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A Mixed Method Study Investigating the Impact of Talking about Patients' Internet Use on Patient-Reported Outcomes

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This study aims to propose and test a model that provides a more comprehensive understanding of the impact of discussing online health information on patient outcomes. By combining survey data ($N = 160$) and qualitative analysis of video recordings of consultations ($N = 165$) with structural equation modeling, this study explores: (1) whether patients and health-care providers talk about online medical information and (2) the impact of talking about online medical information on patient outcomes (patient satisfaction, recall of medical information, and medication adherence). Results show that more than half of the patients searched online prior to their consultation. In about half of these consultations (46.81%), the online information was discussed. Patients were more satisfied with the consultation if the online information was discussed during the consultation. Moreover, patient satisfaction was positively related to recall of medical information, but only in patients with whom the online information was discussed. There was no effect found on medication adherence. Results of this study demonstrate the importance of talking about online information during a consultation for improving patient outcomes. Implications for research are discussed.

Because of significant changes in today's society and media landscape, the internet is an important and easy to use gateway to relevant information before patients consult their health-care provider (Abdul-Muhsin, Tyson, Raghu, & Humphreys, 2017; Fox & Duggan, 2013). The internet has brought patients greater access to health information, thereby increasing their autonomy in accessing information to satisfy their information needs (Caiata-Zufferey & Schulz, 2012). Patients are more confident and empowered during the consultation if they went online first (Tan & Goonawardene, 2017). Additionally, they report to be more confident in their health-care providers' diagnosis once they discussed their online findings. Notwithstanding the potential benefits of internet health information seeking, many concerns have been raised about the impact of online health information on patient outcomes and the patient–provider relationship (Im & Huh, 2017). Online information is often not accurate, may be difficult to understand, and interpretation of information can be overwhelming (Diviani, van den Putte, Meppelink, & van Weert, 2016). Hypothesized negative effects of patients' online information seeking behavior on (patient) outcomes include inappropriate requests for clinical interventions (Eysenbach & Köhler, 2002), higher anxiety, and higher non-adherence rates (Linn et al., 2018).

If and how health-care providers deal with online information is expected to be highly relevant to the success of the consultation and consequently, patient outcomes. Unfortunately, knowledge is scarce on whether patients' online medical information seeking behavior should be discussed and how this affects patient outcomes. Anecdotal research shows that patient satisfaction can be enhanced or jeopardized, depending on how providers communicate with their patients about online medical information (Bylund, Gueguen, D'Agostino, Li, & Sonet, 2010; Bylund, Sabee, Imes, & Aldridge Sanford, 2007). This study adds to this line of research by focusing on other important patient outcomes (e.g., recall of medical information and medication adherence).

Furthermore, most studies in this field use retrospective questionnaires and many results are descriptive (Tan & Goonawardene, 2017). Using retrospective questionnaires has some major drawbacks such as recall bias and could provide inaccurate results (Shiffman, 2009). Additionally, these studies often used a healthy population (Bylund et al., 2007). The current study differentiates itself by analyzing chronically ill patients' and health-care providers' actual behavior by combining videotapes of consultations and survey data. This would help paint a more complete picture of the frequency with which patients talk about the information found online but also the impact on patient outcomes.

By adding to this line of research, the following research question is proposed: how is talking about online information related to patient satisfaction, recall of medical information, and medication adherence (RQ1)? To this end, this study has two aims: (1) to propose a conceptual model that provides a more comprehensive understanding of the impact of talking about online medical information on patient outcomes and (2) to empirically test this model to understand which of these patient

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outcomes (i.e., patient satisfaction, recall of medical information, and medication adherence) are affected by discussing online medical information among a chronically ill patient population. The current study focusses on chronically ill patients at the start of their treatment. Health-care providers are still patients' preferred, most trusted information source. Nonetheless, many patients use the internet as a source of information in addition to their health-care provider (Feathers, Yen, Yun, Strizich, & Swaminath, 2016). Previous research shows that chronically ill patients often use online health information to help them to make treatment decisions (Fox & Duggan, 2013).

