

Trust, Risk and Perceived Usefulness in Consumer Acceptance of Online Health Services

Jian Mou

Jason F. Cohen

School of Economic and Business Sciences

University of the Witwatersrand

South Africa

Email: jian.mou@wits.ac.za, jason.cohen@wits.ac.za

Abstract

The Web is developing into an important health information dissemination channel. Benefits cannot however materialize without consumer acceptance. This study developed a research model of the effects of trust, perceived risk and perceived usefulness on consumer acceptance of online health information services. Trust was modeled as a higher-order construct reflected by trust in the online information provider, the website interface, and the institutional structures of the Internet. We collected data from a sample of 161 university students in South Africa. Only 30% of respondents indicated strong future usage intentions. Our multi-dimensional trust construct was found to have both direct and indirect effects, via perceived usefulness, on consumer acceptance. Perceived risk was not found to have a significant influence on consumer acceptance. Results have helped us identify the relative salience of trust, risk and usefulness perceptions in consumer acceptance of online health information services and have important implications for practice.

Keywords

Trust, Risk, Perceived Usefulness, Online Health Services, E-Service.

INTRODUCTION

The Web is developing into an important health information dissemination channel (Yi et al. 2013). Online health information services such as WebMD, MayoClinic and Medlineplus offer consumers the promise of increased convenience and greater access to information for engaging in self-management of their health (Harbour and Chowdhury 2007; Xiao et al. 2014). By facilitating self-diagnosis, they can save unnecessary trips to the doctor's office whilst also encouraging early intervention by recommending consumers to seek health professional advice (Lanseng and Andreassen 2007). They also allow consumers to obtain insights into treatment options, and empower them to obtain information on health conditions about which they may feel uncomfortable interacting face-to-face with a health practitioner (Hadwich et al. 2010; Xiao et al. 2014). Online health services also help to extend the reach of health services into remote communities, and may play an important role in improving the quality and decreasing the overall costs of healthcare delivery (Hadwich et al. 2010). These and other potential benefits cannot however materialize unless online health services are accepted and used by healthcare consumers.

Unfortunately, however, uncertainties still characterize the online context and varying degrees of consumer acceptance and engagement in the use of online health services has been observed. Due to these uncertainties, trust has been considered one of the most important factors influencing consumer acceptance of online health services. More specifically, three trust dimensions are considered important to consumer acceptance. These are trust in the online service provider, trust in the e-service platform or website, and trust in the institutional structures of the Internet (Gefen 2002; Gefen et al. 2003; Dinev and Hart 2006). Trust is important to reducing consumer perceptions of risks and enhancing perceptions of information credibility and usefulness (Bansal et al. 2010; Yi et al. 2013; Xiao et al. 2014). Performance-based risk, i.e., the online service not performing as expected and therefore failing to deliver the desired benefits (Featherman and Pavlou 2003), may be particularly relevant in the online health context. For example, the delivery of inferior or inaccurate information may compromise the health of consumers. Trust can also ensure the online health service is judged as more useful and convenient (Lanseng and Andreassen 2007).

Empirical studies of how multiple trust dimensions influence perceptions of both risk and usefulness in the online health information context are however lacking. Although Lanseng and Andreassen (2007) examined trust and usefulness in online self-diagnoses, they did not examine multi-dimensions of trust, and did not consider how trust and risk are related. Although, Bansal et al. (2010) considered how trust and risk influence consumer online health information behavior, they did not consider the effects of perceived usefulness. Yi et al. (2013)

considered the antecedents of trust and the relationship with risk in web-based health information, however their study did not consider how trust, risk and perceived usefulness influence behavior. Moreover, while Xiao et al. (2014) considered informational trust as a salient determinant of online health information seeking behavior, they did not consider the role of perceived usefulness or risk. Thus understanding the combined effects of multiple dimensions of trust, perceived risk and perceived usefulness in consumer acceptance of online health information services is a research problem in need of attention.

Consequently, we pose the following research questions:

RQ1: To what extent does trust in the e-service provider, trust in the website, and trust in the institutional structures of the Internet influence consumer acceptance of online health information services?

RQ2: To what extent are the effects of trust on consumer acceptance mediated by the perceived risks as well as the perceived usefulness of online health information?

RQ3: Which of trust, risk and usefulness are the more salient determinants of consumer acceptance of online health information services?

To address these questions, this study develops a research model of the effects of trust, perceived risk and perceived usefulness on consumer acceptance of online health information services. Our treatment of trust beliefs as multi-dimensional consisting of three components, namely trust in provider, trust in website and trust in institutional structures, constitutes a unique contribution over prior works which examine only one of these components or treat the multiple components separately. We test our model using data collected from a sample of undergraduate students using an experimental scenarios approach combined with a questionnaire survey

Results of our study shed light on the perceptions and attitudes of consumers towards this high-potential digital health initiative. Moreover, this study provides an opportunity to extend theories of trust and risk in consumer acceptance of e-service into the online health information context. In the next section, the conceptual background and proposed research model are presented and prior research on trust, risk and perceived usefulness in e-services adoption is reviewed. Next, the research methodology, and approach are outlined. The paper concludes with research results, discussion and implications.

CONCEPTUAL BACKGROUND AND RESEARCH MODEL

The attitude and behavioral intention literature has underpinned a number of investigation into e-service acceptance (e.g. Hansen et al. 2004; Yousafzai et al. 2010). In the past three decades, various theoretical models of attitude and behavioral intention have been proposed. Among them, the theory of reasoned action (TRA), the theory of planned behavior (TPB) and technology acceptance model (TAM) have frequently been applied to provide an understanding of e-services adoption (e.g. Featherman and Pavlou 2003; Leonard et al. 2004; Yousafzai et al. 2010).

