

## Health Website Success: User Engagement in Health-Related Websites

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Jehad Imlawi  
Al Al-Bayt University, Mafraq, Jordan  
imlawi@aabu.edu.jo

**Abstract**—Increasing number of online users are accessing health-related websites on the Internet, and rely on it to get answers for their health questions. Health care providers try to develop websites that focus on the users' needs. One of the key factors, to develop users' driven health-related websites, is the focus on users' engagement.

This study proposes a research model to investigate what factors are critical to users' engagement in health-related websites. Accordingly, three factors were identified; website usability, website interactivity, and users' perceived quality of health information. Little research has previously explored such a thorough list of factors that affect users' engagement in health-related websites.

240 respondents have participated in an online survey, to test the research model. Results show that the influence of the engagement antecedents, identified by the study, is significant. These factors explain a great percentage of the variance for the engagement. The study is finally concluded by implications for theory and practice.

**Keywords**— website usability, website interactivity, engagement, health information quality, human computer interaction

### 1 Introduction

Research found that online users frequently access health-related websites to search for online health information [1]. Questions posted online, by these users, are considered as beneficial and engaging dialogues. Interactive communication that provide quick and recent responses may also contribute to a sense of online social presence, which may also be perceived as beneficial by online users.

Interactivity has been defined as responsiveness, control, and reciprocity between a website and their users. Interactivity is a type of two-way communication between a user and the website [2]. Significance of website interactivity is well established in IS literature. However, Liu & Shrum (2002) found that the effect of interactivity on online users' behavior requires more investigations, to generate specific design guidelines for online websites to be more interactive [2].

When online users choose to explore a web environment, they are also choosing to interact with it [3]. Therefore, websites' designers are required to support this interac-

tion [4]. To this end, practitioners need more insights about the implementation of interactive communication features in their websites. Ariely (2000) argued that most websites are facing the challenge of providing their users with relevant information [14]. This task might be easier when engaging those users in an interactive communication.

The tremendous growth in health-related websites, and its success in providing user-centric services, encouraged more researchers to investigate the different aspects of health-related websites' usability. Website usability defined as the combined effect of several design goals that make a website easy to learn, easy to remember, easy to understand, easy to find and effective to use [5]. Prior literature provided principles and guidelines that practitioners can follow to improve their websites' usability. However, many of these design rules did not go through a systematic test of validation in the literature [6]. Consequently, theoretical and empirical evidences are still needed to better understand the influence of website usability on online user behavior. Moreover, the available guidelines are sometimes not appropriate for all of the different settings. Usability design guidelines for health-related websites, for example, need more investigations by the literature.

Engagement was defined in the literature as the feeling that a system has caught, captured, and captivated user interest [7]. Prior research has focused on the significance of engagement in online settings. However, little research has investigated whether and how engagement in online settings influences users' experience [8]. No previous research has studied antecedents of users' engagement in health-related websites.

Perceived quality of online information refers to the extent to which a user perceives the information, provided by a website, as complete, accurate, current, useful, and relevant [9]. Quality is one of the main challenges that online information face. Sources of online health information have been initially perceived by online users as low reputation sources [10]. However, more studies developed specific criteria that helped in improving users' perception of online health information quality.

This research investigates the impact of website interactivity, website usability, and perceived information quality on users' engagement in health-related websites. The second section of this research presents the literature review and hypotheses building. Third section explains the research methodology, followed by section four that presents the research results. The research is finally concluded with the research implications for theory and practice in section five.

## **2 Literature Review and Hypotheses Building**

In this research, we sought to identify the influential factors that have been consistently reported to influence online users' engagement in health-related websites. Engagement was selected in this research, because it is one of the main indicators of website's success. Researchers have proposed that users' engagement in online environment should be a central construct in explaining online users' behavior [11].

Engagement is the quality of user’s experiences with technology that facilitates more enriching interactions with computer applications [12]. It is the feeling that a system has caught, captured, and captivated user interest [7]. These feeling states are present in every online environment, and are likely to influence the user’s experience in this online environment [13].

Concerning the antecedents of engagement in health-related websites, the efforts were to build a thorough list of factors that might affect users’ engagement in health-related websites. Accordingly, three main factors were identified. First factor is related to the interaction between the health-related website and its users; website interactivity. Second factor is related to the health-related website itself; website usability. The third factor is related to the website content; information quality. Figure 1 shows the research model.