Talking about Online Information during a Consultation

The internet became an ever-present part of individuals' information lives. Currently, most people have access to, and are becoming comfortable with using the internet to fulfill their information needs (Tan & Goonawardene, 2017). The changing paradigm in which patients changed from passive to active patients occurred almost simultaneously with the rise of the internet (Wald, Dube, & Anthony, 2007). These active patients fit in nicely with a broader trend in which individuals take a more active role in all aspects of life (Beck, Giddens, & Lash, 1994). In general, patients who seek online health information report a greater understanding of, and ability to manage, their health (Diaz et al., 2002; Imes, Bylund, Sabee, Routsong, & Sanford, 2008; Wald et al., 2007). As a result, patients feel more empowered and are more inclined to be involved in their own health. This may also change the way patients and health-care providers talk to each other (Tan & Goonawardene, 2017).

The few studies on this topic examined this along four themes: (1) communication strategies used to talk about the online information, (2) predictors of talking about the online information, (3) facilitators to talk about the online information, and (4) barriers to talk about the online information (Tan & Goonawardene, 2017). Percentages of patients discussing the online information with their health-care provider vary between 10% and 75% (Chung, 2013; Corcoran, Haigh, Seabrook, & Schug, 2010; Fox & Rainie, 2002; Shen et al., 2015). This means that up to 90% of the patients do not discuss online health information with their health-care provider. When talking about online information, patients can use direct (i.e., by asking questions or making suggestions) or indirect (i.e., discussing the information found online without revealing that they used the internet) references (Bylund et al., 2007; Kivits, 2006; Sommerhalder, Abraham, Zufferey, Barth, & Abel, 2009). Facilitators to discuss online health information include having a family member present during the consultation and an open communication style (i.e., health-care providers' encouragement to talk about the online information). Barriers include patients' fear of how the health-care provider would react (i.e., by "stepping on the doctor's turf") and a closed communication style (i.e., discouragement or neglecting patients' initiation; Bylund et al., 2010; Imes et al., 2008; McMullan, 2006).

Overview of Patient Outcomes

Accumulating evidence indicates that the communication between patients and health-care providers plays an important role in impacting patient outcomes. In the current study, a conceptual model will be developed and empirically tested to gain more insight into the impact of talking about online health information patients on three important patient outcomes (i.e., patient satisfaction, recall of medical information, and medication adherence).

Patient Satisfaction

Patient satisfaction can be considered a multidimensional concept in which patient satisfaction is a positive attitude or a positive evaluation of health-care services (Linder-Pelz, 1982). In this view, patients evaluate different aspects of their care, for example, the quality of the communication and the degree to which the health-care provider fulfills their needs (Sixma, Kerssens, Campen, & Peters, 2002). When patients seek online information prior to the consultation, they often expect that they can discuss this information with their health-care provider (Diaz, Sciamanna, Evangelou, Stamp, & Ferguson, 2005; Sommerhalder et al., 2009). Only a few studies demonstrated that not feeling encouraged to discuss the information retrieved online, or not being able to do so, can lead to dissatisfaction (Bylund et al., 2007). On the contrary, when providers take patients' online health information seeking seriously, this is generally positively related to patient satisfaction (Bylund et al., 2010; Hay et al., 2008a).

