

Impact of Online Health Information on Patient-physician Relationship and Adherence; Extending Health-belief Model for Online Contexts

Tahir Hameed

SolBridge International School of Business, Daejeon, Republic of Korea

Keywords: Online Health Information, Patient-physician Relationship, Health-belief Model, Adherence, Health Behavior.

Abstract: Physicians have information advantage over patients in terms of professional knowledge and expertise, implying patients have to fully depend on them for diagnosis, prescription and treatment. However, in the wake of abundant online health information (OHI) on the internet and through mobile apps, these days patients appear to be better-informed when approaching their physicians. As per health-belief model, patients would be motivated better to adhere to physicians' prescribed treatments if they feel threatened by their symptoms and/or when they are convinced about the benefits of the treatment. This research proposes improved health-belief model incorporating use of OHI. It identifies different types of OHI shaping up patients' perceptions prior to interactions with physicians. It suggests that patient-physician meetings (relationship) and consequent adherence behavior of the patients are inter-related and deeply affected by the initial perceptions of the patients based on consumed OHI. The proposed model is being tested using anonymous survey data collected immediately after patient-physician meetings in clinics/hospitals and subsequent adherence data from the same patients. Key contribution of this paper is combining individual's information behavior with health behavior which provides much better understanding for management of emergent healthcare delivery models in the digital economy.

1 INTRODUCTION

Nature of the patient-physician relationship plays an important role in patient outcomes and well-being (Kaplan et al., 1989). Traditionally, physicians have held an advantage over patients in terms of professional knowledge and expertise which implied patients were fully dependent on physicians for diagnosis, treatment options and prescriptions. However, in the wake of abundant online health information (OHI) on the internet and mobile apps, these days patients appear to be better-informed when approaching their physicians (Wald et al., 2007).

While several physicians look at the "informed patient" in a positive way, a large number of physicians also consider OHI a source of problems and in-efficiencies in their diagnosis and treatment procedures (McMullan, 2006, Rosenstein, 2015). Informed patients tend to ask more questions during consultation meetings, would like to discuss alternative treatment options, are not convinced easily

on prescriptions and might choose not to engage in further communications (Chung, 2013, Dedding et al., 2011). Consequent patient-physician relationship, formed on the basis of authority (from professional expertise) and mutual trust could deteriorate, ultimately leading to negative changes in the patient's health behavior.

There is a large emerging body of e-health research, but in case of patient-physician interactions and relationship, it is focused more on the physician's behavior and attitude or the meeting itself (Assis-Hassid et al., 2016, Rosenstein, 2015); systematic studies on linking patient-physician relation to outcomes are largely missing (Clayman et al., 2016). On the other hand, patient's ensuing health behavior and its antecedents have not been discussed to the best of our knowledge.

Therefore, this version of our larger research, constructs a theoretical model to study patient's health behavior, especially adherence, in the wake of OHI consumption and changing nature of patient-physician's meetings. The second section of the paper

covers literature review, while third section discusses the research model at some length. Fourth and the concluding section discusses the progress and future directions of this research.

2 LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1 Online Health Information Search

Online health information (OHI) search has emerged as one of the most prolific uses of the internet. According to (Fox, 2011, Fox and Duggan, 2015), OHI search is taking a new social life of its own in the internet.

OHI seekers typically search information about symptoms, diagnosis, diseases, treatment options and their effectiveness, while many of them also share their own experiences about the above with others (Hameed and Swar, 2015, Frost and Massagli, 2008, Ba and Wang, 2013). On top of making sense of the medical information, OHI seekers, especially if they are diagnosed patients or their caretakers, also seek information about hospitals, clinics, doctors and interactions and outcomes of other patients with them (McMullan, 2006). In general, almost everyone at some point seek OHI about general well-being, exercise, and diet and disease prevention.

2.2 Patient-physician Relationship

Charles et al. (1999) defined “patient-physician relationship” (PPR) as a medical encounter which involves shared decision-making and needs consideration on the part of the physician for considering different patient positions. However, in contrast to “patient-physician communications”, PPR could be generally considered multiple encounters involving diagnosis, interpretation of medical records, prescriptions and treatments/interventions.

The quality of PPR has direct relationship with patient’s outcomes including patient’s willingness to adhere to the prescribed treatment. (Kaplan et al., 1989) were among early scholars who pointed out “physician-patient relationship may be an important influence on patients’ health outcomes and must be taken into account in light of current changes in the health care delivery system that may place this relationship at risk”.

