Exploring Antecedents of Consumers' Willingness to Depend on E-Health Information

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ABSTRACT

Previous research on online health (e-health) information was primarily focused on consumer information search behavior and information quality. Although studies addressing online information quality have flourished, they have yet to thoroughly examine whether consumers actually use the information they search. The purspose of this study suggests a conceptual framework that examines the potential antecedents of a consumers' willingness to depend on e-health information as an indicator of the consumer's trust of the provided e-health information. The proposed antecedents include healthcare product involvement, online skill level, perceived quality, and credibility of the source. Using structural equation modeling on online survey data, seven hypotheses, which describe the relationships between the variables of the model, were tested. The results indicate that consumer willingness to depend on provided e-health information was significantly influenced by the consumers' perceived quality and credibility of specific e-health information. Consumer involvement in healthcare and their online skill-level, respectively, also positively related to perceived quality and credibility regarding e-health information.

Keywords: Consumers' willingness to depend on information, consumer's trust on provided information contents, and information quality.

1. INTRODUCTION

As a step in the consumer decision-making process, consumer information searches are one of the most enduring and important streams in consumer behavioral research. Given the uncertain and risky nature of healthcare services, it was regarded as a basic tenet that consumers' engage in search activities in an attempt to reduce risk. Physicians had been the purveyors and integrators of healthcare information and held almost exclusive expert to access knowledge, while consumers confronted insufficient and asymmetrical information. Even though health information directly affects consumers' well-being and quality of life, the scope of information that a consumer traditionally sought or received was limited.

However, the emergence of the Internet has completely changed consumer information search process. Consumers can access health information with greater ease than ever before. According to the research from the PEW Internet American life survey [20], 80% of adult Internet users have searched for online health information related to the 15 health topics. In the 2010 survey, searching for health information was the third most popular activity online, followed by e-mail exchange (96%) and pre-purchase information searches for products or services (83%). Usually, health information seekers utilized the Internet to inform themselves in preparation for a doctor's appointment, to share information, or to seek and provide support [21].

Previous research in the healthcare area focused on consumers' information search behavior [12] and evaluation of the quality of provided health information [19], [30]. While there has been quite a bit of research on seeking online health (e-health) information, most of the previous research has merely listed the characteristics of individuals who use the Internet as their primary information source (e.g. Pew Internet & American Life Project) or identified factors that determine where consumers seek health information between offline and online sources [14], [26]. Simply examining socio-economic factors of the digital divide in seeking health information is no more than an intriguing research question because the Internet penetration rates have already increased to the point of other media penetration rates (e.g. TV).

Also, objective information quality, per se, can be pointless if seekers (consumers) do not use the information. E-health information only has the greatest influence on consumers when they trust the health information. Therefore, the concept of consumer trust in reference to provided e-health information will be addressed in this paper in order to appropriately measure the consumers' subjective assessment of provided online information. It can be connected to consumers' intention to use that information channel as their prior information source before purchasing healthcare product. To measure consumer trust toward e-health information, this study applied the concept of consumer willingness to depend on information, which was previously utilized in an e-commerce trust study

[33], as a formation of consumers trust. Understanding the use of healthcare information sources during the information seeking process is critical if marketing managers want to efficiently allocate their communication budgets.

The purpose of this study is to develop a conceptual framework that examines the potential antecedents of a consumers' willingness to depend on online health information as an indicator of the consumer's assessment of quality of the provided online health information. First, a consumers' willingness to depend on online health information was proposed depicting the antecedents of consumers' willingness to depend on online health information that influences consumers' trust to use provided e-health information. Second, the proposed model was tested by structural equation modeling. Finally, conclusions are presented and the implications of the study are discussed.

2. PROPOSED MODEL

In this study, it was assumed that health information can be regarded as a special type of good. Following this logic, consumer behavior concerning either goods or information can be described in the same terms. To eliminate the digital divide factor, this study was conducted on online health information seekers. Their primary health information sources fell into three categories: Internet (online), doctors/nurses and friends/relatives.