Recall of medical information

Information about medication is often difficult to understand and remember. It is therefore not surprising that 40–80% of the information provided by the health-care provider is immediately forgotten (Kessels, 2003). Recall of medical information can be defined as a patients' ability to understand and reproduce medical information (Linn, van Dijk, Smit, Jansen, & van Weert, 2013). An explanation of how talking about online medical information affects recall of medical information can be found in a psychological process called *forward encoding*. When patients seek medical information online before the consultation and talk about these topics during the consultation, they will be exposed to two different modalities (i.e., the internet and patient–provider communication). If exposed to multiple communication modalities, forward encoding is stimulated (Voorveld, Neijens, & Smit, 2011). Forward encoding occurs when a message in the first modality (i.e., medical information found on the internet) "primes" attention to a message in the second modality (i.e., talking about the same online medical information during a consultation). This may stimulate interest, curiosity, deeper processing, and consequently, recall of medical information (Dijkstra, 2002). This process is also demonstrated in a review on the use of preparatory tools. This review concludes that talking about patients' preparations during a consultation can improve recall of medical information (Brandes, Linn, Butow, & van Weert, 2014). In the study of Brandes and colleagues (2014), the patients' preparation consisted of a Question Prompt List (QPL, a structured list of

questions provided hardcopy or online that can be used as a form of preparation before a consultation). The use of a QPL especially improved recall when the health-care provider was proactive in talking about the tool (Brown et al., 2011). Thus, if health-care providers talk about patients' preparations, this is expected to result in higher recall rates compared to health-care providers who do not talk about patients' preparatory work (e.g., reading online health information prior to the consultation).

Medication Adherence

Medication adherence refers to whether patients take the medication as prescribed as well as whether they continue to take their prescribed medication (Sabaté, 2003). Although non-adherence is directly related to poor clinical outcomes, high health-care costs, and poor well-being (Osterberg & Blaschke, 2005), non-adherence rates are high, varying from 30% to 80% (van den Bemt, Zwikker, & van den Ende, 2012; Vrijens et al., 2012). Recall of medical information is an important first step in achieving successful medication adherence (Linn et al., 2013). After all, if patients do not remember how, when, and what kind of medication to take, they will not be able to adhere to their medication. The relationship between recall and adherence is often discussed, but only a few studies researched it. The few studies testing this relationship indeed suggest that recall is positively associated with successful medication adherence (Eysenbach, 2003; Ley, 1988; Linn et al., 2013).

To summarize, we discussed several patient outcomes that might be directly or indirectly affected by discussing online medical information during a consultation. To address our first aim, an overview of the aforementioned patient outcomes is presented in a conceptual model. To address our second aim, we will empirically test which of these patient outcomes are affected by discussing online medical information. Thus, it might be expected that talking about the online information results in higher levels of patient satisfaction and better recall of medical information. Research on patient–provider communication also suggests that patient satisfaction with a consultation is directly related to recall of medical information. It can be expected that this relation will be stronger when patients are exposed to multiple modalities and the preparatory work of the patients is acknowledged, i.e., discussed during a consultation. Additionally, it is expected that recall of medical information is directly related to medication adherence. Based on

the literature on patient–provider communication and the effects of internet use on patient outcomes, we propose the following conceptual model as displayed in Figure 1.

In testing the model, the following (sub)questions and hypotheses are proposed:

RQ2: How many patients seek online health information prior to their consultation?

RQ3: How many patients and health-care providers talk about online information and who initiates the discussion?

H1: Talking about online information is positively related to patient satisfaction as compared to not talking about it.

H2: Talking about online information is positively related to recall of medical information as compared to not talking about it.

H3: (a) Satisfaction with the consultation is related to improved levels of recall, (b) this relationship is stronger when patients and health-care providers talk about online information.

H4: Recall of medical information is positively related to medication adherence.

Methods

Procedure and Design

In the Netherlands, as part of usual care, nurses inform patients about their newly prescribed, severe medication (in this case immunosuppressive and biological therapy). In total, eight nurses from six different hospitals participated in the study. Patient inclusion criteria for this study were (a) diagnosed with Crohn or Ulcerative Colitis, (b) about to start with one of the following medication: Azathioprine, Methotrexate, Adalimumab, Infliximab, 6-mercaptopurine, or 6-thioguanine, and finally (c) being able to speak and write Dutch. The Medical Ethical Committee of the authors' university granted permission for this study, which was supplemented with local feasibility statements.