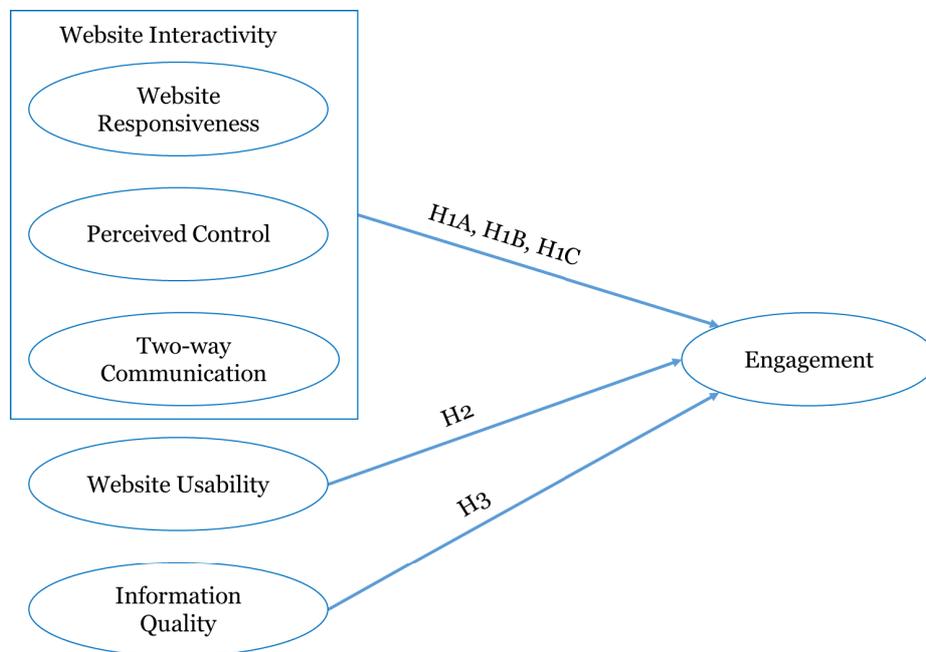


Fig. 1. The Research Model

## 2.1 Website Interactivity

Steuer (1992) defined interactivity as “the extent to which users can participate in modifying the form, or content, of a website in real time” [15]. Although there is no agreed definition of interactivity [16]; Mollen & Welson (2010) argued that Steuer’s definition is the most cited definition of interactivity [17]. Cui, Wang & Xu (2010, P. 37) defined website interactivity as “the degree to which the consumer perceives the Web site to be controllable, responsive, and synchronic” [18].

Website interactivity was proved, in prior research, to improve users' satisfaction [19], flow experience [20, 21], and users' positive attitudes [22]. Website interactivity was also proved to increase the appeal of websites [23, 24]. Wu & Chang (2005) even found that interactivity improves enjoyment and absorption [20], meaning that interactivity might affect user's engagement in online websites. Thus, user's preference of interactive website is expected to be associated with users' engagement in health-related websites.

Mollen & Welson (2010) argued that there is a degree of consensus in literature on the common components of interactivity; perceived responsiveness, perceived user control, and two-way communication (reciprocity) [17].

Green & Pearson (2011, P. 186) defined responsiveness as “the presence of feedback to users, and the availability of responses from the site managers” [25]. Responsiveness pertains the willingness, and readiness to provide services [26], and it is the most important element in interactivity [27]. Responsiveness is a key user issue in online environment. Green & Pearson (2011) found a positive relationship between responsiveness and ease of use [25], and consequently, it is expected to improve the user engagement in a web environment.

Based on the flow theory, users who reported more perceived control on a website, felt more involved when navigating this website [28]. When user have more control in an online experience, they tend to have more flow and pleasure [14]. Similarly, information control theory says that increasing the user control on information flow, improve ability to figure more of the information structure of any information system [14]. Understanding the information structure also suggest that the user would be more engaged in this information system. Cui, Wang & Xu (2010) argued that perceived control over a website pertains users' participation behavior, and it influences attitude toward a website [18].

