

Online Information Seeking: A Review of the Literature in the Health Domain

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Abstract—The development of the information technology and Internet has been transforming the healthcare industry. The internet is continuously accessed to seek for health information and there are variety of sources, including search engines, health websites, and social networking sites. Providing more and better information on health may empower individuals, however, ensuring a high quality and trusted health information could pose a challenge. Moreover, there is an ever-increasing amount of information available, but they are not necessarily accurate and up to date. Thus, this paper aims to provide an insight of the models and frameworks related to online health information seeking of consumers. It begins by exploring the definition of information behavior and information seeking to provide a better understanding of the concept of information seeking. In this study, critical factors such as performance expectancy, effort expectancy, and social influence will be studied in relation to the value of seeking health information. It also aims to analyze the effect of age, gender, and health status as the moderator on the factors that influence online health information seeking, i.e. trust and information quality. A preliminary survey will be carried out among the health professionals to clarify the research problems which exist in the real world, at the same time producing a conceptual framework. A final survey will be distributed to five states of Malaysia, to solicit the feedback on the framework. Data will be analyzed using SPSS and SmartPLS 3.0 analysis tools. It is hoped that at the end of this study, a novel framework that can improve online health information seeking is developed. Finally, this paper concludes with some suggestions on the models and frameworks that could improve online health information seeking.

Keywords—Information behavior, information seeking, online health information, technology acceptance model, the theory of planned behavior, UTAUT.

I. INTRODUCTION

THE rapid growth in information technology and advancement of communication technology is changing the landscape of health information. Nowadays, the internet has played a predominant role in individuals' information lives. The enhanced accessibility and convenience setting have prompted people to turn to the Internet in obtaining various types of information. The health and medical information are growingly available through multiple of sources, most notably the Internet, has initiated outstanding opportunities for consumers to engage in health information seeking. There are a wide variety of sources that the internet has provided for health searches, inclusive of search engines, health websites, and social networking sites, and many forms of online health communities (OHCs) [2]-[4].

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In e-services, the online health information is useful when the users have an engagement with the information provider via the platforms and technologies. The utilization of e-services across contexts can be categorized as e-commerce [33], [34], e-banking [35], [36], online legal services [37], [38], mobile banking services [39], [40], e-government [32], [43] and online healthcare services [22], [42], [44]. A study from [45] mentioned that young consumers aged 18 to 34 have stated that online health-information seeking is equally essential as e-services such as e-shopping. On the other hand, [10], [41], [46] stated that online health information helps the consumers to self-manage their health in a more convenient way with broad access to information. It will also encourage the development of their social and personal sense of health as they become more certainty regarding their health status. Besides, the rapid proliferation of health information on the Internet also helps consumers to overcome geographic, temporal, and cost limitations related with traditional health information channels [10], [41], [46]. They can acquire knowledge on their health status before meeting a professional for an advice. In some circumstances, online health information may have economic benefits. When the potential consumers are able to research their symptoms using robust and verifiable health information, the inappropriate consultations with healthcare professionals can be reduced. This scenario can also decrease the costs of transportations and communications. Furthermore, consumers are feeling more empowered [26] and tend to be more involved in their health and health decision making [7], [20]. This may thus lead to higher levels of consumer satisfaction and better treatment. On top of that, the communication process between patients and their physicians and their ability to participate in consultations will also change. As a result, they will experience a different feeling about their relationship with their physicians. In addition, online health information also enables consumers to manage their own rate of learning which will reduce information overload often experienced in a physician's office. What is more, health information also can be customized to be provided to each individual, based on their health status and concern.

