CONSUMER SATISFACTION WITH ONLINE HEALTH INFORMATION

CONSUMER SATISFACTION WITH ONLINE

HEALTH INFORMATION:

A THEORETICAL MODEL AND AN EMPIRICAL STUDY

By

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ABSTRACT

The Internet has enabled consumers to become more proactive in managing their health by accessing information published online. Studies of this phenomenon 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. 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."* Prior studies in this area have largely focused around the issue of quality of health information found online from the perspective of researchers and physicians. Consequently, many of these studies have been prescriptive in nature, suggesting to consumers of online health information how they should evaluate quality of health information Websites. It is necessary to examine how consumers assess the credibility and validity of such information themselves, taking into account their own perceptions of both the quality of Websites and quality of the information found on these sites, as well as the relationship with their beliefs of trustworthiness of Websites and their authors. A research model exploring the antecedents of consumer satisfaction with online health information is proposed using an IS research methodology. By synthesizing related research on the constructs of quality, trust and satisfaction, a proposed second order model is developed. This proposed model for consumer satisfaction with online health information is quantitatively validated using structural equation modeling techniques. The findings of this research provide evidence that content quality, technical adequacy and trust beliefs explain a large proportion of the variance in satisfaction with online health information retrieval for consumers.

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Chapter 1 : Introduction

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

Meta-studies suggest that academic studies on this phenomenon have largely focused around the issue of quality of the information found online, and how consumers assess the credibility and validity of the information they find (Eysenbach *et al.*, 2002; Gagliardi & Jadad, 2002). It is necessary to take a step back from the problems associated with quality of information and examine the Health Information Retrieval process, and how consumers evaluate health information when utilizing the Internet as a resource. More research is needed on how health information consumers evaluate Online content, how they decide that what they find is relevant and trustworthy, and what factors contribute to consumers being satisfied with the information they find on the Internet.

Information retrieval (IR) has the specific meaning which is "the retrieval of information from databases that predominantly contain textual information" (Hersh, 2003). The term health information retrieval (HIR) has been used to describe the use of

the internet and the World Wide Web by consumers to locate health information (Zeng *et al.*, 2006). This research defines **Health Information Retrieval (HIR)** 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.*" This research sees the eight basic stages consumers go through (often iteratively) in the HIR process as a specific application of the information-seeking process defined by Marchionini (1998) which has the following stages:

I. Recognize and accept an information problem
II. Define and understand the problem
III. Choose a search system
IV. Formulate a query
V. Execute search
VI. Examine results
VII. Extract information
VIII. Reflect/iterate/stop

This research refers to HIR as this health information retrieval process from this point forward. Context of information in the HIR process is important, as the information used by consumers is presented through the medium of a Webpage, which itself is situated in a Website. The information sought and retrieved by the consumer is surrounded by additional information, which provides cues to consumers about the reliability and bias of the health information providers.

Satisfaction with the HIR process needs to be understood in order to improve how online health information is delivered on the World Wide Web, and to further our

understanding of consumer behaviour with health related content. Insights into the HIR process can be found in research on the acceptance of digital libraries such as Thong et al.(2002), who found that the relevance of the system to the users' information needs has a significant impact on both perceptions of the ease of use and usefulness of the system. This finding can be applied to the field of HIR to show how users evaluate the information and Websites they access, and how the relevance of the information they access impacts their HIR process experience.

The issues associated with the process of Health Information Retrieval have been studied by a wide variety of researchers and practitioners, originating from different academic fields, as will be discussed in Chapter 2 of this research. This research sets out to integrate some of the different viewpoints on HIR, to build a comprehensive model of consumer satisfaction with HIR.

The model and relationships proposed in this research are to be validated using an online survey, measuring consumers' perceptions of different Websites containing health information. The survey will be administered as an online experiment, by providing participants with scenarios and a related specific information seeking task. The data collected through the survey will be evaluated using structural equation modeling statistical methods.

The remaining sections of this Chapter will first outline the specific research questions and objectives of this dissertation. This will be followed by a discussion on the importance of the topic studied here.

1.1. Research Questions and Objectives

The first objective of this research is to create a model of consumers' satisfaction with online health information retrieval. This model is a predictive model of satisfaction based upon several dimensions such as the relevance, quality and credibility of an item of information found by the consumer, and the Website used to find it. This research will attempt to answer the following questions:

Q1: What factors contribute to consumer satisfaction with HIR?

The second objective is to explore the concept of quality in health information Websites

Q2: How can quality be evaluated for health information Websites from the consumer's perspective?

The third objective of this research is to investigate the role of trust in consumer's evaluation of health information Websites

Q3: How does trust impact satisfaction with HIR?

The fourth objective is to determine how consumers' expectations of quality influence their judgments of overall satisfaction in online health information retrieval.

Q4: What role do expectations play when determining quality of information and Websites in HIR?

1.2. Importance of the Topic

The growing use of the Internet is having a profound impact on healthcare as it enables the storage, retrieval, and transfer of information about medical knowledge to the general public. Internet technologies, such as Websites, newsgroups, discussion boards and email, allow communications between healthcare consumers, medical establishments, physicians, pharmaceutical companies, and insurers; increasing the expectations that issues and questions be resolved in Internet time. There are many processes in the healthcare system that are reliant on the transfer of information such as laboratory reports, insurance claims, and scheduling, just to name a few. These processes can be made more efficient when the information is digitized and sent electronically, with the added benefit that the information can be more easily aggregated and analyzed for further insights on the effectiveness of the healthcare systems and the health of the population (Bliemel & Hassanein, 2004).

The explosion of health information on the Internet has transformed the physician – patient relationship by empowering patients with knowledge about their conditions and treatment options. Internet savvy patients are using their new knowledge to question the advice of their doctors and request alternative treatments for their ailments. Healthcare providers are often asked to evaluate and comment on the information presented to them by their patients, without having the luxury of time to do so during a routine examination. The presence of health related information published on the Internet is changing Canadians' approach and attitudes towards managing their health. A report by the

Change Foundation (Gilbert *et al.*, 2001) has suggested that patients are becoming more like consumers when it comes to healthcare and are expecting better service and more choices. Their report has prompted the inception of the Ontario Hospital eHealth Council, as a research unit of the Ontario Hospital Association whose mandate is to investigate and launch eHealth services at Ontario Hospitals. Their mandate is, however, limited to the needs of healthcare providers on a systems management scale. The needs and concerns of individual healthcare consumers must be explored to better understand and anticipate the shortcomings of current and future designs for the delivery of healthcare by utilizing the Internet in Canada.

These problems are compounded with the fact that 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 will drive the increase of consumers' self-management of their own health, through the researching of medical problems and cures through the Internet. Consumers' expectations of the service level they receive from the healthcare system will

also rise 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).

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. In a recent study (Potts & Wyatt, 2002), 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 through online health information is the reduction of the problem of patients' unmet needs for information (Sanmartin *et al.*, 2002).

Also, it is expected that some of the fatalities due to medical errors (Millar, 2001) can be prevented by informed patients questioning misdiagnosis based on the online information they have discovered about their conditions and treatments. Estimates of

preventable medical errors range between 9250 and 23750 annually in Canada alone (G. R. Baker *et al.*, 2004).

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.

Research on HIR is important for the future management of healthcare for individuals and systems, as it is necessary to understand and predict the impact of consumer e-health tools, such as personalized health information systems, on our healthcare system. With more research on consumer e-health applications, individuals and institutions can better manage healthcare based on a forward thinking manner that anticipates the future impact of the proliferation of medical information through the Internet. While this research is mainly situated in the Canadian context, it has implications for patients who have Internet access worldwide, since the issues and needs of patients are similar regardless of nationality.

There is a need for greater understanding of the consumer health information retrieval process, specifically – how consumers assess the health information they seek on the Internet. It needs to be clarified what consumers judge to be good information, and

which factors come into play when they make their subjective assessments of satisfaction with retrieved health information. This research sets out to examine these issues in detail to augment the field of HIR with a greater understanding of consumers' perspectives on online health information. This is necessary at this time because online health information access has prompted consumers to take a greater role in managing their own health, which is reshaping the nature of relationships between patients and health care providers. In order for health care providers to proactively manage this new relationship they need to understand what health Information is seen as 'good' information by consumers. Additionally, health information provided by healthcare organizations (such as Health Canada) has to be delivered to consumers in such a way that it is clear to consumers that it is 'good' information in order for consumers to acknowledge government sources of health information as preferable over less credible commercial, and individual sources of health information online.

The following Chapters in this dissertation are organized as follows: Chapter 2 reviews literature on online health information retrieval, and online health information quality. Chapter 3 reviews the concepts of satisfaction, trust, information system quality, and relevance, to create a proposed research model for consumer satisfaction with HIR. Hypotheses to be tested in this model are provided in Chapter 3. Chapter 4 outlines the research methodology, development of the research instrument, and describes the pre-test and online experiment. Chapter 5 shows the analysis of the results for the proposed research model and suggests the use of an alternate simplified model. Chapter 6 provides

a discussion of the results of the experiment, answers to the research questions, as well as a summary of the strengths and limitations of this research. Recommendations to researchers and practitioners and conclusions about consumer satisfaction with online health information retrieval are also discussed at the end of Chapter 6.

Chapter 2 : Online Health Information

Online Health information retrieval and health information quality are explored in the following sections in a review of existing knowledge on these topics.

2.1. Health Information Retrieval

Zeng et al (2004) studied consumers' behaviour using MEDLINEplus, a US health information Website. Participants were recruited in hospital waiting rooms and were asked to research anything that interested them. The researchers found that the majority of subjects were interested in information on treatments and specific diseases or problems. When asked if they had found the information they were looking for subjects evenly reported 'yes', 'no' and 'maybe'. Only 7% of respondents said they would not use the Internet to find more information on this topic, indicating that most believed there was more relevant information to be found. Zeng et al. (2004) measured satisfaction as both a question in their survey and as the number of positive versus negative comments. The mean satisfaction ranking was 6.1 out of 10, while 37% of the comments were positive and 63% of comments were negative, suggesting that those participants were dissatisfied or very dissatisfied. The researchers observed that consumers utilized relatively simple browsing and search strategies, using rarely more than one or two keywords.

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 a stupid question, or 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 basic need for consumers in the healthcare sector is that they want access to timely, high quality healthcare, to feel better, or help someone else feel better. The Internet provides consumers with a new channel to fulfill this need in several different ways. First, there are a vast number of sites online (over 65,000 sites under the Open Directory Project heading "Health"; (ODP) that provide health information, advice, self assessment tools, and support groups. The Open Directory Project also lists close to 15,000 Websites dedicated to different "Conditions and Diseases", demonstrating that there is a vast amount of health information available online.

The number of consumers pursuing health information online (often described as "cyberchondriacs") is also enormous. A study by Harris Interactive (2002) found that 110 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. Most (53%) cyberchondriacs use search engines or portals to locate the information that interests them, instead of going directly to a health information site.

Doctors themselves use the information gathering capabilities of the Internet to their advantage. 73% of doctors in Canada use the Internet to gather information about drugs, and 61% look up treatment protocols online (Hodges, 2000). These numbers prove that the Internet is changing the ways that patients and doctors increase their knowledge about healthcare alternatives.

The use of the Internet has great implications in transforming the doctor-patient relationship, as it empowers patients by educating them on their medical conditions, available treatments, and the risks, benefits and side-effects of these treatments. This information comes to patients through published medical WebPages, personal experience WebPages, and pharmaceutical information pages. The interactive aspect of some of these sites is through self assessments tools, such as body mass index calculators. Chat rooms and message postings offer consumers the opportunity to relate their medical problems with others who have similar symptoms, and share experiences about different treatments, specialists, and the location of relevant information.

An important aspect of these relationships is the personality of the patients and the physicians, as some patients are more inclined to take part in decisions regarding their treatments than others (Gerber. & Eisner, 2001). For these proactive kinds of patients, physicians must make sure that the information the decisions are based on is not only

accurate, but also complete. The physician's activeness as the knowledge acquirer plays a large role in the discussion during examinations. Patients may not be motivated to participate in decision making if they feel that their physicians have up-to date information and willingly share it by recommending Websites. Conversely, patients who feel that they have more information than their doctors may be sceptical of their doctor's advice. For example, patients who find negative reports indicating side effects of prescribed drugs on the Internet will stop taking them if they feel that their doctor may not have known about these side-effects. A study by NEO CFgroup (2002) found that 29% of Canadians are likely to stop taking prescribed medications based on negative reports they found online, while 60% of Canadians reported that they felt comfortable regardless of the information they found.

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).

From the doctor's point of view, it was found that 70% of doctors surveyed in Canada reported that they had at least one patient bring printouts of a Webpage to a

consultation (Benday, 2000). The same study found that 91% of doctors expressed some suspicion towards the quality of the information the patients brought in. Doctors often are unaware of the information and when confronted with printouts they seldom have the time to review them during an appointment. Despite this, 53% of doctors found the information to be somewhat helpful, if at the very least to act as a catalyst for useful discussion (Benday, 2000).

2.2. Health Information Quality

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 on the Web.

Okamura et al. (2002) examined Websites 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 Website, 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 criteria, 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 Website'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 Websites have emerged that try to educate consumer on how to evaluate the quality of Online health information. In a review of these sites, Galgliardi and Jadad

(2002) concluded that the value of these quality instruments remains to be seen on 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.

Other quality indicators for health related sites are external awards or quality seals, given to sites by governmental and private health organizations. Most of these are awarded to Websites that adhere to certain rules of conduct regarding editorial procedures and disclosures. These sorts of seals may be the best indicator of quality of information as suggested by the research of Fallis and Fricke (2002). Their research found that the accuracy of Internet based health information cannot always be assessed by 'quality indicators' such as currency, authorship, spelling, references or the presence of advertising. Instead, it seems that the only significantly correlated indictors of accuracy are the presence of the HONcode[1] logo, an organizational domain(.org), and displaying a copyright on the content (Fallis & Fricke, 2002).

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 come from medical professionals and academics in this body of literature. It

[1] HONlogo is displayed on Websites indicating that they participate in Health On Net (HON) self regulated guidelines of authority, complementarity, confidentiality, proper attribution, justifiability and validity of the medical advice and information provided

is clear that online health information retrieval is providing consumers with 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 consumers evaluate the quality of online health information. The following Chapter draws upon research from the management domain to explore constructs that impact the use of health information on the Internet from a consumers' perspective, and builds a model for consumer satisfaction with online health information retrieval.

Chapter 3 : Development of a Theoretical Model and Hypotheses for Consumer Satisfaction with HIR

This Chapter of the dissertation utilises the literature reviewed in Chapter two and literature from the management domain to create a framework for understanding the factors that contribute to satisfaction with online health information retrieval. The first section reviews the endogenous concept of satisfaction and the related concept of disconfirmation of expectations, followed by the identification of the determinants of satisfaction. The second section of this Chapter examines the concept of trust. The third section of this Chapter covers the concept of quality as used in IS research and discusses how relevance overlaps quality in information retrieval tasks. The fourth section of this Chapter develops a proposed theoretical model for consumer satisfaction with online health information retrieval, followed by a discussion of the set of hypotheses to be tested in the model.

3.1 Satisfaction and its Determinants

User satisfaction in an effective way to determine IS success (Zviran & Erlich, 2003), and satisfaction is especially important in the context of consumer health information retrieval, as it is not only indicative of future usage (Doll & Torkzadeh, 1988) of specific Websites, which is interesting in itself, but also predictive of whether or not consumers will act upon the health information they retrieve online. This section reviews the concept of satisfaction and its determinants, in preparation for its use as the endogenous construct in the proposed research model.

In arriving at an understanding about the use of the construct 'satisfaction' in this research, it is helpful to examine its origins and some theories on the use of satisfaction in consumer research. The word 'satisfaction' is derived from the Latin *satis* (enough) and *facere* (to do or make), implying that when someone expresses satisfaction with a service, that level of service provided is 'enough' of what was being sought (Oliver, 1997). The construct satisfaction contains information about the level of expectations and the degree to which these expectations were met. This is referred to as expectation disconfirmation, which is positive when performance exceeds expectations, and negative when performance is lower than what was expected (Khalifa & Liu, 2003).

The approach used in this research for modelling satisfaction has been termed the *Expectancy Disconfirmation Model of Satisfaction* (Oliver, 1997). Here, when a consumer's expectations of a product or service are greater than the actual level delivered by the product or service, then the consumer is said to be dissatisfied (negative disconfirmation). Conversely, when the level of product or service meets or exceeds the consumer's expectations, then the consumer is not only satisfied – but also delighted (positive disconfirmation). This highlights the bipolar scale of the construct *satisfaction.*

The Expectancy Disconfirmation Model of Satisfaction (Oliver, 1997; Spreng & Page Jr, 2001) shown in Figure 3-1 is a widely used approach to measuring satisfaction in a variety of settings. Here the expectations have a negative effect on disconfirmation,

while performance has a positive effect on disconfirmation and satisfaction, both directly and mediated by disconfirmation. In other words, high expectations are more likely to be negatively disconfirmed, and high performance is more likely to be positively disconfirmed, and lead to higher satisfaction.

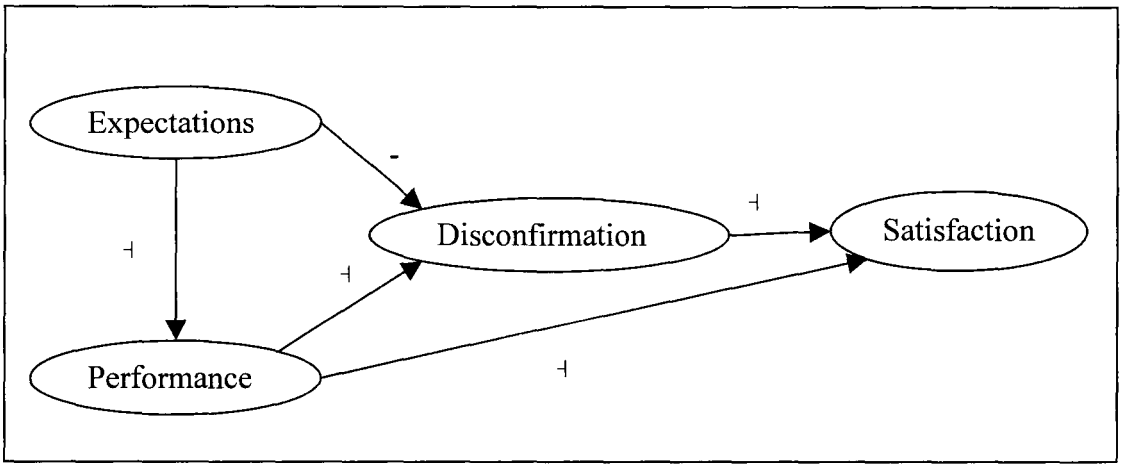

Figure 3-1: Expectancy Disconfirmation Model

Spreng and Page (Spreng & Page Jr., 2003) examined several different methods of measuring disconfirmation. The five different operationalisations of disconfirmation examined by Spreng and Page were the "difference score measures of disconfirmation" operationalisation (DIFF), the "direct effects model" operationalisation (DEM), the "better than/worse than" operationalisation (BTWT), the "standard-percept disparity" operationalisation (SPD), and the "additive difference model" operationalisation (ADM). Their experiments included research on satisfaction in both the product setting and the service setting. Spreng and Page found that the additive difference operationalisation of expectancy disconfirmation (ADM) yielded the highest variance explained in satisfaction

of the five different operationalisations. The ADM operationalisation is illustrated in Figure 3-2.

