy may decrease concern and alleviate self-perceived symptoms specifically for the ailment the patient was seeking help for, but its effects do not generalize to other health areas or patients' overall perception of health.

The Augmented Anamnesis Questionnaire

We found that, although augmenting the anamnesis questionnaire did not affect the patients' overall evaluations of the doctors' empathy, it did have specific positive effects on three aspects of the patients' evaluations about the doctors' empathy: feeling that the doctor fully understood the patients' concerns, showed care and compassion, and was interested in them as "a whole person" (in the adjusted model only). Thus, the added elements in the augmented anamnesis questionnaire produced better experiences in these specific areas of empathy, but not others.

It should be noted that looking into the specific items of the questionnaire is less reliable than focusing on the sum scores. The developers of the CARE questionnaire state that the questionnaire aims at taking into account practitioner empathy as a broad concept involving different subdimensions, whereas the overall perception of empathy is expected to have the beneficial outcomes (36). However, when studying the potential to support patients' experiences of empathy, it is of interest to look into these subdimensions in addition to investigating empathy as a broader concept to determine

what kind of potential benefits the questionnaire has and what are the areas that it is less likely to affect.

Based on the data presented in this article, we cannot make definite inferences on the mechanisms through which the augmented anamnesis questionnaire may influence patients' experiences of empathy. Two separate processes may occur. First, the doctors might have been more sensitive to patients' worries and medical knowledge as this information was explicitly provided for them, therefore leading to an improved interaction at the online visit. Second, as discussed in Introduction, it is possible that exposure to concepts related to empathy in a questionnaire could prime patients' thinking to notice empathy-related signals more readily and also engage in more empathic behavior themselves in an ensuing interaction context.

The specific effects on evaluations of doctors' empathy can be linked to the content that was added to the regular anamnesis. The increase in feeling that the doctor understood the patient's concerns may have been fostered by the inquiry about the patient's level of concern together with the question about the knowledge level of the patient. The automated empathic answer to high-concern responses may have contributed to all the three CARE items. The items that were not improved in the CARE evaluations ("Making you feel at ease," "Letting you tell your "story," "Really listening," "Being positive," "Explaining things clearly," and "Making a plan of action with you") were not as directly represented in the augmented anamnesis. In addition, these aspects of empathy may be more difficult to

convey over chat. For instance, behaviors of active listening are more easily expressed via nonverbal means than over text-based chat.

These results provide an interesting viewpoint to text-based communication that also encourages new studies focusing on the potential to support patient experiences also with automated tools. These tools are undeniably only one part of the care process and do not take away the importance of supporting healthcare personnel's communication skills when interacting with patients. However, because these types of automated solutions for health care are already in use and will be increasingly in use in the future, their effects on patients' experiences are not insignificant, and their development is an important research focus.

Strengths, Limitations, and Future Work

The strengths of the study include the relatively high number of participants, the longitudinal follow-up for gathering data on the patients' experiences during an ecologically valid real-life doctor-patient encounter, and an experimental setup for studying the potential effects of the augmented anamnesis questionnaire.

The study also has some limitations. In this study, the data on patients' health were solely based on subjective reports, which do not provide as reliable information on the patients' physical health or healing as objective measures. Future research should look into the biomarkers of health in a similar setting to determine whether patients' perceptions of doctors' empathy online not only affect their subjective experience of health but also promote objectively measured healing. Furthermore, in this study, we were not able to measure the individual characteristics of the physicians, such as experience, empathy traits, or sex, which is a limitation because all of these might affect the patient's experiences of empathy during the encounter.

Also, even though we saw an overall effect of patients' evaluations of doctors' empathy on their health perceptions, the patients' symptoms and needs were very heterogeneous among the participants, not allowing us to focus on the potentially differential effects of empathy on patients with different symptoms and diagnoses.

It should be noted that using the augmented questionnaire only affected the patient's evaluations of the doctors' empathy on some of the subscales of the CARE questionnaire and not on the questionnaire sum score. Thus, although these results provide some evidence on the benefits of the augmented questionnaire, further studies should be conducted to verify these findings. Our choice of using the CARE questionnaire permitted a comparison with previous research but might have included empathic behaviors that are inherently difficult to express in text-based environments. Future studies should use also other measures for assessing empathic behaviors that are easier to express during limited text-based messaging. They could also focus on the elements that were expected to support experiences of empathy in the augmented anamnesis questionnaire one by one to tease apart their potential independent influences.

Furthermore, the data for the intervention and control groups were collected at different time periods following each other. Thus, we cannot rule out all the temporal effects caused by collecting the data during different seasons for affecting the results. In this study, random preassignment of patients into treatment and control groups was not possible, as there was no way to tell who would potentially contact the service during the data collection months. Because the study was conducted in the actual online service

and with true patients and doctors, emphasis was also placed on interfering with the care process as little as possible. Therefore, interest in participation was asked only after the patient had completed the anamnesis questionnaire.

CONCLUSIONS

Our results show for the first time that patients' perceptions of doctors' empathy can support their self-perceived health status after an online encounter. These findings are especially important today, as the need for online solutions for health care has increased because of the COVID-19 pandemic. There is still a clear need to focus on ways to enrich the online communication between the patients and the doctors to support the care process from a patient-centered point of view. These results encourage further development and research on methods for supporting patients' experiences of empathy online.

The study was supported by grants from Business Finland and Ella and Georg Ehrnrooth's Foundation. We warmly thank all the doctors and patients for participating and in investing their time in this study as well as the staff of Mehiläinen for their help in the implementation of this study.

Contributors: S.M.: planning of the study design, literature search, data collection, data analysis, data interpretation, writing the manuscript, and compiling the figures and tables. M.F., V.W., and K.S.: planning of the study design, literature search, data collection, data interpretation, and writing the manuscript. K.S. is also the leader of the research project. S.P.: planning of the study design, coordinating the implementation of the study within the company, data interpretation, and writing the manuscript. All authors approved the final version.

Source of Funding and Conflicts of Interest: The study was funded by grants from Business Finland (No. 2839/31/2017; to S.M., M.F., V.W., and K.S.) and Ella and Georg Ehrnrooth's Foundation (to S.M.). S.P. is currently employed by Mehiläinen. As required by Business Finland's funding procedure, Mehiläinen contributed approximately 1.5% of the whole grant awarded by Business Finland to the research project.

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