This retrospective cohort study was part of a larger research project aimed at developing and testing a theoretical and evidence-based tailored multimedia intervention to improve medication adherence in patients with Inflammatory Bowel Disease (IBD). For the purpose of this study, we will only report on
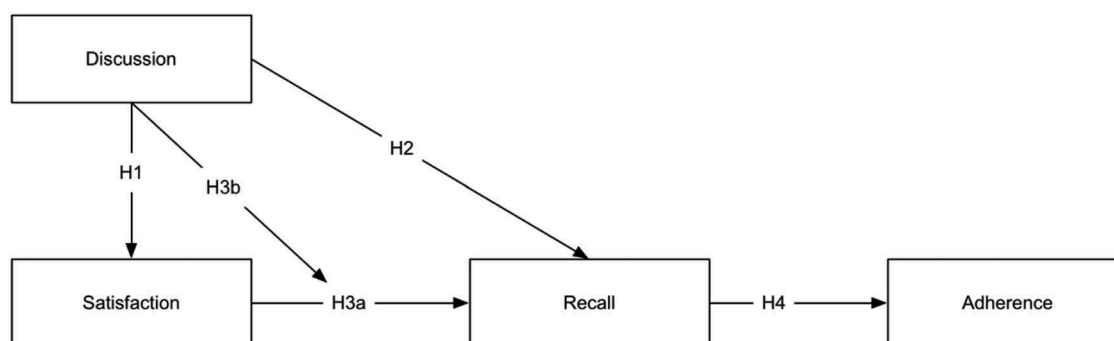

Fig. 1. The conceptual model.

measurements that are relevant to our research questions. Prior to the consultation, patients completed a questionnaire containing several topics such as demographics, medical information, and online health information seeking behavior (T0). Second, the consultations were recorded on video (T1). Third, directly after the consultation, patient satisfaction was measured (T2). Fourth, a follow-up survey was conducted by telephone, 3 weeks after the consultation (T3). This survey measured recall of medical information and medication adherence.

Participants

In total, 165 patients participated in the survey. From five patients, demographics were missing; therefore, they were excluded from the analysis. The sample consisted of 92 women (57.50%), the mean age was 43. The majority was diagnosed with Crohn's disease. On average, the respondents had been diagnosed for almost 12 years. Of the respondents, the majority was moderately or highly educated (see Table 1).

Measurements

Online Medical Information Seeking Behavior
To assess to what extent patients used the internet before the consultation to search for medical information (T1), patients were explicitly asked if they used the internet to search for medical information ("yes" or "no"). This variable was used to group internet users and non-users for further analysis.

Patient Satisfaction
To assess patient satisfaction, a 29-statement scale was used (Linn, van Weert, van Dijk, Horne, & Smit, 2016), measured at T2 (i.e., directly after the consultation). This scale consisted of three subscales. First, satisfaction with the general information provided (e.g., about the disease and treatment; 12 items, α = .87). Second, satisfaction with medication support (7 items, α = .67). Third, the level of affective communication (10 items, α = .82). Respondents were asked to rate statements

Table 1. Patient demographics

Patient Characteristics[a]		N = 160	%
Gender			
	Female	92	57.50%
Age			
	M (SD)	43.10 (15.33)	
Type of disease			
	Crohn's disease	101	63.12%
	Colitis Ulcerosa	49	30.62%
	Other	10	9.09%
Diagnosed in years			
	M (SD)	11.61 (10.55)	
	Range	1.5–47.1	
Educational level			
	Low	36	22.50%
	Moderate	61	38.13%
	High	63	39.37%

note: Demographic data of five patients were missing.

on a four-point scale, ranging from 0 (very good) to 3 (could be much better), M = 1.06; SD = 1.04.