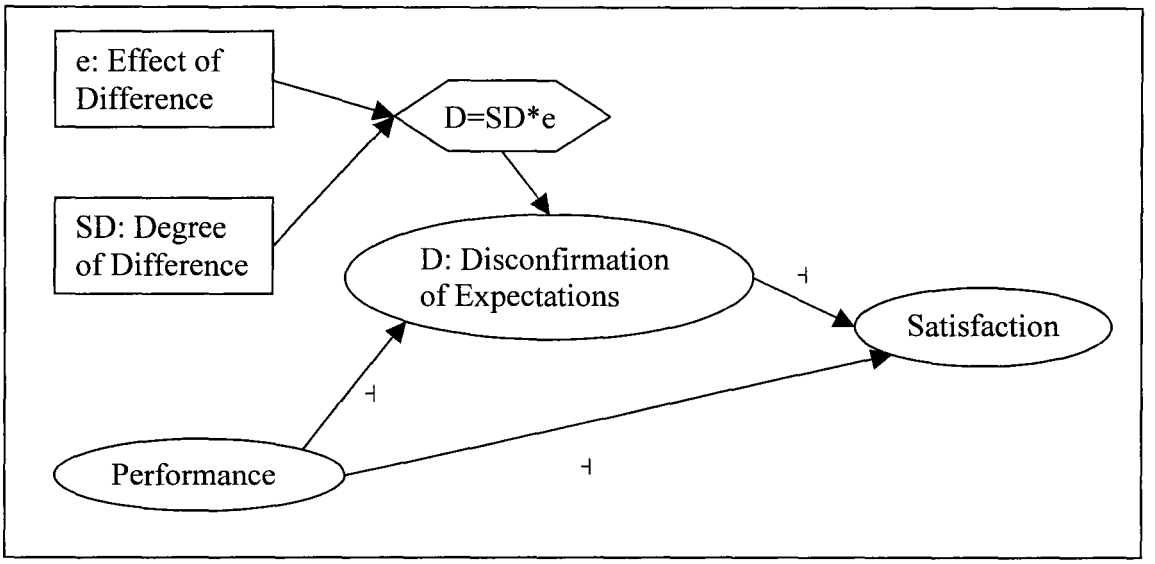

Figure 3-2: ADM Operationalisation Disconfirmation of Expectancy Disconfirmation

The ADM method of measuring disconfirmation asks the respondent to make a judgment about the discrepancy of what was desired and what was received. The drawback of the ADM model (illustrated in Figure 3-2) is that it requires two measures for each attribute (SD & e). This can be overcome however, by evaluating disconfirmation at a global level instead of an attribute level without much loss of predictive power, as suggested by Oliver (1980). For example, if mileage, cost and comfort are performance dimensions of a new car, then the disconfirmation of expectations could either be evaluated for each attribute (mileage cost, and comfort), or it could instead be measured as overall disconfirmation of expectations. This research will

adopt the global approach to economize on the number of survey items that are asked of respondents, rather than evaluating disconfirmation for each attribute.

Having covered the basic concept of satisfaction, we turn our attention to the antecedents of satisfaction. 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. Where the technical antecedents are captured by System Quality, and the semantic antecedents contain constructs related to the quality of the output of the information system, which is also viewed as Information Quality, containing dimensions such as accuracy, format and relevance. Khalifa and Liu (2004) explain that the technical and semantic levels of antecedents lead to influence/effectiveness which are seen as usage or user satisfaction.

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. Ease of use is a component of system quality.

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 capture many of the items in Information Quality and System Quality concepts.

Another emotive antecedent to satisfaction is trust, which is more important for Internet based information systems (i.e. Websites) than organisational information systems, because of the increased uncertainties about the credibility and intentions of information providers Online.

In the eBusiness context, it has been found that trust is a vital factor to predicting satisfaction, leading to purchase intention (D. J. Kim *et al.*, 2003). It is expected that trust is equally important in the HIR context, due to the great variability of health information sources with often contradictory opinions, and the observation that trust is important to satisfaction in relationships between patients and doctors (R. Baker *et al.*, 2003; Keating *et al.*, 2002).

The next sections will discuss the antecedents to satisfaction identified above. Trust, Relevance, Information Quality and System Quality will be discussed, as will their determinants, and their dimensions.

3.2. Trust

Trust implies a lack of information, and a degree of uncertainty when making a decision (Bliemel, 2003). The decision to trust someone or something is a process of reducing the complexity of a situation, and expressing a belief about the consequences of the decision (Gefen *et al.*, 2003). Health information consumers must decide whether they trust the accuracy of the information on Websites, which relates to whether they trust the credibility of the authors and the intentions of the site when it posts its content. For example, many commercial Websites 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).

The concept of 'Trust' is defined in several ways by different sources. On the surface, the construct 'trust' seems to be fairly simple. Dimitrakos (2001) provides a conceptual definition for trust in e-commerce as: "*Trust of a party A in a party B for a service X is the measurable belief of A in that B behaves for a critical period within a specified context.*" The author (Dimitrakos, 2001) adds several clarifications for this definition: *party* can be an individual, organization, or piece of software. *Service* can be a

transaction, recommendation, or a guarantee about another party. *Dependability* refers to security, safety, reliability, timeliness, and maintainability. *Critical period* can reflect past, present, future, or always. *Context* includes business context, technology infrastructure, relevant agreements, legislative and regulatory systems.

Another conceptualization of the construct trust is that of Gefen, et al.(2003), who investigated the effect of trust on online shopping, and explored four antecedents to trust as being; calculative based trust, institution-based structural assurances, institution based situational normality, and knowledge based familiarity. In the context of online shopping, these authors empirically validated their model containing these trust dimensions. They also discuss cognition based and personality based trust, which Gefen et al. do not include in their model based on the argument that both these types of trust are more important for inexperienced consumers – that are not a part of their sample. Analogous to McKnight and Chervany's model (2001) – Personality based trust refers to a person's willingness to trust in general. Cognition based trust is seen as the factors that influence first impressions for the trustor under a lack of information, such as cues of trustworthiness, second-hand information, and stereotypes.

The decision to trust the security measures of a Website is another way of viewing trust (Nikander and Karvonen, 2001), for example a user of a Website who opts for personalized content upon registration has to consider how secure their personal information is when accessing potentially sensitive information such as drug addictions.

Consumers must make the decision to trust the information and that their privacy will be protected when they enter sensitive information into health Websites (W. Luo & Najdawi, 2004). The health information consumer has neither the technical information, nor the knowledge about the security protocols employed by a Website to make a rational decision as to whether their registration information or the tracking mechanisms employed by the site is secure or not. Studies on online trust revealed that consumers feel that there is little protection of personal information (Berendt *et al.*, 2005; Cheskin-Research, 2000). Consumers are wary of the threat of identity theft, and that their personal information will be traded between online marketing companies. In recent years identity theft has become more prevalent with an estimated growth of 300% annually, costing consumers an average of 175 hours and $1,500 in out of pocket expenses to recover from once it occurs (Smith & Lias, 2005).

There are different kinds of mechanisms for establishing trust as identified in the framework by Luo (2002), who distinguishes between characteristic-based, process-based, and institutional-based trust production mechanisms. *Characteristic-based* trust is ascribed to individual commonalities, such as shared culture or technology. The commonalities help build a sense of binding or community, which translates into a feeling that members of the same group can trust each other. *Process-based* trust is built through past experiences, and tends to be linked to brand image, reputation, and endorsements. The key to process-based trust is the perceived satisfactory outcome of previous instances of trusting the party in question. *Institution-based* trust refers to trust

created by formal societal structures such as chartered accountants or third party regulatory bodies, for example. Luo (2002) advocates that e-business should capitalize on institution-based trust mechanisms to encourage consumer trust in e-business by taking part in privacy seal programs such as BBBOnLine and TRUSTe. There is some evidence (Cheskin-Research, 2000) that third party trust seals of approval, such as TRUSTe, can increase consumers' belief in the trustworthiness of a Website's information handling practices. Despite the intention of fostering greater consumer trust, the basic mechanism of the seals is fundamentally flawed. The seals are awarded to Websites that comply to their own policy statements, which is analogous to giving hotels a five star rating for promising poor service and sticking to that promise (Moores & Dhillon, 2003).

In an effort to build consumers' trust in health Websites, third party seals of approval have been employed to assure the public about the accuracy and objectivity of the information presented on Websites. Two common seals are HONcode (www.hon.ch) and URAC (www.urac.org) which are both used to accredit health content providers which have to abide by a set of principles assuring both the quality of the information presented online, and how information about consumers is used. While sites displaying these seals are considered to be reliable information providers, there is always the hazard that consumers may misinterpret the information they access. This problem is often addressed by consumers asking their doctor's advice on the information that they found.

Gefen (2002) examined the relationships between online purchase intentions and trust, using ability, benevolence and integrity as dimensions for overall trust. His research confirmed that integrity and benevolence are significantly related to overall trust, and while ability is not directly related to overall trust it is correlated with integrity and benevolence. This is the case since Gefen's operationalisation of ability is essentially the same as what other researchers have operationalised as integrity.

Cognition based trust is not the same as Cognitive trust, as used by Komiak and Benbasat (2004). These authors define Cognitive Trust as: *a customer's rational expectation that a trustee will have the necessary competence, benevolence, and integrity to be relied upon.* Here components of cognitive trust refers to the rational expectations that the trustee can be relied upon (competence), will be truthful (integrity) and will have the trustor's best interests in mind (benevolence). Komaik and Benbasat (2004) distinguish between cognitive trust and emotional trust, which they define as: *the extent that a trustor feels secure and comfortable relying on a trustee*. This kind of trust is similar to the cognition based trust and personality based trust discussed in the previous paragraphs.

Chen and Dhillon (2003) presented a model for trust based on *integrity*, *competence* and *benevolence* as the three constructs making up overall trust. They suggested these constructs are influenced by a set of determinants placing the act of trusting into context. These determinants are consumer characteristics, Website

infrastructure, firm characteristics, and interactions. Here consumer characteristics include demographic attributes, as well as disposition to trust, attitudes, and subjective norms. Website infrastructure includes functionality, usability, linkability, and trusting infrastructure. The Internet vendor characteristics include reputation, brand recognition and history. Interactions determinants are the past experiences with the trustee, such as service quality, customer satisfaction, and length of relationship.

The difficulty in developing a cohesive framework for trust has been well illustrated by McKnight and Chervany (2001) who identified sixty-five different definitions for trust in their research. One of the reasons why there are so many different conceptualizations for trust is that most have been developed to support empirical research in different disciplines. Understandably, economists, sociologists, psychologists all have different methods for exploring and conceptualizing trust. McKnight and Chervany (2001) categorized these different definitions first by conceptual type, such as attitudes, beliefs, behaviours, and dispositions. Second, they separated the definitions by referent, such as trust in someone, something, or a trust in a specific characteristic. These different categorizations of trust are as follow:

- *Disposition to trust* refers to a person's general willingness to depend on others. This construct is a generalized tendency of a person's beliefs that it is acceptable to rely on others across a wide spectrum of circumstances.
- *Institution-Based Trust* is based on the sociological belief that one can rely on others because of the structures, regulations, governmental enforcements, and

societal repercussions that are in place to provide assurances that things will go well.

- *Trusting Beliefs* are the beliefs and the confidence in those beliefs that the other party has traits which are desirable in a situation where one individual has to depend on another. These are situation and person specific beliefs about the following traits of the trusted party: Competence, Benevolence, Integrity, and Predictability.
- *Trusting Intention* refers to the willingness to depend on, or the intention to depend on another party in a given situation, with a relative feeling of security despite the possibility of negative consequences.

Empirical research by McKnight et al. (2002) found that trusting beliefs could explain most of the variance in trusting intention. Trusting beliefs are also the most frequently investigated trust construct in empirical studies (Grabner-Krauter & Kaluscha, 2003). Therefore, trust beliefs and its dimensions will be adopted in this research model. The dimensions of trusting beliefs which will be used in this research are integrity, competence and benevolence.

Note that the construct 'Trust' used from this point forward in this dissertation 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. This kind of

trust is more appropriate to this research because consumers typically have not had the opportunity to have several interactions with the health information Websites they arrive at when searching for health information Online.

3.3. IS Quality

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, as described by Khalifa and Liu (2004). These two sets of antecedents or dimensions of IS quality are referred to as System Quality and Information Quality from this point forward. Relevance is a related concept, and is discussed in the following section in detail.

As the context of this research is online health information retrieval, it is necessary to discuss a commonly used dimension of the information retrieval activity output, which is the relevance of the information found. It is necessary at this point to reiterate that the theoretical model being developed here is for consumer satisfaction with online health information retrieval, in the context of using the World Wide Web as the information system. If the model were to evaluate only the information itself in a void, then relevance would be an appropriate measure of predicting satisfaction. This research, however, realizes that information found on the World Wide Web is surrounded by context (e.g. dates, authorship) relating information and cues about that information. This

research also views HIR as an iterative process, as outlined in Chapter 1, where multiple relevance assessments are required prior to determining satisfaction with HIR.

This section will first discuss the concept of relevance in information retrieval, followed by a discussion of Information System Quality. This is followed by a discussion of the overlap between the concepts Relevance, Information System Quality, Health Information Quality, and Trust Beliefs using a conceptual mapping to illustrate the complexity of the concepts related to the topic of HIR.

3.3.1 Relevance of Information

The basic objective of information retrieval is to identify relevant items matched to a user's query. Relevance is not a binary concept, but a multidimensional concept where users' judgements range from highly relevant, partially relevant, to not relevant at all. The basic five manifestations or dimensions of relevance have been identified in Table 3-1 as follows based on (Cosjin & Ingwersen, 2000; Greisdorf, 2003; Saracevic, 1996; Spink *et al.*, 1998):

Table 3-1: Manifestations of Relevance

Dimension of Relevance	Description	Operationalisation
Systematic or Algorithmic	relation between a query and information objects (texts) in the file of a system as retrieved, or as failed to be retrieved, by a given procedure or algorithm. Each system has ways and means by which given texts are represented, organized and matched to a query. They encompass an assumption of relevance, in that the intent is to retrieve a set of texts that the system inferred as being relevant to a query. Comparative effectiveness in inferring relevance is the criterion for system relevance.	The item retrieved was/was not in a form or format that met the users need
Topical or Subject	relation between the subject or topic expressed in a query, and topic or subject covered by retrieved texts, or more broadly, by texts in the systems file, or even in existence. It is assumed that both queries and texts can be identified as being about a topic or subject. Aboutness is the criterion by which topicality is inferred.	The item retrieved was/was not on the topic/subject requested
Cognitive or Pertinence	relation between the state of knowledge and cognitive information need of a user, and texts retrieved, or in the file of a system, or even in existence. Cognitive correspondence, informativeness, novelty, information quality, and the like are criteria by which cognitive relevance is inferred.	The item retrieved was/was not informative
Situational or Utility	relation between the situation, task, or problem at hand, and texts retrieved by a systems or in the file of a system, or even in existence. Usefulness in decision making, appropriateness of information in resolution of a problem, reduction of uncertainty, and the like are criteria by which situational relevance is inferred.	The item retrieved was/was not useful in resolving a current or future information need
Motivational or Affective	relation between the intents, goals, and motivations of a user, and texts retrieved by a system or in the file of a system, or even in existence. Satisfaction, success, accomplishment, and the like are criteria for inferring motivational relevance.	The item retrieved would/would not cause other action(s) to be taken now that this item has been retrieved

Spink et al. (1998) examined the different regions of relevance and their dimensions for information seekers on the Internet. They found that users were more likely to judge items as partially relevant if they were conducting an initial search on a topic and were unfamiliar with the topic. Users who were familiar with the topic they were searching for information on were more likely to identify information as highly

relevant. They concluded that the retrieval of partially relevant items were important to users, as these items often lead them to information and directions, which can lead them to discover a possible resolution to their information problem.

This finding supports the differences between informal searching and formal searching as described by Choo et al. (2000), who explored information scanning modes. Their framework differentiates between informal and formal searches, where the objective of informal search is to deepen the knowledge and understanding of a specific issue. Formal searching makes a deliberate effort to retrieve specific information. When applying the findings of Spink et. al (1998) here it is clear that since formal searching is looking for specific information, once it is found – the judgement of higher relevance can be applied, whereas in informal searching, the objective is to increase knowledge which in itself is unlimited so logically no single information item can satisfy this objective, leading users to judge items as being partially relevant.

Greisdorf (2003) examined the decision making process during information seeking sessions on the Internet. His research examined the relevance judgements users made as a series of decisions about the different manifestations or dimensions of relevance. The empirically derived model resulting from this research shows that users initially judge the topical relevance and then the cognitive relevance of an item. Users then assess the utility of the item and according to their judgement they defined the information as relevant when it could be used to resolve their problem. In the situation

where an information item cannot resolve the information problem, yet is on topic and pertinent – the item is judged as partially relevant. The findings by Spink et al. (1998) and Choo et al. (2000) as discussed in the previous paragraphs support the ideas in Greisdorf's (2003) model of relevance decisions.

3.3.2 IS Quality as: System Quality and Information Quality

As indicated in section 3.1, end user satisfaction is determined by technical and semantic dimensions (Khalifa & Liu, 2004), which can also be viewed as system quality and information quality (McKinney *et al.*, 2002; Wixom & Todd, 2005). This research will adopt the system quality and information quality distinctions to evaluate overall quality. The operationalisations of system and information quality will be explored in the following paragraphs in an effort to capture the meaning of these dimensions accurately.

The research by McKinny et al. (2002) used web information quality and web system quality as predictors for satisfaction. Dimensions used to define System and Information Quality are shown below as Table 3-2:

Table 3-2 : 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,

The research methodology used by McKinny et al. (2002) used only six of their twelve dimensions (shown in Table 3-2) in their model for satisfaction using the expectation disconfirmation approach. They dropped six dimensions, because using all twelve dimensions would have made their model and research instrument overly complex. What is useful about the operationalisation used by McKinney et al. (2002) is that they developed an instrument which measured the dimensions making up web information and web system quality, as well as measuring satisfaction with web system quality and web information quality.

Wixom and Todd (2005) empirically validated a model of Information Satisfaction and System Satisfaction using similar dimensions operationalised 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.

Aladwani and Palvia (2002) conducted a study in information systems quality specific to the information retrieval on the web. Their study consolidated many of the different indicators or dimensions for information system quality pertinent to the context of web site quality. They then developed an instrument, which identified four

independent factors through a varimax rotation measuring web quality as content quality, specific content, technical adequacy, and appearance. Each of these factors is measured as formative construct, consisting of the items shown below in Table 3-3:

Table 3-3: Items used in Web Quality Factors

Dimension	Items
Content Quality	Usefulness, Clarity, Completeness, Currency, Conciseness, Accuracy
Specific Content	Finding contact information, Finding firm general information, Finding products/services details, Finding customers' policies, Finding customer support
Technical Adequacy	Security, Ease of navigation, Search Facilities, Availability, Valid links, Personalization or customization, Speed of page loading, Interactivity, Ease of accessing site
Appearance	Attractiveness, Organization, Proper use of fonts, Proper use of colors, Proper use of multimedia

The quality constructs of web information and web system quality shown in Table 3-2 are useful for assessing health information Websites. Since the 12 dimensions (in Table 3-2) are impractical to utilize in a single survey instrument, the 4 dimensions in Table 3-3 will be used in this research instead. These 4 factors or dimensions (content quality, specific content, technical adequacy, and appearance) can be seen as subsets of system and information quality as defined by McKinney et al. (2002), and cover all 12 dimensions of web quality used by Aladwani and Palvia (2002).