PPR’s two main components include emotional and informational aspects. Successful healthcare and

intervention requires strong patient-physician communication. Emotional components include genuineness, trust, respect, empathy, warmth and acceptance (Ong et al., 1995). Informational components include exchanging and sharing medical information, educating patients and providing quality medical management. Most patients’ complaints and displeasure arise from breakdown of the relationship and communication with the physicians.

As noted previously about OHI, these days patients may treat internet as a substitute or supplement to traditional sources of health information (Kitchens et al., 2014). Some people go to the extent of self-diagnosing their symptoms online. Hesse et al. (2005) noted that “most physicians are already experiencing the effects of patients showing up to their offices armed with printouts from the World Wide Web and requesting certain procedures, tests, or medications”.

Several physicians consider “informed patient” as a participant in their health decisions, however a large number of physicians also consider OHI a source of problems and in-efficiencies in their diagnosis and treatment decisions (McMullan, 2006, Rosenstein, 2015). Therefore, some physicians engage in disruptive behavior during interactions with their patients with negative implications for patient’s well-being and healthcare delivery (Rosenstein, 2015, Rosenstein and O’daniel, 2005).

Patients might find it hard to challenge their physician or may not be able to insist for alternatives due to physician’s knowledge, however it is easy for them to disengage and ignore physician’s advice on the spot or after the meetings. In fact, Quill and Brody (1996) proposed that keeping a balance between physician’s power and patients autonomy in choosing the best treatment options would be better for the well-being of the patients ultimately.

2.3 Health Behavior

Health behavior generally refers to one’s behavioral actions with an awareness of their health outcomes (positive or negative). Medical professionals and policy makers are deeply interested in promoting preventive health behaviors that could save the burden on and costs of provision of healthcare services (unhealthy practise such as smoking, etc.) by reducing unnecessary negative health outcomes.

Adherence is one of the most common health behavior which refers to one’s tendency to follow the prescribed routine treatment or intervention gradually reducing the illness symptoms or not worsening them any further. Regular visitations of hospitals and

preventive screening for highly likely infections or diseases are also counted as positive health behavior. Being receptive and engaging positively with the physician would also be counted as a positive health behavior on the part of patients.

Change in health behaviors and corresponding interventions have been studied from numerous perspectives including social-psychological and socio-cognitive (e.g. theory of planned behavior and health-belief models), social-ecological and staged perspectives (such as precede-proceed model), among others (Glanz et al., 2008). This paper is particularly interested in the former two approaches which are discussed and incorporated to build a theoretical research model in the next section.

3 RESEARCH MODEL AND HYPOTHESES SETTING

In this section, health behavior of online informed patients is conceptualized specifically through the theoretical lenses of health-belief model and theory of planned behavior.

3.1 Health Belief Model

As noted in the health behavior section, health-belief model is one of the primary theoretical frameworks for explaining preventive health behavior of people. Godfrey Hochbaum, Stephen Kegels and Irwin Rosenstock originated research on Health Belief Model (HBM) to predict preventive health behavior in a systematic way. They attempted to identify factors behind pre-emptive decisions to obtain a chest x-ray for early detection of tuberculosis as early as 1950s. HBM generally rests on social-psychological theories trying to correlate belief patterns (perceptual worlds) of patients with their health behaviors (Rosenstock, 1990, Rosenstock, 1974).

There are three categories of a person's motivation to undertake a positive or negative health behavior: individual perceptions, modifying behaviors, and likelihood of action (Rosenstock, 1990, Janz and Becker, 1984). Individual perceptions about the current level of illness, disease or well-being shape the individual's perceived susceptibility and perceived severity. A higher susceptibility and severity of a disease could be life threatening, therefore motivating a person highly to save himself by changing his or her behavior radically. Modifying factors include demographic variables, perceived threat, and cues to action. The likelihood of action is

related with factors driving probability of appropriate health behavior (Janz and Becker, 1984) (Figure 1).