In spite of the potential benefits of online health information seeking, some concerns have been escalated about the plausible negative effects of online health information that may influence consumers' acceptance and usage. First, online health information is usually not filtered by doctors or health professionals. Its content can vary from being peer reviewed or professionally reviewed to personal blogs, opinions, or anecdotes of other consumers. These circumstances have led

to large amount of inaccurate and poor-quality information [28]. The information providers also are in doubt regarding the status of their expertise as well as the trustworthiness of the information offered. Furthermore, the consumers' are unable to accurately distinguish high from low quality information [20] and evaluate the medical information by relating it to their own health conditions. As a consequence, this vast amount of online information increases the risks of misinformation, distress or misperceptions being transmitted. It also leads to the tendency toward self-diagnosis or self-treatment [10].

Second, issues also persist on how online health information seeking will affect the relationship between the consumers and the physicians. If consumers' online discoveries are not equivalent to physicians' diagnosis or treatments, then the consumers' appointment satisfaction and trust in the physicians would be affected. It can arouse conflicts or even arguments between the physician and consumer [28]. As a result, there is no doubt that the dissatisfied consumers will seek for a second opinion, change the physician, change their treatment plan or self-medicate using recommendations found on the Internet. Another essential point is that these services utilize the computer-mediated nature. This triggers anxiety and concern over fraud and the misuse of personal health information [29], [30]. Therefore, it is foreseen if the consumers would feel hesitant in using online health information services.

The objective of this paper is to provide an insight of the models and frameworks to improve the online health information seeking of consumers. The sections of this paper are organized as follows: Section II covers the literature review and section III provides the limitations of the current studies. Finally, the paper provides a brief conclusion and opportunity for future research.

II. LITERATURE REVIEW

A. Information Behavior and Information Seeking

This section defines a comprehensive understanding of information behavior and the difference with information seeking. In general, the broadest domain is human information behavior. This domain engaged with all characteristics of human information interactions with various forms of information. [47] defines information behavior as the totality of human behavior in relation to sources and channels of information, including both active and passive information use. Originated from Wilson's definition, [49] conceptualizes information behavior broadly as comprising user needs inclusive of activities associated with seeking, managing, and using information in different contexts. Similarly, [48] highlights the research in information behavior focusing on the relationship between people and information, rather than one between people and technology. To reflect the dynamic nature of this relationship, the author then proposes the term "human information interaction". On the other hand, information seeking is a subset of information behavior. Reference [47] interprets information seeking as a purposeful

act of seeking information as a consequence of a need to satisfy some goal. Information seeking also can be justified as a personal approach in order to satisfy an identified need. Information seeking behavior involves all interactions with the system including computer interactions and abstract interactions [12], [13]. In the other definitions, information seeking behavior can include accidental exposure to the information, feeling the need for information, besides finding, selecting and using the information and in some cases even refusing the information [14]. To sum up, the fundamental and conclusive goal of information seeking behavior is to satisfy the consumers' need of information.

For an effective and efficient process of information seeking, consumers must be capable of recognizing their health information needs. It is also important for them to acknowledge various types of online information sources that can be utilized. According to [5], the information seeking behavior involves three important approaches in retrieving the relevant information. The first step is by distinguishing the needed information. Secondly, the appropriate sources of information need to be selected and the final step is by applying preferred strategies to obtain the required information. The information seeking behavior studies have been recently in academic environments, and these investigations have shown a dramatic growth in the literature which includes numerous theoretical and empirical studies [50]. Reference [51] correlates individuals' behavior to the information by focusing on their cognitive and emotional assimilation. These individuals include students, academicians, and researchers. On the contrary, [52], [53] and [73] are conducting their research that incorporates social or collaborative aspects, or both, in information seeking.

The internet represents a revolution of information and communication technology and has motivated consumers to create and share health-related information. In the context of online information seeking, one of the common topics is health. Health information seeking is described by [9] as the purposive acquisition of health-related information to lessen health status uncertainty and increase understanding of illnesses [8] and offers a key strategy for those patients who are psychosocially adjusting themselves to their illnesses [6].