3.3.3 IS Quality, Health Information Quality, Trust Beliefs, and Relevance Overlap

When evaluating all the constructs leading to satisfaction with online consumer health information retrieval discussed in the sections 2.2, 3.2, and 3.3, it becomes evident

that some of the items in the dimensions of health information quality (section 2.2), trust beliefs (section 3.2), relevance (section 3.3.1), and IS Quality (section 3.3.2) are similar. For example, one dimension for IS Quality is relevance in Table 3-2. In Table 3-3 one dimension for IS quality is content quality, which is highly similar to topical relevance and pertinence (Table 3-1), which are also dimension for relevance. Another example of similarity is competence (section 3.2), a dimension of trust beliefs, which has commonality with credibility and authorship, both being dimensions for health information quality (section 2.2). Figure 3-3 illustrates the various concepts described above in a conceptual map.

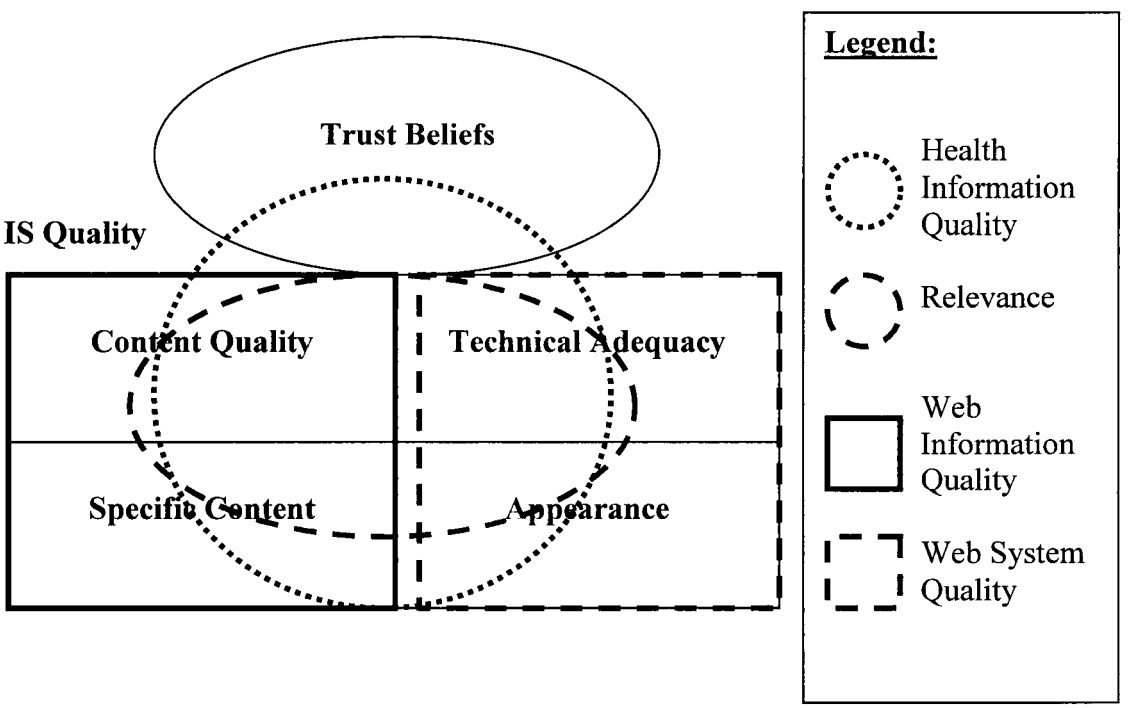

Figure 3-3 : Conceptual Map of Quality and Trust Concepts

Here the large rectangle represents IS Quality in the context of the Web, comprising of the two dimensions Web System quality and Web Information Quality. Each of these dimensions is represented by two factors; Web Information Quality contains Content Quality, and Specific Content, while Web System Quality contains Technical Adequacy and Appearance (Table 3-3). The concept relevance taps into each of the Information System Quality factors to a greater or lesser extent. For example, recall that dimensions of Relevance include systemic (related to technical adequacy and appearance) subjective (related to content quality and technical adequacy). Furthermore, the health information quality dimensions discussed in section 2.2 are related to all of the concepts used by IS researchers, described in this chapter. For example from section 2.2, the quality criteria recommended by the Health Summit Working Group (Marconi, 2002) were: Credibility, Content, Disclosure, Links, Design, Interactivity, and Caveats. Content, Disclosure, Links, Design, and Interactivity, which are all related to Information System Quality dimensions. Additionally, Credibility and Caveats tap into the Trust Beliefs concept. The overlap of the different concepts in Figure 3-3 illustrates the benefit of using the IS Quality concept (as discussed in section 3.3) and Trust Beliefs concept (as in section 3.2) instead of the health information quality concept (as in section 2.2) or relevance concepts (as in Table 3-1) when building a theoretical model of consumer satisfaction to online health information retrieval. This will be discussed further in section 3.4.

3.4 Proposed Research Model for Consumer Satisfaction with HIR

Based on the exploration of concepts in the preceding sections it becomes evident that IS Quality is a higher order construct than relevance, and that the health information quality concept, as discussed in section 2.2, is not clearly defined and also taps into dimensions of trust. In empirical modeling it is also prudent to avoid constructs with overlapping dimensions, since this would result in multicollinearity issues (Kline, 2005). Therefore the concepts of relevance and health information quality will not be included in the proposed research model for consumer satisfaction with online health information retrieval. Dimensions of IS Quality are modelled as antecedents to overall satisfaction with HIR. These dimensions are measured as Satisfaction with Information Quality and Satisfaction with System Quality as in McKinny et al. (2002). Note that the word "Web" has been dropped from this point forward for Web Information Quality and Web System Quality.

The Satisfaction with Information System Quality dimensions are preceded by subjective assessments of the four web quality factors (content quality, specific content, technical adequacy and appearance) as defined by Aladwani and Palvia (2002). This makes the model for consumer satisfaction with online health information retrieval a second order model, which is advantageous. The second order approach to the model is based on the idea that higher order factors try to explain the covariances among the first-

order factors in a more restricted, parsimonious way (Muylle *et al.*, 2004). In this model the four factors pertaining to the subjective assessment of the Website are operationalised as dimensions of system quality and information quality.

Trust beliefs are included in the model as contributing to the overall satisfaction with HIR. The web quality factors (specific content, technical adequacy, content quality and appearance) are also suggested to lead to the three dimensions of trust beliefs (competence, integrity and benevolence).

Disconfirmation of expectations is used at the second order level of the model (satisfaction with system quality, and satisfaction with information quality) to limit the number of measures required to quantify the model, yet provide more insights than just measuring disconfirmation at the overall satisfaction level. As Trust beliefs are not assessments of the Website features, instead they are subjective assessments of the Website's intentions and its abilities, it is logical not to utilize the disconfirmation of expectations evaluation for this construct. Additionally the expectations for trust beliefs can be seen as disposition to trust, a related but separate trust construct (McKnight et al., 2002) that is outside the scope of this research.

Figure 3-4 is a depiction of the proposed research model for satisfaction with online consumer health information retrieval. The illustration contains the hypothesized

relationships between constructs which will be tested as hypotheses and are described in the following section.

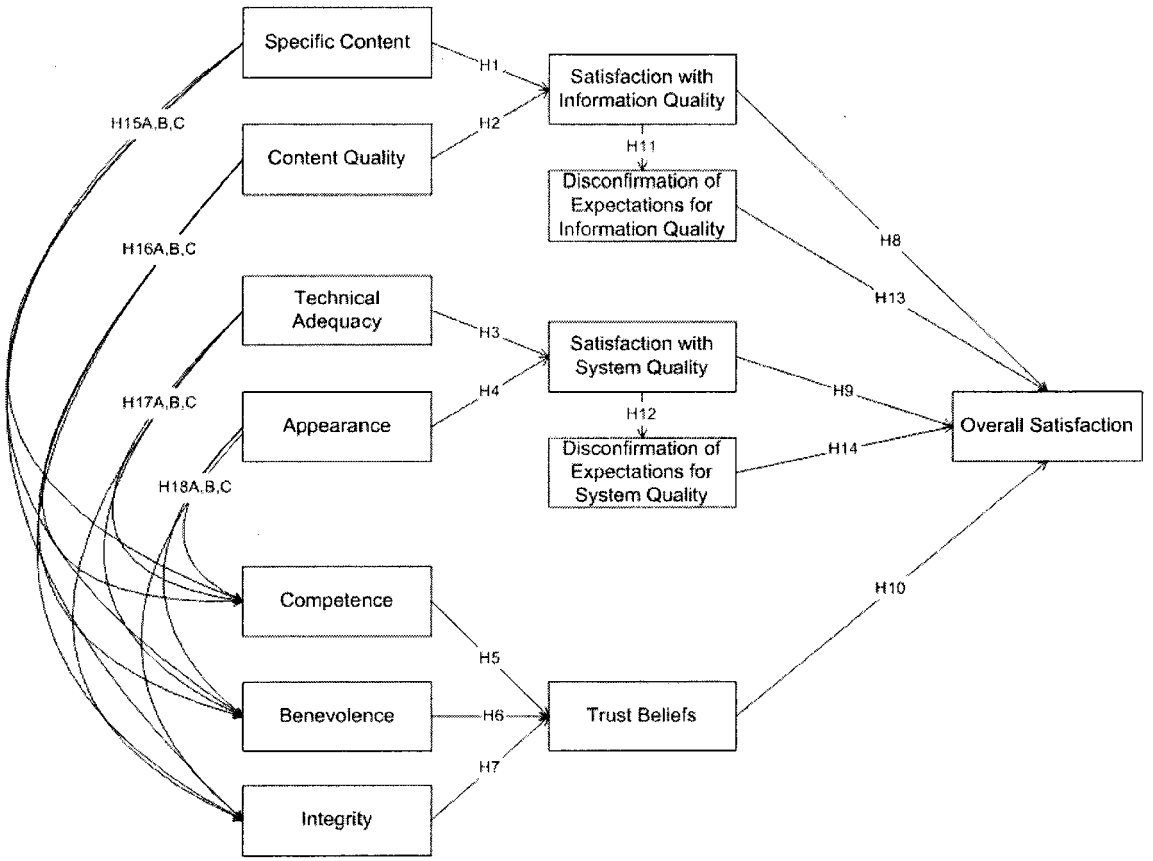

Figure 3-4 : Proposed Model for Consumer Satisfaction with HIR

The relationships in this model for consumer satisfaction with online health information retrieval are based on the preceding discussion of concepts and will be expanded upon in detail in the following section. Note that all the constructs in the model are to be interpreted as perceived constructs, e.g. Content Quality refers to perceived Content Quality.

3.5 Hypotheses and Measurement Models

This section describes the hypotheses to be examined in the proposed research model for consumer satisfaction with online health information retrieval, shown in Figure 3-4. The relationships between constructs are discussed in this section as sets of hypotheses. Additionally the measurement models for the constructs are illustrated in the figures in this section when showing the relationships between constructs. It should be noted that both formative and reflective measurement models for constructs are used in this research. In these figures constructs are represented by rectangles and the items used to measure the constructs are represented as ovals. Abbreviations and short descriptions are used to summarize the items; the full item questions can be referred to in Appendix B and the sources of these items are shown in Figure 4-1.

Normally the items would not be introduced until a later section, but because of the complexity of mixing two different kinds of measurement models (formative and reflective) in the proposed research model it is beneficial to the reader to see which constructs are reflective and which are formative. Reflective measurement models (e.g. Satisfaction with Information quality in Figure 3-5) contain several items representing the construct being measured and are depicted as having the arrows going from the construct to the items. Formative measurement models (e.g. Content Quality in Figure 3-5) are used for the exogenous (left most) constructs in the proposed research model. These are depicted in the following figures with arrows going from the items to the construct, representing that the construct is made up of a composite score of these items. Items used

to measure formative construct do not need to be related to each other in contrast to items in reflective constructs that are multiple ways of measuring the same construct (Burke Jarvis *et al.*, 2003). For example, two of the items measuring the Content Quality are CQ1: the information is useful and CQ4: the information is current, which do not need to be correlated, as they are used to calculate the formative construct Content Quality, which is a sort of index of the items used to measure it.

3.5.1 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 Website 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 (Aladwani & Palvia, 2002). 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 Website features and information satisfaction (Muylle et al., 2004) and thus we propose the following hypothesis as seen in Figure 3-5.

H_1: A higher level of perceived specific content leads to a higher level of satisfaction with information quality

H_2: A higher level of perceived content quality leads to a higher level of satisfaction with information quality

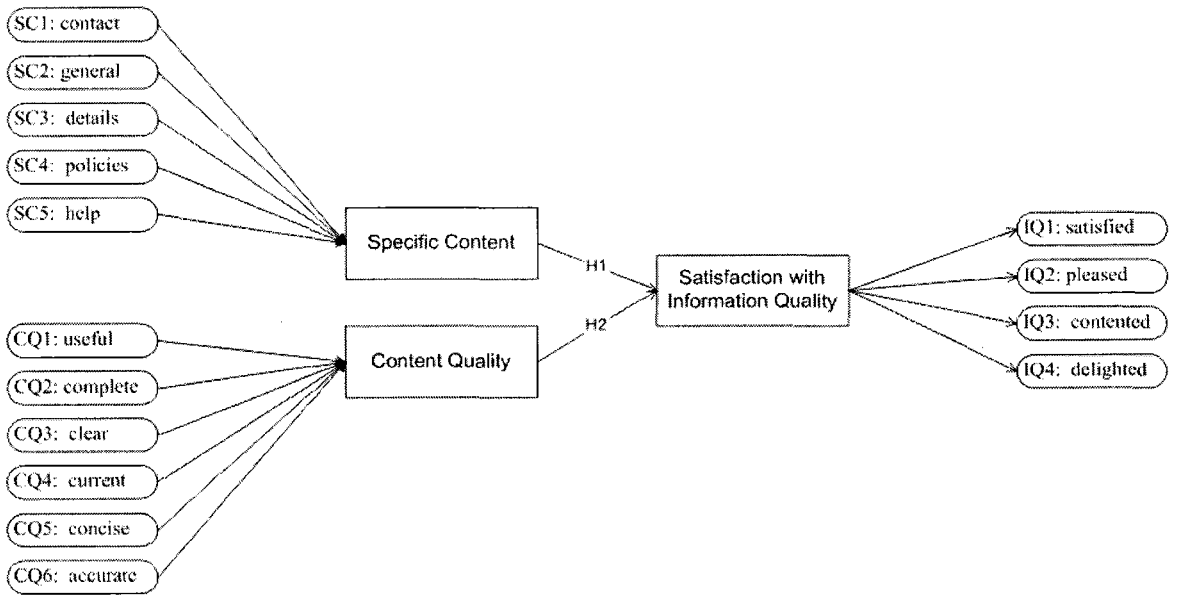

Figure 3-5 : Satisfaction with Information Quality

Note that in the model content quality refers to a person's subjective evaluation of the attributes measured as CQ1-CQ6 which are individuals' perceptions of these performance dimensions in the content quality construct.

3.5.2 Satisfaction with System Quality

As outlined in section 3.3, System Quality is defined in this research model to have the two dimensions; technical adequacy and appearance. The technical adequacy of a Website 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 Websites (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 hypothesis as seen in Figure 3-6:

H_3: A higher level of perceived technical adequacy leads to a higher level of satisfaction with system quality

H_4: A higher level of perceived appearance leads to a higher level of satisfaction with system quality

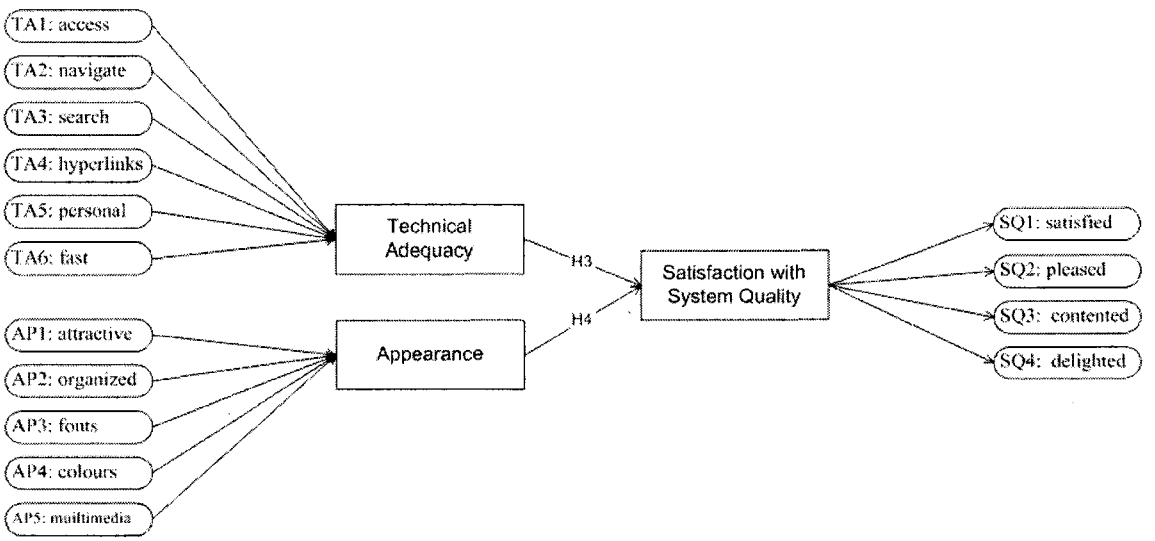

Figure 3-6 : Satisfaction with System Quality

3.5.3 Trust Beliefs

Trust beliefs is a latent construct based on the beliefs and the confidence in those beliefs that the other party has traits which are desirable in a situation where one

individual has to depend on another individual, organization or institution. Trust beliefs can be measured directly using an adapted instrument from Jarvenpaa et al. (2000). Dimensions or traits leading to trust beliefs are situation and person specific beliefs about the trusted party and are defined as: competence, benevolence, and integrity (S. C. Chen & Dhillon, 2003; Gefen, 2002; McKnight et al., 2002). These traits are subjective beliefs about the Website's and author's competence, benevolence and integrity. These dimensions or traits have been found to be predictors for trust beliefs and thus the hypothesis shown in Figure 3-7 are proposed:

H_5: A higher level of competence leads to a higher level of trust beliefs

H_6: A higher level of benevolence leads to a higher level of trust beliefs

H_7: A higher level of integrity leads to a higher level of trust beliefs

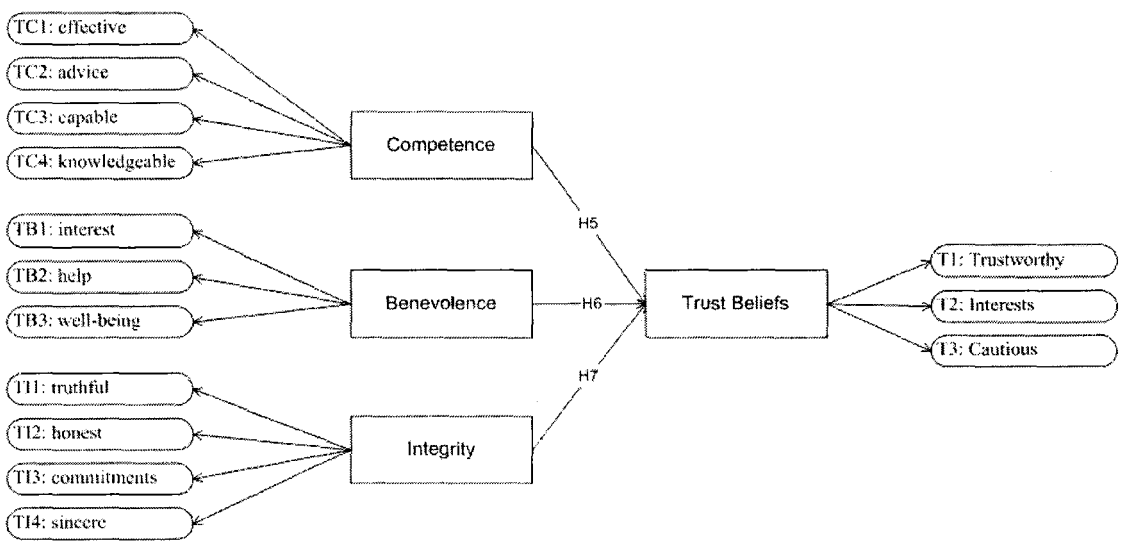

Figure 3-7 : Trust Beliefs

3.5.4 Overall Satisfaction

Overall satisfaction with online health information retrieval is suggested to be derived from satisfaction with the information quality, satisfaction with the web site system quality (McKinney et al., 2002) and the trust beliefs towards the Website and its owners/authors (Huntington et al., 2004). This is similar to the findings of Toms and Taves (2004) who found that trustworthiness, aboutness and authoritativeness impact consumers' willingness to return to a Website. Khalifa and Liu (2004) suggested that antecedents to satisfaction are System Quality and Information Quality dimensions. Figure 3-8 illustrates the hypothesis related to overall satisfaction. Thus we propose the three hypotheses related to overall satisfaction are listed below:

H_8: A higher level of satisfaction with information quality leads to a higher level of satisfaction with online health information retrieval

H_9: A higher level of satisfaction with system quality leads to a higher level of satisfaction with online health information retrieval

H_{10}: A higher level of trust beliefs leads to a higher level of satisfaction with online health information retrieval

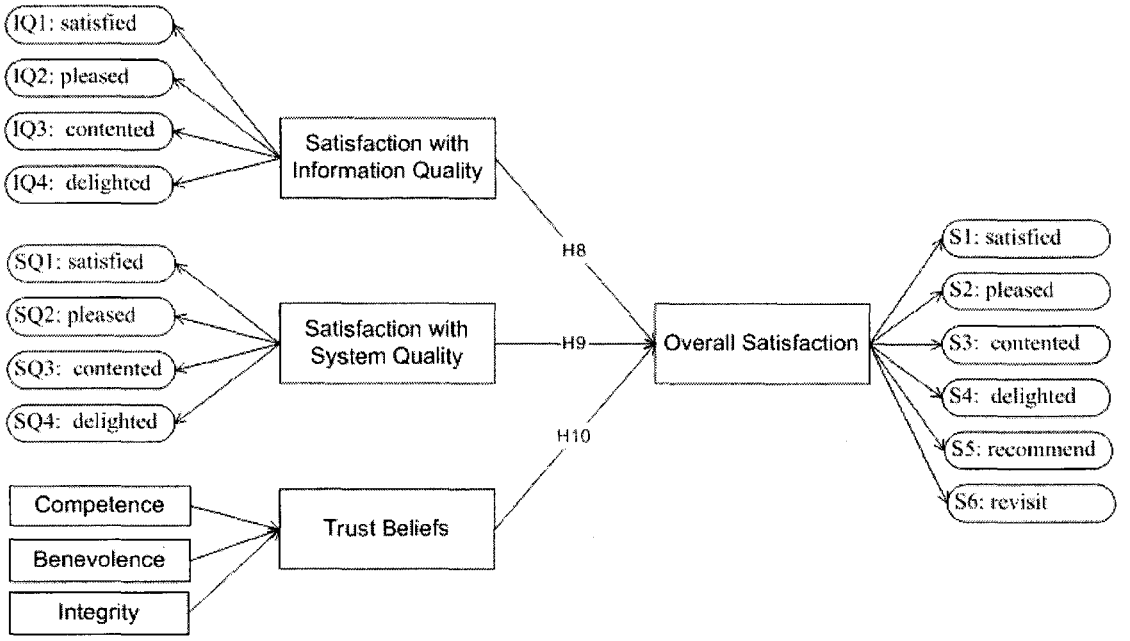

Figure 3-8 : Overall Satisfaction

3.5.5 Disconfirmation of Expectations

Satisfaction with the performance of a product or service depends on the prior expectations of the performance received (Chin & Lee, 2000; Spreng & Chiou, 2002; Spreng & Page Jr., 2003). Satisfaction will be higher if the performance met or exceeded expectations, and conversely it will be lower if the expectations were not fulfilled. These expectations can be modeled as disconfirmation of expectations, which have a mediating effect on the relationship between satisfaction with information quality/satisfaction with system quality and overall satisfaction. Note that the disconfirmation of expectations is a calculated construct using the ADM operationalisation of disconfirmation as discussed in section 2-5. Disconfirmation (SDIQ) is the product of the difference between expectations and performance (SDSQ) and the severity of the difference (eSQ), and is illustrated using a hexagon in Figure 3-9. A positive disconfirmation means that the

expectations were exceeded, while a negative disconfirmation means that the expectations were not met. The relationships between disconfirmation, item satisfaction and overall satisfaction are well supported in prior research (Chin & Lee, 2000; Spreng & Chiou, 2002; Spreng *et al.*, 1996; Spreng & Page Jr., 2003) and the following hypothesis are thus proposed and illustrated in Figure 3-9:

H_{11}: A higher level of satisfaction with information quality leads to a higher level of disconfirmation of expectations for information quality

H_{12}: A higher level of satisfaction with system quality leads to a higher level of disconfirmation of expectations for system quality

H_{13}: A higher level of disconfirmation of expectations for information quality leads to a higher level of satisfaction with online health information retrieval

H_{14}: A higher level of disconfirmation of expectations for system quality leads to a higher level of satisfaction with online health information retrieval

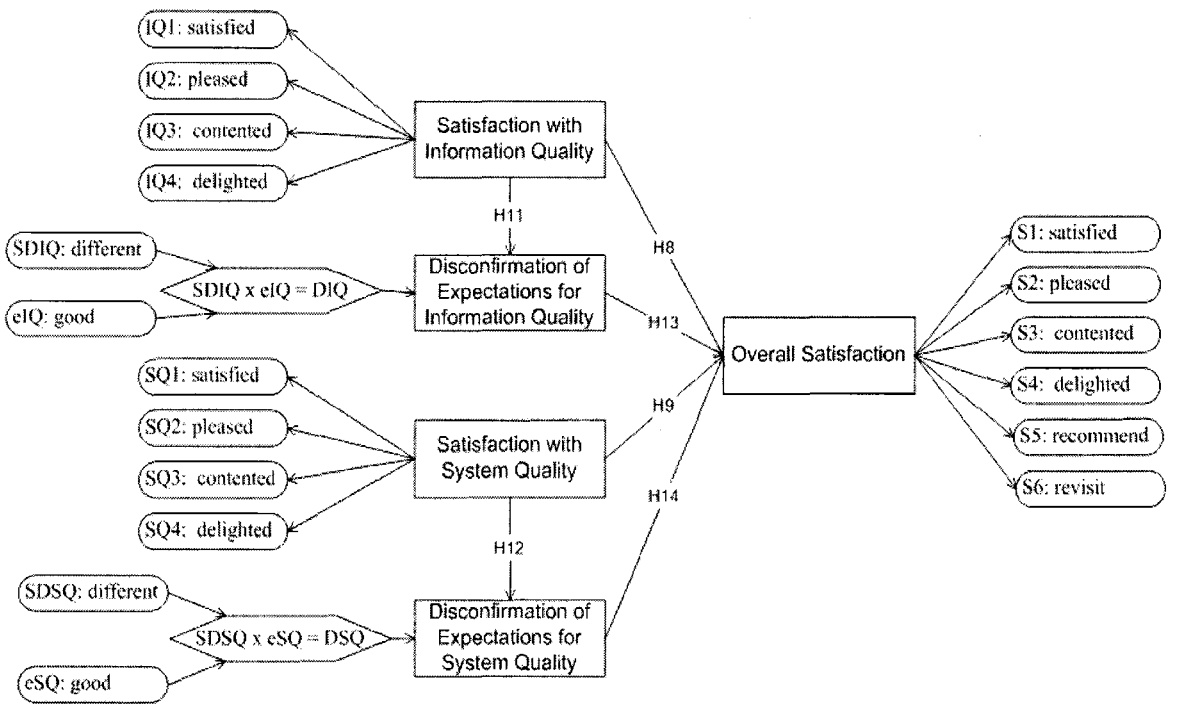

Figure 3-9 : Disconfirmation of Expectations

3.5.6 Drivers of Trust Beliefs

Trust beliefs are built upon the impressions consumers have of the Website. 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 Websites. Prior qualitative research has recognized that the features of a Website can influence the trust or mistrust of health information Websites (Sillence *et al.*, 2004). Quantitative research on consumer trust in health information on the web has also concluded that the features and contents of WebPages 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 beliefs, and the following hypotheses are suggested and illustrated in Figure 3-10:

H_{15A}: A higher level of specific content leads to a higher level of competence

H_{15B}: A higher level of specific content leads to a higher level of benevolence

H_{15C}: A higher level of specific content leads to a higher level of integrity

H_{16A}: A higher level of content quality leads to a higher level of competence

H_{16B}: A higher level of content quality leads to a higher level of benevolence

H_{16C}: A higher level of content quality leads to a higher level of integrity

H_{17A}: A higher level of technical adequacy leads to a higher level of competence

H_{17B}: A higher level of technical adequacy leads to a higher level of benevolence

H_{17C}: A higher level of technical adequacy leads to a higher level of integrity

H_{18A}: A higher level of appearance leads to a higher level of competence

H_{18B}: A higher level of appearance leads to a higher level of benevolence

H_{18C}: A higher level of appearance leads to a higher level of integrity

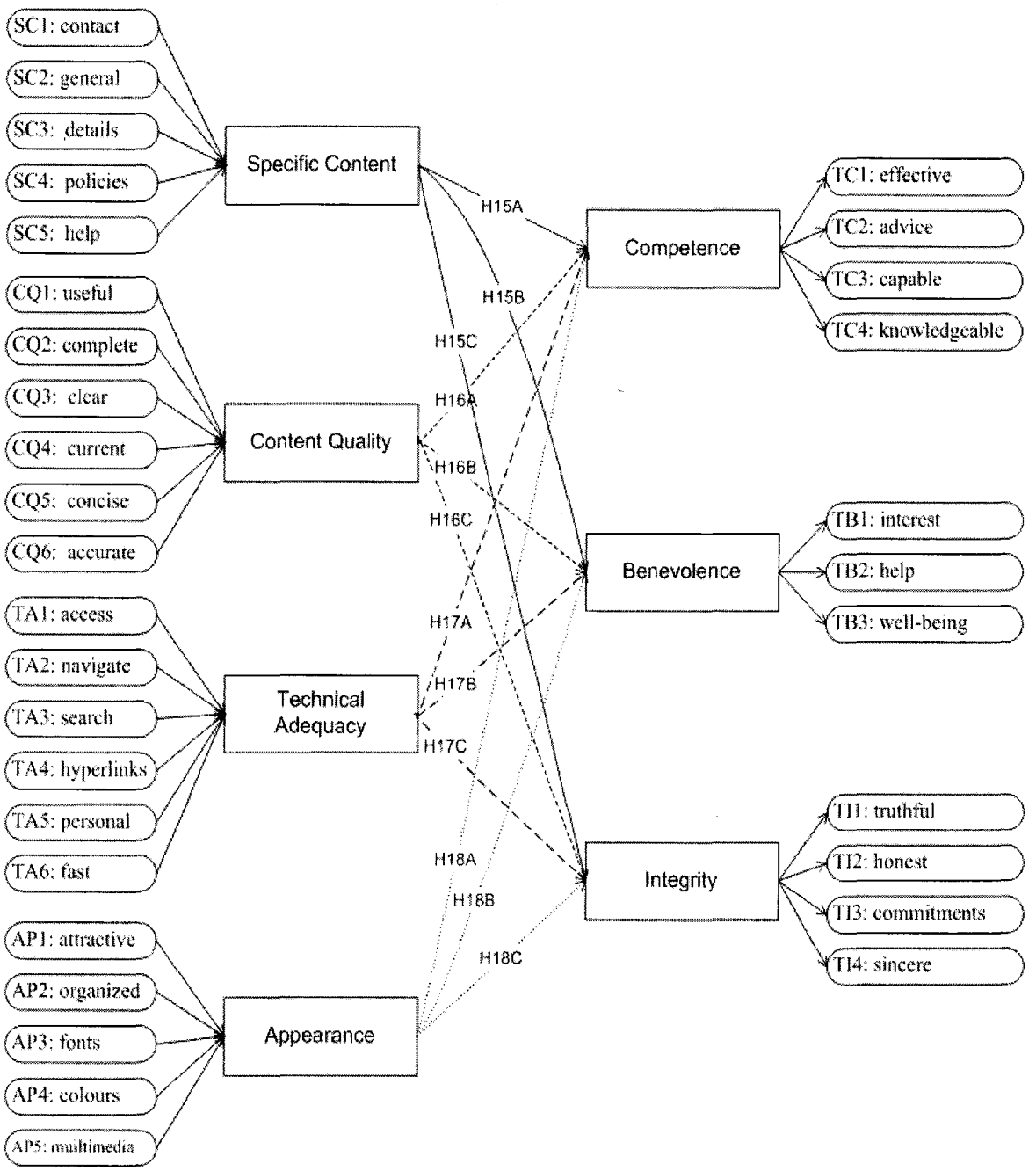

Figure 3-10 : Drivers of Trust Beliefs

Note that in Figure 3-10 the lines are illustrated using different styles for visibility purposes only.

Note that it is unlikely that all the relationships between the performance measures and the trust beliefs constructs are significant, but these hypotheses shall still be tested to determine those that play a significant role in forming trust beliefs. One alternative to this is to measure the relationships between the exogenous constructs and trust beliefs instead, which will be tested in a post hoc analysis and model comparison.

3.6 Summary

Chapter three reviewed concepts related to consumer satisfaction with online health information retrieval. A theoretical research model was proposed based on constructs used in management research. The relationships between constructs and their items were discussed as a set of hypotheses, which will be tested empirically. The next Chapter describes the research methodology, and the instrument that is used to collect data to test the proposed theoretical model developed in this Chapter.

Chapter 4 : Methodology

This Chapter describes the research methodology employed to validate the model proposed in Chapter 3. The model was validated through the analysis of data collected through an online experiment involving consumers performing a health information retrieval task. The details of the research methodology and experimental procedure are described in the following subsections.

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).

Exploratory factor analysis is not an appropriate analysis method in this research for two compelling reasons. First, this research utilizes formative constructs, for which traditional methods such as principal components analysis in exploratory factor analysis is neither appropriate nor required due to the fact that items making up constructs need not be correlated (Bollen & Lennox, 1991; P. Cohen *et al.*, 1990). Second, it is not appropriate to conduct both exploratory factor analysis (such as principal components) and confirmatory factor analysis (such as structural equation modeling) using the same

data (Bandalos, 1996). Submitting data to an exploratory factor analysis to "clean up" factors prior to running a confirmatory factor analysis capitalizes on chance and is not recommended as the quality of the results of the model can be seen as an indicator of the skill of the researcher at deleting items (Chin, 1998a).

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. Disconfirmation of Expectations). Formative indicators are observed variables that are assumed to cause a latent variable (Diamantopoulos & Winklhofer, 2001). 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 PLS approach to structural equation modeling supports both exploratory and confirmatory research (Gefen et al., 2000), which is appropriate in this situation as some of the proposed relationships between trust constructs (H_{15A} – H_{18C}) are more exploratory in nature.

The Conventional Approach to Structural Equation Modeling (Kaplan, 2000) as illustrated in Figure 4-1 is used in this research. Here the theory is first presented based on the literature available, resulting in the specification of a model. Then the sample is selected and measures are obtained from this sample. The measures for this model are obtained through an online experiment, where participants are asked to answer a health related question. During the experiment, participants are provided a health Website and are then asked to navigate through the site to answer the health question. Following this, the participants are asked several questions related to their experience with the Website to obtain the model measures.

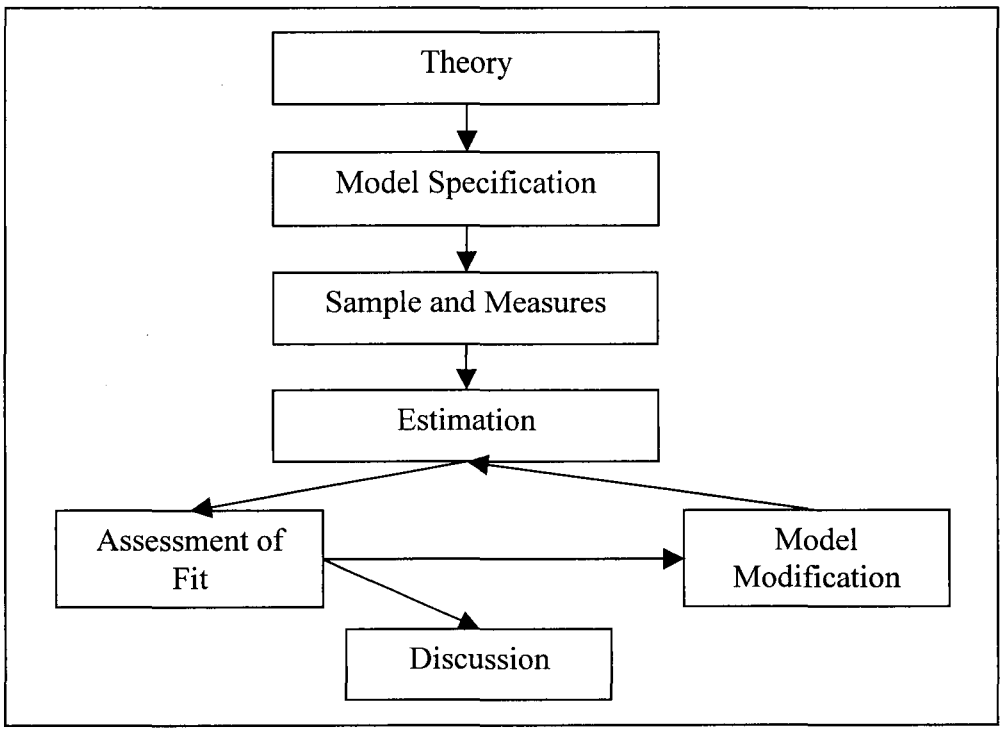

Figure 4-1: SEM Approach (Adapted from Kaplan, 2000)

The model is then estimated using PLS Graph version 3.00 Build 1126. 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). The fit of the model is then assessed using fit indices such as R^2 and then if necessary the model is modified and revaluated. These three stages may be repeated until a decision is made that the model meets some standard of adequate goodness of fit (Kaplan, 2000). After deciding that the model has reached an adequate fit a discussion of the results will follow.

4.1 Data Collection Method

The research model was validated through an online experiment. Prior to conducting the experiment online, the survey instrument and scenario was tested in a pilot study, where participants were observed, and comments were sought on the wording of the instructions. The actual experiment divided the participants into eight different groups with each group evaluating online health information from a different web site as an experimental treatment to vary the satisfaction and its antecedents to satisfaction with system quality and satisfaction with information quality. Data was collected through an online survey instrument WebSurveyor™.

4.2 Operationalisation of Variables

Variables are adapted from instruments found in prior studies (Aladwani & Palvia, 2002; Gefen, 2002; McKinney et al., 2002; Spreng & Page Jr., 2003). The constructs Satisfaction with Information Quality and Satisfaction with System Quality are operationalised using the disconfirmation of expectations approach as discussed in section 3-1. Satisfaction with System quality and Satisfaction with Information Quality are operationalised as having each two independent sub constructs (Specific Content / Content Quality and Technical Adequacy /Appearance) as discussed in Chapter 3-3. Trust Beliefs are seen as arising from participants' perceptions of Competence, Benevolence and Integrity, as discussed in section 3-2. Table 4-1 shows the wording of the construct items and their sources.