2.1 Willingness to depend on e- health information

As a measure of consumer trust regarding e-health information, this study used willingness to depend on e-health information as a measure that reflected the consumers' assessment of provided online information. Considerable amount of research has found that trusting information leads to successful relationships and improves communication, cooperation, satisfaction, and purchase intention [3], [18], [34]. Adapted from [15]'s definition, [33] defined the willingness to depend as "Willingness to depend is defined as volitional preparedness to make oneself vulnerable to the trustee". This study examines consumer subjective probability of depending involves the projected intention to engage in searching e-health information seeking behaviors adapted from the [33]'s willingness to depend on information to measure how much the consumers intended to trust the provided e-health information.

2.2 Consumers' Online Skill-level

Previous studies have examined the moderating effects of domain knowledge or expertise on purchasing behavior [9]. According to [2] and [35], expertise is viewed as a component of knowledge. Knowledge consists of product and technology knowledge. While product knowledge is the consumer's perception of how much he/she knows about the value proposition of various alternatives under consideration [11], technology knowledge refers to the Web consumers' capacity for action and control during the online navigation process. Domain knowledge (i.e. experience with the interactive environment) and skills, such as computer familiarity, could prove to be an important factor in determining what sorts of

activities consumers engage in online. Few studies have examined the relationship between the how experienced an Internet user is, how likely s/he is to search for health information online [22], [23]. Applying this concept, consumers' online skill-level is measured as important technology knowledge. Accordingly, the following hypotheses, describing relationships among variables, were developed and tested.

H_1: Consumers' online skill-level is significant predictors of consumers' willingness to depend on e-health information.
    (a) Consumers' online skill-level is positively related to the level of perceived information quality regarding e-health information.
    (b) Consumers' online skill-level is positively related to the level of credibility regarding e-health information.

2.3 Consumers' health care Involvement

Traditionally, motivation to search for information has been conceptualized in terms of a consumer's involvement with the informational stimuli [10], [27]. Product involvement, defined as perceived personal relevance, is the essential characteristic of involvement [40], [46]. That is, a consumer's level of involvement with an object, situation, or action is determined by the degree to which he or she perceives that the concept is personally relevant. Irrespective of its exact sources, purchase involvement is related with a buyer's subjective assessment [38]. High-involvement purchases are usually ones of expensive, durable goods, such as cars and houses, or purchases that are critically relevant to the buyer, such as drugs or health care drug. In contrast, low-involvement purchases are usually of low price, non-durable products, such as books. Purchase involvement has been found to strongly influence buyer behavior, particularly the degree of information searching and the nature of purchasing decision making [17]. The higher the degree of purchase involvement, the stronger the negative relationship between perceived uncertainty. [32]'s study examined the conditions necessary to transform online information search into "play," using product involvement as a moderator. This study adapted [32]'s items to measure the consumers' involvement regarding health information search behavior. Based on previous research, following hypotheses have been established

H_2: Consumers' level of product involvement is significant predictors of consumers' willingness to depend on e-health information.
    (a) Consumers' product involvement-level is positively related to the level of perceived information quality regarding e-health information.
    (b) Consumers' product involvement-level is positively related to the level of credibility regarding e-health information.

2.4 Perceived quality on online health information

A stream of research has focused on online information quality. Some have studied online information quality as part of a service quality analysis of websites [25], [43] . Others have

studied online information quality more specifically, attempting to develop universal online information quality model [16], [37]. However, these studies apply a functionalist perspective on information quality, which implies that information is viewed as an objective concept. Thus, this view overlooks the phenomenological aspects of information such as social and emotional features. Such aspects of information have shown to be important to consumers when purchasing especially experiential products, like health care product [36], [13], [1]. In [41] examined consumers' information channel choice behavior by adopting a cost-benefit approach. They assumed that the benefits consumers associate with accessing each information channel were a function of the perceived quality of information obtained in each channel. Given that focus, the authors examined whether the use of an information channel depended on the quality of information found in all other available information channels. Including the perceived quality of information obtained from other channels allows them to explore possible interdependencies between information channel utilities due to the perceived quality differences of all channels. In the context of online content, "perceived service quality" has been found to be associated with Willingness to pay [44]. In this study, it is expected that consumers are likely to formulate a perceived overall assessment of the quality of the information and then use this overall assessment to evaluate how much he or she would be willing to depend on provided online health information. Consumers' perceived quality on online health information is thus proposed to increase willingness to depend on e-health information.