Most recent studies regarding health information seeking were done by [7], [27]. They have conducted studies to gain understandings of health information seeking behavior among US adults. They used cross sectional data in the analysis to determine the relationship between the variables. However, by using this kind of data, no causality can be reviewed. In their study, [7] examined factors associated with health information seeking from three different sources, namely the internet, traditional media, and health care professionals and the findings showed that among US adults' health information seeking behavior, there is an age, socioeconomic, and ethnic divide. Meanwhile, [27] aimed for U.S. adults with and without a high school diploma to identify interrelationships among health information seeking behavior, and health status or use of preventive health measures. They discovered strong relation between digital literacy and health status

notwithstanding the status of their education, and the use of the internet is a significant and important moderating factor. In addition, [17] and [18] concluded that gender positively affected online health information seeking behavior. Their objective is to investigate the correlation of health-related online information seeking with special regard to gender differences. However, their samples are different. Reference [17] represents German sample of adults, while participants in [18] were recruited among UK adult and internet users. As a result, age and degree of satisfaction with one's general practitioner were gender-specific determinants of access to online health information seeking behavior [17], whilst according to [18], credibility, recommendation, ease of use, and brand play an important role in forming both men and women attitudes to seek health information online. Nevertheless, women also look upon style and show greater interest in cognition. For instance, they can read and understand the information clearly because of the ease of use. On the contrary, men eschew this for the comprehensiveness and accuracy of the information. They are more concerned with its familiarity and how they can access the information easily. Both studies did not consider age as an important moderator in health information seeking, and health literacy and health status were also not measured. On the other hand, [15], [54] conducted their studies on health information seeking in China. They used survey to collect data and the data were analyzed by structural equation model tool. In their study, [15] was focusing on consumer mobile health information seeking (MHIS) and usage behavior. They attempted to investigate the factors influencing consumers to use MHIS. The factors involved were information quality, perceived value, personal health value, and trust. As a result, consumers' attitudes towards MHIS were significantly affected by information quality and perceived value, followed by trust; ultimately enriching the consumers' intention to seek and use MHIS. In comparison, [54] was concentrating on social media to produce a model of consumer health information seeking behavior. In order to build this integrated model, two different theories were combined. These theories were the theory planned behavior (TPB) and the uses and gratifications approach from mass communication research. Generalization to other countries needs to be done by both studies as many countries are recognizing social media and mobile phones as being useful for public health consumers to manage their health.

Likewise, to investigate consumer willingness to adopt online health information services, [10] integrated health belief model and extended valence framework while identifying the relative salience from both models. For data collection, they employed a laboratory-based, experimental-scenarios research design. University population was chosen as sample because it could affect the generalization of the conclusions negatively to broader consumer populations. On the contrary, by focusing on mobile social media websites, [16] had conducted a study to investigate whether these three social support dimensions, namely perceived health risk, health self-efficacy, and health information-seeking intention

have effects on consumers' intentions to seek health information. They built a research model by integrating the risk perception attitude framework and social support. A survey was carried out among patients with non-serious conditions. As a result, intention of consumers towards health information-seeking behavior were significantly affected by what was found to be influenced perceived health risk and health self-efficacy. The survey was distributed in university-affiliated hospitals. Therefore, it is possible that some associations could not be detected because of the lack of variability in the study sample. Meanwhile, [1] highlighted the factors which include trust, self-efficacy, and health behavior that influence information seeking behavior in the area of healthcare and lifestyle. It also emphasized gender as moderator. They used survey questionnaire to collect data in only three main cities in Malaysia (Klang Valley, Ipoh and Penang), which in turn, could negatively reflect on the generalizability of results across other cities. On top of that, the survey items were adopted with no alteration from a study conducted in Iceland. In consequence, the findings may reflect less of the phenomenon among Malaysians. This study assured the important role of health behavior and gender in forming consumer behavior towards health information seeking in Malaysia.