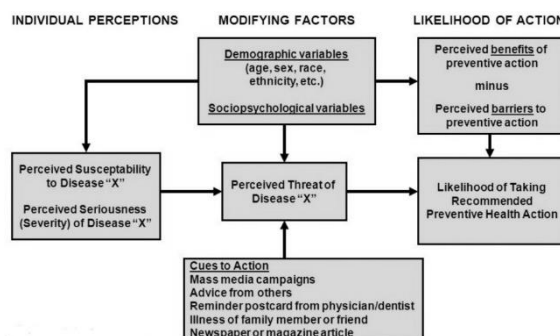


Figure 1: Health Belief Model (Adapted from Becker and Janz, 1985).

Social Learning Theory adds to HBM by demonstrating there could be multiple sources of acquiring new expectations or learning through imitating others or even improving self-efficacy.

3.2 Theory of Planned Behavior

Theory of Planned Behavior (TPB) (Ajzen, 1985) and the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) help in predicting behavioral intention and subsequent behavioural actions of actors. TPB proposes individual behavior is driven by three factors, namely individual's attitude, subjective norms, and the individual's perception of the ease or control consequent to the situations arising from that behavior (Figure 2).

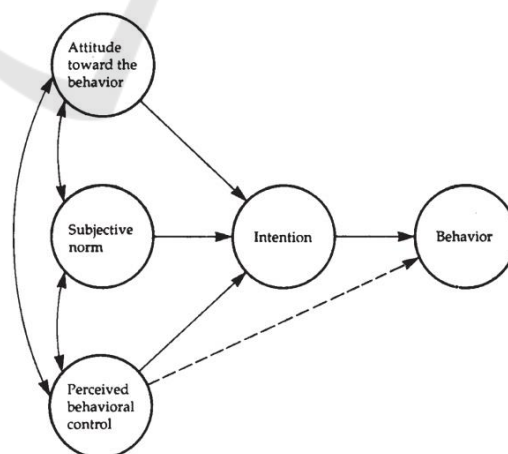


Figure 2: Theory of Planned Behavior (Adapted from Ajzen, 1985).

Attitude generally refers to the positive or negative about a behavior which could be assessed through one's beliefs about consequences of the

behavior and their desirability. Subjective norm is the perception of individual about how divergent or convergent the behavior would be in the opinion of people surrounding the individual. Lastly, behavioral control refers to the perceived difficulty in performing a behavior.

Therefore, in the healthcare domain, it is not difficult to discern that patient's health behavior (action), for example actual behavior of not communicating or engaging effectively with the physician should logically be preceded by an intention to engage.

However, in this case, it would be critical to note how attitudes, norms and perceived control are altered by online health information and modified health-beliefs. Yun and Park (2010) demonstrated that consumers' health consciousness, perceived health risk and Internet health information use efficacy influenced consumers' beliefs, attitude and intention of use of disease information on the Internet. In another study, (Mills and Todorova, 2016) presented the opposite view; they looked at the propensity of susceptibility and severity of one's illness in shaping up their OHI search behavior.

However, this paper is taking a position that once OHI is obtained information-seekers perceptions of susceptibility and severity might be affected.

3.3 Extended Health-belief Model Incorporating Online Health Information Behavior

An original model (Figure 3) has been developed amalgamating the theoretical concepts discussed above i.e. health-belief model and the theory of planned behavior. Discussion on the model follows.

3.3.1 Hypotheses 1-6: Online Health Information Search and Health Belief Formation

OHI sought could be generally categorized into three categories, namely disease-related information, physician or clinic related information (including patient reviews and feedback) and finally the community related information (experiences and discussions on effectiveness of treatments, drugs and interventions) (McMullan, 2006, Frost and Massagli, 2008).

Each type of information relates to different parts of patient's belief systems (or patterns). Disease-related OHI affects perceived severity and severity of symptoms and diagnostics results, therefore adding to perceived threat to the life of a person. Therefore,

hypotheses 1-2 and hypotheses 5-6 establish associations between disease-related OHI and perceived threat as follows.

H1: Negative disease-related online health information for one's symptoms is positively associated with higher levels of perceived severity

H2: Negative disease-related online health information for one's symptoms is positively associated with higher levels of perceived susceptibility

H5: Higher levels of perceived severity are positively associated with perceived threats (to life/well-being)

H6: Higher levels of perceived susceptibility are positively associated with perceived threats (to life/well-being)

Practitioner, hospital or clinic related information typically drives ones perceptions about the potential benefits or outcomes (recuperating from the disease). The following hypothesis is therefore established.