Table 4-1: Sources for Construct Items

Question	Source
Technical Adequacy	
TA1: WEBSITE is easy to access (i.e. has a reflective and widely registered name)	(Aladwani & Palvia, 2002)
TA2: WEBSITE looks easy to navigate through	(Aladwani & Palvia, 2002)
TA3: WEBSITE has adequate search facilities	(Aladwani & Palvia, 2002)
TA4: WEBSITE has valid links (hyperlinks)	(Aladwani & Palvia, 2002)
TA5: WEBSITE can be personalized or customized to meet one's needs	(Aladwani & Palvia, 2002)
TA6: Web pages load fast in WEBSITE	(Aladwani & Palvia, 2002)
WEBSITE looks secured for carrying out transactions (e.g. uses SSL, Digital Certificates, etc.	Dropped for HIR context
WEBSITE is always up and available	Dropped for experimental logic
WEBSITE has many interactive features (e.g. online shopping etc.)	Dropped for HIR context
Content Quality	
CQ1: The content of WEBSITE is useful	(Aladwani & Palvia, 2002)
CQ2: The content of WEBSITE is complete	(Aladwani & Palvia, 2002)
CQ3: The content of WEBSITE is clear	(Aladwani & Palvia, 2002)
CQ4: The content of WEBSITE is current	(Aladwani & Palvia, 2002)

CQ5: The content of WEBSITE is concise	(Aladwani & Palvia, 2002)
CQ6: The content of WEBSITE is accurate	(Aladwani & Palvia, 2002)
Specific Content	
SC1: In WEBSITE, one can find contact information (e.g. e-mail addresses, phone numbers, etc.)	(Aladwani & Palvia, 2002)
SC2: In WEBSITE, one can find its general information (e.g. goals, owners)	(Aladwani & Palvia, 2002)
SC3: In WEBSITE, one can find details about authors	(Aladwani & Palvia, 2002)
SC4: In WEBSITE, one can find information related to customers' policies (e.g. privacy and dispute details)	(Aladwani & Palvia, 2002)
SC5: In WEBSITE, one can find help information* *Original Wording: In WEBSITE, one can find information related to customer service*	(Aladwani & Palvia, 2002)
Appearance	
AP1: WEBSITE looks attractive	(Aladwani & Palvia, 2002)
AP2: WEBSITE looks organized	(Aladwani & Palvia, 2002)
AP3: WEBSITE uses fonts properly	(Aladwani & Palvia, 2002)
AP4: WEBSITE uses colors properly	(Aladwani & Palvia, 2002)
AP5: WEBSITE uses multimedia features properly	(Aladwani & Palvia, 2002)
Satisfaction with Information Quality	
Only based on the information provided by WEBSITE, please indicate your views regarding the overall quality of information. *Original Wording: Only based on the information provided by the assigned web site, please indicate your views regarding the overall quality of information.*	Modified for clarity – WEBSITE is replaced with the name of the appropriate site in each case
IQ1: Very dissatisfied vs. Very satisfied	(McKinney et al., 2002)
IQ2: Very displeased vs. Very pleased	(McKinney et al., 2002)
IQ3: Frustrated vs. Contented	(McKinney et al., 2002)
IQ4: Disappointed vs. Delighted	(McKinney et al., 2002)
Satisfaction with System Quality	
Only based on the information provided by WEBSITE, please indicate your views regarding the overall quality of Web site's features *Original Wording: Only based on the information provided by the assigned web site, please indicate your views regarding the overall quality of Web site's features*	Modified for clarity - WEBSITE is replaced with the name of the appropriate site in each case
SQ1: Very dissatisfied vs. Very satisfied	(McKinney et al., 2002)
SQ2: Very displeased vs. Very pleased	(McKinney et al., 2002)
SQ3: Frustrated vs. Contented	(McKinney et al., 2002)
SQ4: Disappointed vs. Delighted	(McKinney et al., 2002)

* Adapted for the HIR setting

Disconfirmation of Expectations of Information Quality	
SDIQ: "In comparison to the level of overall quality of the information on the Website that you expected, how big was the difference between what you wanted and what the Website actually provided?" * *Original Wording: In comparison to the level of each aspect that you expected, how big was the difference between what you wanted and what the camcorder actually provided?*	(Chin & Lee, 2000; Spreng et al., 1996; Spreng & Page Jr., 2003)
eIQ: "How good or bad is this difference?"	(Chin & Lee, 2000; Spreng et al., 1996; Spreng & Page Jr., 2003)
Disconfirmation of Expectations of System Quality	
SDSQ: "In comparison to the level of overall quality of the features on the Website that you desired, how big was the difference between what you wanted and what the Website actually provided?" * *Original Wording: In comparison to the level of each aspect that you expected, how big was the difference between what you wanted and what the camcorder actually provided?*	(Chin & Lee, 2000; Spreng et al., 1996; Spreng & Page Jr., 2003)
eSQ: "How good or bad is this difference?"	(Chin & Lee, 2000; Spreng et al., 1996; Spreng & Page Jr., 2003)
Benevolence	
TB1:I believe that WEBSITE would act in my best interest	(McKnight et al., 2002)
TB2: If I required help, WEBSITE would do it's best to help me	(McKnight et al., 2002)
TB3: WEBSITE is interested in my well-being, not just its own	(McKnight et al., 2002)
Integrity	
TI1: WEBSITE is truthful in it's dealings with me	(McKnight et al., 2002)
TI2: I would characterize WEBSITE as honest	(McKnight et al., 2002)
TI3: WEBSITE would keep its commitments	(McKnight et al., 2002)
TI4: WEBSITE is sincere and genuine	(McKnight et al., 2002)
Competence	
TC1: WEBSITE is competent and effective in providing health advice* *Original Wording: WEBSITE is competent and effective at providing legal advice*	(McKnight et al., 2002)
TC2: WEBSITE performs its role of giving health advice very well* *Original Wording: WEBSITE performs its role of giving legal advice well*	(McKnight et al., 2002)
TC3: Overall, WEBSITE is a capable and proficient Internet health advice provider* *Original Wording: Overall, WEBSITE is a capable and proficient Internet legal provider*	(McKnight et al., 2002)

* Adapted for the HIR setting

TC4: In general, WEBSITE is very knowledgeable about health issues* *Original Wording: In general, WEBSITE is very knowledgeable about the law*	(McKnight et al., 2002)
Trust Beliefs	
T1: This Website is trustworthy	(Jarvenpaa et al., 2000)
T2: I trust this Website keeps my best interests in mind	(Jarvenpaa et al., 2000)
T3: I find it necessary to be cautious with this Website [reverse]	(Jarvenpaa et al., 2000)
Overall Satisfaction	
"Thinking of your overall experience with this Website, how do you feel?"	
S1: very dissatisfied vs. very satisfied	(McKinney et al., 2002)
S2: very displeased vs. very pleased	(McKinney et al., 2002)
S3: frustrated vs. contented	(McKinney et al., 2002)
S4: terrible vs. delighted	(McKinney et al., 2002)
S5: Will never recommend it to my friends vs. will definitely recommend it to my friends	(Toms & Taves, 2004)
S6: Will never use it again vs. Will definitely use it again	(Toms & Taves, 2004)

4.3 Pre-test of the Survey Instrument

A pre-test of the survey Instrument was conducted with eight participants to identify any potential problems in the wording of the questions or the Websites. Two subjects each completed the information retrieval task on one of the four Websites selected using overall quality as treatments. The task and Websites used in the pre-test are described below. Participants were observed during the experiment and asked to comment on the task and wording of the questions in the instrument.

A scenario was used to frame the information seeking task for the participants. The question for the scenario was chosen from the questions used in the study by Berland et al. (2001), since this article has a large number of questions already used with answers by the authors of whom seven hold MDs. The answers to the question by the authors are

shown in Appendix C. The following scenario has been adapted for the question for this research:

> ***Asthma 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 child asthma 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?**

Websites used in the pre-test were selected to vary in quality to reflect what consumers can find on the Internet and for maximum variance of the quality constructs. Websites were chosen based on articles which assessed and ranked best and worst Websites (Barrett, 2003; Cropper, 2004; Stanford *et al.*, 2002). The Websites chosen for this study were validated for the chosen research scenario and evaluated for content and quality, in other words the Websites were examined in detail for the specific question used in the scenario, and examples of what WebPages can be found are depicted in Appendix D. The following four Websites were used in the pre-test experiment:

- MayoClinic – Organizational information site – Highest quality
- WebMD – Commercial information site – High quality
- DrWeil – Private Information site – Suspect quality
- Health Bulletin – Commercial site – Poor quality

The pre-test was conducted using Web Surveyor™[2] – an online survey tool. After completing the consent form and some general demographic questions, participants were

[2] http://www.websurveyor.com

given the preceding health scenario and question to answer using one of the four Websites to which they were automatically directed

After entering their answer to the above question, participants filled out the survey instrument. The order of the questions for the indicators of technical adequacy, appearance, specific content, content quality, benevolence, competence, integrity and trust beliefs were randomized.

4.3.1 Pre-test Observations and Comments

Participants were asked to complete the experiment while being observed, and to comment on any ambiguous questions or issues they had with the instrument or the experiment. No major issues were identified during the experiment. Observations and comments on the experiment were as follows:

Observations

- Instructions to limit the amount of time expected to find an answer to the question were missing
- Web-MD's search provided external links through a Google search engine
- All participants copy-pasted their answers to the posed question despite their being no instructions to do this
- Question TA5 on personalization or customization posed difficulties for all participants
- Participants switched repeatedly between the survey and the assigned Website to lookup features such as the existence of policies or contact information
- Two participants were unsure what exacerbation meant
- Some participants did not find items such as references or policies
- One participant was quite upset by the quality of the Healthbulletin site and emailed complaints about the site to the site owners

Comments

- For satisfaction measures "delighted may be too strong a word"
- The name of the Website should replace the wording "the Website you just used"
- "I always check other sources to verify information"
- "make the instrument shorter"
- Regarding Healthbulletin "Stupid site. Who made this?"

4.3.2 Pre-test Demographics

The results of the demographic questions answered by the pre-test participants were as follows in Table 4-2:

Table 4-2: Pre-test Demographics

Demographic	Responses					
Gender	Male 6	Female 2				
Age	25-29 2	30-34 2	35-39 1	40-44 0	45-49 1	50 and older 2
Highest level of Education	High School 0	College 1-3 year 1	4 year College 0	Post Graduate 7		
Internet Use	Everyday 8	Several times a week 0	Once a week 0	Several times a month 0	Once a month 0	Less than once a month 0
Health Website Use	Everyday 0	Several times a week 2	Once a week 0	Several times a month 2	Once a month 0	Less than once a month 4

4.3.3 Pre-test Treatment Means

The means of the construct items were examined for each different Website in order to understand the differences between the four Websites used in the pre-test. These are depicted in Table 4-3, and suggest that greater variance for the exogenous constructs Technical Adequacy, Content Quality, Specific Content, and Appearance may improve

the significance of the full experiment. For this reason the full experiment adopted a slightly different approach to Website and scenario selection to increase the variance in these exogenous constructs.

Table 4-3: Pre-test group differences

Construct (Scale)	Mayoclinic	WebMD	DrWeil	Health bulletin	Average
Technical Adequacy (1-7)	5.50	6.33	5.75	2.83	5.10
Content Quality (1-7)	5.00	6.33	6.50	3.50	5.33
Specific Content (1-7)	4.90	5.70	5.20	2.80	4.65
Appearance (1-7)	5.50	6.20	6.30	2.10	5.03
Benevolence (1-7)	4.33	5.33	5.67	2.17	4.38
Integrity (1-7)	4.50	6.00	5.63	3.13	4.81
Competence (1-7)	5.50	6.25	6.13	3.50	5.34
Trust Beliefs (1-7)	4.83	5.17	5.33	2.83	4.54
Information Quality Satisfaction (-5 -+5)	3.00	3.63	2.75	-5.00	1.09
System Quality Satisfaction (-5 -+5)	2.63	3.38	3.00	-4.50	1.13
Disconfirmation of Information Quality (-35 - +35)	2	-3	2	-27	-6.5
Disconfirmation of System Quality (-35 - +35)	2.5	0	-1.5	-32.5	-7.875
Overall Satisfaction (-5 - +5)	**2.83**	**3.92**	**2.58**	**-4.92**	**1.10**

The means from the pre-test groups show that the level of overall satisfaction with Websites was in roughly the same order as the quality of the Websites with WebMD and MayoClinic being higher than DrWeil and HealthBulletin. These results are based on four samples of two so no other real conclusions can be drawn at this stage in the research about the Websites or the model. The purpose of the pre-test was to examine the suitability of the Websites and scenario, as well as to refine the wording of the research instrument.

4.3.4 Changes made to the experiment

The pre-test showed that the constructs were stable and that they could be applied to the online health information setting. Slight changes to the wording of the instructions were made based on the comments. The main change made based on the results of the pre-test experiment is to the experimental design, which was based on varying the quality of the Websites in the pre-test. The main study experimental design varied the level of the first order constructs, or antecedents to system and information quality, which is discussed in the following section. The effect of this change is that the Websites in the experiment have changed slightly between the pre-test and the main study. Of the Websites in the pre-test; DrWeil.com, MayoClinic.org and HealthBulletin.com were utilized in the main experiment. WebMD.com was dropped, because of similarities with Mayoclinic.org and the fact that WebMD's search results provided Google links internally making it possible for subjects to unknowingly leave the Website. The main study included the addition of five new Websites and one additional scenario as discussed in the following section.

Additionally to the increase of the number of treatments, three control variables were added and four open ended questions were added. The control variables added are the constructs Involvement, Knowledge, and Browsing Self Efficacy. The questions for the control variables were added to the instrument to explore their possible impact on the research model. These questions and their sources are shown in Table 4-4.

Table 4-4 Sources for Control Variables

Question	Source
Involvement (Asthma or Phentermine)	
INA1: In general I have a strong interest in learning more about asthma INP1: In general I have a strong interest in learning more about weight loss drugs *Original wording: In general I have a strong interest in this product category*	(Beatty & Talpade, 1994)
INA2: Information about asthma is very important to me INP2: Information about weight loss drugs is very important to me *Original wording: This product category is very important to me.*	(Beatty & Talpade, 1994)
INA3: I get bored when other people talk to me about asthma *(reverse)* INP3: I get bored when other people talk to me about weight loss drugs *(reverse)* *Original wording: I get bored when other people talk to me about this product category. (reverse)*	(Beatty & Talpade, 1994)
Knowledge (Asthma or Phentermine)	
KNA1: I know a lot about asthma KNP1: I know a lot about weight loss drugs *Original wording: I know a lot about skin cancer*	(Block & Keller, 1995)
KNA2: I know more about asthma than most people KNP2: I know more about weight loss drugs than most people *Original wording: I know more about skin cancer than most people*	(Block & Keller, 1995)
KNA3: I know a lot about asthma in general KNA3: I know a lot about weight loss drugs in general *Original wording: I know a lot about cancer in general*	(Block & Keller, 1995)
Browsing Self Efficacy (Confidence)	
CO1: I feel confident surfing the World Wide Web (WWW)	(Torkzadeh & Van Dyke, 2001)
CO2: I feel confident browsing the World Wide Web (WWW)	(Torkzadeh & Van Dyke, 2001)
CO3: I feel confident finding information on the World Wide Web (WWW)	(Torkzadeh & Van Dyke, 2001)

The four open ended questions, listed below, were added to generate additional insights and were kept general in nature to give respondents a chance to express concerns and comments that may not have been captured in the questionnaire. The questions are as

follows (where WEBSITE was substituted with the appropriate Website name such as DrKoop.com, for example):

- Please describe what you liked about WEBSITE
- Please describe what you disliked about WEBSITE
- How could WEBSITE be improved?
- If you would like to describe a memorable good or bad experience with any health information Website you have had in the past, please share it here:

4.4 Experimental Design

The goal of the main experiment is 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 beliefs as well as the satisfaction with system quality and information quality. The experiment utilized live Websites and scenarios to reflect how consumers judge Websites outside of a laboratory setting. As such, the method of manipulating the exogenous constructs in the model was to create treatments by varying the scenario and the Website so that variation among constructs is achieved.

The questions for the scenarios were chosen from the questions used in the study by Berland et al. (2001), since this article has a large number of questions already used with answers by the authors of whom seven hold MDs. The answers to the question by

the authors are shown in Appendix C. The following scenarios have been adapted for the questions for this research:

Asthma Scenario
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?***

Phentermine Scenario
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 Website 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?***

The research model contains four exogenous constructs, thus if we were to vary the experiment to achieve full factorial solution we would need 16 groups assuming two levels for each construct. This would be impractical to achieve both from a logistical standpoint and also because selecting the scenarios and Websites is based on subjective judgments of the treatments, which may not be identical to those of each participant. In this experiment eight treatments comprising of two different scenarios and eight different Websites 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; Y. Chen & Lou, 2002; Hoeffler, 2003). It is likely that survey respondents will have unique experiences and their own judgements on the exogenous constructs in this experiment may differ from those in Table 4-5. This should not pose any difficulties to this research because the purpose of this design is to vary the measures of the exogenous constructs sufficiently to generate robust relationships in the research model in terms of the significance level of the relationships between constructs in PLS. The design can be seen as successful if there is an overall significant variance in constructs for the combined data from all eight (2^{4-1}) groups. Table 4-5 shows the eight treatments used in the experiment.

Table 4-5: Experimental Design

	Specific Content	Content Quality	Technical Adequacy	Appearance	Website	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 Websites used for the treatments were chosen based on careful analysis of the contents of the websites and results of the pre-test to best reflect relative (High or Low) values of the exogenous constructs, and can be seen in Appendix D and E. Note

that for the cases where specific content is low, subjects may be unable to find satisfactory information for the assigned scenario question. They will still be able to complete the survey despite being unable to find acceptable information on the assigned Website.

Subjects were assigned to a group randomly to complete one of the eight variants of the online survey. The participants used an online survey tool WebSurveyor™ that linked them to the site and provided them with the scenario for the chosen treatment. The randomization method used was Java random redirector page which randomly assigned participants to one of the eight treatments; as such the treatment groups may be uneven due to the nature of random number assignments.

4.5 Sample (size, recruitment)

Participants were recruited by invitation. This invitation in the form of an email was sent out to McMaster faculty and staff. An announcement was also posted for the general public accessing the McMaster News webpage. The invitation was also advertised as a posting in two online mothering community forums (http://www.mothering.com,, http://www.silvermailhaven.com) because of the nature of the question in the experiment, and because these are representative of the population of online health information seekers. Additionally subjects recruited from mothering forums

will have a higher likelihood of being knowledgeable about asthma in children and weight loss drugs.

When modelling with PLS, the desired minimum sample size is ten times the greater of a) the number of relationships of the construct with the greatest number of formative relationships and b) the relationships for the construct with the greatest number of structural paths going into it (Chin & Newsted, 1999). In this research model this minimum is 60 based on ten times six formative constructs for the Content Quality.

Based on these calculations a sample of 60 minimum respondents is desired with eight groups averaging 7.5 subjects each. This research takes a conservative approach and samples more than the minimum number of subjects aiming for a total sample of 120 with an average 15 subjects in each group.

4.6 Procedure

1. From the invitation to participate in the study, participants begin by entering the random redirector webpage, which takes participants to one of the eight treatments (shown in table 4-5).
2. An overview of the experiment is presented to participants who have to give their consent to participate in the study (shown in Appendix B).