The TRA (Ajzen and Fishbein 1980) in particular has been well established in social psychology discipline and is the most widely used theories for explaining individual behavior. Fishbein and Ajzen (1975) argued that TRA is concerned with rational, volitional and systematic behavior. It predicates a belief–attitude–intention–behavior model. Attitude is defined as an individual's positive or negative feelings about performing the target behavior (Davis et al. 1989), whilst behavioral intention is defined as the consumer's intention to perform the behavior in the near future (Fishbein and Ajzen 1975). TRA does not however specify the specific behavioral beliefs that come to influence attitudes or intentions. Consequently, researchers drawing on TRA are required to identify the beliefs considered appropriate to employ in their specific research context (Davis et al. 1989; Yousafzai et al. 2010).

The TRA has been adopted in IS research to examine technology acceptance where acceptance is typically examined through the TRA constructs of attitude and behavioral intention. Drawing on TRA, we therefore define consumer acceptance of online health information services as the consumer's attitude and behavioral intention towards the use of the e-service. Attitude is defined as the individual consumer's overall evaluation that using an online health service would be positive and appropriate (Hsu et al. 2006), whilst behavioral intention is defined as the consumer's intention to use or continue to use the site to obtain health information in the future (Bhattacharjee and Premkumar 2004).

Fig. 1. depicts the study's research model with attitude and behavioral intention modeled as the two acceptance constructs. The model identifies trust, risk and perceived usefulness as the behavioral beliefs that can influence e-services acceptance. Trust plays an important role in exchange relationships between organizations and their customers (Corbitt et al. 2003; Teo and Liu 2007). The importance of trust in consumer acceptance of e-service is increasingly being recognized (Grabner-Kräuter and Kaluscha 2003), and multiple dimensions of trust have been identified. Pavlou (2003) for example considered both trust in a specific party (i.e., Web retailer) and trust

in the integrity of the transaction medium (i.e., trust in the Web infrastructure). Thatcher et al. (2013) more recently argued that technology and institutional mechanisms play an active role in shaping online transactions. Thus both general trust in Internet infrastructure and in institutional mechanisms and specific trust in the online merchant and website are important to consumers. Others too have distinguished between trust in the e-service provider (e.g. Gefen 2002; Pavlou and Gefen 2004; Nicolaou and McKnight 2006), trust in the website interface through which consumers access the online services (e.g. Dinev and Hart 2006; Liao et al. 2011), and trust in institutional structures of the Internet which provides the interaction environment for the provision of e-services (Gefen et al. 2003). Taken together, we recognize that consumer trust in the e-service provider, the website platform, and the institutional structures of the Internet are three important dimensions of the trust construct that have implications for consumer acceptance. Our research model therefore depicts trust as a higher-order construct reflected by these three first-order dimensions.

Risk perceptions are an additional barrier to consumer online decision making (Kim et al. 2008). Our model includes risk perceptions defined as consumer's belief about the potential performance loss when undertaking online health service interactions. Past e-services research suggests that trust beliefs and risk perceptions have both direct and indirect effects on consumer acceptance of e-services in numerous commercial (e.g. e-shopping) and non-commercial (e.g. e-government) online services (Mou and Cohen 2013). In particular, trust is theorized to attenuate the perceived risks associated with the use of e-services (Pavlou 2003; Liao et al. 2011; Bélanger and Carter 2008).

In addition, an individual's perception of the expected benefits or usefulness of technology is one of the primary beliefs influencing acceptance in offline (Davis et al. 1989) and online e-services contexts (Chandra et al. 2010). Therefore, consumer perceptions of usefulness are modeled as an alternative mechanism through which trust influences acceptance (Gefen et al. 2003). The model's hypotheses are presented next.

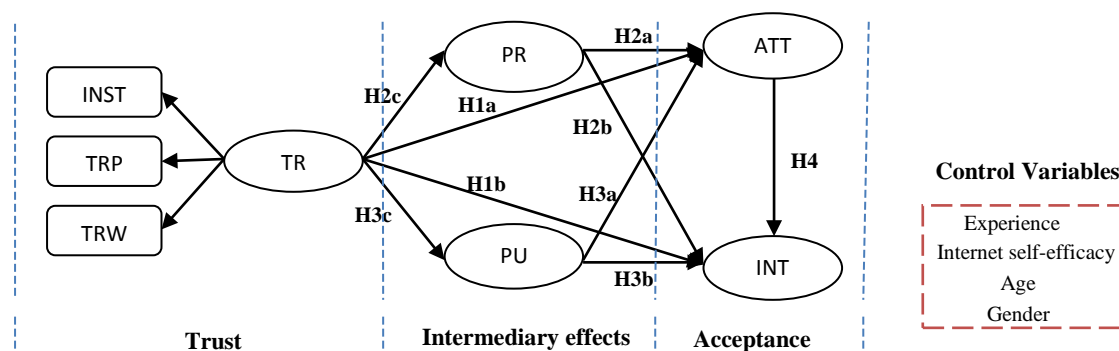


Fig. 1. Research Model. (INST: Trust in institutional structures; TRP: Trust in provider; TRW: Trust in website; TR: Trust; PR: Perceived risk; PU: Perceived usefulness; ATT: Attitude; INT: Behavioral intention).

Consumer Trust and Online Health Information Service Acceptance

Trust in the e-service provider is defined as the consumer's confidence in the integrity and dependability of the provider (Rotter 1967; Bhattacharjee 2002; Pavlou and Gefen 2002). It is a belief that the other party will behave in a socially responsible manner, and will fulfil expectations (Pavlou 2003). Trust allows consumers to be vulnerable to actions taken (or information provided) by the vendor based on these trust beliefs (Gefen 2000). Past studies have found trust important to consumer behavior (Gefen et al. 2003; Kim et al. 2008). A trusted e-service provider is more likely to be perceived as offering accurate and useful information that is in the best interests of the consumer. Pavlou (2003) argues that trust creates positive attitudes toward a service provider, reduces uncertainty and provides expectation for a satisfactory transaction experience.