H_3: Consumer with a higher level of perceived information quality regarding e-health information will exhibit a higher level of willingness to depend on e-health information.

2.5 Perceived credibility on online health Information

Credibility, along with liking, quality, and representativeness, is one of four criteria that influence attitudes toward print and online news [42]. A few studies have examined consumers' evaluations of information source types, yet most of these were secondary findings in studies with the traditional objective of investigating antecedents or conditions of searches [72]. In studying the acceptance of mobile banking, the perceived credibility that people have in the system, to securely conclude their transactions and maintain the privacy of their personal information, has regarded as affecting their voluntary acceptance of mobile banking. [45] has conceptually distinguished perceived credibility from perceived risks (e.g., [31]) and trust (e.g., [24]), and found that perceived credibility had a significant positive influence on the behavioral intention to use Internet banking. According to [45], perceived credibility is defined as the extent to which a person believes that the use of mobile banking will have no security or privacy threats. This study used perceived credibility on online health information as a mediator of a consumers' willingness to depend on online health information. Consumers' perceived quality on online health information is thus proposed to increase willingness to depend on e-health information.

H_4: Consumer with a higher level of credibility regarding online health information will exhibit a higher level of willingness to depend on e-health information.

The purpose of this study is to examine the potential antecedents of a consumers' willingness to depend on e-health information as an indicator of the consumer's assessment of online health information quality. The model (figure 1) proposes to examine how consumer perceptions of quality and credibility as mediators, as well as Consumers' involvement in health care and online skill-level as antecedents, affect consumers' willingness to depend on online health information, respectively.
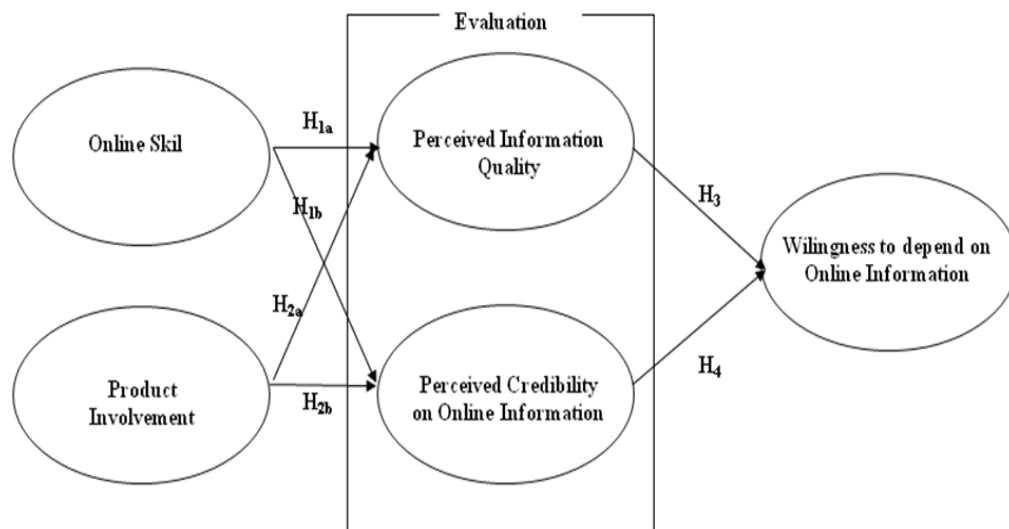

Fig. 1. Conceptual model of this study

3. METHODS

Data were collected using an online survey. For the online survey, an email were distributed by an online marketing company to US national panels, with a cover letter and the linked website addresses. Among 2,000 invited panel members, a total of 260 usable completed samples was included in the data analysis. The response rate was 13%. Respondents were surveyed by means of a self-administered questionnaire. Respondents were self-identified as having had previous online health information seeking experiences.