3. Participants can fill out demographic information about their age, Internet experience, their experience with online health information, and their educational level (Questions shown in Appendix B).
4. Participants are given either the Asthma or the Phentermine scenario as shown in Appendix C, depend on which treatment they were assigned to in step 1.
5. Participants are then provided with one of the 8 Websites, depending on the treatment they were assigned to in step 1, and asked to find the answer to the question
6. Participants are asked their answer to the health question in an open-ended response
7. Participants are asked to fill out the survey instrument as shown in Appendix B

4.7 Ethics and Compensation

Ethics approval for this research has been obtained. In order to participate, subjects needed to give their consent by agreeing to the consent form in Appendix B. In order to motivate participation n the study compensation in the form of a two draws for $200CDN each was offered to participants. In order for participants to be eligible for the draw, they had to complete the survey and submit their email address so that they could be contacted. Entry in the draw was voluntary by withholding email address, which 14 participants chose to do. After the experiment was completed the experimental data from the eight treatments was combined into one file, where the email address were removed and stored separately for the draw to ensure confidentiality of responses. The two prizes

were paid out to the winners of the random draw conducted by the Dean of the Business School.

4.8 Data Analysis

The results of this experiment were analyzed using descriptive statistics and ANOVA to examine the results from the eight groups and using partial least squares structural equation modeling techniques to examine the research model. The constructs in the model were examined for convergent validity and discriminant validity. The fit of the model was assessed using R^2 values of the relationships between constructs. In PLS Graph, the software used to evaluate the model, the R^2 values were calculated using Bootstrapping techniques.

Additionally, the relative importance of constructs in the model was evaluated by examining the effect sizes and dominant paths. The sensitivity of the model was tested by evaluating the impact of control variables and demographic items on the endogenous constructs and the impact on the average variance extracted for overall satisfaction. The responses to the open ended questions in the research instrument were examined to confirm quantitative results and for further insights on how consumers perceive health information Websites.

4.9 Summary

This Chapter covered the methodology used to validate the research model developed in Chapter three. The experimental design and survey instrument were described, as was the initial pilot study, which was used to verify the clarity of the instrument and preliminarily examine the quality of the constructs. The following Chapter describes the results and analysis of these, leading up to Chapter 6, where conclusions and a discussion of the answers to the research questions of Chapter 1 are presented.

Chapter 5 : Data Analysis and Results

This Chapter describes how the data of this experiment were obtained and analyzed. The administration of the experiment is discussed, followed by a description of the treatment the data underwent prior to analysis. The demographics of the participants are described, and control variables are analyzed subsequently. Sections 5.5 and 5.6 are dedicated to the analysis of the research model and a simplified version of the research model. The disconfirmation constructs are explored in more depth in section 5.7. This Chapter concludes with the analysis of the open ended comments which provide support to the quantitative findings in this Chapter.

5.1. Experiment Administration

In preparation for the data collection, eight nearly identical surveys were created using the online survey tool WebSurveyor™. The differences between the eight survey versions were as follows. These surveys were programmed in the tool according to the scenario (Asthma, or Phentermine as described in section 4.4) and the assigned Website to create eight treatments. The questions for the items in each survey were customized to replace the word WEBSITE in the survey sample with the appropriate Website name. The surveys with Phentermine as a scenario asked knowledge and involvement questions relating to weight loss pills, while the Asthma scenario surveys asked involvement and knowledge questions regarding Asthma.

The WebSurveyor™ tool allowed for randomization of questions for each instance of the survey. This was utilized for the questions on the agree/disagree scale, so that the order of the items for the control variables knowledge, involvement and confidence were randomized for every participant. The questions for the exogenous constructs and the Trust constructs were also randomized in this manner.

As described in section, 4.5 participants were recruited by invitation. The hyperlink posted in the invitation directed participants to a random redirector webpage hosted on a personal webpage. This random redirector page used JavaScript to randomly forward the participant to one of the eight surveys. Due to the nature of random number generators, it was necessary to monitor the distribution of the assignments and adjust the list of surveys contained in the JavaScript file throughout the course of the experiment. For example, when one version of the survey received over twenty participants, its hyperlink was replaced in the JavaScript file with the version of the survey which had only eight respondents at that point.

After one week of the experiment being posted online, the surveys were closed. The number of participants in each version of the surveys is shown in Table 5-1.

Table 5-1: Experimental Version Distribution

Version	Frequency	Percent
1	21	12.4
2	22	12.9
3	21	12.4
4	25	14.7
5	19	11.2
6	18	10.6
7	20	11.8
8	24	14.1
Total	**170**	**100.0**

5.2 Data treatment

The raw data from the experiment were treated by first reverse coding the items Involvement3 and Trust3. The disconfirmation constructs were calculated by multiplying the differences (SDIQ and SDSQ) times the effect of the differences (eIQ and eSQ respectively).

The reverse coded items were utilized to identify participants that were not carefully reading the questions. The criteria used for removing a participant from the sample was based on the calculation of the average of the forward coded items minus the reverse coded item. If the magnitude of the calculation was half the scale range (3.5) or greater then the participant was removed. For example for the trust beliefs construct, participants whose $\frac{T1+T2}{2} - T3 \geq 3.5$ were identified as not attentive during the experiment. Table 5-2 summarizes how many participants were removed from the sample

for each group. Overall 17% of the participants were identified as being inattentive, which is reasonable due to the long questionnaire.

Table 5-2 : Removal of Outliers

Version	Original	Final	Removed
1	21	19	2
2	22	18	4
3	21	18	3
4	25	18	7
5	19	15	4
6	18	15	3
7	20	17	3
8	24	21	3
Total	**170**	**141**	**29**

5.3 Participant Demographics

This section of the thesis examines the demographics and characteristics of the sample population. The research instrument allowed participants to skip any demographic questions, if they were uncomfortable answering them. Thus some unlabeled responses appear in the analysis in this section, which simply refer to participants that chose not to respond to the question.

5.3.1 Gender

The study population comprised of approximately 83% female participants, 16% male participants and one percent of participants chose not to answer the question. The

high proportion of females in the sample is due to the recruitment methods, which tended to attract more female respondents.

5.3.2 Age

The ages reported by the respondents are shown in Figure 5-1. 60% of the respondents were between 18 and 30 years old. 32% of the sample was between 31 and 50 years old.

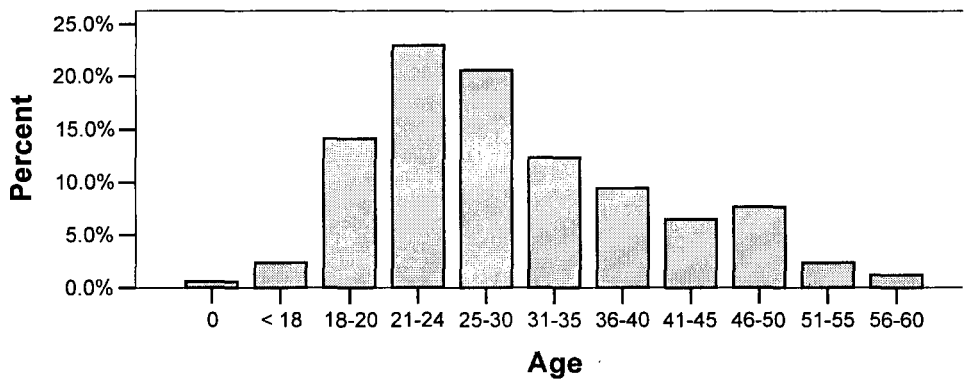

Figure 5-1: Age of Respondents

5.3.3 Education

As shown in Figure 5-2, the education level of the sample population was fairly well educated, with 32% enrolled in college, 30% having completed a 4 year program, and 35% completed a post graduate degree.

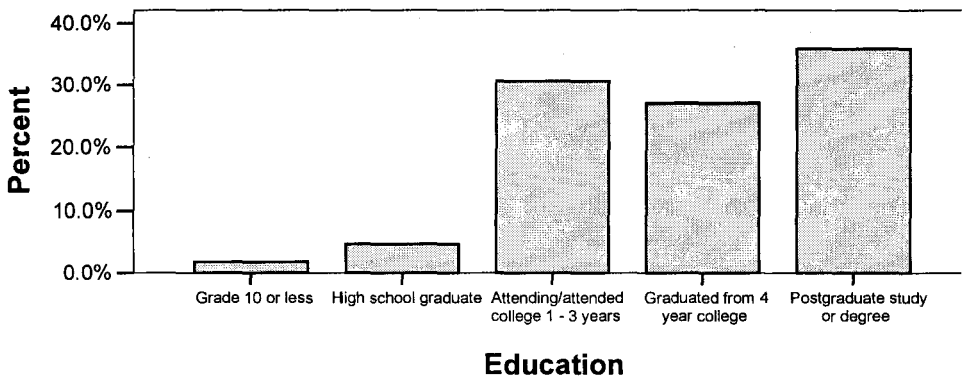

Figure 5-2: Participant Education

5.3.4 Time Spent Online

Over 50% of the participants in the study spent over 10 hours a week online, as can be seen in Figure 5-3. This indicates that the sample population is well experienced with the Internet and is likely to be related to the recruitment method for the experiment. Despite the high Internet usage of the majority of participants, 24% spent less than one hour a day online.

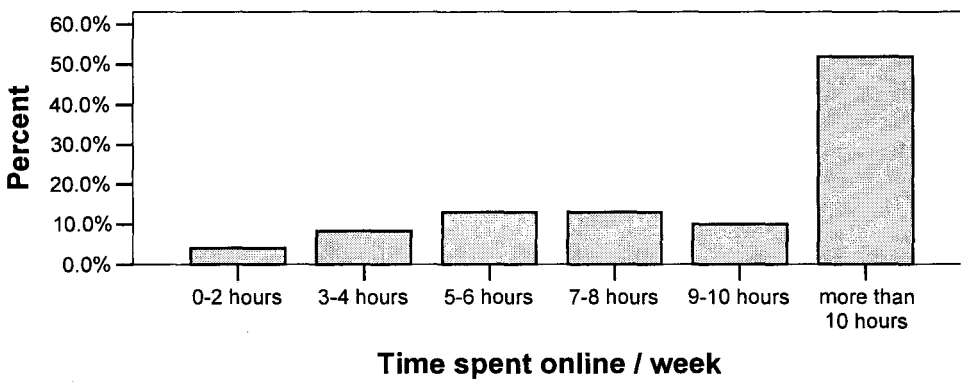

Figure 5-3 : Internet Usage

5.3.5 Frequency of accessing health information online

Figure 5-4 demonstrates that the majority of the sample population (61%) accessed health information at least once a month in the past. 37% of the participants looked up health information on the Internet once every few months. Nearly all participants had accessed health information on the Internet before, with only 2 respondents reporting that they had never looked up health information Online.

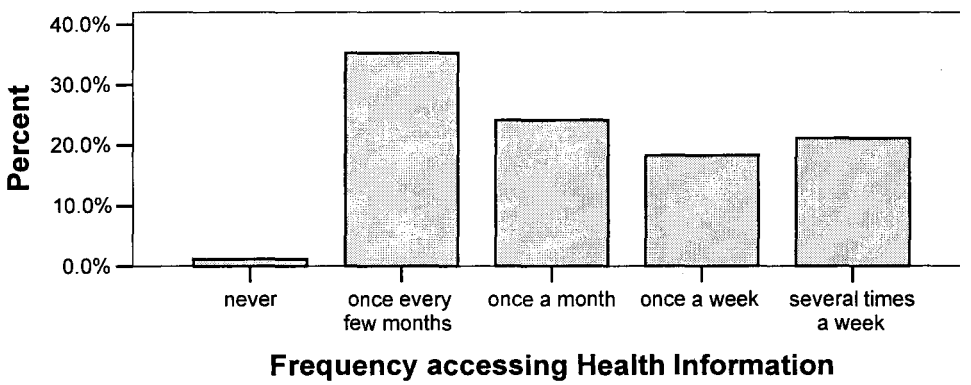

Figure 5-4: Health Information Access

5.4 Analysis of Demographic Control Variables

Demographic control variables were latent constructs measured using three Likert scale indicators each (shown in Table 4-5). The reliability and loadings of these constructs is examined in this section. For the purposes of summarizing the results in table format the rounded average of the indicators is used. The statistical comparisons and ANOVA for these constructs uses the unrounded average values. These demographic control variables are then examined below to see if there are any issues with the sample.

5.4.1 Confidence in Online Information Retrieval

Self reported confidence in online information retrieval was measured as a set of three indicators. The indicators loaded highly (>0.9) on one factor using Principal Components Analysis with good reliability (above the recommended 0.7 (Nunnally, 1978)) of the construct as measured using Cronbach's Alpha as seen in Table 5-3

Table 5-3 : Confidence PCA

	Factor Loading
Confidence 1	0.935
Confidence 2	0.933
Confidence 3	0.926
Cronbach's Alpha	0.92

The distribution of the confidence construct, shown as Figure 5-5, is skewed towards the high end of the scale, where its mean is 6.4 out of 7, indicating that almost all participants were confident in their ability to find information online.

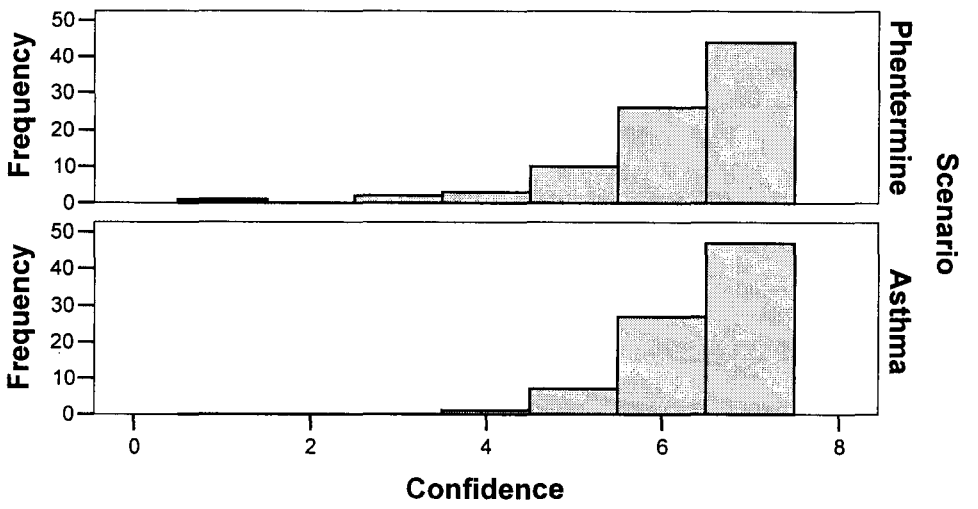

Figure 5-5 : Self assessed confidence in Information retrieval

5.4.2 Involvement

Involvement was measured using three questions (shown in Table 4-5) tailored to either the Asthma or the Phentermine scenario. As shown in Table 5-4, the factors in the construct loaded well (>0.8) and demonstrated good reliability (above the recommended 0.7 (Nunnally, 1978)). The Involvement3 indicator was reverse coded, explaining the slightly lower factor loading. Table 5-5 shows that the participants assigned to the Asthma scenario reported being more involved in the topic of asthma than those assigned to the Phentermine scenario. Note that the total in this table is 139 and not 141 because two participants did not answer all the demographic questions. The mean for the Asthma participants was 4.1 while only 2.6 for the Phentermine participants. The distributions can be seen in Figure 5-6.

Table 5-4 : Involvement PCA

	Factor Loading
Involvement1	0.91
Involvement2	0.921
Involvement3	0.801
Cronbach's Alpha	**0.853**

Table 5-5 : Involvement by Scenario

Scenario	Mean	N	Std. Deviation
Asthma	4.148	72	1.466
Phentermine	2.672	67	1.354
Total	3.437	139	1.591

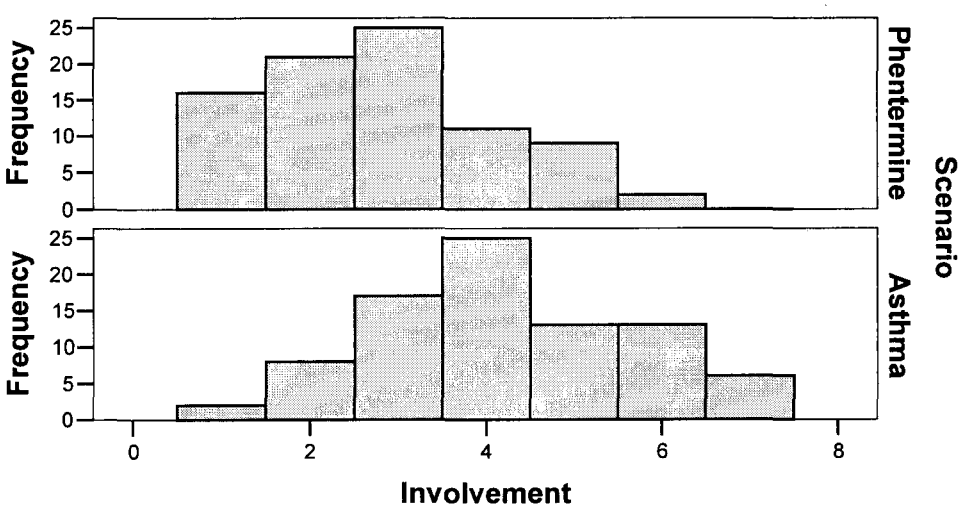

Figure 5-6 : Involvement of Participants

5.4.3 Knowledge

Knowledge was measured as three separate indicators (shown in Table 4-5) representing the self reported knowledge of the participants about their assigned scenario topic, either Asthma or Phentermine. The indicators of the construct loaded highly (>.9) on one factor and the scale was reliable with a Cronbach's Alpha above the recommended 0.7 (Nunnally, 1978)), as depicted in Table 5-6. As with involvement, the group of participants that were assigned the Asthma scenario reported a higher level of knowledge than the group assigned the Phentermine scenario. The mean for the Phentermine group was 2.9, and 4.0 for the Asthma group, which can be seen in Table 5-7.

Table 5-6 : Knowledge PCA

	Factor Loadings
Knowledge 1	0.948
Knowledge 2	0.905
Knowledge 3	0.947
Cronbach's Alpha	0.926

Table 5-7 : Knowledge by Scenario

Scenario	Mean	N	Std. Deviation
Asthma	4.032	72	1.621
Phentermine	2.947	69	1.543
Total	3.501	141	1.669

Figure 5-7 depicts the frequency distribution the Knowledge construct for the two different groups. It clearly illustrates that the participants in the Phentermine groups were

mostly unfamiliar with weight loss drugs, and the participants in the Asthma groups had an almost evenly distributed degrees of knowledge of Asthma.

