CONSUMER SATISFACTION WITH ONLINE HEALTH INFORMATION RETRIEVAL: A MODEL AND AN EMPIRICAL STUDY

Michael Bliemel* & Khaled Hassanein
*Corresponding Author

ABSTRACT

This research examines the area of online consumer health information retrieval as a field of study that pertains to consumers' use of the Internet to locate and evaluate health related information for the purposes of self education and collection of facts to enable informed decision making. A research model exploring the antecedents of consumer satisfaction with online health information retrieval is developed using constructs from the Information Systems and Human Computer Interaction bodies of literature. This model is quantitatively validated using structural equation modeling techniques. The findings of this research provide evidence that content quality, technical adequacy and trust explain a large proportion of the variance in consumer satisfaction with online health information retrieval for consumers. Appearance and specific content on Web sites played a much smaller role in predicting consumer satisfaction with online health information retrieval.

Keywords: human-computer interaction, online trust, health information, e-health, quality, satisfaction

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INTRODUCTION

The Internet has enabled consumers to become more proactive in managing their health by accessing information that is published online. Several studies of this phenomenon (Fox, 2006; Harris Interactive, 2002; HON, 2005; Lawry, 2001; Sciamanna *et al.*, 2002) have indicated that a large percentage of the population is now utilizing information found on the Internet to educate themselves, and to make and reinforce decisions about medications, treatments and lifestyle choices for themselves and others.

The typical patient's visit with a physician is seen as too short to exchange sufficient information, resulting in patients often not fully understanding their condition, or treatment, not recognizing the value of following the treatment and the hazards of not complying, and how feedback should be shared with their provider (Glaser & Schueler, 2003). This can lead to patients being under diagnosed, misdiagnosed, or being non-compliant with their doctor's prescriptions (Glaser & Schueler, 2003). These factors drive the growth of consumers' self-management of their own health, by researching their medical problems and cures through the Internet.

Consumers' expectations of the service level they receive from the healthcare system have also risen as they educate themselves on new medical treatments that could improve their quality of life. A study on consumerism in healthcare (Gilbert et al., 2001) found that consumers are taking on more responsibilities in managing their own health and making their own decisions. Roughly half of those surveyed felt that they had as much medical knowledge on their particular problem as their physicians. Just as many reported that they are the prime decision makers on their own health (Gilbert et al., 2001).

Meta-studies suggest that academic studies on the phenomenon of consumers seeking and using online health information have largely focused around the issue of quality of the information found online from academics and medical professionals perspective (Eysenbach *et al.*, 2002; Gagliardi & Jadad, 2002). These studies consistently conclude that from a health professional's perspective, a lot of the health information available to consumers on the Internet is of poor quality.

As mentioned above, prior research has focused on the information and its authors to determine the quality from experts' perspectives. What is missing, however, is the consumers' perspective. The role of the Web site as an information retrieval system and the contents of the Web pages both contribute to consumers' overall experience with the information they found. The knowledge of what consumers find as satisfactory information in the health context has great implications, because of the seriousness of the consequences when consumers act upon this information. It is likely the case the consumers and experts evaluate online health information differently. This is the case since consumers lack the prerequisite medical knowledge to spot erroneous information consumers must rely on different queues than experts. It is important to determine the elements of the online health information retrieval experience which lead to consumer satisfaction, and to incorporate those elements in Web site that are deemed to contain high quality information from a medical experts' perspective. In the absence of this, consumers will probably turn to Web sites with poor information but containing other quality elements which consumers value. In order to identify what elements of the online health information retrieval process are important to consumers, more research is needed to understand how health information consumers evaluate online content, how they decide that what they find is trustworthy, and what factors contribute to consumers' overall satisfaction with their Health

Information Retrieval (HIR) experience within an online environment. This research sets out to examine these issues in detail, to augment the field of health information retrieval with a greater understanding of consumers' perspectives on online HIR.

This paper is organized as follows: the context of this research is provided by first reviewing consumers' use of online health information. This is followed by the development of hypotheses and a theoretical model predicting consumer satisfaction with online health information retrieval. The experiment and research methodology are then explained. Subsequently the results of the analysis are presented, followed by the findings of a post-hoc analysis. Finally, the strengths and limitations are discussed, as are the implications of the results in our conclusions.

ONLINE HEALTH INFORMATION

The motivations of patients seeking information and advice online was studied by Eysenbach and Diepgen (1999), who examined unsolicited emails to physicians. These authors concluded that patients turned to the Internet with their questions rather than talking to their physicians because they were either frustrated with failed or ineffective treatments, lacked trust in their doctor's competency on their ailment, were uncomfortable discussing their problem with their doctor because it might be considered a stupid question, felt that their doctor did not give them adequate information, because of time constraints or that the patient simply forgot to ask their doctor during their visit.

The number of consumers pursuing health information online is also enormous. Studies (Fox, 2006; Harris Interactive, 2002) suggest that 110-113 million or 80% of all online U.S. adults sometimes use the Internet to look for healthcare information. 18% of online U.S. adults stated that they often look for health information online (Harris Interactive, 2002). Most health

information consumers use search engines or portals to locate the information that interests them, instead of going directly to a health information site (Fox, 2006; Harris Interactive, 2002).

Internet savvy patients are using their new knowledge to question the advice of their doctors and request alternative treatments for their ailments. This empowerment can lead to problems, as the information can be misinterpreted by patients, or the information can be unreliable. One study (Potts & Wyatt, 2002) found that 44% of UK physicians reported that they had patients who had experienced health problems as a result of accessing material on the Internet. In the same study 85% of UK doctors reported that they had patients who had experienced health benefits as a result of accessing health information on the Internet. One of the benefits of more informed and proactive patients who access online health information is the reduction of the problem of patients' unmet needs for information (Sanmartin et al., 2002).

A Delphi study by Brender et al. (2000) found that experts in health informatics agreed that 'the more informed patient' was a significantly important research priority, and agreed unanimously that it was economically reachable to create an environment where patients are empowered to participate actively in their own healthcare.

Although patients use the information found on the Internet to negotiate treatment alternatives with their physicians, much of the information is not scientifically sound, as it is anecdotal, or based on other patient's personal experiences (Hardy, 2001). This is apparently no deterrent for patients wanting to discuss their findings with their doctors. Toronto's University Health network found that 48% of patients who had looked up information on the Internet presented it to their doctors (CIHI, 2002).

The quality of health information posted on the Internet has been a concern for many physicians and academics. In the research of Eysenbach et al. (2002) 79 studies on this issue were reviewed

systematically to arrive at two major conclusions. First, although quality has been expressed using accuracy, completeness, readability, design, disclosures, and references provided as criteria, the term quality requires a better operational definition for cross study comparisons. Second, the majority (70%) of research studies on the quality of health information on the Internet stated that quality is a problem.

Okamura et al. (2002) examined Web sites on infertility for their adherence to quality standards of Authorship, Attribution, Disclosure, and Currency. Where Authorship means that the person(s) accountable for the content is named on the page, Attribution refers to copyright information and references, Disclosure indicates who owns and sponsors the Web site, and Currency refers to how recently the page was uploaded and updated. Okamura et al. (2002) found that of the 197 unique sites on infertility reviewed, only 2% met minimal standards for all four criteria, 4% met three of the four standards, 20% addressed two standards, 23% only one criterion, and 51% had met none of the quality criteria.

Marconi (2002) cites the efforts of a Health Summit Working Group in their guidelines for evaluating the quality of health information on the Internet. She describes seven criteria that should be assessed by consumers as; Credibility, Content, Disclosure, Links, Design, Interactivity, and Caveats. Where Credibility includes the source, author, sponsor, currency of information, relevance and utility of the information and the editorial review process. Content must be accurate and complete, Disclosures should inform the user about the purpose of the site and use of personal information, Links should match the primary Web site's focus, the Design of the site should allow internal searching and logical navigation, users should be able to provide feedback to the site and each other via Interactivity, and Caveats take into account if the site acts to market services and products or solely provides information. These seven quality criteria are

highly multidimensional and often unreasonable for common consumers to assess. For example, how does a consumer judge the accuracy and completeness of the content?