A qualitative study in United Kingdom by [20] attempted to explore the experiences, practices and preferences of health professionals and public members in accessing health information. This study has concentrated on finding the issues regarding the searching process and the accessibility of the online health information. It also discussed on the credibility and trustworthiness of online information. Focus groups were conducted with healthcare professionals and public members. A large number of nurses compared to healthcare professionals and doctors had limited the wider area of expertise and professional grades which can ultimately benefited this study. In addition, [55] had carried out a research among adults with chronic conditions to investigate the relationship between health information seeking and confidence in performing self-management activities. Data were drawn from the 2007 Health Tracking Household Survey (HTHS), a dataset utilized in previous studies to examine health behavior and healthcare delivery. The results revealed that confidence to perform self-management was strongly predicted by self-management activities which include rurality, education level, having a usual source of care, and perceived health status.

In conclusion, most of the studies provided a further understanding regarding the main factors predicting online health information seeking including trust and information quality. The moderators on the factors such as gender, education and health status are also claimed to be important in their research. These studies also developed theoretical frameworks by drawing from a literature search and analysis of well-established models in information seeking such as theory of planned behavior, technology acceptance model, and health belief model. The next section elaborates further on the factors that influenced online health information seeking

behavior.

B. Health Information Seeking Models

Information seeking behavior researchers have formulated various models and theories from IS/IT area in order to describe and interpret a number of components, levels, stages, contextual factors, and processes which involved in human information seeking behavior. If users are acknowledging the system, willing to accept and make use of it, then the advantages and drawbacks of any system or application can be identified. However, not all health information services are in use regardless of all the potential benefits such as cost reductions, provision of high quality care and patient safety assurance. There are a number of factors that lead to the emergence of this situation. Factors like health-related information found online is inaccurate or misleading for health information seekers [10] and the trustworthiness and expertise of information providers has often been questioned [29], [30]. Hence, it is necessary to explain the role of each factor on the consumers' intention to seek information online.

Over the last three decades, the implementation of the TAM model has been undertaken by many researchers and academicians across multiple domains in different adoption studies. More importantly, as the new technology is rapidly emerged, these researchers seem to be more motivated to extend its boundary with domain-specific constructs to integrate with the new characteristics and environment.

Reference [56] affirmed that the theory of TAM is a scientific tool that has been applied frequently in investigating the individuals' acceptance of technology innovation. In TAM model, perceived ease of use (PEOU) and perceived usefulness (PU) are the two key drivers of consumers' behavioral intention (BI) towards the adoption of the technology and ultimately facilitated the consumers' willingness to accept and use the technology [56].

In the context of healthcare, [57], [58] had also agreed that TAM model was the most commonly approached to explore and comprehend the consumers' adoption and acceptance of information technology. Recent study by [44] was focusing on the adoption of mobile technologies in the domain of healthcare. TAM theory had been implemented as a theoretical framework and the structural boundary was also extended by integrating new relevant and applicable parameters to various healthcare domains. This study provided further understanding from consumers' perspectives and perceptions regarding the mechanisms of mobile technologies adoption in the contexts and settings of healthcare.

In addition, theory of planned behavior (TPB) is one of the most broadly used models in applied social psychology. Originally, this theory is extended from the theory of reasoned action (TRA) [59]. TPB has acquired noteworthy recognition in the literature and has successfully predicted the behavioral patterns of people by assessing the relationships between the components. The theory of TPB empirically supported the considerable role of these four social cognitive components; namely behavior intentions, attitude toward the behavior, perceived behavioral control, and subjective norms in shaping

the consumers' behavior. Behavior intentions are conceptualized as one's motivation in a conscious plan or decision and play a crucial role in predicting consumer behavior. Attitudes toward the behavior represent the positive or otherwise value of behavior performance. Subjective norms indicate the perception of social pressure and motivation that people perceived evaluation of important others supporting or not supporting the behavior, while perceived behavioral control is defined as the perceived degree of difficulty in performing the behavior. These three factors are proposed to predict intention.