Two-way communication, or reciprocity, was defined by Chai, Das & Rao (2011) as behavioral response to perceived communication [29]. Communicated information must be recent, current, timely, interactive, and up-to-date [30], to be considered as interactive and engaging. Website content should be updated continually to be perceived as performance supportive [31]. This is more significant in the case of health information that loses its weight if it's not interactive, updated and responsive. Han, Min & Lee (2015) found that immediate feedback is one of the social network sites characteristics that fulfill their users' need [32]. This suggest that feedback communicating behavior influences users' engagement.

H1A: Website responsiveness has a positive impact on users' engagement in this website.

H1B: Users' perceived control over a website has a positive impact on their engagement in this website.

H1C: Users' perceived two-way communication with a website has a positive impact on their engagement in this website.

## **2.2 Website Usability**

Usability is the most traditional concept in human computer interaction (HCI) research. The International Standards Organization (ISO) 9241 standard defines usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” [33]. Rahman & Ahmed (2013) defined website usability as the combined effect of several design goals that make a website easy to learn, easy to remember, easy to understand, easy to find, and effective to use [34]. Nielsen (2016, p.1) argued that “usability is a quality attribute that assesses how easy user interfaces are to use” [35]. Accordingly, he defined usability as learnability, efficiency, memorability, user errors, and satisfaction [35].

Website interface is a primary motivator to use a website, and be engaged in it. The friendlier and usable the interface is, the better the impression of the Website [36]. From both user and business perspectives, a business website can determine the success, or failure of net-enabled businesses [4]. Users are goal-driven; they need to achieve their goal with the least possible efforts [37]. Usable interfaces allow users to achieve goals with less efforts, thus, they are expected to engage those users.

Prior research found that usability can affect online users’ behavior, like increasing computer usage. Imalwi & Gregg (2014) found that increasing computer usage is linked to user engagement [38]. Nantel & Senecal (2009) suggest that users tend to complete their task on the website when there was no download delay [39], due to high perceived usability. Usability is also a factor that assists in predicting intentions to use a system [40, 41]. Mummalaneni (2005) found that web design quality affects the emotional state of online users, like arousal and pleasure [42]. Website usability was proven to affect the quality of a website [43, 44], therefore, it may influence users’ engagement in a usable website.

Usability concerns capability of managing a system, by memorizing the basic functions, and avoiding errors. It also concerns ease of navigating a website [45]. Manageability, which is one element of usability, increases the general satisfaction of the user [46, 47, 48]. Flavián, Guinalú, & Gurrea (2006) found that both usability and satisfaction are directly linked to the website loyalty [45]. Users tend to feel familiar with usable website [46], because usability helps in simplifying transactions, and allowing user to achieve their goals in a simple manner [66]. Thus, we hypothesized that website usability has a positive impact on users’ engagement in this website.

H2: Website usability has a positive impact on users’ engagement in this website.

## **2.3 Perceived Information Quality**

Online users increasingly search for online health information. However, Internet is a largely unregulated source that provide inconsistent quality of information [49]. This suggest how important the quality of online health information in such uncertain environment. Higher perceptions of information quality can motivate positive feeling states that may, in turn, lead to increased time spent in the online website [11]. In

contrast, online experience with lower perceptions of information quality may induce low affective engagement.

When online users perceive higher information quality, users tend to be more involved, and they feel an intrinsic enjoyment [50, 51]. Previous research has found that an engaging online experience is intrinsically motivating [52, 53], and can be influenced by users' involvement in online information gathering.

This study proposes that perceived information quality will positively influence users' engagement in health-related websites, because developing and evaluating a reliable measure of information quality, assists in improving engagement elements, such as attention, affect, aesthetics, novelty, interest, control, feedback, challenge, and motivation [12]. Research on engagement and related constructs supports this assertion. Thus, we propose:

H3: Users' perceived information quality has a positive impact on users' engagement in the website that publish this information.

### **3 Research Methodology**

#### **3.1 Research Design**

An exploratory study was conducted to test the proposed research model. A Web-based survey was utilized to validate the study constructs. Data were collected using a commercially available survey tool; Survey Monkey ([www.surveymonkey.com](http://www.surveymonkey.com)). The survey is divided into three parts. The first part of the survey included questions for the respondents, to check whether they accessed any health-related websites before, and if they searched for online health information. Respondents whose answer is yes, were also asked which health-website they accessed, how many times they accessed these websites, and how long they spent in these websites. Second part of the survey included the measurement items that the study utilized to measure the proposed constructs. The third part of the survey included demographic questions.