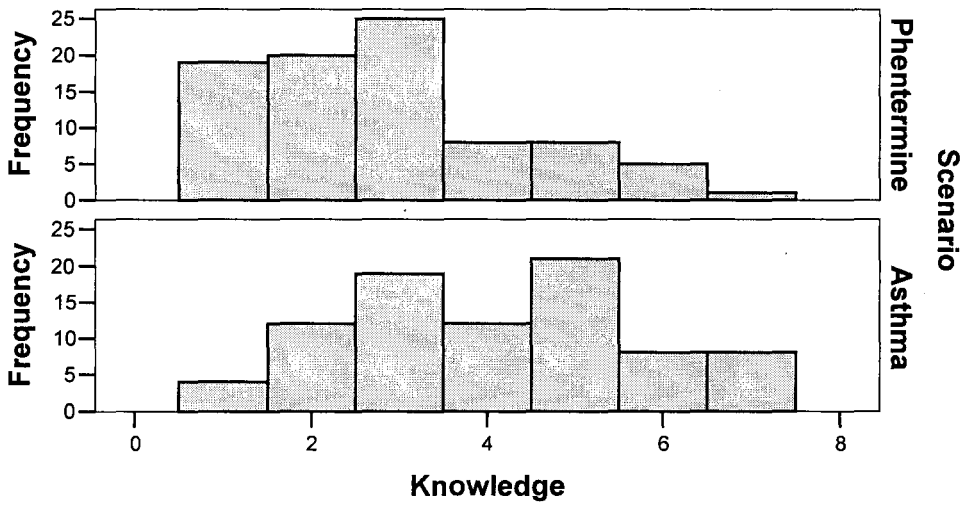

Figure 5-7 Self Reported Knowledge

5.4.4 Control Variable Scenario Contrasts

The averages of the three control variables Confidence, Knowledge and Involvement were tested for significant differences between the two scenario groups. Table 5-8 shows that Knowledge and Involvement are both statistically significantly different at the 0.001 level for the two different scenarios, while Confidence is not significantly different at the 0.1 level. The test employed here was the independent sample t-test with equal variances not assumed. This statistically confirms the contrasts in these variables for the two scenarios, which were visually discernable from the distributions shown in Figures 5-6 and 5-8.

Table 5-8 : Control Variable Differences by Scenario

	Mean Difference	t	df	Sig. (2-tailed)
Confidence	0.25	1.82	119.1	0.074
Knowledge	1.09	4.07	139.0	0.000
Involvement	1.48	6.17	137.0	0.000

Identifying that the control variables Knowledge and Involvement differed for the two scenarios may be important when explaining the possible effects of these on the structural model presented in subsequent sections. Overall this analysis concludes, as expected, that participants had higher knowledge and involvement with Asthma than with weight loss drugs (Phentermine).

5.4.5 Answer to Scenario Question

During the experiment the subjects were asked if they found the answer to their assigned scenario. Overall 74% of participants reported that they found the answer. Figure 5-8 shows the success rates for each group assigned either Asthma or Phentermine questions.

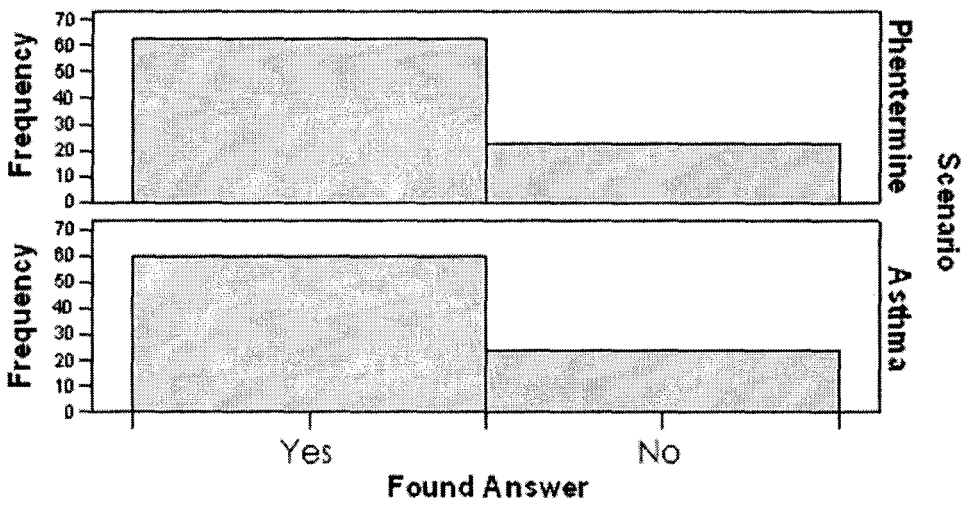

Figure 5-8 : Successful Answer to Scenario Question by Scenario

Recall that the experimental treatment comprised of both a scenario and a specific Website. The success rates of the subjects for each treatment are depicted in Figure 5-9. Here it becomes clear that the majority of participants who did not find an answer were in treatment 1 or treatment 6. Treatment 1 was the Asthma scenario on www.healthbulletin.com, and treatment was the Phentermine scenario on www.canadian-health-network.com. Both these Websites were specifically selected because of their low content quality as experimental treatments as discussed in section 4.4.

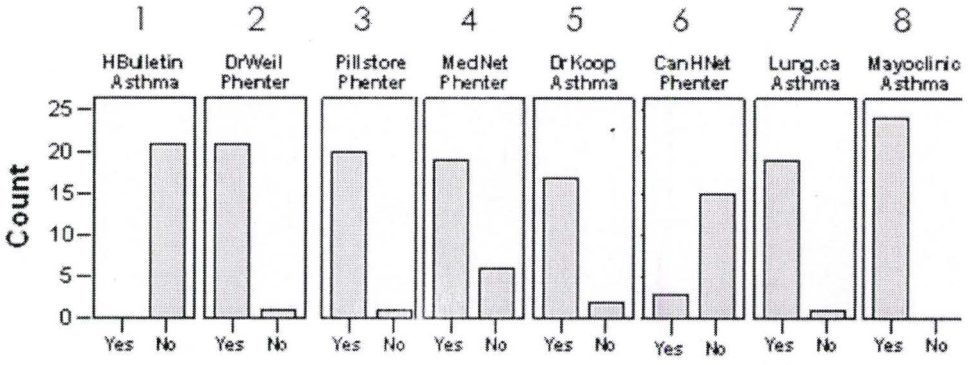

Figure 5-9 : Successful Answer to Scenario Question by Treatment

5.4.5 Scenario Answer Success ANOVA

The control variables confidence, involvement and knowledge were examined to see if they contributed to differences in participants' ability to successfully find an answer to their assigned scenario. By comparing the means (shown in Table 5-9) of the two groups of participants who either found an answer or did not, it is clear that there are no significant differences in their self assessed confidence, knowledge or involvement. Additionally the Table 5-10 demonstrates that there are no statistical significant differences using a two independent sample t-test with equal variances not assumed in the populations' control variables for respondents who found an answer and those who did not.

Table 5-9 : Control Variables by Answer

	Found Answer	N	Mean	Std. Deviation	Std. Error Mean
Confidence	Yes	104	6.37	0.73	0.07
	No	37	6.28	1.06	0.17
Knowledge	Yes	104	3.52	1.63	0.16
	No	37	3.44	1.79	0.29
Involvement	Yes	102	3.48	1.59	0.16
	No	37	3.32	1.62	0.27

Table 5-10 : Test for Differences in Control Variables by Answer

	Mean Difference	t	df	Sig. (2-tailed)
Confidence	0.09	0.474	48.5	0.638
Knowledge	0.08	0.241	58.5	0.810
Involvement	0.17	0.534	62.8	0.595

5.5 Research Model Analysis

This section describes the analysis of the research model, and describes the methodology utilized to support the validity of the findings. Common methods bias is assessed, the treatments are examined, the quality of the formative constructs is analyzed, and correlations and loadings are examined to test for convergent and discriminant validities.

5.5.1 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 method 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 method bias needs to be assessed. Harman's *one-factor test* is the method of assessing common methods bias utilized here 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. The second factor in this solution accounted for 16% of the variance and contained items relating to trust beliefs, competence, integrity, and benevolence. 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.

5.5.2 Treatment Comparisons

Recall that the research methodology utilizes a fractional factorial design to increase the variance of the constructs Specific Content (SC), Content Quality (CQ), Technical Adequacy (TA), and Appearance (AP). Table 5-11 summarizes the results of this research design. Complete means of all items in the model are shown for reference in Appendix F. The overall means of the four exogenous constructs across all treatments are compared to the means of these constructs for each of the eight treatments. If the mean construct value for a treatment is greater than the overall mean of that construct across all eight treatments then a High (H) actual rating is assigned to it. A Low (L) actual rating is assigned to treatments, where the mean value of a construct is lower than the overall mean for that construct across al treatments. Table 5-11 shows the originally proposed ratings from Table 4-5 in comparison to actual ratings. For example, the table of treatments (Table 4-5) proposed that specific content for treatment 1 should be Low (L). Based on collected data for this treatment, this particular construct averaged 3.7 which is below the overall mean for that construct across all eight treatments of 4.5. Thus the actual specific content rating for treatment 1 in Table 5-11 is determined to be Low (L).

Table 5-11 Treatment Results

Treatment			Specific Content		Content Quality		Technical Adequacy		Appearance	
Website	Scenario	#	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual
www.healthbulletin.org	Asthma	1	L	L(3.7)	L	L(3.2)	L	L(3.9)	L	L(3.2)
www.drweil.com	Phentermine	2	H	H(4.5)	L	L(4.5)	L	L(4.9)	H	H(4.9)
www.pillstore.com	Phentermine	3	L	L(4.1)	H	L(4.3)	L	L(4.7)	H	H(4.8)
www.medicinenet.com	Phentermine	4	H	H(4.6)	H	L(4.4)	L	L(4.6)	L	H(4.7)
www.drkoop.com	Asthma	5	L	L(4.4)	L	L(4.6)	H	H(5.0)	H	L(4.3)
www.canadian-health-network.ca	Phentermine	6	H	L(4.3)	L	L(4.4)	H	L(4.1)	L	H(4.7)
www.lung.ca	Asthma	7	L	H(5.3)	H	H(5.4)	H	H(5.3)	L	H(5.5)
www.mayoclinic.com	Asthma	8	H	H(4.6)	H	H(4.9)	H	L(4.8)	H	H(4.7)
Overall Mean			4.5		4.8		4.9		4.4	
Overall Variance			0.93		1.1		0.8		1.3	
Kolmogorov-Smirnov Significance Level			0.025		0.372		0.342		0.077	

It was expected in section 4.4 that the proposed levels of means of the constructs due to treatments would not exactly match their actual level of means. While this was the case here, these treatments are seen as successful, because they yielded variability in the constructs as seen in Table 5-11. Additionally, Kolmogorov-Smirnov tests were used to examine the normality of the frequency distributions of the constructs. The significance level shown in Table 5-11 is the significance level that the frequency distribution of each construct is different from a normal distribution. In other words, at the $p<0.05$ level of significance, Specific Content is not normally distributed and Technical Adequacy, Content Quality, and Appearance are normally distributed. The existence of a non-normally distributed exogenous construct confirms one of the reasons for the decision to

use Partial Least Squares (PLS) as opposed to Covariance Based (CB) SEM since CB-SEM requires multivariate normal distributions while PLS does not (Gefen et al., 2000).

5.5.3 Quality of Formative constructs

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). This is because formative constructs are made up of a linear composite of indicators, that each in their own right contributes to the latent construct, but does not need to be correlated to the other indicators. For example, some of the indicators in the formative construct "leading economic index" include building permits, stock prices and consumer expectations. All of these indicators contribute to the leading economic index, but there is no reason that a change in the one of the indicators will affect a change on 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 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).

5.5.3.1 Technical Adequacy

A linear regression using the indicators for Technical Adequacy as independent variables and Satisfaction with System Quality as the dependent variable was conducted to evaluate indicator collinearity. Table 5-12 shows that the correlations between indicators were less than 0.54 and variance inflation factors (VIF) were below the suggested cut-off of 5.0 (Kleinbaum *et al.*, 1988; Stevens, 1996) for all the indicators suggesting that multicollinearity is not a problem for the construct Technical Adequacy.

Table 5-12 : Technical Adequacy - Satisfaction with System Quality Correlations and VIFs

	SQ	TA1	TA2	TA3	TA4	TA5	TA6	VIF
SQ	1.00	0.42	0.47	0.54	0.14	0.41	0.27	
TA1		1.00	0.36	0.44	0.31	0.24	0.34	1.35
TA2			1.00	0.54	0.12	0.23	0.29	1.53
TA3				1.00	0.28	0.35	0.21	1.74
TA4					1.00	0.28	0.37	1.24
TA5						1.00	0.12	1.27
TA6							1.00	1.15

A two construct MIMIC model was constructed in PLS using Technical Adequacy as the exogenous construct and Satisfaction with System Quality as the endogenous construct. Table 5-13 shows that this construct has good composite reliability

but a low average variance extracted (AVE), as well as a significant path coefficient on Satisfaction with System Quality. The low AVE is not a cause for concern because the items in Technical Adequacy are not expected to covary, which in this case they do not.

Table 5-13 : MIMIC model Technical Adequacy - Satisfaction with System Quality

CR	AVE	Path Beta	t-statistic	R^2
0.765	0.38	0.683	12.8487	0.467

5.5.3.2 Appearance

The correlation matrix of the Appearance indicators and Satisfaction with System Quality is shown as Table 5-14. Here it can be seen that AP1 and AP2 are more correlated than the rest of the indicators, with a correlation of 0.7 (approaching the 0.8 limit suggested by Stevens (1996). Recall that AP1 is "WEBSITE looks attractive" and AP2 is "WEBSITE looks organized". Since multicollinearity is a problem in formative constructs (Diamantopoulos & Winklhofer, 2001), and taking a cautionary approach, these two indicators warrant further examination. This was done using a regression of the Appearance Items on Satisfaction with System Quality, which found that the variance inflation factors of all the indicators were below the suggested cut-off of 5.0 (Kleinbaum *et al.*, 1988; Stevens, 1996).

Table 5-14 Appearance Indicators – Satisfaction with System Quality Correlations and VIFs

	SQ	AP1	AP2	AP3	AP4	AP5	VIF
SQ	1.00	0.47	0.52	0.40	0.38	0.36	
AP1		1.00	0.70	0.52	0.51	0.51	2.51
AP2			1.00	0.50	0.41	0.48	2.33
AP3				1.00	0.62	0.46	2.14
AP4					1.00	0.36	1.85
AP5						1.00	1.50

Using PLS, a MIMIC models were run to evaluate the quality of the indicators with all five indicators and without each of the correlated indicators AP1 and AP2. Table 5-15 summarizes the results of the three models. It is decided to retain both indicators AP1 and AP2 since the model with all 5 items yielded the highest variance explained (R^2), composite reliability and path beta and the acceptable variance inflation factors. Had the correlation been even higher than it was, then one of the two items would have been likely dropped or the two could have been combined into a single item if their correlation were greater than 0.8 (Stevens, 1996).

Table 5-15 : Appearance – Satisfaction with System Quality Models

	CR	AVE	Path Beta	t-statistic	R^2
All 5	0.877	0.594	0.631	11.71	0.398
No AP1	0.84	0.575	0.627	9.23	0.393
No AP2	0.86	0.612	0.582	9.33	0.339

5.5.3.3 Specific Content

The analysis of the Specific Content construct quality found indicator – Satisfaction with Information Quality correlations ranging between 0.25 and 0.56, as shown in Table 5-16. Additionally, the highest variance inflation factor was 2.01, well

below suggested cut-off of 5.0 (Kleinbaum *et al.*, 1988; Stevens, 1996), suggesting that there is no problem with multicollinearity for this construct.

Table 5-16 : Specific Content – Satisfaction with Information Quality Correlations and VIFs

	IQ	SC1	SC2	SC3	SC4	SC5	VIF
IQ	1.00	0.27	0.45	0.25	0.31	0.45	
SC1		1.00	0.53	0.34	0.41	0.39	1.59
SC2			1.00	0.36	0.40	0.56	2.01
SC3				1.00	0.34	0.25	1.36
SC4					1.00	0.37	1.48
SC5						1.00	1.55

The external validity of these indicators was examined using a MIMIC model with Specific Content as an exogenous construct and Satisfaction with Information Quality as the endogenous construct. The loadings for all of the indicators for Specific Content were found to be significant. Table 5-17 shows that this construct has good composite reliability and average variance extracted, as well as a significant path coefficient on Satisfaction with Information Quality.

Table 5-17 : Specific Content - Information Quality MIMIC Model

CR	AVE	Path Beta	t-statistic	R^2
0.828	0.502	0.541	8.5645	0.298

5.5.3.4 Content Quality

Content Quality indicators and Satisfaction with Information Quality correlations were moderate as seen is Table 5-18. Variance inflation factors for all indicators were below suggested cut-off of 5.0 (Kleinbaum *et al.*, 1988; Stevens, 1996), leaving to the conclusion that multicollinearity is not a problem for Content Quality.

Table 5-18 : Content Quality - Satisfaction with Information Quality Correlations and VIFs

	IQ	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6	VIF
IQ	1.00	0.58	0.60	0.51	0.36	0.35	0.40	
CQ1		1.00	0.63	0.54	0.52	0.41	0.59	2.39
CQ2			1.00	0.49	0.42	0.37	0.58	2.25
CQ3				1.00	0.38	0.64	0.39	2.37
CQ4					1.00	0.28	0.64	1.96
CQ5						1.00	0.39	1.87
CQ6							1.00	2.45

The analysis of the MIMIC model using Content Quality as an exogenous construct and Satisfaction with Information quality showed that all the indicators were significant. Table 5-19 shows that Content Quality has good composite reliability and average variance extracted. The path coefficient and variance explained are found to be higher than that of the MIMIC model for Specific Content, predicting that Content Quality will be more important in the research model.

Table 5-19 : Content Quality - Satisfaction with Information Quality MIMIC Model

CR	AVE	Path Beta	t-statistic	R^2
0.858	0.514	0.705	11.398	0.497

5.5.4 Measurement Model Evaluation

This section examines the validity of the measurement model by first examining the formative constructs and reflective in the model for construct reliability and discriminant validity. The constructs in the research model were evaluated for consistency by performing a bootstrap in PLS Graph using 500 bootstrap resamples. The quality of the formative constructs was evaluated in Section 5.5.3, and Table 5-20 shows

the weights for items in the formative constructs reflecting their relevance or the extent to which the items relate to their underlying construct (Wixom & Watson, 2001).

Table 5-21 shows the indicator and construct reliability for reflective measures, where the loadings represent the extent the items relate to the construct. All the reflective constructs have component reliability are above the recommended level of 0.70 (Nunnally, 1978) suggesting adequate internal consistency. Convergent validity was satisfactory for all reflective measures, as the average variance extracted (AVE) was above the guideline of 0.5 (Fornell & Larcker, 1981) for these constructs.