In this study, the constructs were measured in the following way. Willingness to depend on online health information was assessed using a scale adapted from [33]'s trust measure for e-commerce. Four-items, presented on a five-point Likert type scale, were used to measure the consumer's willingness to depend on online health information. Online skill-level was measured using 3 items presented on a five-point Likert type scale adapted from [32]. Product involvement was measured using 3 items, presented on a seven-point semantic differential scale adapted from [32]. Perceived information quality was measured using 6 items presented on a five-point Likert type scale adapted from [41]. The measure for perceived credibility of online health information was generated and assessed using 3 items presented on a five-point Likert type scale.

Data analysis in this study was conducted in two stages. First, a preliminary analysis was conducted to provide baseline descriptive statistics. Second, a confirmatory analysis was conducted to test the proposed model. AMOS 5.0 [4] was used to test the structural models.

4. RESULTS

4.1 Profiles of Respondents

Sample characteristics are presented in Table 1. Women made up 66.2% of the total population, while men comprised 33.8% of the total population. Approximately 27 percent of the respondents were 30 to 49 years old. One notable characteristic of the respondents was that approximately 90 percent of the respondents were highly educated (some college education or higher), and around 60 percent of the respondents' reported incomes were over US $50,000 a year.

Table 2 shows consumers' primary health information source. 58.1% of the total sample population answered that they started their health information search with the Internet, compared with 26.1% who turned to doctors, and 13.5% who turned, respectively, to friends or relatives (interpersonal sources). These results demonstrate that consumers already use the Internet as their primary information source when consumers' need to seek health information.

4.2 Measurement Model

The measurement model was assessed through Confirmatory Factor Analysis(CFA) using a maximum likelihood estimation to test the construct validity as well as the underlying structure of the measures. Table 3 presents the measurement statistics for the model variables and composite reliability of the construct. Overall, a measurement model fits the data well. The level for internal consistency in each construct was acceptable with Cronbach's alpha estimates ranging from .76 to 95, exceeded the recommended .60 threshold [5].

Table 1: Profiles of respondents (N=260)

Variable	Number	%	Variable	Number	%
Gender			**Education**		
Male	88	33.8	High school	18	6.5
Female	172	66.2	College graduate	177	68.1
			Graduate school	66	24.6
			Rather not say	1	0.4
Age			**Income**		
~20	3	1.2	Under $20,000	21	8.1
21-30	55	21.2	$20,000 – 29,999	21	8.1
31-40	71	27.3	$30,000 – 39,999	31	11.9
41-50	61	23.5	$40,000 – 49,999	36	13.8
51-60	48	18.5	$50,000 – 74,999	40	15.4
Over 61	22	8.5	$75,000 – 99.999	36	13.8
			$100,000 or more	49	18.8
			Rather not say	26	10.0

Table 2 : Consumers' health information source (N=260)

Consumers' primary health Information sources	Number	%
Internet	151	58.1
Doctors/Nurses	61	26.1
Friends/Relatives	38	13.5

The result of the CFA indicated that the factor loadings of some items were quite low. This problem was related to the measurement of items, for example some these items (e.g. product involvement) measured as semantic differential scales in this study. The result of the CFA indicated that the factor loadings of some items were quite low. This problem was related to the measurement of items, for example some these items (e.g. product involvement) measured as semantic differential scales in this study.

Table 4 provided the overall model fit. The overall fit of the proposed model was statistically assessed using a number of goodness of-fit statistics. Because chi-square statistic method is very sensitive to sample size [6], other widely used goodness-of-fit indices were also examined. First, Normed Chi-square (χ^2/degree of freedom) was considered to reduce the sensitivity of the chi-square statistic. The value of the Normed Chi-square was 1.5973, which was below the cut-off criterion of three [28], and showed that the model fit the data well (χ^2/df=1.5973). In addition, satisfactory fits are obtained when CFI and TLI are greater than or equal to .90 and RMSEA is less than or equal to .08 [8]. These fit indices (χ^2 /df =1.5973; CFI = 0.9231; TLI = 0.8948; RMSEA = 0.048) consistently indicated a good fit to the data.