Recall of Medical Information
Recall of medical information was measured using a structured telephone interview 3 weeks after the consultation (T3). To measure recall of medical information, an adapted version of the Netherlands Patient Information Recall Questionnaire (NPIRQ) was used (Jansen et al., 2008). Patients were prompted to remember the information that the nurses gave about the prescribed medical treatment during the consultation. Examples of questions are "Can you describe the purpose of your treatment?", "Can you describe the most common side effects of your prescribed medication?", and "Can you describe how you should administer your medication." All questions were provided with three response options: "not discussed," "discussed, but I can't remember the details," and "discussed, namely . . . ." With the latter, the patient was invited to write down what (s)he recalled about this topic. Each item recalled by the patient was recorded and checked against the information mentioned by the nurse using an observation checklist (Jansen et al., 2008). Answers to the questions were coded as 0 (not recalled), 1 (partially recalled), or 2 (recalled correctly). In line with previous studies (Jansen et al., 2008; van Weert, Jansen, Spreeuwenberg, van Dulmen, & Bensing, 2010), a percentage of accurate recall was calculated by dividing the sum of accurate items that were recalled by the total number of items questioned (M = .51; SD = .16). In total, 19 consultations (13%) were coded by a second coder to calculate intercoder reliability. Intercoder reliability was high (Kappa = .91).

Medication Adherence
Medication adherence was measured after 3 weeks (T3) using one item (Linn et al., 2013). The question was as follows: "how closely do you follow instructions when you take your medication (right amount of pills/injections per day/week)." Patients were asked to rate their medication adherence on a 10-point scale, ranging from 0 (not at all adherent) to 10 (completely adherent), (M = 8.64; SD = 1.53).

Analysis

To describe how many patients sought online before a consultation about their medication (RQ2), and who initiated the discussion about this information (RQ3), self-reported data (T0) was combined with video recordings of consultations (T1). Consultations were listened to and transcribed in MAXQDA. Based on the survey and the transcripts, four groups were identified: (1) not searched/not discussed, (2) not searched/discussed, (3) searched/not discussed, and (4) searched/discussed. Patients were included in the analysis if (any combination of) the words *internet, Google(d), webpages, fora, online*, or any other internet-related words were mentioned (N = 60).

To test the model, first, independent *t*-test were used to gain insight into the differences between groups (i.e., 3) searched/not discussed and 4) searched/discussed) on the variables satisfaction with consultation, recall of medication information, and adherence. To test the hypothesis, Structural Equation Modeling

(SEM; AMOS 23) was used. This method allowed for testing the whole model at once, instead of separate analysis which would mean a capitalisation on chance.

Missing values were imputed using regression imputation. In total, 165 observations were used for the analysis. The model was tested using the two-step approach in which first the measurement and then the structural part were tested. Since the model would also be tested for the subsample of patients that searched for online health information prior to the consultation ($n = 97$), the model was tested using the derived latent factors from the measurement structure and these were inserted as observed variables in the structural part (Kline, 2016). While it would be more in line with the two-step approach to use the measurement part as input for the structural part, doing this would largely exceed the minimum ratio of 1:10 as discussed by Kline (2016). Using the latent variables directly would only leave eight values to be estimated, thus still satisfying the 1:10 ratio. The measurement model was specified and showed a good fit ($\chi2(2) = .419$, $p = .811$; $CFI = 1.00$; $RMSEA = 0.00$, CI90% [.00, .09]). The constructs showed good discriminative validity, the maximum absolute correlation between factors was $r = .16$.

The following variables were included in the model: talking about online health information, patient satisfaction, and the interaction between these two as independent variables and recall of medication information and adherence as dependent variables (see Appendix 1).

Patient Satisfaction

Within the structural equation model, satisfaction with the consultation was inserted in the model using the three subscales. While scale 1 loaded strongly on the latent factor, scale 2 ($\beta = .66$; $R^2 = .43$) and scale 3 ($\beta = .69$; $R^2 = .47$) showed lower standardized estimates compared to the standard of Kline (2016). Deleting these items resulted in a significant lower model fit and loss of much data; therefore, they were included in the sum scale that was created.