Trust in the website is based on its reliability and ability to meet the consumer's needs of functionality (McKnight and Thatcher 2006). A website's features and functions play an important role in mitigating transaction uncertainty (Thatcher et al. 2013). Thatcher et al. (2013) argue that the website serves as a representation of the 'unobservable' e-service provider, and consumers form perceptions of trust based on cues from the website interface. The website enables transactions to occur and must be seen to reliably and consistently help the consumer easily locate and search for required information and ensure they can complete necessary transactions (Thatcher et al. 2013). A trusted website interface is thus important to creating positive perceptions and usage intentions.

Trust in the institutional mechanisms concerns whether the Internet is perceived to be a reliable and safe environment in which to exchange information and transact with others (Gefen et al. 2003). Institutional-based trust reflects the consumers belief as to whether within the online context there are enough regulations to protect

consumer's rights (e.g. legal structures), sufficient assurances and statements of guarantees such as the use of third-party seals, as well as enough technological safeguards (e.g. encryption) to make the transaction environment safe (Thatcher et al. 2013). Trust in such institutional mechanisms is needed to reduce overall uncertainties associated with using the Internet to engage with service providers and to provide an overall feeling of confidence that the Internet is a protected environment.

Taken together, all three dimensions of trust (trust in provider, trust in website, and trust in institutional mechanisms) are considered important to reducing the complexities and uncertainties associated with the use of online health information services and promoting consumer acceptance. We therefore hypothesize that:

Hypothesis 1a: Trust has a positive effect on consumer attitudes toward online health information services.

Hypothesis 1b: Trust has a positive effect on consumer behavioral intentions toward online health information services.

Risk and Online Health Information Service Acceptance

Garbarino and Strahilevitz (2004) define perceived risk as the potential for loss and the seriousness of the outcome if loss was to occur. In the e-service context, consumers face numerous performance, financial, privacy, and even psychological risks (Featherman and Pavlou 2003). Reducing risk perceptions is thus considered essential to the success of e-services (Jarvenpaa et al. 2000). When consumers interact with the health websites, they stand a risk of loss resulting from use of poor quality health information (Yi et al. 2013). Because consumers usually obtain online health information to make health behavior decisions for themselves and/or their family, they are likely to be particularly concerned about this performance based risk. If consumers perceive a risk of obtaining inferior and inaccurate information that may cause them to experience negative health related outcomes they are less likely to accept and use of online health services. It can therefore be hypothesized that:

Hypothesis 2a: Risk perceptions have a negative effect on consumer attitudes toward online health information services.

Hypothesis 2b: Risk perceptions have a negative effect on consumer behavioral intentions toward online health information services.

Pavlou (2003) argued that trust reduces the uncertainties that give rise to risk perceptions. Xiao et al. (2014) argue that trust can attenuate perceived risk by reducing the complexity and uncertainty of online health information seeking. Because the perceived risk of loss is likely to be lower when interacting with a trusted provider through a reliable website interface in a safeguarded online environment, we can hypothesize that:

Hypothesis 2c: Trust lowers the perceived risks associated with using online health information.

Perceived Usefulness and Online Health Information Service Acceptance

Perceived usefulness (PU) has been identified as a central behavioral belief in technology acceptance (Davis et al. 1989), and online consumer behavior (Gefen et al. 2003). In the e-service context, PU refers to the degree to which a consumer believes that using the e-service would enhance his/her performance or effectiveness. We extended Lanseng and Andreassen's (2007) definition of PU in the online health information context, and draw on Lim et al. (2011) to define PU as a consumer's belief that an online health service will enhance their effectiveness in self-management of their health. Consumers are more likely to accept the use of an online health service if it is perceived to be of benefit and is performance enhancing. We therefore hypothesize that:

Hypothesis 3a: Perceived usefulness has a positive effect on consumer attitudes toward online health information services.

Hypothesis 3b: Perceived usefulness has a positive effect on consumer behavioral intentions toward online health information services.

Consumers are however likely to perceive the potential for benefits only if the online provider is trusted as a reliable and competent provider of health information, and if the website is reliable in facilitating the desired goals of searching for and obtaining health information. Empirical studies have found perceived usefulness to partially mediate the effects of trust on consumer acceptance of e-services (Gefen et al. 2003). Therefore it can also be hypothesized that:

Hypothesis 3c: Trust has a positive effect on the perceived usefulness of online health information.

Attitudes and Behavioral Intention

The attitude-behavior relationship is central in TRA theory where behavioral intentions are theorized to result from positive attitudes towards performing the behavior (Hansen et al. 2004). A consumer's positive or negative feeling towards using e-services is thus expected to influence his/her behavioral intentions. The attitude-behavior relationship has been empirically examined in e-health context (e.g. Lanseng and Andreassen 2007). We therefore hypothesize that:

Hypothesis 4: Consumer attitude toward online health information services has a positive effect on behavioral intentions.

Control Variables

Fig. 1. identifies Internet self-efficacy (ISE), Age, Gender, and online health service experience as controls. Consumers who have higher Internet self-efficacy are more likely to engage with online services (Dabholkar and Bagozzi 2002). Younger consumers are also considered to have more positive attitudes toward using new technologies (Morris and Venkatesh 2000). Ybarra and Suman (2008) suggest that gender and age differences may shape online health service adoption. Shim et al. (2001) found that prior experience with e-services predicts consumer online behavior. Consumers who have not used online health information before may have a lower likelihood of future acceptance.

RESEARCH METHODOLOGY

Study Design

To test our research model, we used a laboratory-based, experimental scenarios research design carried out at a large national university in South Africa. We invited undergraduate students who are registered in computing related courses to take part in the study. The use of a university student sample is appropriate because they represent an important portion of online consumers (Kim et al. 2008). Moreover, prior studies suggest that university students are the primary population using the Internet to acquire health information (Bansal et al. 2010; Li et al. 2014; McKinley and Ruppel 2014). Furthermore, a review on the use of student samples in information systems research indicated that when theories are under examination, using a student sample is valid and appropriate (Compeau et al. 2012). All these suggest that the use of a university population is appropriate for the study.