H3: Positive reviews in the practitioner or clinic-related online health information associate positively with higher degree of perceived benefits

Finally, information-sharing in online health communities contributes to self-confidence and self-regulation of OHI seekers by knowing about the experiences of others and comparing them with one's own (Ba and Wang, 2013, Frost and Massagli, 2008). That leads us to propose the following hypothesis.

H4: High number of positive experiences (of recuperation and adherence) in the community-related online health information from the people experiencing similar symptoms promotes higher levels of self-efficacy

3.3.2 Hypotheses 7-9: Health Belief Formation and Intention to Engage with the Physician

Firmed health beliefs of patients regarding threats would normally reflect their attitude towards upcoming physician interactions. Patients with higher levels of perceived life threats would like to get clearer answers, firm assurances, and would be willing to try interventions with bigger risks (even asking for medically incorrect treatments) (Iverson et al., 2008). Therefore, they would form an intention to dig deeper, share their acquired OHI in low tone, and be willing to understand and listen to the physician more keenly. As a result, a positive relationship should arise between the patient and the physician leading to the following hypothesis:

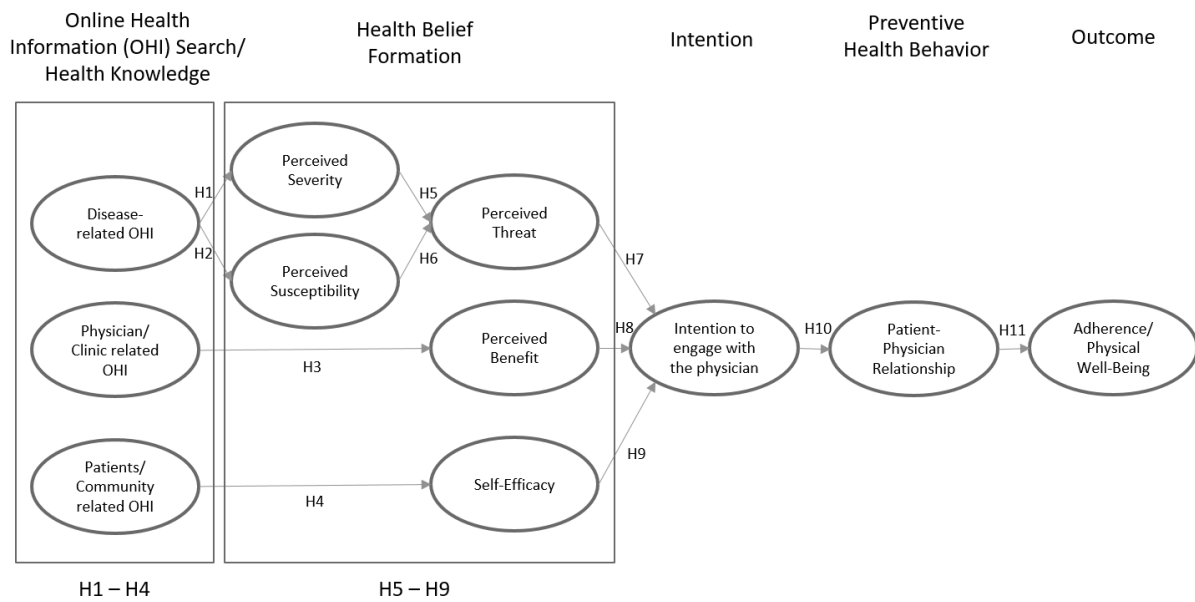


Figure 3: Extended Health-Belief Model incorporating online health information behavior (Source: Author).

H7: A high level of perceived health threats is positively associated with intentions to positively engage with the physician and vice versa

On the other hand, a higher level of perceived benefits, based on the reputation of the physician or hospital, should also wield similar psychological effects on the patients’ intentions to engage with the physician. Such effects come from our tendency to accept the authority attached with knowledge and expertise. However, if the reviews are negative, patients’ might generate the intention to engage firmly or aggressively with the physician about the consumed OHI which could generate friction, in some cases even leading to physician’s disruptive behavior (Rosenstein, 2015).

H8: A high level of perceived health benefits is positively associated with intentions to positively engage with the physician and vice versa

Finally, if one could find positive stories about others with similar symptoms (threats) recuperating or fighting back the diseases successfully should increase one’s confidence. On communities like patientslikeme.com where extensive comparative data is available in the form of user feedback on effectiveness of drugs, treatments and home remedies, one could adapt own opinions about previously prescribed drugs or treatments with some degree of confidence. The following hypothesis covers these scenarios.