Several Web sites have emerged that try to educate consumers on how to evaluate the quality of online health information. These sites provide consumers with checklists, seen as quality assessment instruments. In a review of these sites, Galgliardi and Jadad (2002) concluded that the value of these quality instruments remains to be seen in terms of health outcomes, as the instruments are often confusing and their number is in a state of flux with established instruments disappearing nearly as fast as new ones are posted online. That said, most instruments contained variations on the criteria, Authorship, Attribution and Disclosure.

While the existing body of literature on health information retrieval suggests specific measures for quality, it is evident that the basis for quality of health information dimensions comes from medical professionals and academics. It is clear that consumers are using the Internet to retrieve online health information which is used to make health related choices and decisions with and without the support of medical experts. It is recognized that the quality of health related information found on the Internet is of varying quality, which is a cause for concern. What is missing is an understanding of how satisfaction with online HIR is developed by consumers. Unlike academics and medical professionals, who study specific Web pages, consumers' impressions of the health information found on the Internet is situated within Web sites, which can influence their impression of the quality of the information. As such the artifact of study in this research will be Web sites, and not specific Web pages. In the next section, this research draws upon literature from the information systems (IS) and human computer interaction (HCI) domains to explore constructs that impact the satisfaction of online HIR from a consumers' perspective.

We believe that applying a model developed using IS and HCI constructs will be useful in explaining a large proportion of the variance in consumer satisfaction with health information retrieval. It is also possible that some other factors such as involvement or prior knowledge could play a role in this context. Therefore we explore the potential impact of these variables and other demographic variables on our proposed model.

RESEARCH MODEL AND HYPOTHESES

We propose the model depicted in Figure 1 to investigate the factors that influence overall consumer satisfaction with online Health Information Retrieval (HIR). The proposed model incorporates several constructs that we theoretically link to overall satisfaction with online HIR in the following subsections.

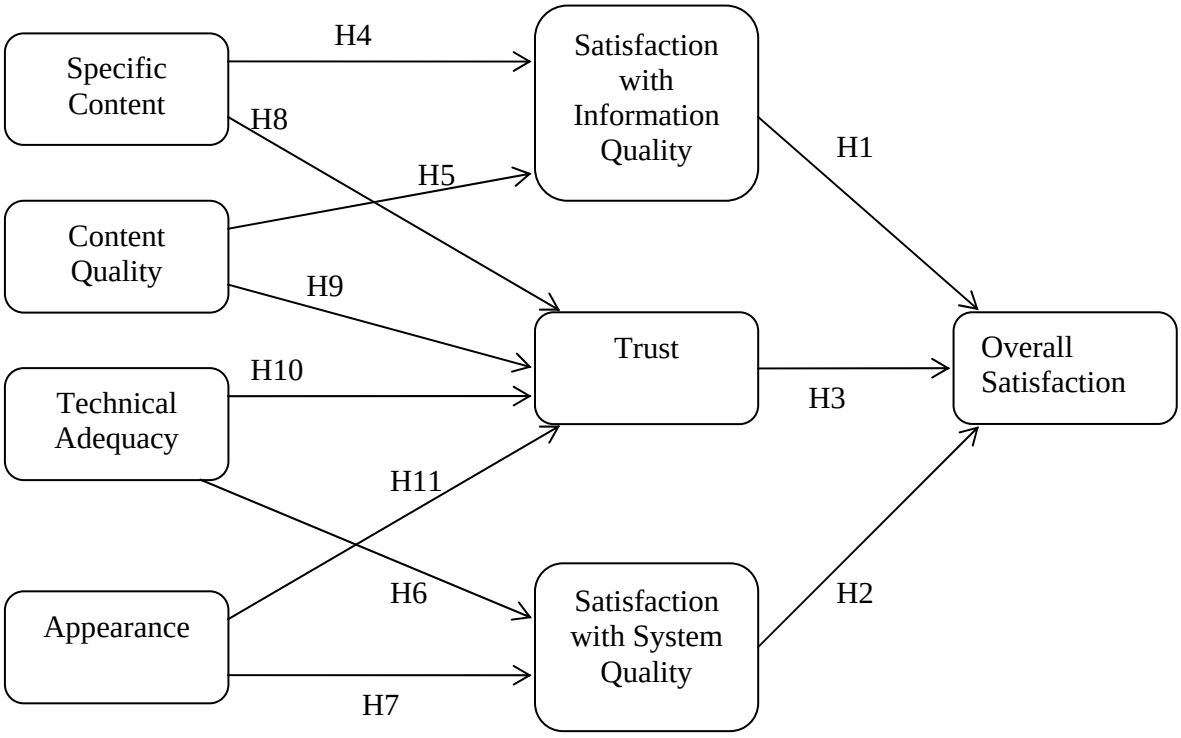

Figure 1. Proposed Research Model

Overall Satisfaction with HIR and its Determinants

User satisfaction is an effective way to determine IS success (Zviran & Erlich, 2003), and satisfaction is especially important in the context of consumer HIR, as it is not only indicative of future usage (Doll & Torkzadeh, 1988) of specific Web sites, which is interesting in itself, but also predictive of whether or not consumers will act upon the health information they retrieve online.

In a review of the use of satisfaction in IS research, Khalifa and Liu (2004) classify antecedents of user satisfaction as being technical or semantic, which can also be viewed as system quality and information quality (McKinney *et al.*, 2002; Wixom & Todd, 2005). User satisfaction can be seen as an emotive response to subjective assessments of the information systems being evaluated. Lindegaard and Dudek (2003) suggest the use of Web site Analysis Measurement Inventory (WAMMI) rating scales to capture the following five dimensions of satisfaction and perceived usability: attractiveness, control, efficiency, helpfulness, and learnability. These five dimensions are seen as dimensions contained within Information Quality and System Quality concepts. Others have described these two levels of antecedents for satisfaction as Ease of Use and Information Quality (Rai et al., 2002), and have also empirically validated that these antecedents explain over half of the variance in satisfaction.

IS Quality refers to the concept of quality of information systems, as has been examined in literature in the Information Systems (IS) area. Within IS Quality, there are the technical and the semantic antecedents to satisfaction (Khalifa & Liu, 2004), which can also be viewed as system quality and information quality (McKinney *et al.*, 2002; Wixom & Todd, 2005). The research by McKinny et al. (2002) used Web information quality and Web system quality (shown in Table 1 below) as predictors for satisfaction. This research will adopt the system quality and information

quality distinctions, because these two dimensions comprehensively cover the different aspects impacting the online information retrieval experience.

Table 1. Dimensions of System Quality and Information Quality	
Quality Construct	**Dimensions**
Web Information Quality	Relevance, Understandability, Reliability, Adequacy, Scope, Usefulness
Web System Quality	Access, Usability, Entertainment, Hyperlinks, Navigation, Interactivity

Wixom and Todd (2005) empirically validated a model of Information Satisfaction and System Satisfaction using similar dimensions operationalized as sets of constructs leading to Information Quality and System Quality. In their research the constructs (or dimensions) leading to Information Quality were completeness, accuracy, format, and currency. Constructs leading to System Quality were reliability, flexibility, integration, accessibility, and timeliness. Note that their research took place in the organizational information systems context, so not all the system quality dimensions are appropriate for the Web information retrieval context.

Another antecedent to satisfaction is trust, which is more important for consumer-oriented Internet-based information systems (i.e. Web sites) than organizational information systems, because of the increased uncertainties about the credibility and intentions of information providers online (Hassanein & Head, 2004).