The design involves a first phase where participants gain experience in the use of the online services by completing a number of assigned tasks, and a second phase for completing a survey questionnaire. Before starting phase 1, we had a short training session to teach participants how to access the online tasks and questionnaire.

In phase 1, participants were introduced to the purpose of this study and were given the opportunity to choose between four popular online health information services. The four online health information websites were general medical, health and wellness sites accessible to consumers with optional registration. Allowing participants the opportunity to select their own health information website increased the voluntary nature of the e-service usage process (Zahedi and Song 2008). Participants were asked to browse their chosen health website for information on a variety of issues in a number of general health categories that included diet and nutrition, exercise and fitness, and were asked to complete specific tasks (available from the authors on request) related to the search for health information. The tasks were adopted and redesigned from van Deursen's (2012) study. The use of tasks aims to provide them with some experiences and exposure to their chosen health information website and promote variability in the use and attitudes toward using the site.

In phase 2, which immediately followed phase 1, participants were asked to complete an online questionnaire. The questionnaire aimed to capture the participants' trust beliefs, their perceptions of site usefulness and risk as well as their attitudes and future usage intentions. Demographic questions (e.g. age, gender and health information website experience) were also asked. The task exercises and survey were administered through the university's e-learning system.

Measurement Instrument

Constructs were mostly operationalized based on previously validated instruments. All items measured using a seven-point Likert-scale with anchors from "strongly disagree" to "strongly agree". The example questionnaire items are presented in Table 1 below. The questionnaire was pre-tested using a convenience sample of senior students to determine if there are any ambiguous or confusing measurement items.

Table 1. Questionnaire Items.

Constructs	Operationalization	Example Items
Trust in institutional structures (INST)	5-item scale modified based on McKnight et al. (2002) and Gefen et al. (2003).	This site has enough safeguards to make me feel comfortable using it to obtain personal health information.
Trust in provider (TRP)	4-item scale modified based on Pavlou and Genfen (2004).	This website information provider is in general trustworthy.
Trust in website (TRW)	5-item scale modified based on McKnight and Thatcher (2006).	I think this website is very reliable.
Perceived usefulness (PU)	4-item scale modified based on Bhattacharjee and Premkumar (2004).	Using this website can be of benefit to me in managing my health.
Perceived risk (PR)	4-item scale modified based on Corbitt et al. (2003).	Using this website to obtain health care advice is risky because the health information may be inferior.
Attitude (ATT)	4-item scale modified based on Hsu et al. (2006).	I think using online health websites are good for me.
Behaviour intention (INT)	8-item scale modified based on Bhattacharjee and Premkumar (2004) and Kim et al. (2009).	I intend to continue using/use this website to obtain health information.

EMPIRICAL RESULTS

Participants

A total of 248 students registered for the undergraduate computing courses were invited to participate. A total of 169 (response rate=68.1%) students participated in our study. Given the high response rate, non-response bias is not considered a threat for our study. However, eight responses were eliminated as they were missing a large number of data values. The final sample thus consisted of 161 observations with sufficient data for meaningful statistical analysis. Table 2 presents a description of the sample profile of the dataset.

Table 2: Respondent Profile

Demographics	Category	Frequency	Percentage (%)	Demographics	Category	Frequency	Percentage (%)
Gender	Male	103	63.98	Age	18-19	55	34.16
	Female	58	36.02		20-22	86	53.42
Internet experience (years)	1-3	14	8.70		23-25	14	8.70
	4-6	18	11.18		> 25	6	3.72
	7-9	37	22.98		Choice of online health information service provider	Provider 1	55
	>9	91	56.52	Provider 2		72	44.72
	Missing	1	0.62	Provider 3		4	2.48
Online health information experience	Yes	83	51.55	Provider 4		28	17.39
	No	75	46.58	Missing	2	1.24	
	Missing	3	1.86				

As the study was conducted at university, the respondents aged between 18 and 22 (87.58%). Among them, 63.98% were male and 36.02% were female. Among our respondents, most of the subjects have more than 7 years Internet experience (79%) and 52% indicated that they had used an online health information site before. All the subjects indicated that they have used other types of e-services in the past including online shopping,

Internet banking, mobile banking, and social networking services. Because participants were allowed to choose between four online health information providers for the carrying out the tasks and gaining familiarity with the online health service context, we did an ANOVA test to determine if trust, risk and usefulness beliefs, and the acceptance scores were independent of the choice of provider. Results indicated that there were no significant differences along the items measuring trust, risk, usefulness, and attitude or intention variables.

Measurement Model Evaluation

An initial principal components (PCA) analysis was carried out to confirm the unidimensionality of the measures and to eliminate any inappropriate items. We removed one TRW3 item at this point because of high cross-loadings. Thereafter, the measurement model was analysed through a confirmatory factor analysis using SmartPLS software package (version 2.0 M3) (Ringle et al. 2005).