A pretest was conducted (n=25). The survey items were pretested to ensure message clarity, believability, and likability. Accordingly, some items were modified or reworded depending on the feedback provided by the respondents. Participants in the pretest were excluded from any further participation in the study.

The survey link was posted to health-related Facebook groups for two months, from Jan to March 2017. When a respondent click the survey link, they were first informed about the study purpose, participants' privacy, and animosity. Then, they were asked to think of a last online experiment of health information search they conducted. Finally, respondents were directed to complete the survey items.

#### **3.2 Measurement**

Six constructs were measured in this study: website responsiveness, perceived control, two-way communication, website usability, information quality, and engagement. Well established measurements, already used in the literature, were adopted in

this study. A seven point Likert scale was utilized in the questionnaire, where 1 represents the completely disagreement, and 7 represents the completely agreement, with each item. Final measurement items appear in the Appendix.

### **3.3 Participants**

Participants in this study are students from a public university in Jordan. Students found to be the most Internet users [54]. Youth in general found to be the dominant Internet users [55]. Students' online behavior found to be similar to the general population behavior [56].

Moreover, students deemed to be suitable for this research, because the study includes a goal-directed online health information search. Participants who participated in this study have reported some access to health-related websites, searching for online health information.

### **3.4 Control Variables**

The following control variables were considered in this study: computer self-efficacy, experience, and gender. Computer self-efficacy is defined as user's belief about his/her ability to perform a specific task using a computer [57]. We used a T-test, to check if there is a significant difference between users with different levels of computer self-efficacy (high-level and low-level computer self-efficacy).

Users also have different levels of experience in information seeking tasks. A T-test was used, to check if there is a significant difference between those who have a little experience, and others who have a longer experience with information seeking tasks. Finally, a T-test was used to check if there is a significant difference between male and female participants.

## **4 Results**

240 completed survey were collected. The percent of female respondents was 64%, while 36% were males. The T-tests used to check the influence of the control variables showed no significant impact for any of the studied control variable ( $P > 0.05$ ).

The study used Partial Least Squares (PLS) Structural Equation Modeling (SEM) method to evaluate the hypotheses model. In order to evaluate the properties of the research model; items loading, internal consistency, and discriminant validity were used. Each item's loading should be high on its corresponding construct, at least 0.7 [58]. The entire items' loading in this study exceeded this level, as can be seen in table 1.

Composite reliability scores were used to check for internal consistency. Table 2 shows that composite reliability scores exceeded 0.9 for all constructs. Accordingly, composite reliability considered to be adequate in this study [59], and hence, internal consistency is not a concern in this study.

For discriminant validity, we used the Square Root of Average Variance Extracted (AVE). For a good discriminant validity, square root of AVE for each construct must be higher than inter-correlations with the other constructs. Accordingly, discriminant validity was not a concern in this study as can be seen in table 2.

**Table 1.** Items Loading

	Engagement	P. Info Quality	Responsiveness	Control	Two-way Communication	Usability
ENG1	0.955					
ENG2	0.944					
ENG3	0.944					
ENG4	0.930					
ENG5	0.961					
ENG6	0.963					
ENG7	0.930					
PQ1		0.888				
PQ2		0.901				
PQ3		0.885				
PQ4		0.920				
PQ5		0.903				
PQ6		0.892				
RSP1			0.876			
RSP2			0.913			
RSP3			0.938			
RSP4			0.891			
Cont1				0.715		
Cont2				0.845		
Cont3				0.754		
Cont4				0.781		
Cont5				0.714		
Comm1					0.846	
Comm2					0.798	
Comm3					0.904	
USB1						0.922
USB2						0.949
USB3						0.940