Table 3: The result of confirmatory Factor Analysis

Items	Standardized Factor Loading	Construct Reliability
Online Skill Level		. 954
I am extremely skilled at using the Web	.92	
I consider myself knowledgeable about good search techniques on the web	.98	
I know how to find what I am looking for on the web	.82	
Product Involvement		.824
Health information means (nothing/a lot) to me	.84	
Health information (worthless/valuable)	.84	
Perceived Information Quality (Internet is...)		.900
A good source of information on prices of different brand and models of medical products	.74	
Useful in helping me clarify and define what I need in a medical products	.73	
Useful in helping me understand the terminology necessary to research medical products	.79	
A good source of information about the differences between medical products	.89	
A good source of information informative about the potential for upgrading to different medical products	.83	
A source of information I can trust	.67	
Perceived Credibility		.757
The health information on the internet is credible	.90	
I think the information on the internet is exaggerated	.49	
I think the information on the internet is unbelievable	.52	
Willingness to depend on Information		.847
When an important health problem arises, I would feel comfortable depending on the information provided by Internet	.88	
I can always rely on Internet information in a tough health situation	.85	
I feel that I could count on Internet information to help with a crucial health problem	.79	
Faced with a difficult health problem that required me to go to hospital, I would go a hospital which was recommended by internet information	.54	

Table 4: Fit Measures for Proposed Model

Fit Measures	Fit Guidelines	Proposed model
X^2	P≥ .05	199.668(00)
X^2/df	≤ 3.0	1.5973
GFI	≥ .90	.9231
AGFI	≥ .90	.8948
TLI	≥ .90	.9696
CFI	≥ .90	.9751
RMSEA	≤ .08	.048

4.3 Structural Equation Modeling

Structural equation modeling was performed to test the proposed model and the hypotheses. The results of the standardized parameter estimates and t-values are presented in Table 5. Figure 2 presented the proposed model, illustrating structural path coefficients for each relationship. These results indicate support of all proposed hypotheses. Hypothesis 1_a, which predicted a positive relationship between the consumer's online skill-level and the perceived quality of e-health information, was supported. Results reveal that the path between these two constructs was indeed positive (ß =0.32) and significant (p <0.001). The proposed positive relationship between online skill-level and the credibility of e-health information ($H1_b$) was also supported (ß =0.15; p<.05). As predicted, product involvement was one of the traditional variables of a consumer's external search and is also positively influenced by the assessment of quality of e-health information (H_{2a}: ß=0.24; p<.001) and the consumer's perceived credibility ($H2_b$: ß =0.21; p<.01). The remaining hypotheses were also supported. The positive relationship between the consumer's perceptions of information quality and their willingness to depend on e-health information (H_3: ß=0.19; p<.01) and the consumer's perceptions of credibility their and willingness to

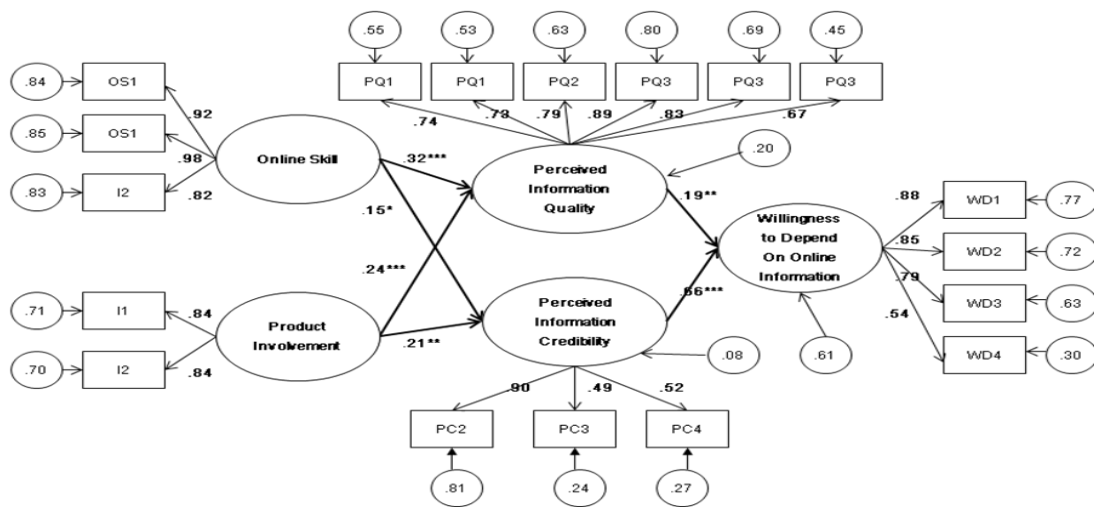depend on e-health information (H_4: ß =0.66; p<.001) are also supported.