H9: Higher level of self-efficacy leads to intentions of engaging positively with the physician

3.3.3 Hypothesis 10: Intention to Engage with the Physician and Patient-physician Relationship

Since intentions are antecedents of behavior (actions) in theory of planned behavior, firmed intentions to engage positively or negatively with the physicians are highly likely to generate the intended behavior (Ong et al., 1995). The corresponding hypothesis follows.

H10: Intentions to engage positively with the physician is positively associated with the level of satisfaction (and trust) of the patient-physician relationship

3.3.4 Hypothesis 11: Patient-physician Relationship and Adherence

Finally, it is well-established in the literature that satisfactory and trustworthy (positive) patient-physician relationships encourage patients to adhere to the prescribed treatments and interventions (Kaplan et al., 1989, Ong et al., 1995). The following hypothesis is therefore quite discernable.

H11: Satisfactory patient-physician relationships are positively associated with adherence levels by the patients (hence recuperation) and vice versa

4 PROGRESS, CONCLUSIONS AND FUTURE WORK

The paper has proposed an original conceptual model connecting the online health information behavior and health behavior of the patients and online users in an increasingly online world. Therefore, it aims to provide much-needed understanding and implications for changing roles of patient and physician engagement in the emergent healthcare delivery model contexts.

A survey has been developed including several measurement items from published sources (already tested for construct validity) for each construct shown in the research model. It is targeted to be circulated to partner hospitals in South Korea and other countries with an expected completion rate of around three hundred surveys. The survey will be administered by qualified physicians or their staff members. The adherence data would be collected from the same patients by the same doctors (or their staff). A due approval has been acquired from the author's institutional ethics board for conducting research involving human subjects.

Once the data collection would be completed (approximately 3-6 months), both the measurement model and the structural model would be tested using PLS-SEM (partial least squares- structural equation modelling) approach. Further analysis would lead to acceptance or negation of the hypotheses and their underlying explanations.

Future research could consider to test other health behavioural outcomes than adherence such as those covered by RAND 36-item survey (Hays et al., 1993). Additionally moderating or mediating roles of physicians' attitudes, physician's competencies, cultural differences and gender differences would greatly enhance the understanding of this model. Social exchange perspective appears to be an interesting alternate perspective which could shed further light on the nature of patient-physical relationship in this context.

REFERENCES

- Ajzen, I. 1985. *From intentions to actions: A theory of planned behavior*, Berlin, Heidelberg, Springer. doi: 10.1007/978-3-642-69746-3_2.
- Assis-Hassid, S., Heart, T., Reychav, I. & Pliskin, J. S. 2016. Modelling Factors Affecting Patient-Doctor-Computer Communication in Primary Care. *International Journal of Reliable and Quality E-Healthcare (IJRQEH)*, 5, 1-17. doi: 10.4018/IJRQEH.2016010101.
- Ba, S. & Wang, L. 2013. Digital health communities: The effect of their motivation mechanisms. *Decision Support Systems*, 55, 941-947. doi: doi.org/10.1016/j.dss.2013.01.003.
- Charles, C., Gafni, A. & Whelan, T. 1999. Decision-making in the physician-patient encounter: revisiting the shared treatment decision-making model. *Social science & medicine*, 49, 651-661. doi: 10.1016/S0277-9536(99)00145-8.
- Chung, J. E. 2013. Patient-provider discussion of online health information: results from the 2007 Health Information National Trends Survey (HINTS). *Journal of health communication*, 18, 627-648. doi: 10.1080/10810730.2012.743628.
- Clayman, M. L., Bylund, C. L., Chewing, B. & Makoul, G. 2016. The impact of patient participation in health decisions within medical encounters: a systematic review. *Medical Decision Making*, 36, 427-452. doi: 10.1177/0272989X15613530.
- Dedding, C., van Doorn, R., Winkler, L. & Reis, R. 2011. How will e-health affect patient participation in the clinic? A review of e-health studies and the current evidence for changes in the relationship between medical professionals and patients. *Social science & medicine*, 72, 49-53. doi: 10.1016/j.socscimed.2010.10.017.
- Fishbein, M. & Ajzen, I. 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Reading, MA, Addison-Wesley.
- Fox, S. 2011. *The social life of health information 2011*, Pew Internet & American Life Project Washington, DC.
- Fox, S. & Duggan, M. 2015. *Pew Internet and American Life Project* [Online]. Pew Research Center Washington, DC. Available: <http://www.pewinternet.org/2015>.
- Frost, J. H. & Massagli, M. P. 2008. Social uses of personal health information within PatientsLikeMe, an online patient community: what can happen when patients have access to one another's data. *Journal of medical Internet research*, 10. doi: 10.2196/jmir.1053.
- Glanz, K., Rimer, B. K. & Viswanath, K. 2008. *Health behavior and health education: theory, research, and practice*, John Wiley & Sons.
- Hameed, T. & Swar, B. 2015. Social value and information quality in online health information search. Australasian Conference on Information Systems 2015 Adelaide. Australasian Conference on Information Systems arXiv preprint arXiv:1606.03507
- Hays, R. D., Sherbourne, C. D. & Mazel, R. M. 1993. The rand 36-item health survey 1.0. *Health economics*, 2, 217-227.
- Hesse, B. W., Nelson, D. E., Kreps, G. L., Croyle, R. T., Arora, N. K., Rimer, B. K. & Viswanath, K. 2005. Trust and sources of health information: the impact of the Internet and its implications for health care providers: findings from the first Health Information National