Recall of Medical Information

Within the structural equation model, this observed variable was inserted as a one item latent factor with an assumed error margin of 10% (variance of error term = .3). This margin was chosen by first taking the intercoder reliability (.9) as starting point and then by exploring whether changing the error margin, and thus the error term variances, changed the model fit and estimates significantly, which it did not.

Medication Adherence

Within the structural equation model, this single item scale was inserted as a one-item latent factor with an assumed error margin of 10% (variance of error term = .11). This margin was achieved by taking the assumed measurement error of the variable *recall* and then exploring whether changing the error margin, and thus the error term variances, changed the model fit and estimates significantly, which it did not.

Interaction Satisfaction and Talking

To test the moderation of the variables satisfaction and talking about the online information on recall of medical information, a moderation variable was made by making a new variable (called *interaction*) consisting of the calculation: satisfaction * discussion ($M = .34$; $SD = .63$). The dataset was ill-scaled and recall was therefore transformed. The minimization history showed no errors, with a steady decline across diameter, condition, and F without too many tries or negative eigenvalues. No Haywood cases appeared.

Results

Talking about Online Health Information

First, we explored how many patients sought online health information prior to their consultation, how many patients and health-care providers talked about it (RQ2) and who initiated the discussion about this information (RQ3). In total, 57.00% ($n = 95$) patients searched for medication-related online information prior to the consultation. In 46.81% ($n = 44$) of the consultations with these patients, the online health information was discussed. Overall, the discussion of online health information was almost evenly initiated by patients ($n = 33$; 55.00%) and health-care providers ($n = 27$; 45.00%).

The Health Information Triangulation Model

To test the hypotheses, the proposed conceptual model was only tested for patients who searched online health information prior to the consultation. Hypothesis 1 predicted that talking about patients' online health information was positively related to patient satisfaction. Hypothesis 1 was confirmed: there was a significant relation between the discussion of online health information during a consultation and patient satisfaction ($B = -.69$, $p < .001$). Meaning, patients who talked about the online health information during consultation were more satisfied with the consultation ($M = .86$; $SD = .61$) compared to patients who searched online but did not talk about it ($M = 1.30$; $SD = 1.13$), $M_{diff} = -.43$, $p = .041$, d = .48). Hypothesis 2 predicted that talking about patients' online health information was positively related to recall of medical information, compared to not talking about. Hypothesis 2 was rejected. There was no significant relation between discussion of online health information and recall of medical information ($M_{diff} = .12$, $p = .310$). Hypothesis 3 predicted that patient satisfaction was related to an improved level of recall of medical information (3a), and that this effect was stronger when patients and health-care providers talk about patients' online health information (3b). Hypothesis 3a was rejected; there was no significant direct relation between patient satisfaction on the recall of medical information ($M_{diff} = -.13$, $p = .270$). Hypothesis 3b was confirmed with a marginal significance level: for patients discussing online health information, higher satisfaction with the consultation was related to higher recall of medical information, compared to not discussing it ($M_{diff} = .32$, $p = .054$). Hypothesis 4 predicted that recall of medical information was positively related to medication adherence and was rejected. There was no significant relation between recall of medical information and adherence ($M_{diff} = .01$, $p = .922$). The outcomes are displayed in Table 2 and Figure 2.

Table 2. Means per condition on patient satisfaction, recall of information and medication adherence.

	Internet use			Group			
	Overall	No	Yes	1	2	3	4
Satisfaction*	1.06	.99	1.10	.98	1.09	**1.30[b]**	**.86[b]**
Recall	.51	.48[a]	.53[a]	.47	.51	.53	.52
Adherence	9.15	9.14	9.16	9.21	8.86	9.21	9.15

[a]Mdiff = .05, p = .007; [b]Mdiff(78.99)= .43, p = .029.
*lower means indicates higher.