Table 3: Results of Reliability and Validity Analysis

Factor	Item	Standard loading	AVE	CR	Alpha value	Factor	Item	Standard loading	AVE	CR	Alpha value
INST	INST1	.792	.665	.908	.874	PU	PU1	.849	.743	.920	.885
	INST2	.815					PU2	.872			
	INST3	.852					PU3	.866			
	INST4	.758					PU4	.861			
	INST5	.856					TRW1	.851			
INT	INT1	.869	.780	.966	.960	PRW	TRW2	.845	.632	.873	.814
	INT2	.892					TRW4	.724			
	INT3	.898					TRW5	.752			
	INT4	.824					PR	PR1			
	INT5	.875				PR2		.896			
	INT6	.902				PR3		.865			
	INT7	.904				PR4		.850			
	INT8	.897				TRP	TRP1	.929			
ATT	AT1	.882	.799	.941	.916		TRP2	.902	.837	.954	.935
	AT2	.944					TRP3	.910			
	AT3	.893					TRP4	.919			
	AT4	.854									

The constructs in our research model were evaluated in terms of convergent validity, discriminant validity, and reliability. The items loaded onto their expected theoretical constructs. Convergent and discriminant validities were evaluated by using factor item loadings and average variance extracted (AVE) (Gefen et al. 2000). The standardized loadings of the measurement items, AVE, composite reliability (CR) and Cronbach’s alpha value are reported in Table 3. The values of the loadings range from 0.724 to 0.944, which are above the recommended value of 0.70. None of the items exhibited high cross-loadings on factors they were not intended to measure. The values of composite reliability range from 0.873 to .966, which are above the acceptable value of 0.70. The lowest AVE value is 0.632, which is above the recommend threshold of 0.50, thus, the convergent validity is confirmed. For the discriminant validity, the square root of AVE of each construct is larger than the inter-construct correlations (see Table 4), and thus discriminant validity is confirmed.

Table 4: Construct Correlations (Diagonal bold values are square root of AVE)

	Mean (sd)	ATT	INT	PR	PU	INST	TRP	TRW
ATT	5.1 (1.2)	.894						
INT	4.4 (1.4)	.470	.883					
PR	4.0 (1.1)	-.242	-.232	.870				
PU	5.6 (1.0)	.413	.388	-.203	.862			
INST	4.5 (1.1)	.482	.435	-.286	.283	.815		
TRP	5.2 (.93)	.292	.343	-.233	.365	.499	.915	
TRW	5.3 (.97)	.246	.332	-.264	.558	.361	.476	.795

Results of Hypothesis Testing

The PLS tests of the structural model are reported in Fig. 2. Trust was modeled as a second-order factor with the latent factor scores for the first order dimensions (trust in the institutional structures, trust in provider, and trust in website) modeled as reflective manifest indicators. The AVE for this second-order trust construct is 0.628. Bootstrap re-sampling (300 re-samples) was used to produce t-values for determining significance of paths. The R² value for consumer intention to use online health information service in the future is 0.344, which means the model explains 34.4% of variance. The analysis controlled for the effects of online health information experience, Internet self-efficacy, age and gender for attitude and behavioral intention. Amongst the controls, only the effect of online health information experience on attitude was significant.

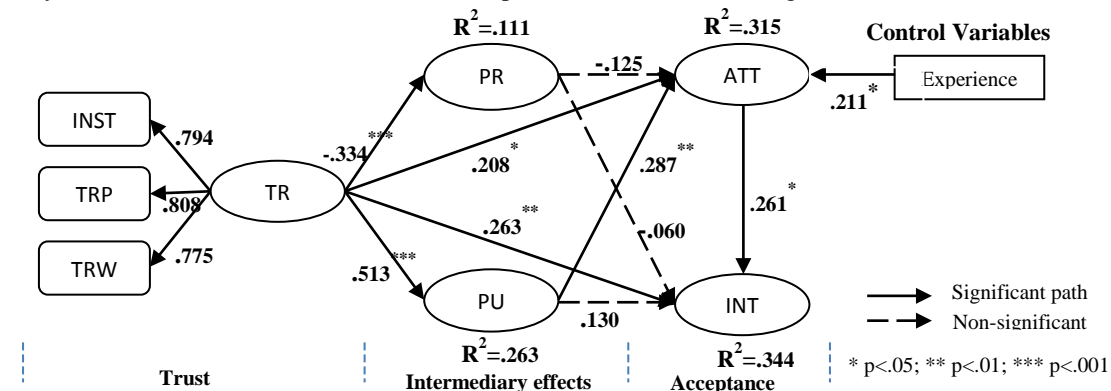


Fig. 2. PLS test of research model (non-significant controls omitted from figure to improve readability).

As seen from Fig. 2, trust as a higher-order factor has a significant direct effect on consumer attitude and behavioral intention to adopt online health information services. Hence, H1a (path coefficient of 0.208, p<0.05) and H1b (path coefficient of 0.263, p<0.01) are supported. This finding supports the view that trust is important to consumer acceptance of online health services. As predicted by TRA, attitude has a positive effect on intention, thus supporting H4 (path coefficient of 0.261, p<0.05). Consumer trust has a strongly significant negative effect on perceived risk i.e., trust attenuates risk perceptions, hence, H2c (path coefficient of -0.344, p<0.001) is supported. However, perceived risk has no significant influence on consumer attitude or consumer intention. H2a and H2b are thus rejected and consumer acceptance is not found to be a function of the risks that online health information may be inaccurate or inferior. Results confirm that trust has a significant effect on perceived usefulness, which in turn has a significant effect on consumer attitude. However, perceived usefulness has no direct effect on consumer intention. Hence, H3c (path coefficient of 0.513, p<0.001) and H3a (path coefficient of 0.287, p<0.01) are supported. However H3b is rejected. Table 5 summarises the results of hypothesis testing.

Moreover, the mediating effect of perceived usefulness on the link between trust and attitude, the mediating effect of attitude on the link between trust and intention, and the mediating effect of attitude on the link between perceived usefulness and intention were also subjected to a Sobel test. The Sobel test provides us with a more direct test of these mediating effects suggested by the research model. Support for the importance of perceived usefulness as an explanatory variable for the effects of trust on attitude is confirmed by a significant Sobel statistic (2.315, p<0.05). Support for attitude as an explanatory variable for the effects of trust on intention is

confirmed by a significant Sobel statistic (2.884, $p < 0.01$). Finally, support for the importance of attitude as an explanatory variable for the effects of perceived usefulness on intention is confirmed by a significant Sobel statistic (3.073, $p < 0.01$).