Trust is a complex concept that has been defined in a variety of ways from different perspectives. For example, trust has been defined as “the willingness to depend on an exchanging partner in whom one has confidence” (Moorman et al., 1993) and as “the willingness to be vulnerable to the actions of another party” (Mayer et al., 1995) and as “a trustor’s expectations about the motives and behaviors of a trustee” (Jarvenpaa *et al.*, 2000). Trust helps consumers overcome

perceptions of uncertainty and risk leading them to transact with vendors (McKnight et al., 2002).

Within a health information retrieval context, consumers must decide whether they trust the accuracy of the information on health Web sites, which relates to whether they have confidence in the credibility of the authors of the information and the intentions of the site posting it. For example, many commercial Web sites posting health information have an agenda of promoting specific products or services, which can bias the advice given by the site (Reed & Anderson, 2002).

Trust between parties, in this case the consumer and the information provider, is more difficult to achieve in an online environment than offline because of the lack of physical cues, the impersonal nature of the Internet, and the temporal and physical separation between the trustor and trustee (Bliemel, 2003; Hassanein & Head, 2004).

In an eCommerce context, it has been found that trust is a vital factor to predicting satisfaction, leading to purchase intention (D. J. Kim *et al.*, 2003). The same was found in an e-services context, where trust leads to purchase intentions (Gefen & Straub, 2003) and to satisfaction (Balasubramanian *et al.*, 2003). It is expected that trust is equally important in the online HIR context, due to the great variability of online health information sources with often contradictory opinions, and the observation that trust is important to satisfaction in relationships between patients and doctors (Baker *et al.*, 2003; Keating *et al.*, 2002).

Note that the construct 'Trust' used from this point forward in this research refers to 'Initial Trust' (McKnight et al., 2002) or 'Swift Trust' (Corritore et al., 2003), which refers to trust in an unfamiliar trustee, as opposed to slow trust that occurs over a longer period of time and several interactions between trustor and trustee. In this research, we are interested in the initial formation

of trust and the factors contributing to it, as opposed to the development of slow trust, which is difficult to measure in an experimental setting.

Based on the forgoing discussion, overall consumer satisfaction with online HIR is suggested to be derived from consumer satisfaction with the information quality, consumer satisfaction with the Web site system quality (McKinney et al., 2002) and the trust towards the Web site and its owners/authors (Huntington *et al.*, 2004). Thus we propose the following three hypotheses related to overall satisfaction with HIR:

H1: A higher level of satisfaction with information quality leads to a higher level of overall satisfaction with HIR

H2: A higher level of satisfaction with system quality leads to a higher level of overall satisfaction with HIR

H3: A higher level of trust leads to a higher level of overall satisfaction with HIR

Satisfaction with Information Quality

In this research model information quality contains two separate dimensions; specific content and content quality. Specific content is information about the Web site and authors such as contact information, privacy policies, and support information (Aladwani & Palvia, 2002). Content quality is assessed as usefulness, clarity, completeness, currency, conciseness, and accuracy. Content quality is a subjective evaluation, and can also be seen as relevance which has been found to have a significant impact on ease of use and usefulness of digital information retrieval systems (Thong *et al.*, 2002), as well as on the intention to use the information (Greisdorf, 2003) which is related to satisfaction with the information. It is expected that consumers will utilize these factors consciously or subconsciously to determine their level of

satisfaction with the information, as similar research has shown a causal link between Web site features and information satisfaction (Muylle *et al.*, 2004). Thus we propose the following hypotheses:

H4: A higher level of perceived specific content leads to a higher level of satisfaction with information quality

H5: A higher level of perceived content quality leads to a higher level of satisfaction with information quality

Satisfaction with System Quality

System Quality is defined in this research model to have the two dimensions; technical adequacy and appearance. The technical adequacy of a Web site comprises aspects such as the speed with which pages load, searching capabilities, personalization and customization features, and the ease of accessing the site (Aladwani & Palvia, 2002). The appearance dimension of system quality includes overall attractiveness, organization, proper use of fonts, proper use of colors, and proper use of multimedia (Aladwani & Palvia, 2002). Prior research has found that technical aspects and design elements impact perceptions of quality and satisfaction with Web sites (S. Kim & Stoel, 2004; van Iwaarden *et al.*, 2004). It is expected that consumers will utilize these factors consciously or subconsciously to determine their level of satisfaction with the system quality and thus we propose the following hypotheses:

H6: A higher level of perceived technical adequacy leads to a higher level of satisfaction with system quality

H7: A higher level of perceived appearance leads to a higher level of satisfaction with system quality

Trust

Within the online HIR context, consumers must decide whether they trust the accuracy of the information on health Web sites, which relates to whether their confidence in the credibility of the authors of the information and the intentions of the site posting it. For example, many commercial Web sites posting health information have an agenda of promoting specific products or services, which can bias the advice given by the site (Reed & Anderson, 2002).

Trust is built upon the impressions consumers have of the Web site. These impressions are quantified in the constructs specific content, content quality, technical adequacy, and appearance. Theoretical research such as that by Corritore et al. (2003) supports this idea, proposing that trust is formed by users' perceptions of credibility, ease of use and risk of Web sites. Prior qualitative research has recognized that the features of a Web site can influence the trust or mistrust of health information Web sites (Sillence *et al.*, 2004). Quantitative research on consumer trust in health information on the Web has also concluded that the features and contents of Web pages impact consumers' willingness to trust and utilize the information they found (Huntington et al., 2004). It is proposed that these subjective evaluations of performance measures relate to the perceptions of trust, and the following hypotheses are suggested:

H8: A higher level of perceived specific content leads to a higher level of trust

H9: A higher level of perceived content quality leads to a higher level of trust

H10: A higher level of perceived technical adequacy leads to a higher level of trust

H11: A higher level of perceived appearance leads to a higher level of trust

RESEARCH METHODOLOGY

This research utilizes structural equation modeling (SEM) in order to examine the relationships between the constructs in the research model. SEM uses a combination of factor analysis and path analysis to explore theoretical constructs which are represented by latent factors (Hox & Bechger, 1998). SEM is a method of performing confirmatory factor analysis, which is appropriate in this research because it draws upon existing constructs and has the objective of examining the relationships between these constructs (Bandalos, 1996). SEM allows researchers to answer a set of interrelated research questions by modeling the relationships among multiple dependent and independent constructs simultaneously, while assessing the measurement model of the latent constructs (Gefen et al., 2000).

In this research the Partial Least Squares (PLS) method of structural equation modeling is used because of the minimal demands it imposes on the measurement scales (Chin & Newsted, 1999; Gefen et al., 2000). These aspects of PLS are important in this research, because of the combined use of reflective and formative indicators, latent and emergent constructs, and the use of measures with different scales (e.g. 7 point and 11 point). Furthermore the partial least squares method of SEM requires a smaller recommended minimum sample than covariance based (e.g. LISREL) SEM (Gefen et al., 2000).

The partial least squares method in structural equation modeling first estimates the weights and loadings used to create the latent variable scores, then the relationships between latent variables and their associated observed or manifest variables, and finally the means and location parameters (or regression coefficients) for the indicators and latent variables (Chin & Newsted, 1999; Tennenhaus *et al.*, 2005).

Constructs in our model were all perceived and were measured using adapted scales found in prior studies (Aladwani & Palvia, 2002; Jarvenpaa *et al.*, 2000; McKinney et al., 2002; Toms & Taves, 2004), and are shown in Appendix A.