A study from [60] reviewed a number of well-acknowledged models in information seeking including TPB. They aimed to establish a new model which incorporates both information seeking and communication. Thus, all the essential elements of existing model had been captured and a further detail regarding communication as a part of information behavior was also provided. Meanwhile, the main focus of a study from [54] was health-related social media. They explored how and why consumers are using this medium in order to have a comprehensive view about this topic. They incorporated and combined influencing factors from these two theories namely TPB and the uses and gratifications approach from mass communication research. As a result, a model of consumer health information seeking behavior via social media was developed.

Another important theory in health behavior is the health belief model (HBM). Initially, in the 1950s, the social psychologists developed HBM to elaborate more on preventive health behavior [61]. According to [62], the model postulates the existence of certain beliefs toward a given condition in order to determine an individual's health behavior. In the theory of HBM, four health beliefs components: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers could be identified to describe the action undertaken by people to prevent or control their condition of illness. However, HBM theory had been commonly implemented in the studies related to traditional health management behaviors; for example, prevention of skin cancer, exercise habits and the cessation of smoking. Recent study by [10] combined the HBM and extended valence framework to investigate the consumer acceptance towards online health information services. They intended to extend the valence framework to the non-commercial service context. They found that health information seekers are more enthused to accept online health services by covering these two fundamental aspects from health beliefs and the valence framework.

Alternatively, [63] has proposed Unified Theory of Acceptance and Use of Technology Model (UTAUT) to explain the technology acceptance. It is unified from eight existing model of acceptance technology. The eight models are the theory of reasoned action [59]; the technology acceptance model [56]; the motivational model [66]; the theory of planned behavior [64]; a model combining the technology acceptance model and the theory of planned behavior [65]; the model of PC utilization [67]; the innovation

diffusion theory [69], and the social cognitive theory [68]. UTAUT is utilized primarily in organizational contexts. It is generally consisting of four major elements; performance expectancy, effort expectancy, social influence and facilitating conditions [25]. The technology intention to use and behavior are the endogenous variables while age, experience, gender and voluntariness are listed as four moderators for this model.

Similarly in 2012, [21] had developed a theoretical model based on UTAUT named as UTAUT2. Their objective is to design a detailed framework which specifically describing the technology acceptance and use. The main difference of UTAUT and UTAUT2 is the original UTAUT which was principally focused on organizational contexts, whereas the new UTAUT2 was applicable in consumer-focused contexts. UTAUT2 incorporates three new explanatory variables which are hedonic motivation, price value, and habit, in addition to the four constructs included in the original model. Many researchers applied UTAUT or UTAUT2 in their current study. For example, [24] used UTAUT2 to identify the antecedent factors that influenced the healthcare professionals' to use electronic health records (EHRs) and evaluate acceptance of EHRs. In Slovenia, [70] also employed UTAUT in their study regarding the factors of Home Telehealth Services (HTS) acceptance by the older users. An integration of UTAUT2 and Protection Motivation Theory (PMT) was proposed by [22] to explore the acceptance of user towards Personal Health Records in Malaysia. Additionally, PMT analyzes the vision of an individual concerning the vulnerability and severity of certain threat and the capability of the individual to cope with this threat. This situation will eventually reflect the user's behavioral intention toward the new technology [71].

There are many elements from various theories that were integrated in the reviewed studies. The theories include human behavior in social psychology, communication research, health behavior, information science, and user acceptance. It is apparent that these theories and models can provide a strong foundation in developing on a new framework for this study.

III. LIMITATIONS OF THE CURRENT STUDIES

Recent developments of online health knowledge bases and social media have also opened up a wide range of channels worldwide for health information seeking and sharing from sources other than health care providers. The consumers have more opportunities to retain and improve their health. However, the significance of the research regarding health information seeking behavior is due to the lack of actual knowledge among consumers concerning their own diseases [12].