Discussion

This study aimed to gain more insight into how talking about online information is related to patient outcomes. We proposed and tested a conceptual model that aimed to provide a more comprehensive understanding of the impact of talking about online information on patient outcomes (i.e., patient satisfaction, recall of medical information, and medication adherence). More than half of the patients searched for online health information prior to the consultation. In around half of these consultations, online health information was discussed, initiated evenly by patients and health-care providers. Results also showed that, if patients and health-care providers talked about online health information, this resulted in higher patient satisfaction. Furthermore, satisfaction was positively related to recall of medical information, but only in patients who discussed the online information during the consultation. Based on the results of our study, we propose the Health Information Triangulation Model (see Figure 3).

Only half of the patients talked about the online information with their health-care provider. These results are in line with previous research indicating that percentages of patients who (intended to) discuss the online information vary between 10% and 75% (Corcoran et al., 2010; Fox & Rainie, 2002; Shen et al., 2015). However, it is possible that patients in our sample discussed online information without disclosing the source (i.e., indirectly). According to a study among cancer patients, almost half of the patients indirectly disclose online health information (Bylund et al., 2007). As we analyzed recordings of actual consultations, we only coded if patients directly disclosed online information. Possibly, more patients discussed online health information without us being able to code this. Future research could supplement recordings of consultations with self-reported measurements (i.e., interviews) in which patients are asked which online information was cited during the consultation.

In a non-disease-specific patient population, it was found that health-care providers' disagreement with online information resulted in lower patient satisfaction (Bylund et al., 2007). On the contrary, taking the information seriously was related to greater patient satisfaction (Bylund et al., 2010). Our results demonstrate that not the communication style but the act of discussing online health information improved patient satisfaction. It might be that the effect on patient satisfaction is stronger for certain communication styles. Due to a lack of power, we were not able to differentiate between these different communication strategies (e.g., taking the information seriously). Future research should experimentally test the effects of different communication strategies. This would not only allow us to gain more insight into the different effects of these communication strategies on patient outcomes, it would also allow us to pinpoint causalities.

In today's information environment, patients often combine advice from different sources (Harvey, Harries, & Fischer, 2000). In relation to medical information, health-care providers and the internet are the most common sources of conflicting information. Previous research demonstrated a negative effect of receiving conflicting information on medication adherence
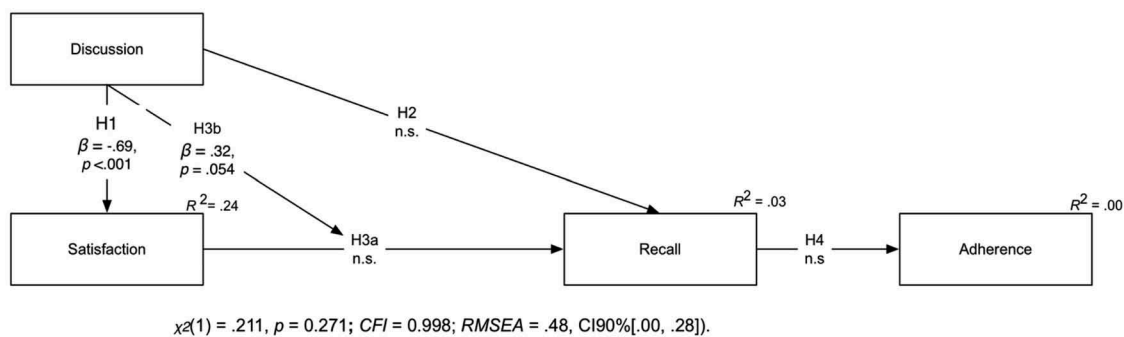

$\chi2(1) = .211$, $p = 0.271$; $CFI = 0.998$; $RMSEA = .48$, CI90%[.00, .28]).

Fig. 2. Hypotheses with significant standardized regression coefficients.
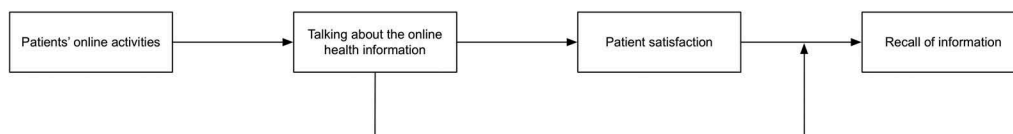

Fig. 3. The health information triangulation model.