EXPERIMENT AND TASK

The research model was empirically validated through an online experiment. The goal of the experiment was to examine the impact of the factors specific content, content quality, technical adequacy, and appearance on consumer's satisfaction with online health information retrieval. These factors influence trust as well as the satisfaction with system quality and information quality. As such, the method of manipulating the exogenous constructs in the model was to create treatments by presenting different subjects with different health information seeking scenarios and Web sites so that variation among the exogenous constructs is achieved. Additionally, two different scenarios were utilized to vary the subjects' prior knowledge of the topics. One scenario had subjects find the symptoms for asthma in children, the other had subjects look for side effects of the weight loss drug phentermine. The instructions for the two scenarios used in this experiment are outlined in Appendix B. The questions for the scenarios were chosen from the questions used in the study by Berland et al. (2001). The use of scenarios makes it possible for respondents to feel the task was a real information seeking task by framing the assigned question in such a way that their answer would have an impact on their friend's well being. A recent study found that 48% of online health seekers do so on behalf of someone else (Fox, 2006).

With four exogenous constructs, 16 treatments are needed to achieve a full factorial design. This would be impractical to achieve logistically. In this study eight treatments comprising two

different scenarios and eight different Web sites are chosen following a 2^{4-1} fractional factorial design, which exploits the redundancy in terms of an excess number of interactions (Box et al., 1978). Fractional factorial designs have been successfully utilized in management research when full factorial designs are too costly and complicated, such as (Bodapati & Gupta, 2004; Chen & Lou, 2002; Hoeffler, 2003). Table 2 shows the eight treatments used in the experiment.

Table 2. Experimental Design

	Specific Content	Content Quality	Technical Adequacy	Appearance	Web site	Scenario
1	Low	Low	Low	Low	http://www.healthbulletin.org	Asthma
2	High	Low	Low	High	http://www.drweil.com	Phentermine
3	Low	High	Low	High	http://www.pillstore.com	Phentermine
4	High	High	Low	Low	http://www.medicinenet.com/	Phentermine
5	Low	Low	High	High	http://www.drkoop.com/	Asthma
6	High	Low	High	Low	http://www.canadian-health-network.ca	Phentermine
7	Low	High	High	Low	http://www.lung.ca/	Asthma
8	High	High	High	High	http://www.mayoclinic.com/	Asthma

The eight health information Web sites used for the treatments were chosen to best reflect relative (High or Low) values of the exogenous constructs based on a careful analysis of the contents of the Web sites by the authors and the results of a pilot study involving 8 subjects (Note that the Web sites are all active and have changed since the time of the experiment). The two scenarios were utilized to vary the subjects' prior knowledge and involvement with the topics. This was important, because we wanted to test if knowledge and involvement impacted

the model in a post hoc analysis. The instructions for the two scenarios used in this experiment are outlined in Appendix B.

Subjects and Procedure

Subjects were recruited online through two sources: a university news Web site and invitations posted in online parenting forums. The invitations in the online parenting forums were aimed to acquire subjects with higher involvement in the asthma scenario. 170 subjects ranging in age from 18 to 55 completed the experiment, with 50% older than 25 years old. When modeling with PLS, the desired minimum sample size is ten times the greater of (i) the number of items for the most complex construct; or (ii) the largest number of independent variable impacting a dependent variable (Chin & Newsted, 1999). Therefore, to use PLS for the analysis of this model a minimum of 60 participants was required sine the most complex construct in the model (Content Quality) had six items.

The recruitment of participants from online parenting communities and advertising on the university news Web site yielded a sample containing subjects with a wide range of knowledge and involvement with the asthma scenario. Additionally, this sample did not consist of mainly students, and represented a wider age distribution more reflective of the Internet using population.

After reading and signing an initial consent form, subjects were randomly assigned to complete one of the eight variants of the online survey. An online survey tool WebSurveyor™ was used to link subjects to their assigned Web site and provided them with the appropriate scenario for the chosen treatment. The questions for the items in each survey (seen in Appendix A) were customized to replace the word WEBSITE in the survey sample with the appropriate Web site name. Items were chosen from previously used studies measuring the constructs in our research

model (Aladwani & Palvia, 2002; Jarvenpaa et al., 2000; McKinney et al., 2002; Toms & Taves, 2004). The use of the online survey instrument allowed questions to be randomized for each and every instance of the survey, thus reducing the risk of common methods bias.

In addition to answering the questions measuring the construct items, subjects voluntarily answered demographic questions, and questions of three control variables assessing their browsing self efficacy, as well as their knowledge and involvement with the scenario.

DATA ANALYSIS AND RESULTS

We begin our analysis by first examining the validity of the data and instrument using an assessment for common methods bias. We then examined the reliability of the constructs themselves and the discriminant validity using two different methods. After showing the validity of our data and constructs we examine the structural model using PLS Graph. The model was estimated using PLS Graph version 3.00 Build 1126.

Common Methods Bias

Common methods bias refers to the variance attributable to the measurement method, and has been identified as a concern (Bagozzi *et al.*, 1991; Campbell & Friske, 1967) as method biases are one of the main sources of measurement error in self reported studies, which can threaten the validity of conclusions of a study (P. M. Podsakoff *et al.*, 2003). While procedural techniques for controlling for methods bias were adopted in this study, such as randomizing the questions and utilizing different scales for endogenous and exogenous variables and separating the assessment of predictor and criterion variables (P. M. Podsakoff et al., 2003), common methods bias still needs to be assessed to ensure the reliability of our findings.

Harman's *one-factor test* is the method of assessing common methods bias utilized in this paper, following the procedure outlined by Podsakoff et al. (N. P. Podsakoff & Organ, 1986; N. P. Podsakoff *et al.*, 1984). All the items were entered in an exploratory factor analysis using the unrotated solution to a principal components analysis. The resulting solution yielded 12 components with an eigenvalue greater than one. The first factor accounted for 36.5% of the variance and the twelve factors taken together accounted for 75.0% of the variance. Additionally, the solution was rotated using a varimax rotation in principal component analysis. The first factor in this rotated solution accounted for 20% of the variance, and was comprised of mainly overall satisfaction, satisfaction with information quality and satisfaction with system quality items. It is therefore concluded that the variables do not load on a single general factor, which suggests that common methods variance is not an adequate explanation for the findings of this study (P. M. Podsakoff et al., 2003).

Measurement Model Evaluation

The analysis of the construct quality is conducted in two stages as the model in this research contains both reflective and formative constructs. The distinction between formative constructs and reflective constructs has implications on the methods of determining internal consistency (Bollen & Lennox, 1991). Formative indicators are observed variables that are assumed to cause a latent variable (Diamantopoulos & Winklhofer, 2001). Formative constructs are made up of a linear composite of indicators, that each in their own right contributes to the latent construct, however they do not need to be correlated to the other indicators. Since indicators of formative constructs need not be correlated and are assumed not to covary, it is neither required nor appropriate to conduct conventional techniques for construct consistency assessment, such as

principal component analysis or factor analysis to evaluate their quality or consistency (P. Cohen *et al.*, 1990).

This research follows the procedure by Diamantopoulos and Winklhofer (2001) for the evaluation of the four formative constructs in the research model: Technical Adequacy, Content Quality, Specific Content, and Appearance. Indicators for these constructs are examined for multicollinearity, and external validity using both linear regression and PLS models with two construct Multiple Indicators, Multiple Causes (MIMIC) models (Burke Jarvis *et al.*, 2003; Diamantopoulos & Winklhofer, 2001). No evidence of multicollinearity was present as the item-item correlations were all below 0.7 and the highest variance inflation factor (VIF) was 2.5, well below the suggested cut-off of 0.8 for correlations and 5.0 for VIFs (Kleinbaum *et al.*, 1988; Stevens, 1996). From this analysis we concluded that no formative construct items needed to be dropped.