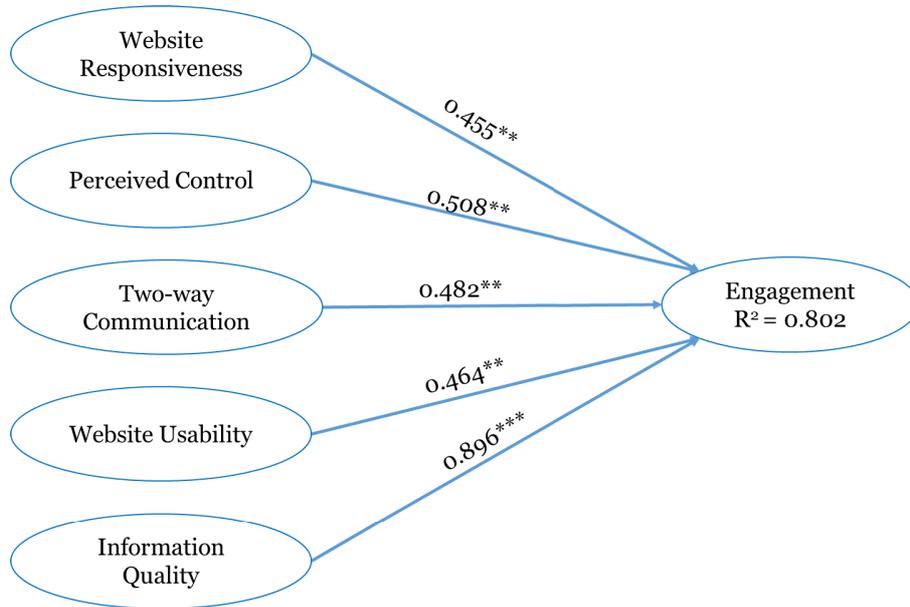
Results of this study are presented in figure 2. Engagement had an R-Square of 0.783, meaning that the model explains 78.3% of the variance in engagement collectively [50]. Path coefficients were all significant as shown in table 3. All five hypotheses are supported.

**Table 2.** Internal consistency and discriminant validity

		Square Root of AVE and inter-construct correlations					
		<i>Eng</i>	<i>P. Qual.</i>	<i>Resp</i>	<i>Cont</i>	<i>Comm</i>	<i>Usab</i>
<b>Comp. Reliability</b>							
0.984	Eng	0.947					
0.973	P. Qual.	0.596	0.894				
0.948	Resp	0.551	0.582	0.905			
0.909	Cont	0.354	0.481	0.382	0.884		
0.847	Comm	0.452	0.418	0.344	0.512	0.902	
0.956	Usab	0.552	0.574	0.552	0.476	0.534	0.937

**Table 3.** Summary of hypotheses tests

	Path Coefficient	t-Value	P Values
H1A: Responsiveness → Engagement	0.455**	3.839	0.000
H1B: Control → Engagement	0.508**	3.912	0.000
H1C: Two-way communication → Engagement	0.482**	3.742	0.000
H2: Usability → Engagement	0.464**	8.774	0.000
H3: Perceived Quality → Engagement	0.896***	10.498	0.000



**Fig. 2.** PLS results

## **5 Discussion and Implications**

This research investigates the impact of three main factors on users' engagement in health-related websites. First factor is related to the interaction between the health website and its users; website interactivity. Second factor is related to the health-related website itself; website usability. The third factor is related to the website content; information quality.

The results of this study proved that interactive websites engaged users more than un-interactive websites. Responsive, controllable, and interactive websites, engage users in these websites more than other websites. Results also proved that users who explored a usable website were engaged in these websites more than other users who explored an unusable website. Finally, users who perceived online published information in a health-related website as a high-quality information, were also more engaged, comparing to other users who perceived such information as a low-quality information.

The results are consistent with prior research, about the significance of website interactivity, and its impact on users' engagement. Based on the flow theory, users with higher perceptions of control when exploring a website, reported higher users' involvement when navigating this website [28]. This control can lead to increased pleasure and flow [14], and hence, increased engagement. Website interactivity, where users find quick and interactive responses to their questions and inquiries, was proved to improve website revisit intention, suggesting that engaged users have higher revisit intention.

Website usability positively influences users' engagement. This was also compatible with prior research. Prior research has found that users who explore a usable system made less errors, and experienced higher accuracy and increasing computer usage [60]. These factors were found, in turn, to be connected to users' engagement [38]. Most prior research in e-commerce found a strong connection between e-commerce website's usability and purchase intention [61, 62]. Prior research also proved a relationship between website usability, and emotional state of online users, like arousal and pleasure.