Table 5: Summary of Results (* $p < .05$; ** $p < .01$; *** $p < .001$)

Hypothesis (path)	Path coefficient	t-Value	Supported	Hypothesis (path)	Path coefficient	t-Value	Supported
H1a	.208	1.979*	Yes	H3a	.287	2.324*	Yes
H1b	.263	2.766**	Yes	H3b	.130	1.163	No
H2a	-.125	1.405	No	H3c	.513	6.885***	Yes
H2b	-.060	.620	No	H4	.261	2.117*	Yes
H2c	-.334	3.424***	Yes				

DISCUSSION

This study aimed to determine the extent to which trust, risk and perceived usefulness influence consumer acceptance of online health services. To do so, we developed and empirically tested a TRA-grounded research model. Data was collected in a laboratory setting from a sample of university students.

Our results have shed light on the general perceptions and attitudes of consumers towards this high-potential area of e-service. Attitudes and intentions are still evolving as only 30% of respondents indicated they had strong intentions to continue to use the online information service for obtaining health related information. Determining the factors that influence acceptance is therefore important to more widespread adoption and to ensure the potential benefits of such services can materialize.

The study confirmed that trust can be modeled as a higher-order construct consisting of three dimensions, namely trust in institutional structures, trust in provider and trust in the website platform. Our results showed that together these trust dimensions are important to influencing consumer attitudes and intentions towards the use of online health services. This confirms that consumers must have a basis on which to form a positive expectation for a satisfactory service experience (Pavlou 2003). Trust in a dependable, reliable and honest provider allows the consumer to accept the necessary vulnerability required to engage in e-service usage. Furthermore, a website's features and performance play an important role in mitigating uncertainty and acting as a proxy for the unobservable provider. Moreover, consumers must have positive perceptions of the overall institutional environment of the Internet and that it contains the necessary safeguards to protect consumers (Thatcher et al. 2013).

Trust was also important to perceived usefulness, which was found to partially mediate the effects of trust on consumer acceptance via attitudes toward e-services. This confirms the links between trust and usefulness as suggested elsewhere (e.g. Gefen et al. 2003). Although, we did not find the direct relationship between perceived usefulness and intention, our findings are consistent with the belief-attitude-behavior process defined within TRA. First, online health information seekers evaluate whether the information could be beneficial for improving their performance in self- management of health, this will lead them to form positive or negative attitudes, which in turn translate into willingness to accept.

Our results also confirmed prior e-commerce studies (e.g. Jarvenpaa et al. 2000; Pavlou 2003) in finding that trust is important to reducing perceptions of risk in the online health service context. However, we found that consumer acceptance in the online health information context is not directly a function of the risks that online health information may be inaccurate or inferior. This lack of support for H2a and H2b is surprising given arguments that risk perceptions are a barrier to consumers' online activities (Kim et al. 2008; Lee 2009; Pavlou 2003; Yousafzai et al. 2009; Jarvenpaa et al. 2000).

One explanation for our finding is that privacy or security related risks may be more important than performance-based risks. This is because consumers still have an opportunity to exercise judgment and discretion and to engage with other sources for verification before acting upon online health information. Therefore the risks of immediate loss by simply retrieving information are not sufficiently high to deter usage. Our findings might also be explained by the possibility that younger online consumers (who constituted our study sample) may be less risk averse than older consumers (Udo et al. 2010). These consumers may therefore be willing to trade-off the risks of poor information against the convenience and potential benefits of accessing health information online. Our results show the average risk scores as lower than the average usefulness scores. These young consumers may therefore be more interested in the performance benefits of using a trusted online

service than the potential adverse consequences of seeking information online. This relationship between risk and acceptance in the online health services context deserves further consideration in future research.

An examination of the total effects confirms that whilst perceived usefulness has a large direct effect on attitude, trust is the more salient determinant of usage intentions.

CONCLUSION

The primary contribution of this study has been the identification of specific beliefs, namely trust, risk, and perceived usefulness, and their integration into a TRA model for predicting consumer acceptance of online health services. Our results confirm the importance of trust in the belief-attitude-acceptance structure and the role of trust in e-service acceptance. Moreover, we show that trust is not only salient in commercial e-service contexts but also extends to in the non-commercial online health services context. Our finding that trust can be reliably modeled as a higher-order construct reflected by trust in provider, trust in website and trust in institutional structures can help future researchers to more comprehensively capture trust in the e-service context. This provided a new insight into the multidimensional nature of trust. From a practical perspective, it necessary to focus on all three components as they address complementary trust perceptions in the e-service context. Consumers base their trust on whether the e-vendor is dependable and honest, the website is reliable and has the functionality needed, and institutional safeguards (e.g. statements of guarantees, encryption and legal structures) exist to make it safe to obtain health information online. Trust is the foundation on which subsequent usefulness perceptions and behavioral intentions are formed.

We also found that perceptions of usefulness partially mediate the effects of trust on consumer attitudes. This implies that consumers value information that will help them improve their performance in managing their health. Whilst these perceptions are important to creating a positive attitude towards the use of the site, our results show that intentions to actually engage in the use of the service are largely reliant on trust.

Results of our study can help focus practitioner attention on determining the mechanisms required for trust-building and for improving consumer acceptance through demonstration of the usefulness of health information provided. The importance of three dimensions of trust in this study namely, trust in institutional structures, trust in provider and trust in website can help practitioners better understand the formation of trust. Practitioners need to ensure that they increase trust by building their reputation as a reliable, competent provider of health information, ensuring their website platforms are dependable and perform reliably, and promoting over institutional trust by provision of assurances and support of technologies designed to safeguard consumer interactions with their site.

It is important to note some limitations of our study. First, the sample is drawn from a university population and while they are an important consumer group, findings may not necessarily generalize to broader consumer populations. Second, some of the tasks may not be applicable to all participants and may have created bias in their perceptions (Lanseng and Andreassen 2007). Third, our data was also cross-sectional and therefore causal inferences can only be made with reference to theory. Future studies may wish to adopt longitudinal designs and consider the temporal changes in trust beliefs and risk perceptions as well as in consumer attitudes and intentions towards online health services. Because this study has confirmed trust as multi-dimensional and as highly important to acceptance, future research may wish to determine the specific antecedents that can influence trust in online health services.