The constructs in the research model were evaluated for consistency by performing a bootstrap in PLS Graph using 500 bootstrap resamples. Table 4 shows the indicator and construct reliabilities for reflective constructs and weights of indicators for formative constructs. The weights for items in the formative constructs reflect their relevance or the extent to which the items relate to their underlying construct (Wixom & Watson, 2001). In other words, a formative variable that has a large, significant weight is more representative of its underlying construct than a formative variable with a small insignificant weight. All the reflective constructs had a component reliability above the recommended 0.70 level (Nunnally, 1978), suggesting internal consistency. The convergent validity for the reflective constructs was also confirmed, as the average variance extracted (AVE) was above the guideline of 0.5 (Fornell & Larcker, 1981). Please note that for formative constructs AVE is not applicable and as such was not included in the Table 4.

Table 4. Indicator and Construct Reliability for the Research Model								
Formative Construct	**Item**	**CR**	**AVE**	**Mean**	**Std.Dev**	**Weight**	**t-Stat**	**Significance Level**
Technical Adequacy	TA1	0.78	N/A	4.89	1.35	0.31	2.44	0.016
	TA2			4.55	1.66	0.15	0.96	0.339
	TA3			4.38	1.69	0.33	2.29	0.023
	TA4			4.87	1.32	0.11	0.82	0.413
	TA5			3.92	1.07	0.47	0.34	0.733
	TA6			5.35	1.35	0.11	1.05	0.296
Content Quality	CQ1	0.88	N/A	4.77	1.38	0.23	1.90	0.059
	CQ2			3.83	1.45	0.48	4.11	0.000
	CQ3			4.52	1.53	0.07	0.50	0.620
	CQ4			4.55	1.09	0.27	1.62	0.107
	CQ5			4.69	1.35	-0.01	0.09	0.928
	CQ6			4.48	1.23	0.17	1.18	0.241
Specific Content	SC1	0.84	N/A	4.47	1.34	0.30	2.56	0.012
	SC2			4.46	1.37	0.31	2.26	0.025
	SC3			4.18	1.20	0.22	1.64	0.103
	SC4			4.38	1.19	0.03	0.24	0.814
	SC5			4.63	1.43	0.44	2.93	0.004
Appearance	AP1	0.89	N/A	4.36	1.65	0.12	0.74	0.459
	AP2			4.68	1.61	0.44	2.43	0.017
	AP3			4.89	1.31	0.23	1.06	0.291
	AP4			4.65	1.34	0.22	1.19	0.235
	AP5			4.39	1.15	0.24	1.14	0.257

Reflective Construct	Item	CR	AVE	Mean	Std.Dev	Loading	t-Stat	Significance Level
Trust	T1	0.90	0.76	4.23	1.27	0.90	41.89	0.000
	T2			3.88	1.31	0.89	47.38	0.000
	T3			3.38	1.59	0.81	25.88	0.000
Satisfaction	IQ1	0.97	0.87	0.45	2.88	0.91	28.87	0.000
With	IQ2			0.41	2.76	0.98	100.71	0.000
Information	IQ3			0.00	3.02	0.96	66.46	0.000
Quality	IQ4			-0.10	2.73	0.97	83.66	0.000
Satisfaction	SQ1	0.98	0.93	0.42	2.76	0.96	70.60	0.000
With	SQ2			0.40	2.73	0.98	169.59	0.000
System	SQ3			0.09	2.87	0.96	112.13	0.000
Quality	SQ4			0.19	2.66	0.97	159.04	0.000
Overall	S1	0.98	0.88	-0.02	2.80	0.96	95.97	0.000
Satisfaction	S2			0.01	2.77	0.97	134.53	0.000
With	S3			-0.20	2.84	0.94	91.45	0.000
Web site	S4			-0.25	2.56	0.94	70.86	0.000
	S5			-0.48	3.07	0.93	57.14	0.000
	S6			-0.38	3.25	0.90	39.60	0.000

The correlation matrix and square root of the average variances extracted on the diagonal elements are shown in Table 5, showing adequate discriminant validity for the model. Off-diagonal values are the correlations between constructs. Diagonal values are the square root of the average variance extracted (AVE). “n.a.” indicates not applicable, as AVE is not appropriate for formative constructs. For adequate discriminant validity, the diagonal elements should be larger than the off diagonal elements (Compeau et al., 1999).

Table 5. Discriminant Validity

	Technical Adequacy	Content Quality	Specific Content	Appearance	Information Quality	System Quality	Overall Satisfaction	Trust
Technical Adequacy	n.a.							
Content Quality	0.67	n.a.						
Specific Content	0.77	0.75	n.a.					
Appearance	0.72	0.61	0.65	n.a.				
Information Quality	0.62	0.65	0.52	0.51	0.93			
System Quality	0.66	0.49	0.55	0.62	0.74	0.97		
Overall Satisfaction	0.72	0.67	0.64	0.54	0.80	0.80	0.94	
Trust	0.43	0.73	0.60	0.38	0.48	0.36	0.50	0.87

A second, more detailed method of examining discriminant validity was performed to examine how the items in the model correlate with their own constructs and with other constructs. The method employed for this test is the procedure described by Gefen and Straub (2005). Here the correlations between the individual items and the PLS calculated construct scores are shown, as well as the individual item loadings as seen in Table 6. For discriminant validity it is expected for the item loading to be higher than the item-construct correlations. This discriminant validity assessment shows that the item loadings for all reflective constructs are greater than the construct's correlations with other items. As already discussed the correlations between formative constructs and other items can be higher than the item loadings because items in formative constructs are not expected to be correlated amongst each other (Diamantopoulos & Winklhofer, 2001).

Table 6. Research Model Item to Construct Correlations

Item	Technical Adequacy	Content Quality	Specific Content	Appearance	Trust	Satisfaction w. Information Quality	Satisfaction w. System Quality	Overall Satisfaction
TA1	**0.68**	0.33	0.41	0.45	0.28	0.40	0.46	0.48
TA2	**0.59**	0.33	0.46	0.63	0.08	0.34	0.50	0.42
TA3	**0.77**	0.55	0.63	0.56	0.24	0.45	0.57	0.60
TA4	**0.45**	0.49	0.48	0.38	0.37	0.31	0.19	0.32
TA5	**0.76**	0.55	0.61	0.51	0.42	0.50	0.44	0.55
TA6	**0.33**	0.17	0.23	0.20	0.13	0.22	0.22	0.20
CQ1	0.61	**0.84**	0.67	0.54	0.54	0.63	0.48	0.66
CQ2	0.56	**0.89**	0.62	0.50	0.62	0.62	0.48	0.62
CQ3	0.70	**0.63**	0.53	0.70	0.34	0.55	0.57	0.57
CQ4	0.51	**0.75**	0.58	0.49	0.63	0.39	0.27	0.43
CQ5	0.52	**0.44**	0.46	0.49	0.24	0.37	0.43	0.45
CQ6	0.45	**0.80**	0.62	0.42	0.69	0.41	0.25	0.41
SC1	0.51	0.48	**0.74**	0.44	0.50	0.32	0.36	0.39
SC2	0.67	0.58	**0.85**	0.58	0.49	0.47	0.52	0.54
SC3	0.41	0.44	**0.61**	0.29	0.41	0.27	0.21	0.32
SC4	0.51	0.43	**0.58**	0.45	0.30	0.36	0.35	0.44
SC5	0.67	0.70	**0.80**	0.58	0.44	0.46	0.50	0.61
AP1	0.54	0.46	0.47	**0.81**	0.27	0.40	0.53	0.42
AP2	0.65	0.49	0.55	**0.88**	0.26	0.46	0.59	0.48
AP3	0.50	0.45	0.46	**0.81**	0.34	0.39	0.48	0.38
AP4	0.48	0.52	0.47	**0.72**	0.36	0.39	0.39	0.38
AP5	0.60	0.53	0.59	**0.72**	0.33	0.34	0.41	0.45
T1	0.40	0.72	0.58	0.38	**0.90**	0.45	0.35	0.46
T2	0.43	0.63	0.56	0.36	**0.89**	0.43	0.33	0.46
T3	0.27	0.53	0.41	0.24	**0.81**	0.38	0.24	0.37
IQ1	0.56	0.65	0.48	0.46	0.48	**0.91**	0.60	0.73
IQ2	0.57	0.64	0.49	0.48	0.51	**0.96**	0.69	0.74
IQ3	0.60	0.58	0.51	0.49	0.44	**0.93**	0.75	0.78
IQ4	0.57	0.57	0.47	0.47	0.38	**0.94**	0.73	0.76
SQ1	0.68	0.52	0.58	0.64	0.37	0.73	**0.96**	0.78
SQ2	0.63	0.49	0.54	0.61	0.36	0.73	**0.98**	0.79
SQ3	0.60	0.43	0.48	0.55	0.34	0.70	**0.96**	0.76
SQ4	0.63	0.46	0.51	0.59	0.32	0.70	**0.97**	0.77
S1	0.73	0.63	0.62	0.54	0.45	0.79	0.79	**0.96**
S2	0.71	0.64	0.61	0.55	0.46	0.79	0.79	**0.97**
S3	0.70	0.60	0.60	0.52	0.43	0.76	0.80	**0.94**
S4	0.67	0.61	0.57	0.50	0.41	0.78	0.77	**0.94**
S5	0.66	0.64	0.62	0.49	0.51	0.72	0.70	**0.93**
S6	0.62	0.65	0.61	0.46	0.55	0.70	0.67	**0.90**