Results of this research proved that online users, who highly rated the quality of information published in health-related websites, feel more engaged in these websites. With the information explosion on the Internet, and substantial quantity of online health information sources, online users need more reasons to trust the information quality, and be more engaged in its source. This is especially true when dealing with more sensitive information, like health information.

Among factors related to: the interaction between the health-related website and its users, the website itself, and the website content, results showed that factors related to the website content, perceived information quality ( $\beta = 0.896$ ,  $P < .000$ ), is the strongest predictor of engagement in health-related websites. Meaning that users of health-related websites are most motivated to be engaged when they have less concerns about the quality of health information. Information quality influenced users' engagement more than website interactivity and usability do. This is true because health

information quality is more sensitive comparing to any other type of online information. Low-quality health information can be harmful.

Investigating health-related website's success, represented in engagement in health-related websites, is one of the contributions of this research for practice. This research provides deep insights for online health service providers, who must be interested in understanding the factors affecting users' engagement in their websites.

Using results provided by this research, designers of health-related websites can learn that when the website, website managers, and fellow members are more responsive to other users of this website, they would be more engaged in it. Alternatively, low interactive and low responsive websites would less engage users. Consequently, designers of these websites would include contents that support interactivity in their designs. Example of these designs are online chat features or interactive discussion boards.

### **5.1 Limitations and Future Research**

This research aimed to investigate the success of health-related websites. Toward this purpose, the research identified a thorough list of factors that might influence engagement in health-related website. However, in addition to engagement, other factors might represent website's success as well. Example of these factors are: trust, intention to use, satisfaction, and design quality. Future research is recommended to conduct an inductive approach, that provide a comprehensive list of factors that represent website success.

### **5.2 Conclusions**

This research aimed to investigate the success of health-related websites. Toward this purpose, the research identified a thorough list of factors that might influence engagement in health-related website. However, in addition to engagement, other factors might represent website's success as well. Example of these factors are: trust, intention to use, satisfaction, and design quality. Future research is recommended to conduct an inductive approach, that provide a comprehensive list of factors that represent website success.

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## 7 Author

**Jehad Imlawi** is Assistant professor at Al Albayt University, IT School, Information Systems Department, Mafraq, Jordan.

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## Appendix A

### Measurements and Items

Table A1. Measurements and Items

Construct	Items	Source
Perceived Responsiveness	<ul style="list-style-type: none"> <li>• The Web site is effective in gathering visitors' feedback.</li> <li>• This Web site facilitates two-way communication between the visitors and the site.</li> <li>• The Web site makes me feel it wants to listen to its visitors.</li> <li>• The Web site gives visitors the opportunity to talk back.</li> </ul>	[18]
Perceived Control over a Web site	<ul style="list-style-type: none"> <li>• While I was on the Web site, I was always aware where I was.</li> <li>• While I was on the Web site, I always knew where I was going.</li> <li>• I was delighted to be able to choose which link and when click.</li> <li>• I feel that I have a great deal of control over my visiting experience at this Web site.</li> <li>• While I was on the Web site, I could choose freely what I wanted to see.</li> </ul>	[18]
Two-way communication	<ul style="list-style-type: none"> <li>• When I share information through this website, I believe that my questions will be answered in the future.</li> <li>• I believe that websites manager I interact with would help me if I was in need.</li> <li>• When I share my knowledge and information through this website, I expect some other users to respond when I am in need.</li> </ul>	[29]
Website usability	<ul style="list-style-type: none"> <li>• The website was very user-friendly.</li> <li>• The website was easy to use.</li> <li>• The website was well organized.</li> </ul>	[63]
Engagement	<ul style="list-style-type: none"> <li>• The Web site kept me totally absorbed in the browsing.</li> <li>• The Web site held my attention.</li> <li>• The Web site excited my curiosity.</li> <li>• The Web site aroused my imagination.</li> <li>• The Web site was fun.</li> <li>• The Web site was intrinsically interesting.</li> <li>• The Web site was engaging.</li> </ul>	[64]
Perceived information quality	<ul style="list-style-type: none"> <li>• The website provides up-to-date information with regard to transactions.</li> <li>• The data this website provides are never outdated.</li> <li>• I feel satisfied with the data accuracy of the website.</li> <li>• Data provided by this website are completely error-free</li> <li>• The information content of the website meets my needs.</li> </ul>	[65]