According to [1], online healthcare information seeking behavior studies are generally concentrating on developed countries while these sorts of studies are limited in developing countries. For example, [27] and [7] carried out their research in the USA; [18] conducted a study in the United Kingdom, while [17] used German citizen as the respondents. Meanwhile, in Malaysia the information seeking studies only involved certain cities or states with limited scope. For

instance, [1] collected their data in three leading cities that are Ipoh, Penang and Klang Valley, while in [19], the scope is limited to undergraduate students in Universiti Utara Malaysia, Kedah. Therefore, the reality is not truly represented by both samples. For a satisfactory result, it is suggested to use a larger and more varied sampling from different regions of Malaysia.

In the information seeking literature, most of the studies have explained social characteristics of the subjects such as age, gender, education, race, ethnicity and income. However, [1] mentioned in the samples used by researchers, variance on some of these characteristics is often disregarded. [31] also agreed with this statement and emphasized the importance to investigate the influence of these characteristics to information seeking in order to provide a more vigorous understanding of health information seeking behavior. Furthermore, previous studies in information seeking, for example [10] and [19] were mostly focusing on groups such as academics, students, or university associated community. This is because these populations are easy to acquire and always available. Nevertheless, more recent studies on information seeking [1], [17], [18] have focused on gender issues.

In recent years, health behavior has also become more significant among researchers [1], [72]. Many health behaviors are often discussed such as exercise habits, the cessation of smoking, a healthy diet practice and the consumption of alcohol. In the topic of health behavior and online health information-seeking behavior, there are only very few studies that can be identified [1], [11]. Moreover, most of the studies only consider health information seeking behavior for specific diseases and health conditions. For example, a study by [55] is focusing on adults with chronic conditions. Very few have addressed the role and effects of health information seeking behavior in varied characteristics of the population who may have no specific disease or diagnosis [27].

According to [11], most studies of health information seeking employ a cross-sectional design. For example, [7], [10], [17], [27] used cross-sectional data in the analysis. Therefore, the cross-sectional data used in the analysis can only determine the association between variables and do not allow for any causal attributions. Furthermore, the majority of studies are more interested in the measures of engagement in health information seeking behavior such as general health information seeking and information seeking content, rather than studying relevant outcomes related with the search process. This is because studying relevant outcomes associated with the search process required a long period of time. In a qualitative study by [20], patients'/public and health professionals' practices, experiences and preferences in accessing health information were explored. The data collection occurred in 2013 and it took almost three years to analyze all the data thematically. Meanwhile, [57], [58] have concluded that the most broadly used approach to understand and examine the consumer's adoption and acceptance of information technology in healthcare context is the TAM model. However, [23] justified that UTAUT2 is the most comprehensive one among all other technology acceptance

models to elaborate consumer's technology acceptance and use. Since its introduction in 2012, UTAUT2 has been broadly utilized in multiple areas and disciplines except a notable lack in the health sector [22], [24]. It has been recommended by its author [21] to use this model in different fields, studies, and countries in order to generate the highest accurate results. There are seven main constructs in UTAUT2 which were proposed as direct determinants of consumers' intention to adopt the new technology. These direct determinants are identified as key predictors of behavioral intention among consumers. Despite its enhanced structure, UTAUT2 has not yet been applied in the research area of health information seeking. Thus, this research attempts to investigate online health information seeking behavior in Malaysia, a developing country with diverse characteristics consumers and no specific diagnosis or disease. UTAUT will be used as the main model to investigate the user acceptance of online health information seeking in Malaysia. As UTAUT and UTAUT2 have been introduced as a business model, the researchers need to add on some attributes in order to meet the standard in the healthcare field. In addition, this study also aims to analyze the effect of age, gender and health status as the moderator on the factors that influence health information-seeking behavior, i.e. trust and information quality.

IV. CONCLUSION

This article has presented a review on online information seeking behavior particularly in the health domain. Some models have been reviewed and the outcome will be used in the next level of this research that is producing a conceptual framework through preliminary study.

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