Note: Bold font denotes item loadings on own construct, non-bold font denotes item-construct correlations

Structural Model Evaluation

The structural model was evaluated using PLS Graph version 3.00 and is depicted in Figure 2. Asterisks beside the numbers represent the significance levels of the parameter estimates which were calculated based on the t-statistics from the bootstrapping procedure, using a one tailed t-test (with d.f = 499). Bootstrapping is a nonparametric approach for estimating precision, which creates N samples to obtain N sets of parameter estimates (Chin, 1998). Figure 2 shows all the path coefficients and variance explained in the Research Model for consumer satisfaction in online health information retrieval.

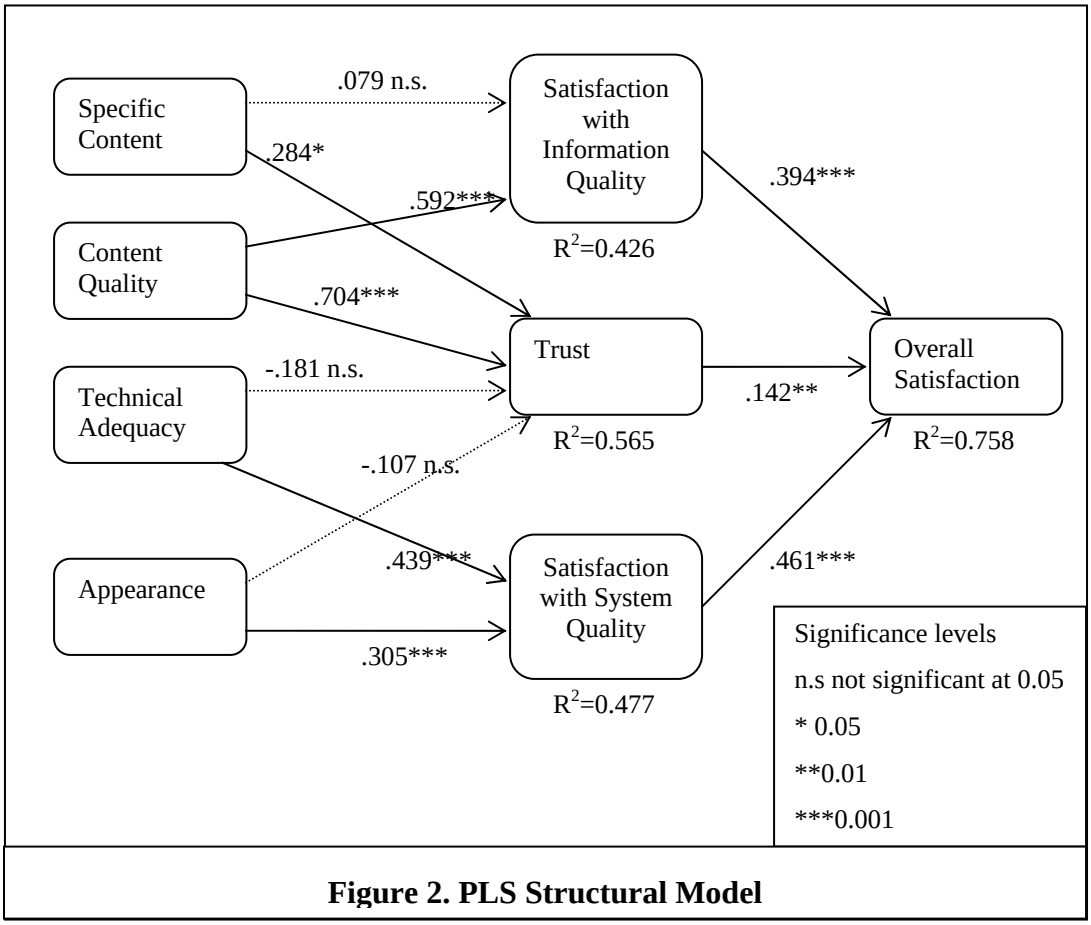

Figure 2. PLS Structural Model

Effect Sizes

When evaluating a PLS model for predictive power, one can examine the impact of individual constructs by looking at the variance explained (R^2) of dependent variables. One can find out what the contributions of independent variables were by comparing the R^2 of the dependent variable with and without the presence of each independent variable (Chin, 1998). The calculation for effect size (f^2) is calculated as follows:

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{excluded}}$$

Using Cohen's (1988) operational definition for multiple regression effect sizes, levels of high (0.35), medium (0.15) and small (0.02) effect sizes are presented for each of the independent variables on their corresponding dependent variables in Figure 3. The effect sizes show the dominant paths which explain the most variance in the research model. Here it can be seen that the dominant paths emanate first from Content Quality, going to Satisfaction with Information Quality and Trust to Overall Satisfaction. The second dominant path begins with Technical Adequacy through Satisfaction with System Quality to Overall Satisfaction.