(Carpenter, Elstad, Blalock, & DeVellis, 2014). As we did not analyze how the online information was discussed (e.g., repeated by the nurse or corrected in the case of inaccurate information), experimental studies should be conducted to explore how repeating or correcting online information would affect recall of medical information and medication adherence. We used forward encoding to explain the effect of talking about online information on recall of medical information. Our findings suggest that forward encoding (Dijkstra, Buijtels, & van Raaij, 2005) is a useful psychological process that should be considered when analyzing the effects of the use of different modalities in health communication. We, however, did not measure forward encoding. Forward encoding should be included in future research to exclude other processes or mechanism such as encoding variability (i.e., the information will be encoded in a more complex manner when patients are exposed to the same message in a variety of media (Voorveld & Neijens, 2015)) that might contribute to the effect of multiple exposures on recall of medical information.

We did not find an effect of recall of medical information on medication adherence. A possible explanation can be found in the way we measured adherence. Rossiter (2002) proposes that if the behavior can be operationalized as concrete, it is not necessary to use multiple items to measure this construct. Thus, we can assume that the item used to measure adherence might be accurate; however, other measurements such as refill data or electronic monitoring may enhance the validity of our findings.

A limitation of this study is that we measured patient's online health information seeking behavior before the consultation which might have primed patients to talk about their online-seeking behavior. We limited this possibility by taking the following precautionary measures. First, patients were blinded to the actual purpose of this study. Second, as this study was part of a larger project, we not only included patients' online medical information seeking behavior in the survey but also other measurements. Third, we checked whether the recordings could be considered an accurate reflection of an average consultation. According to the providers who were interviewed afterward, the taped consultations were usually reflecting an average consultation. However, possible priming effects could not be excluded and future research should control for possible testing effects.

The proposed model could be extended with factors such as the type of information searched and the attention paid to the discussion of online health information. First, in the current study it remains unknown which online health information patients encountered prior to the consultation. When seeking online, patients can use information found in peer-reviewed journals or join an online discussion forum. These sources differ in function, content, credibility, and needs fulfillment. For example, information found in a peer-reviewed journal might fulfill patients' information needs while participating in a forum fulfills patients' need for support (Sanders, Linn, Araujo, Vliegenthart, & van Weert, 2017). These different sources might also affect the consultation differently. Imes

and colleagues (2008), for example, showed that the type of information found (e.g., low-quality information) affects patients' intention to discuss this information with their health-care provider. Moreover, in the current study, talking about online health information was treated as a dichotomy. It can be argued that talking about online information is a continuum, ranging from "no attention" to "a lot of attention" (Im & Huh, 2017). As we measured online information seeking with only one dichotomous item, we neither have data on the type of information nor on the attention paid. Future research should take measures into account that capture the inherent complexity of online health information. By doing this, more variation will be considered, which could possibly lead to a more detailed picture.

Conclusion

Theoretically, the current study has been among the first that integrates two previously distinct bodies of research: patient–provider communication research and the literature on internet-seeking behavior. In doing so, we identified promising avenues for future research in health communication. By combining survey data and qualitative analysis of video recordings of actual consultation with structural equation modeling, the Health Information Triangulation Model is proposed.

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Appendix I

Model correlation matrix with mean and standard deviations

Variables	1	2	3	4	5
1. Discussion	1.00	-	-	-	-
2. Satisfaction with consultation	−.09	1.00	-	-	-
3. Recall of medication information	−.07	−.09	1.00	-	-
4. Interaction	.72	.23	.01	1.00	-
5. Adherence	−.09	−.08	.11	−.14	1.00
Mean	.36	1.06	.51	.34	8.64
SD	.48	1.04	.16	.63	1.53