The indirect effects of consumer's involvement toward health information and online skill levels on willingness to depend on e-health information are also shown in Table 5. As consumer had high level of involvement toward health information, they were more likely to have greater willingness to depend on e-health information (ß= 0.183). Also, consumer who had high level of online skill, were more likely to have a greater willingness to depend on e-health information (ß=0.161). The results show that consumer's involvement toward health information contributed much more than consumer's online skill level in predicting customers' willingness to depend on provided online health information.

Considering the total effects of all the constructs, consumer's perceptions of the credibility of provided e-health information exhibited the strongest direct impact (ß= 0.663; *t*= 6.31; p<0.001) on willingness to depend on e-health information. These results prove that consumers hold enduring beliefs (perceived credibility) through their experiences and involvement, and that these beliefs affect what information consumers trust and how they use various information source types.

Table 5: Direct and indirect path coefficients in the model

Paths			Standardized estimates		Critical Ratio
			Direct	**Indirect**	
H_1	Online skill-level	→	Willingness to depend on online info.	-	.161	-
H_{1a}	Online skill-level	→	Perceived Information Quality	.323	-	4.93***
H_{1b}	Online skill-level	→	Perceived Information Credibility.	.152	-	2.32*
H_2	Product Involvement	→	Willingness to depend on online info.	-	.183	-
H_{2a}	Product Involvement	→	Perceived Information Quality	.241	-	3.37***
H_{2b}	Product Involvement	→	Perceived Information Credibility	.208	-	2.82**
H_3	Perceived Information Quality	→	Willingness to depend on online info.	.189	-	2.66**
H_4	Perceived Information Credibility	→	Willingness to depend on online info.	.663	-	6.31***

Note: ***p <0.001, ** p <0.01, *p <. 05

Note: ***p<0.001, **p<0.01, **p<0.05
Fig. 2. Standardized structural equation model with parameter estimates

5. DISCUSSION

The purpose of this study was to identify possible antecedents of consumers' willingness to depend on e-health information as measures of trust. As proposed, all antecedents affect consumer willingness to depend on e-health information. Consumers' perceptions of the quality of online information positively influenced consumer willingness to depend on online health information. Consumers' online skill-level and health care involvement also positively influenced perceptions of the quality of online health information in turn. These results prove that the constructs adapted from traditional external search constructs influence consumers' evaluations of e-health information in this study.

For health care practitioners, these results can give some insights. Based on previous research [29], the introduction of the Internet has influenced goods/services along the continuum of information asymmetry in a different way. Depending on what type of information consumer needs, the extent of the healthcare information available can be very wide. Consumers want to obtain different kinds of information via the Internet depending on the consumers' need for healthcare information even though it categorized into the same category as healthcare. These results show which factors consumers consider most important when they choose their primary health information source. Consumers' willingness to depend on provided information information primarily depended on consumers' perceived information credibility than perceived information quatiliy of the provided information. In order to increase trust of a particular information source (to increase consumer willingness to depend on information), the health-related product marketer should deliver information in a more credible way for their target customer.

For the policy makers, the findings also give some insights. Consumer have a tendency to trust information which delivered in credible way, so the provided online information should be monitored or set a standard a priori to protect consumer from pseudo credible information.

This study also has some limitations because it was conducted as an online survey, and the respondents were screened for consumers who had searched for health information online before. Therefore, the issue of generalizability (due mainly to selection bias) still remained an important consideration. Also, some groups of people (for example, man) were underrepresented, and some groups of people (for example, woman) were overrepresented. Therefore, some variables didn't reflect their exact racial difference due to the composition of sample. Also, unequal numbers within each group can be caused by that problem.

For future studies, it would be possible about effects of the more specific grouping of their primary information source. Another area to be investigated is how choice of information sources could be determined by other variables.

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