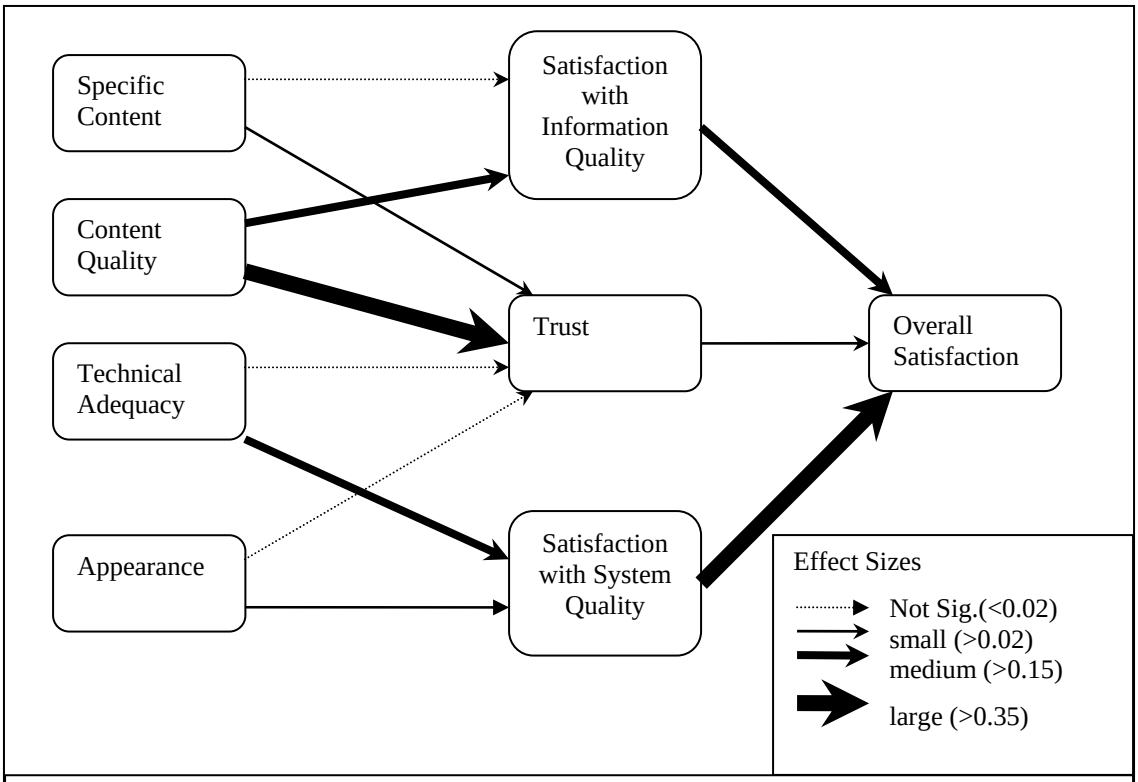

Figure 3. Effect Sizes for the PLS Model

POST HOC ANALYSIS

The analysis of the proposed model using PLS Graph showed the relationships between constructs explaining how consumers' overall satisfaction with health information retrieval is developed. Since the application of IS models is new to the context of health Web sites, we further examined the predictive power of the demographic and control variables on the constructs in the model. In particular we wanted to test if subjects with higher levels of browsing self efficacy, knowledge or involvement reacted to the Web sites in a different way, because prior research (Gilbert et al., 2001) indicated many patients felt their knowledge was as high as their health care providers on their particular health issue. This was subsequently followed by testing a fully saturated model, where all constructs were related to each other to explore whether or not additional relationships should be present in the model.

Analysis of the Impact of Control Variables on the model

Several control models were created by adding a control variable with paths leading to all the constructs in the model. The variables tested in these models were the control variables confidence with online searching, knowledge of the subject (Asthma or Phentermine) and involvement with the subject (Asthma or Phentermine), as well as demographic variables. Demographic variables tested were age, gender, education level, prior use of the Internet for health information, and weekly Internet usage. The impact of control variables was examined on the research model by comparing the variance explained for the endogenous constructs in the uncontrolled model against the variance explained for the corresponding endogenous constructs in each controlled model. Each control variable was individually tested and modeled as having paths on every construct in the model. The impact of control variables was found to be marginal in most cases.

A further examination of the control variables performed by inspecting the control variables' path coefficients on the constructs in the model found that some of the paths were significant at the 0.05 level. Notable findings from identifying significant control variable paths are as follows: subjects who looked up health information more often tended to rate Satisfaction with System Quality lower, participants with higher confidence in information retrieval tended to rate Overall Satisfaction lower. Subjects who were more involved in the health scenario tended to rate Overall Satisfaction higher.

Saturated Model

A saturated model was tested to examine the possibility of additional relationships not included in the model of Figure 1. In PLS Graph additional direct relationships were included between the

exogenous constructs Content Quality, Specific Content, Technical Adequacy, and Appearance, and the first and second order endogenous constructs Satisfaction with System Quality, Satisfaction with Information Quality, and Overall Satisfaction. Additionally, paths between Trust to Satisfaction with System Quality, and Satisfaction with Information Quality as well as Satisfaction with System Quality to Satisfaction with Information Quality were added.

In the Saturated Model, there is a slight increase (0.05) of the variance explained R^2 for the endogenous construct Overall Satisfaction, due to the direct paths to it from exogenous constructs. These additional relationships were significant, yet their path coefficients were relatively small and can all be explained by the new positions of the constructs in the nomological network (Chin *et al.*, 2003). One additional relationship was found to be significant in the saturated model between Satisfaction with System Quality on Satisfaction with Information Quality, which is theoretically plausible. It could be argued that the this relationship mirrors the relationship between Ease of Use and Usefulness in the Technology Acceptance Model (Davis, 1989), which was the line of reasoning used by Wixom and Todd (2005) in research on user satisfaction in an organizational information system context. There is however, no conclusive theoretical support about the causality of this relationship which could simply be an artifact of simple correlation. To verify the causality of this possible relationship, the direction of the path was reversed. The path coefficient changed from .595 to .519 and the overall R^2 for Overall Satisfaction was unchanged. Therefore, none of the new relationships found in the Saturated Model reduce the validity of the Model in Figure 1, and it is argued that they should not to be included in the Model.

DISCUSSION AND CONCLUSIONS

The overall theoretical contribution of this research was to provide a model of how consumer satisfaction with online health information retrieval can be explained. The exploration of consumers' assessments of online health information in this research provides a starting point for future research, aimed at examining the growing use of online information in peoples' personal health decisions from the consumer's perspective.

The effects of several factors on satisfaction with online health information retrieval were investigated in this research. The model presented and empirically validated in this work showed that the factors explaining the most variance in Overall Satisfaction with HIR were Content Quality and Technical Adequacy. Trust played a smaller, but still significant role. Appearance had a small effect on Satisfaction with System Quality, which in turn had a large effect on Overall Satisfaction. The importance of Specific Content was the smallest in these quantitative results. Overall the model was quite successful in explaining a large proportion of the variance associated with the endogenous constructs (R^2 for satisfaction with information quality (0.426), for satisfaction with system quality (0.477), for trust (0.565), and for overall satisfaction (0.758)).

The PLS model validated in this study was also found to be robust during the analysis of the control variables. Here the change in variance explained barely changed with the inclusion of demographic variables such as gender, or individual trait constructs such as involvement.

From a practice point of view, these findings indicate that consumers' satisfaction with health information Web sites can be best predicted based on the perceived quality of the information on the Web site and the perceived technical adequacy of the Web site. The Appearance of the Web site plays a minor role in predicting satisfaction, and specific content (such as privacy policies,

and contact information) is the least important in predicting satisfaction with health information Web sites. These results has been confirmed in a recent Pew / Internet study (Fox, 2006) where it was found that 75% of health seekers say they only sometimes, hardly ever, or never check health sites for quality indicators such as the date or source of information. Specific content did lead towards explaining some of the trust respondents had towards the Web sites in our model. This shows evidence that it is important for Web sites to offer specific content to provide their visitors with an impression about their trustworthiness. Although we found that trust only had a small effect on overall satisfaction, this relationship may prove to be stronger for consumers that evaluate Web sites more thoroughly for quality indicators.

The finding that specific content plays a minor role in determining overall satisfaction with online health information retrieval for consumers is a major difference with how medical experts assess online health information. Expert evaluations of online health information places a heavy emphasis on specific content in assessing quality (Eysenbach et al., 2002; Marconi, 2002; Okamura et al., 2002). Additionally differences between experts' and consumers' assessments of health information Web sites are in the technical adequacy and the appearance of Web sites. Expert studies have mainly determined the quality of the information in an objective manner without letting navigation issues, or unattractive design influence their opinions, while consumers, on the other hand, do place some emphasis on these factors. Our study found that satisfaction with system quality actually played a larger role in determining overall consumer satisfaction than satisfaction with information quality. This leads to the recommendation that operators of health information Web sites place at least as much emphasis on the design and usability of their Web sites as they do on their content quality.