REFERENCES

- Ajzen, I., Fishbein, M., 1980. *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Bansal, G., Zahedi, F.M., Gefen, D., 2010. "The Impact of Personal Dispositions on Information Sensitivity, Privacy Concern and Trust in Disclosing Health Information online," *Decision Support Systems* 49, pp 138-150.
- Bélanger, F., Carter, L., 2008. "Trust and Risk in E-government Adoption," *Journal of Strategic Information Systems* 17, pp 165-176.
- Bhattacharjee, A., 2002. "Individual Trust in Online Firms: Scale Development and Initial Test," *Journal of Management Information Systems* (19:1), pp 211-241.
- Bhattacharjee, A., Premkumar, G., 2004. "Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test," *MIS Quarterly* (28:2), pp 229-254.

- Chandra, S., Srivastava, S.C., Theng Y.L., 2010. "Evaluating the Role of Trust in Consumer Adoption of Mobile Payment Systems: An Empirical Analysis," *Communications of the Association for Information Systems* 27, pp 561-588.
- Compeau, D., Marcolin, B., Kelley, H., Higgins, C., 2012. "Research Commentary Generalizability of Information Systems Research Using Students Subjects—a Reflection on Our Practices and Recommendations for Future Research," *Information Systems Research* (23:4), pp 1093-1109.
- Corbitt, B.J., Kracher, B., Yi, H., 2003. "Trust and E-commerce: A Study of Consumer Perceptions," *Electronic Commerce Research and Applications* (2:3), pp 203-215.
- Dabholkar, P.A., Bagozzi, R.P., 2002. "An Attitudinal Model of Technology-based Self-service: Moderating Effects of Consumer Traits and Situational Factors," *Journal of the Academy of Marketing Science* (30:3), pp 184-201.
- Davis, F.D., Bagozzi, R.P., Warshwa, P.R., 1989. "User Acceptance of Computer Technology: A Comparison of two Theoretical Models," *Management Science* (35:8), pp 982-1003.
- Dinev, T., Hart, P., 2006. "An Extended Privacy Calculus Model for E-commerce Transactions," *Information Systems Research* (17:1), pp 61-80.
- Featherman, M.S., Pavlou, P.A., 2003. "Predicting E-services Adoption: A Perceived Risk Facets Perspective," *International Journal of Human-Computer Studies* 59, pp 451-474.
- Fishbein, M, and Ajzen, I., 1975. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Garbarino, E., Strahilevitz, M., 2004. "Gender Differences in the Perceived Risk of Buying Online and the Effects of Receiving a Site Recommendation," *Journal of Business Research* 57, pp 768-775.
- Gefen, D., 2000. "E-commerce: The Role of Familiarity and Trust," *Omega* 28, pp 725-737.
- Gefen, D., Straub, D.W., Boudreau, M., 2000. "Structural Equation Modelling and Regression: Guidelines for Research Practice," *Communications of AIS* (4:7), pp 1-70.
- Gefen, D., 2002. "Customer Loyalty in E-commerce," *Journal of Association for Information Systems* 3, pp 27-51.
- Gefen, D., Karahanna, E., Straub, D.W., 2003. "Trust and TAM in Online Shopping: An Integrated Model," *MIS Quarterly* (27:1), pp 51-90.
- Grabner-Kräuter, S., Kaluscha, E.A., 2003. "Empirical Research in On-line Trust: A Review and Critical Assessment," *International Journal of Human-Computer Studies* 58, pp 783-812.
- Hadwich, K., Georgi, D., Tuzovic, S., Büttner, J and Bruhn, M., 2010. "Perceived Quality of E-health Services: A Conceptual Scale Development of E-health Service Quality Based on the C-OAR-SE Approach," *International Journal of Pharmaceutical and Healthcare Marketing* (4:2), pp 112-136.
- Hansen, T., Jensen, J.M., Solgaard, H.S., 2004. "Predicting Online Grocery Buying Intention: A Comparison of the Theory of Reasoned Action and the Theory of Planned Behavior," *International Journal of Information Management* 24, pp 539-550.
- Harbour, J., Chowdhury, G.G., 2007. "Use and Outcome of Online Health Information Services: A Study among Scottish Population," *Journal of Documentation* (63:2), pp 229-242.
- Hsu, M.H., Yen, C.H., Chiu, C.M., Chang, C.M., 2006. "A Longitudinal Investigation of Continued Online Shopping Behavior: An Extension of the Theory of Planned Behavior," *International Journal of Human-Computer Studies* (64:9), pp 889-904.
- Jarvenpaa, S.L., Tracinsky, N., Vitale, M., 2000. "Consumer Trust in an Internet Store," *Information Technology and Management* (1:1), pp 45-71.
- Kim, D.J., Ferrin, D.L., Rao, H.R., 2008. "A Trust-based Consumer Decision-making Model in Electronic Commerce: The Role of Trust, Perceived Risk, and Their Antecedents," *Decision Support Systems* (44:2), pp 544-564.
- Kim, D.J., Ferrin, D.L., Rao, H.R., 2008. "Trust and Satisfaction, two Stepping Stones for Successful E-commerce Relationships: A Longitudinal Exploration," *Information Systems Research* (20:2), pp 237-257.