- Trends Survey. *Archives of internal medicine*, 165, 2618-2624. doi: 10.1001/archinte.165.22.2618.
- Iverson, S. A., Howard, K. B. & Penney, B. K. 2008. Impact of internet use on health-related behaviors and the patient-physician relationship: a survey-based study and review. *Journal of the American Osteopathic Association*, 108, 699.
- Janz, N. K. & Becker, M. H. 1984. The health belief model: A decade later. *Health Education & Behavior*, 11, 1-47. doi: 10.1177/109019818401100101.
- Kaplan, S. H., Greenfield, S. & Ware Jr, J. E. 1989. Assessing the effects of physician-patient interactions on the outcomes of chronic disease. *Medical care*, S110-S127.
- Kitchens, B., Harle, C. A. & Li, S. 2014. Quality of health-related online search results. *Decision Support Systems*, 57, 454-462. doi: 10.1016/j.dss.2012.10.050.
- McMullan, M. 2006. Patients using the Internet to obtain health information: how this affects the patient-health professional relationship. *Patient education and counseling*, 63, 24-28. doi: 10.1016/j.pec.2005.10.006.
- Mills, A. & Todorova, N. 2016. An integrated perspective on factors influencing online health-information seeking behaviours. Australasian Conference on Information Systems, 5-7 Dec 2016. Wollongong.
- Ong, L. M., De Haes, J. C., Hoos, A. M. & Lammes, F. B. 1995. Doctor-patient communication: a review of the literature. *Social science & medicine*, 40, 903-918. doi: 10.1016/0277-9536(94)00155-M
- Quill, T. E. & Brody, H. 1996. Physician recommendations and patient autonomy: finding a balance between physician power and patient choice. *Annals of internal medicine*, 125, 763-769. doi: 10.7326/0003-4819-125-9-199611010-00010
- Rosenstein, A. H. 2015. Physician disruptive behaviors: Five year progress report. *World journal of clinical cases*, 3, 930. doi: 10.12998/wjcc.v3.i11.930.
- Rosenstein, A. H. & O'daniel, M. 2005. Disruptive Behavior & Clinical Outcomes: Perceptions of Nurses & Physicians. *Nursing Management*, 36, 18-28.
- Rosenstock, I. M. 1974. Historical origins of the health belief model. *Health education monographs*, 2, 328-335. doi: 10.1177/109019817400200403
- Rosenstock, I. M. 1990. The health belief model: Explaining health behavior through expectancies. In: Glanz, K., Rimer, B. K. & Viswanath, K. (Eds.) *Health behavior and health education: Theory, research, and practice*. San Francisco: Jossey-Bass.
- Wald, H. S., Dube, C. E. & Anthony, D. C. 2007. Untangling the Web—The impact of Internet use on health care and the physician-patient relationship. *Patient education and counseling*, 68, 218-224. doi: 10.1016/j.pec.2007.05.016.
- Yun, E. K. & Park, H. 2010. Consumers' disease information-seeking behaviour on the Internet in Korea. *Journal of clinical nursing*, 19, 2860-2868. doi:10.1111/j.1365-2702.2009.03187.x.