As with any experimental research, the findings of this research are constrained by several limitations. First, the use of the online experiment using live Web sites resulted in less control and thus specificity than an experiment in laboratory using carefully created Web sites would have. The online experiment using live Web sites, did however provide a more accurate reflection of the real world use of online health information, and made it possible to collect a much greater sample size than a laboratory based experiment would have allowed with the time and funding constraints imposed on this research.

Second, the use of scenarios only approximates real usage of online health information. Ideally, consumers going about their own health information seeking research could have been examined. This was not done due to the serious privacy issues around personal health information and the challenge of finding subjects willing to be observed online during actual HIR tasks. If we had observed subjects without their consent it would have been unethical. If we had been able to obtain their consent, their behavior would have likely changed, knowing that they were being observed. So the use of scenarios was deemed the most appropriate approach in this research.

Third, this research may suffer from temporal stability. Information on the Internet is constantly evolving, as are people's expectations and experiences with the Internet. If the quality of Web sites increases at a different pace than people's expectations, then the relationships found in this research may change. This limitation exists in any social research.

Fourth, providing consumers with specific Web sites and the limited number of Websites used may reduce the realism of the experiment. Letting consumers have free roam of the Internet would have more accurately reflected true usage, but would have been more difficult to control and achieve the sufficient variability of quality of sites that were examined. As for the limited

number of Web sites used, the breadth of Web sites used in this research experiment do represent several different kinds of health information Web sites (commercial, opinion based, non-profit, and organizational) being accessed by consumers today.

Areas of future research include testing this model across different cultures to compare our findings from this study involving a North American pool of subjects with subjects from other cultures; and testing the model with variations in the experimental setup involving various degrees of ailment severity in the scenarios and focusing the scenarios on the subject him/her self as opposed to a friend.

Finally, the research model proposed and validated in this paper was specifically tested in the online health information context. It is possible that the model developed in this paper from Information Systems constructs for the health information retrieval context is equally valid in other contexts of online information retrieval, such as online shopping, or online retrieval of news or financial data (e.g. stock prices) for example. It will be interesting to see if content quality and technical adequacy are the dominant paths in the application of this satisfaction model in other information retrieval contexts.

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APPENDIX A: INSTRUMENT ITEMS

Note that the word "WEBSITE" is a placeholder for the actual Web site named used in the study. All variables were measured on a 7-point Likert scale except for Satisfaction with Information Quality, Satisfaction with System Quality and Overall Satisfaction which were measured on a 9 point scale.

Technical Adequacy (Aladwani & Palvia, 2002)
TA1: WEBSITE is easy to access (i.e. has a reflective and widely registered name)
TA2: WEBSITE looks easy to navigate through
TA3: WEBSITE has adequate search facilities
TA4: WEBSITE has valid links (hyperlinks)
TA5: WEBSITE can be personalized or customized to meet one's needs
TA6: Web pages load fast in WEBSITE

Content Quality (Aladwani & Palvia, 2002)
CQ1: The content of WEBSITE is useful
CQ2: The content of WEBSITE is complete
CQ3: The content of WEBSITE is clear
CQ4: The content of WEBSITE is current
CQ5: The content of WEBSITE is concise
CQ6: The content of WEBSITE is accurate

Specific Content (Aladwani & Palvia, 2002)
SC1: In WEBSITE, one can find contact information (e.g. e-mail addresses, phone numbers, etc.)
SC2: In WEBSITE, one can find its general information (e.g. goals, owners)
SC3: In WEBSITE, one can find details about authors
SC4: In WEBSITE, one can find information related to customers' policies (e.g. privacy and dispute details)
SC5: In WEBSITE, one can find help information *
*Adapted for the HIR Setting

Appearance (Aladwani & Palvia, 2002)
AP1: WEBSITE looks attractive
AP2: WEBSITE looks organized
AP3: WEBSITE uses fonts properly
AP4: WEBSITE uses colors properly
AP5: WEBSITE uses multimedia features properly

Satisfaction with Information Quality (McKinney et al., 2002)
Only based on the information provided by WEBSITE, please indicate your views regarding the overall quality of information.
IQ1: Very dissatisfied vs. Very satisfied
IQ2: Very displeased vs. Very pleased

IQ3: Frustrated vs. Contented
IQ4: Disappointed vs. Delighted

Satisfaction with System Quality (McKinney et al., 2002)
Only based on the information provided by WEBSITE, please indicate your views regarding the overall quality of Web site's features
SQ1: Very dissatisfied vs. Very satisfied
SQ2: Very displeased vs. Very pleased
SQ3: Frustrated vs. Contented
SQ4: Disappointed vs. Delighted

Trust (Jarvenpaa et al., 2000)
T1: This Web site is trustworthy
T2: I trust this Web site keeps my best interests in mind
T3: I find it necessary to be cautious with this Web site [reverse]

Overall Satisfaction (McKinney et al., 2002; Toms & Taves, 2004)
"Thinking of your overall experience with this Web site, how do you feel?"
S1: very dissatisfied vs. very satisfied
S2: very displeased vs. very pleased
S3: frustrated vs. contented
S4: terrible vs. delighted
S5: Will never recommend it to my friends vs. will definitely recommend it to my friends
S6: Will never use it again vs. Will definitely use it again

Control Variables Used
Browsing self efficacy or Confidence (Torkzadeh & Van Dyke, 2001)
CO1: I feel confident surfing the World Wide Web (WWW)
CO2: I feel confident browsing the World Wide Web (WWW)
CO3: I feel confident finding information on the World Wide Web (WWW)

Knowledge (Asthma) * (Block & Keller, 1995)
KNA1: I know a lot about asthma
KNA2: I know more about asthma than most people
KNA3: I know a lot about asthma in general

Knowledge (Phentermine) * (Block & Keller, 1995)
KNP1: I know a lot about weight loss drugs
KNP2: I know more about weight loss drugs than most people
KNA3: I know a lot about weight loss drugs in general

Involvement (Asthma) * (Beatty & Talpade, 1994)
INA1: In general I have a strong interest in learning more about asthma
INA2: Information about asthma is very important to me
INA3: I get bored when other people talk to me about asthma *(reverse)*

Involvement (Phentermine) * (Beatty & Talpade, 1994)
INP1: In general I have a strong interest in learning more about weight loss drugs
INP2: Information about weight loss drugs is very important to me
INP3: I get bored when other people talk to me about weight loss drugs *(reverse)*
* Either Asthma or Phentermine questions were asked, which ever was appropriate to the scenario question

APPENDIX B: EXPERIMENT SCENARIOS

ASTHMA SCENARIO INSTRUCTIONS

Please picture the following scenario:

You have a friend without Internet access who has a four year old son who sometimes has trouble breathing. Your friend suspects that it is either exacerbation or asthma and asked if you could find out what the symptoms for asthma in children are by looking in the Internet.

The specific question your friend would like an answer for is: **What are the common symptoms of asthma in children?**

Please click on the link below to open the Web site your friend wants you to navigate to find the answer to the question. When you have found the answer to the question, please return to this page to enter your answer and then proceed to complete the survey.

Please do not spend more than five minutes searching for an answer, if you can not answer the question just say so in the response and proceed with the survey.

PHENTERMINE SCENARIO INSTRUCTIONS

Please picture the following scenario:

Your friend has been trying to lose weight and has heard about weight loss pills that have been shown to work. Your friend is concerned about health risks and side effects of one particular kind of drug called Phentermine, and would like you to look on a specific Web site to find out if these pills are safe to use.

The specific question your friend would like an answer for is: **What are the potential side effects of Phentermine weight loss pills?**

Please click on the link below to open the Web site your friend wants you to navigate to find the answer to the question. When you have found the answer to the question, please return to this page to enter your answer and then proceed to complete the survey.

Please do not spend more than five minutes searching for an answer, if you can not answer the question just say so in the response and proceed with the survey.

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