- Lanseng, E.J., Andreassen, T.W., 2007. "Electronic Healthcare: A Study of People's Readiness and Attitude toward Performing Self-diagnosis," *International Journal of Service Industry Management* (18:4), pp 394-417.
- Lee, M.C., 2009. "Predicting and Explaining the Adoption of Online Trading: An Empirical Study in Taiwan," *Decision Support Systems* 47, pp 133-142.
- Leonard, L. N.K., Cronan, T.P., Kreie, J., 2004. "What Influences IT Ethical Behaviour Intentions – Planned Behaviour, Reasoned Action, Perceived Importance, or Individual Characteristics?" *Information and Management* 42, pp 143-158.
- Li, H., Gupta, A., Zhang, J., Sarathy, R., 2014. "Examining the Decision to Use Standalone Personal Health Record Systems as a Trust-enabled Fair Social Contract," *Decision Support Systems* 57, pp 376-386.
- Liao, C., Liu, C.C., Chen, K., 2011. "Examining the Impact of Privacy, Trust and Risk Perceptions beyond Monetary Transactions: An Integrated Model," *Electronic Commerce Research and Applications* 10, pp 702-715.
- Lim, S., Xue, L., Yen, C.C., Chang, L., Chan, H.C., Tai, B.C., Duh, H.B.L., Choolani, M., 2011. "A Study on Singaporean Women's Acceptance of Using Mobile Phones to Seek Health Information," *International Journal of Medical Informatics* 80, e189-e202.
- McKinley, C.J., Ruppel, E.K., 2014. "Exploring How Perceived Threat and Self-efficacy Contribute to College Students' Use and Perceptions of Online Mental Health Resources," *Computers in Human Behavior* 34, pp 101-109.
- McKnight, D.H., Choudhury, V., Kacmar, C., 2002. "The Impact of Initial Consumer Trust on Intentions to Transact with a Web Site: A Trust Building Model," *Journal of Strategic Information Systems* (11:3), pp 297-323.
- McKnight, D.H., Thatcher, J.B., 2006. "Trust in Technology: Development of a Set of Constructs and Measures," Working Paper.
- Mou, J., Cohen, J.F., 2013. "Trust and Risk in Consumer Acceptance of E-services: A Meta-analysis and a Test of Competing Models," *In Proceedings of the Thirty-Fourth International Conference on Information Systems*.
- Morris, M.G., Venkatesh, V., 2000. "Age Differences in Technology Adoption Decisions: Implications for a Changing Work Force," *Personnel Psychology* 53, pp 375-403.
- Nicolaou A.I., McKnight D.H., 2006. "Perceived Information Quality in Data Exchanges: Effects on Risk, Trust, and Intention to Use," *Information Systems Research* (17:4), pp 332-351.
- Pavlou, P.A., 2003. "Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model," *International Journal of Electronic Commerce* (7:3), pp 101-134.
- Pavlou, P.A., Gefen, D., 2002. "Building Effective Online Marketplaces with Institution-based Trust," *In Proceedings of the Twenty-Third International Conference on Information Systems*. pp 667-675.
- Pavlou, P.A., Gefen, D., 2004. "Building Effective Online Marketplaces with Institution-based Trust," *Information Systems Research* (15:1), pp 37-59.
- Ringle, C.M., Wende, S., Will, A., 2005. SmartPLS (Release 2.0 (beta)), University of Hamburg, Hamburg, Germany (<http://www.smartpls.de>).
- Rotter, J.B., 1967. "A New Scale for the Measurement of Interpersonal Trust," *Journal of Personality and Social Psychology* (35:4), pp 651-665.
- Shim, S., Eastlick, M.A., Lotz, S.L., Warrington, P., 2001. "An Online Prepurchase Intentions Model: The Role of Intention to Search," *Journal of Retailing* 77, pp 397-416.
- Teo, T. S. H., Liu, J., 2007. "Consumer Trust in E-commerce in the United States, Singapore and China," *The International Journal of Management Science* 35, pp 22-38.
- Thatcher, J.B., Carter, M., Li, X., Rong, G., 2013. "A Classification and Investigation of Trustees in B-to-C E-commerce: General vs. Specific Trust," *Communications of the Association for Information Systems* 32, pp 107-134.
- Udo, G.J., Bagchi, K. K., Kirs, P. J., 2010. "An Assessment of Customers E-service Quality Perception, Satisfaction and Intention," *International Journal of Information Management* 30, pp 481-492.

- van Deursen, A.J.A.M., 2012. "Internet Skill-related Problems in Accessing Online Health Information," *International Journal of Medical Informatics* 81, pp 61-72.
- Xiao, N., Sharman, R., Rao, H.R., Upadhyaya, S., 2014. "Factors Influencing Online Health Information Search: An Empirical Analysis of a National Cancer-related Survey," *Decision Support Systems* 57, pp 417-427.
- Ybarra, M., Suman, M., 2008. "Reasons, Assessments and Actions Taken: Sex and Age Differences in Uses of Internet Health Information," *Health Education Research* (23:3), pp 512-521.
- Yi, M.Y., Yoon, J.J., Davis, J.M., Lee, T., 2013. "Untangling the Antecedents of Initial Trust in Web-based Health Information: The Roles of Argument Quality, Source Expertise, and User Perceptions of Information Quality and Risk," *Decision Support Systems* 55, pp 284-295.
- Yousafzai, S.Y., Pallister, J. G., Foxall, G. R., 2009. "Multi-dimensional Role of Trust in Internet Banking Adoption," *The Service Industries Journal* (29:5), pp 591-605.
- Yousafzai, S.Y., Foxall, G.R., Pallister, J.G., 2010. "Explaining Internet Banking Behaviour: Theory of Reasoned Action, Theory of Planned Behaviour, or Technology Acceptance Model?" *Journal of Applied Social Psychology* (40:5), pp 1172-1202.
- Zahedi, F.M., Song, J., 2008. "Dynamic of Trust Revision: Using Health Infomediaries," *Journal of Management Information Systems* (24:4), pp 225-248.

ACKNOWLEDGEMENTS

This research work was supported in part by the National Research Foundation (NRF) of South Africa. We would like to thank the editor and anonymous reviewers for their comments, which have greatly improved this paper.

COPYRIGHT

Jian Mou & Jason Cohen © 2014. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.