Table 5-20: Indicator and Construct Reliability (Formative Constructs)

Construct	Item	CR	AVE	Mean	Std.Dev	Weight	t-Stat	Sign. Lev.
Technical Adequacy	TA1	0.79	0.37	4.89	1.35	0.23	2.15	0.034
	TA2			4.55	1.66	0.08	0.69	0.491
	TA3			4.38	1.69	0.34	2.91	0.004
	TA4			4.87	1.32	0.27	2.41	0.017
	TA5			3.92	1.07	0.49	4.37	0.000
	TA6			5.35	1.35	0.03	0.38	0.702
Content Quality	CQ1	0.88	0.57	4.77	1.38	0.26	2.73	0.007
	CQ2			3.83	1.45	0.36	4.34	0.000
	CQ3			4.52	1.53	0.08	0.94	0.350
	CQ4			4.55	1.09	0.18	1.71	0.089
	CQ5			4.69	1.35	0.04	0.59	0.558
	CQ6			4.48	1.23	0.32	3.11	0.002
Specific Content	SC1	0.84	0.52	4.47	1.34	0.26	2.89	0.005
	SC2			4.46	1.37	0.28	2.56	0.011
	SC3			4.18	1.20	0.20	1.78	0.077
	SC4			4.38	1.19	0.07	0.66	0.513
	SC5			4.63	1.43	0.50	4.37	0.000
Appearance	AP1	0.87	0.60	4.36	1.65	-0.04	0.30	0.767
	AP2			4.68	1.61	0.42	2.60	0.010
	AP3			4.89	1.31	0.13	0.76	0.447
	AP4			4.65	1.34	0.33	2.08	0.039
	AP5			4.39	1.15	0.42	2.37	0.019

Table 5-21: Indicator and Construct Reliability (Reflective Constructs)

Construct	Item	CR	AVE	Mean	Std.Dev	Loading	t-Stat	Sign. Lev.
Trust	T1	0.90	0.75	4.23	1.27	0.90	42.87	0.000
	T2			3.88	1.31	0.90	51.02	0.000
	T3			3.38	1.59	0.81	25.89	0.000
Competence	TC1	0.94	0.80	4.22	1.40	0.91	52.85	0.000
	TC2			4.14	1.38	0.91	56.85	0.000
	TC3			4.23	1.49	0.88	40.28	0.000
	TC4			4.49	1.35	0.88	32.09	0.000
Integrity	TI1	0.93	0.77	4.24	1.08	0.89	34.47	0.000
	TI2			4.50	1.26	0.89	37.21	0.000
	TI3			4.15	0.93	0.80	18.51	0.000
	TI4			4.38	1.30	0.92	58.16	0.000
Benevolence	TB1	0.90	0.75	4.09	1.31	0.89	47.68	0.000
	TB2			3.97	1.37	0.81	17.46	0.000
	TB3			3.98	1.28	0.89	37.34	0.000
Satisfaction With Information Quality	IQ1	0.97	0.87	0.45	2.88	0.91	28.82	0.000
	IQ2			0.41	2.76	0.95	99.81	0.000
	IQ3			0.00	3.02	0.93	70.66	0.000
	IQ4			-0.10	2.73	0.94	84.34	0.000
Satisfaction With System Quality	SQ1	0.98	0.93	0.42	2.76	0.96	70.52	0.000
	SQ2			0.40	2.73	0.98	171.11	0.000
	SQ3			0.09	2.87	0.96	112.61	0.000
	SQ4			0.19	2.66	0.97	144.86	0.000
Overall Satisfaction With Website	S1	0.98	0.88	-0.02	2.80	0.96	96.54	0.000
	S2			0.01	2.77	0.97	142.99	0.000
	S3			-0.20	2.84	0.94	90.07	0.000
	S4			-0.25	2.56	0.94	70.93	0.000
	S5			-0.48	3.07	0.93	63.52	0.000
	S6			-0.38	3.25	0.90	41.36	0.000

Table 5-22 lists the correlations between constructs and the square root of the AVE on the diagonal. Satisfactory discriminant validity is found here, as each diagonal elements is greater than the variance shared between that construct and the other constructs in the model (Chin, 1998b).

Table 5-22 : Correlations of Constructs

	Technical Adequacy	Content Quality	Specific Content	Appearance	Information Quality	System Quality	Overall Satisfaction	DIQ	DSQ	Trust	Integrity	Competence	Benevolence
Technical Adequacy	n.a.												
Content Quality	0.70	n.a.											
Specific Content	0.79	0.77	n.a.										
Appearance	0.73	0.64	0.69	n.a.									
Information Quality	0.61	0.64	0.53	0.50	**0.93**								
System Quality	0.62	0.49	0.56	0.59	0.74	**0.97**							
Overall Satisfaction	0.71	0.66	0.66	0.55	0.80	0.80	**0.94**						
DIQ	0.55	0.34	0.49	0.44	0.46	0.59	0.58	**1.00**					
DSQ	0.56	0.48	0.49	0.45	0.60	0.61	0.68	0.78	**1.00**				
Trust	0.47	0.73	0.59	0.40	0.48	0.36	0.50	0.24	0.34	**0.87**			
Integrity	0.53	0.74	0.65	0.48	0.48	0.40	0.53	0.28	0.33	0.86	**0.88**		
Competence	0.70	0.89	0.72	0.64	0.65	0.53	0.70	0.40	0.50	0.71	0.74	**0.89**	
Benevolence	0.60	0.72	0.65	0.50	0.52	0.44	0.59	0.39	0.43	0.83	0.79	0.71	**0.87**

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).

A second, more detailed method of examining discriminant validity is performed to examine how the items in the model correlate to their constructs and on 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 5-23. Here for discriminant validity it is expected for the item loading to be higher than the item-construct correlations. This is the case in most cases here. Exceptions that could threaten discriminant validity are high correlations between Content Quality (CQ) and Competence (TC) items and constructs respectively. In this case there are two reasons alleviating concerns about these correlations: first the Content Quality construct is formative, on which reliability concepts do not relate clearly since the items do not correlate (Diamantopoulos & Winklhofer, 2001). Secondly, cross loadings between dependent and independent constructs are not relevant to construct validity tests since they are expected to correlate (Straub *et al.*, 2004).

Table 5-23 : Item-Construct Correlations and Loadings♦

	SC	CQ	TA	AP	TC	TB	TI	T	IQ	SQ	S
SC1	**0.71**	0.47	0.52	0.45	0.43	0.57	0.48	0.50	0.32	0.36	0.39
SC2	**0.83**	0.59	0.68	0.60	0.53	0.55	0.58	0.49	0.47	0.52	0.54
SC3	**0.58**	0.44	0.43	0.32	0.38	0.45	0.37	0.41	0.27	0.21	0.32
SC4	**0.59**	0.45	0.54	0.46	0.40	0.38	0.38	0.30	0.36	0.35	0.44
SC5	**0.84**	0.70	0.68	0.60	0.69	0.46	0.52	0.44	0.46	0.50	0.61
CQ1	0.69	**0.85**	0.64	0.57	0.81	0.55	0.56	0.54	0.63	0.48	0.66
CQ2	0.63	**0.86**	0.58	0.53	0.76	0.62	0.59	0.62	0.62	0.48	0.62
CQ3	0.55	**0.65**	0.68	0.69	0.62	0.42	0.35	0.34	0.55	0.57	0.57
CQ4	0.58	**0.72**	0.55	0.51	0.60	0.58	0.61	0.63	0.39	0.27	0.43
CQ5	0.46	**0.50**	0.50	0.49	0.44	0.35	0.33	0.24	0.37	0.43	0.45
CQ6	0.62	**0.85**	0.49	0.44	0.75	0.63	0.75	0.69	0.41	0.25	0.41
TA1	0.41	0.34	**0.61**	0.44	0.37	0.30	0.35	0.28	0.40	0.46	0.48
TA2	0.47	0.34	**0.51**	0.61	0.36	0.19	0.18	0.08	0.34	0.50	0.42
TA3	0.64	0.55	**0.75**	0.56	0.57	0.36	0.31	0.24	0.45	0.57	0.60
TA4	0.49	0.49	**0.58**	0.41	0.46	0.40	0.38	0.37	0.31	0.18	0.32
TA5	0.60	0.54	**0.80**	0.53	0.52	0.56	0.43	0.42	0.50	0.44	0.55
TA6	0.24	0.17	**0.27**	0.21	0.15	0.14	0.16	0.14	0.22	0.22	0.20
AP1	0.47	0.46	0.53	**0.74**	0.45	0.36	0.27	0.27	0.40	0.53	0.42
AP2	0.56	0.49	0.62	**0.83**	0.53	0.36	0.34	0.26	0.46	0.59	0.48
AP3	0.47	0.46	0.50	**0.76**	0.47	0.38	0.35	0.34	0.39	0.48	0.38
AP4	0.48	0.52	0.48	**0.73**	0.46	0.39	0.40	0.36	0.39	0.39	0.38
AP5	0.60	0.52	0.62	**0.80**	0.52	0.43	0.40	0.33	0.34	0.41	0.45
TC1	0.63	0.82	0.62	0.55	**0.91**	0.64	0.68	0.63	0.55	0.43	0.60
TC2	0.67	0.80	0.68	0.65	**0.91**	0.65	0.64	0.60	0.62	0.55	0.69
TC3	0.67	0.80	0.63	0.59	**0.88**	0.57	0.61	0.58	0.59	0.51	0.62
TC4	0.59	0.78	0.57	0.49	**0.88**	0.69	0.72	0.73	0.57	0.42	0.59
TB1	0.56	0.65	0.50	0.35	0.62	**0.89**	0.73	0.81	0.41	0.29	0.45
TB2	0.64	0.61	0.61	0.57	0.64	**0.81**	0.61	0.58	0.47	0.48	0.60
TB3	0.51	0.60	0.46	0.39	0.59	**0.89**	0.72	0.75	0.48	0.40	0.50
TI1	0.57	0.67	0.47	0.41	0.64	0.69	**0.89**	0.76	0.36	0.32	0.42
TI2	0.56	0.67	0.44	0.43	0.70	0.70	**0.89**	0.76	0.46	0.36	0.51
TI3	0.48	0.53	0.35	0.35	0.49	0.63	**0.80**	0.66	0.35	0.27	0.32
TI4	0.67	0.72	0.57	0.48	0.74	0.75	**0.92**	0.82	0.50	0.44	0.56
T1	0.57	0.72	0.43	0.39	0.72	0.74	0.86	**0.90**	0.45	0.35	0.46
T2	0.55	0.63	0.46	0.38	0.61	0.81	0.76	**0.90**	0.43	0.33	0.46
T3	0.40	0.51	0.30	0.25	0.49	0.60	0.58	**0.81**	0.38	0.24	0.37
IQ1	0.48	0.64	0.56	0.46	0.64	0.50	0.50	0.48	**0.91**	0.60	0.73
IQ2	0.49	0.63	0.57	0.47	0.64	0.53	0.50	0.51	**0.95**	0.69	0.74
IQ3	0.52	0.57	0.59	0.48	0.59	0.47	0.42	0.44	**0.93**	0.75	0.78
IQ4	0.48	0.55	0.57	0.46	0.54	0.45	0.38	0.38	**0.94**	0.73	0.75
SQ1	0.59	0.52	0.64	0.61	0.55	0.45	0.41	0.37	0.73	**0.96**	0.78
SQ2	0.55	0.49	0.60	0.59	0.54	0.43	0.40	0.36	0.73	**0.98**	0.79
SQ3	0.48	0.42	0.56	0.52	0.48	0.41	0.37	0.34	0.70	**0.96**	0.76
SQ4	0.52	0.45	0.59	0.56	0.48	0.42	0.36	0.32	0.70	**0.97**	0.77
S1	0.63	0.62	0.71	0.55	0.67	0.55	0.50	0.45	0.78	0.79	**0.96**
S2	0.62	0.64	0.70	0.56	0.67	0.56	0.50	0.46	0.79	0.79	**0.97**
S3	0.62	0.59	0.68	0.52	0.63	0.50	0.47	0.43	0.76	0.80	**0.94**
S4	0.58	0.60	0.66	0.51	0.63	0.53	0.47	0.41	0.78	0.77	**0.94**
S5	0.63	0.63	0.66	0.50	0.66	0.57	0.49	0.51	0.72	0.70	**0.93**
S6	0.62	0.64	0.62	0.46	0.67	0.62	0.53	0.55	0.70	0.67	**0.90**

♦ Bold font denotes item loadings, non-bold font denotes item–construct correlations

5.5.4 Structural Model Evaluation

The structural model was evaluated using PLS Graph version 3.00 and is depicted in Figure 5-10. The significance of the path coefficients were estimated using a bootstrap with 500 resamples. Bootstrapping is a nonparametric approach for estimating precision, which creates N samples to obtain N sets of parameter estimates (Chin, 1998b). In contrast to Jackknifing (another resampling procedure), bootstrapping requires more computational time but is more efficient, as Jackknifing is considered an approximation of Bootstrapping (Efron & Tibshirani, 1993).

The structural model shown as Figure 5-10 depicts the testing of the model proposed in section 4. Note that all of the paths between the exogenous constructs (Specific Content, Content Quality, Technical Adequacy and Appearance) and the trust constructs (Competence, Benevolence, and Integrity) were used in the model, but only those that were significant are present in the illustration for readability of the Figure. The numbers along the paths represent path coefficients and the dashed paths indicate non significant paths. 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).

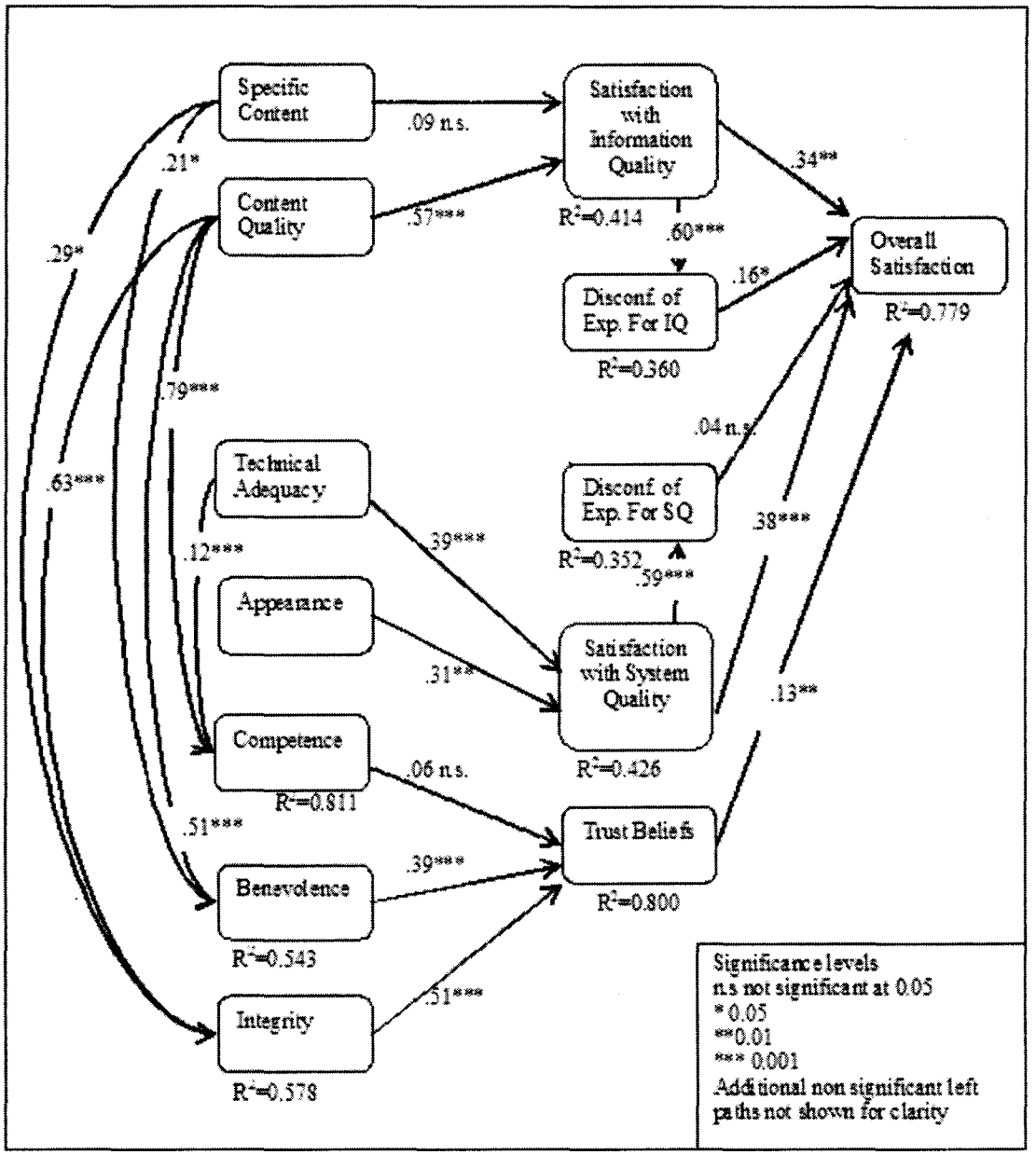

Figure 5-10: Proposed Research Model PLS Results

5.5.4.1 Hypotheses tests

The model in Figure 5-10 graphically represents the testing of the hypothesis proposed in section 4. Table 5-24 shows the individual hypothesis, the path, as well as the path coefficients with standard errors and calculation of significance. Hypotheses in Table 5-24 in bold font that are significant at the 0.05 level support the hypothesized relationships.

Table 5-24 : Support of Hypotheses

Hypothesis	Path	Path Coefficient	Standard Error	t-Statistic	Significance Level	Validation
H1	SC->IQ	0.091	0.112	0.814	0.208	rejected
H2	CQ->IQ	0.571	0.136	4.190	0.000	supported
H3	TA->SQ	0.394	0.108	3.661	0.000	supported
H4	AP->SQ	0.309	0.109	2.840	0.002	supported
H5	TC->T	0.059	0.070	0.838	0.201	rejected
H6	TB->T	0.388	0.099	3.937	0.000	supported
H7	TI->T	0.507	0.096	5.269	0.000	supported
H8	IQ->S	0.344	0.130	2.648	0.004	supported
H9	SQ->S	0.380	0.118	3.215	0.001	supported
H10	T->S	0.132	0.053	2.503	0.006	supported
H11	IQ->DIQ	0.600	0.062	9.654	0.000	supported
H12	SQ->DSQ	0.594	0.078	7.625	0.000	supported
H13	DIQ->S	0.164	0.089	1.852	0.032	supported
H14	DSQ->S	0.035	0.069	0.510	0.305	rejected
H15A	SC->TC	-0.031	0.076	0.410	0.341	rejected
H15B	SC->TB	0.213	0.124	1.723	0.043	supported
H15C	SC->TI	0.297	0.131	2.275	0.012	supported
H16A	CQ->TC	0.792	0.071	11.138	0.000	supported
H16B	CQ->TB	0.507	0.100	5.078	0.000	supported
H16C	CQ->TI	0.627	0.098	6.412	0.000	supported
H17A	TA->TC	0.123	0.068	11.138	0.000	supported
H17B	TA->TB	0.119	0.118	1.005	0.158	rejected
H17C	TA->TI	-0.127	0.164	0.776	0.219	rejected
H18A	AP->TC	0.061	0.063	0.963	0.168	rejected
H18B	AP->TB	-0.060	0.093	0.644	0.260	rejected
H18C	AP->TI	-0.033	0.109	0.302	0.382	rejected

5.6 Simplified Model

The purpose of the proposed model in Figure 5-10 was to examine relationships suggested by the literature on consumer satisfaction with HIR, as discussed in Chapter 3. As seen in the Figure and Table 5-24, not all the hypothesized relationships were supported in this empirical study. Notable non-significant relationships are those between Competence and Trust Beliefs as well as between Disconfirmation of Expectations for System Quality and Overall Satisfaction. Full discussion of these findings will take place in Chapter 6.

As suggested in section 3.5.6, not all the expected relationships between exogenous constructs (SC, CQ, TA, AP) and dimensions for Trust Beliefs (TC, TB, TI) were expected to be significant. An alternative way of modelling the relationships between these exogenous constructs and trust beliefs is to omit the Trust Belief dimensions Competence, Integrity and Benevolence. Jarvenpaa et al. (2000) measured Trust Beliefs directly in this manner. The Simplified Model, shown in Figure 5-11, contains all the originally proposed relationships and constructs, except the Disconfirmation constructs and the Trust Beliefs components. The three Trust Belief dimensions (Competence, Integrity and Benevolence) were dropped in the simplified model as was proposed as a possibility in section 3.5.6. This turned out to be a good decision due to the multicollinearity identified between the three Trust Belief dimensions. This is discussed in more detail in section 6.1.3. Disconfirmation constructs were dropped because of the non-significance of disconfirmation of expectations of system

quality and the relatively small path coefficient for disconfirmation of expectations of information quality on overall satisfaction. Modeling Satisfaction with Information Quality and Satisfaction with System Quality without using Disconfirmation of Expectations has been successfully done by Wixom & Todd (2005). The new model is shown as Figure 5-11.

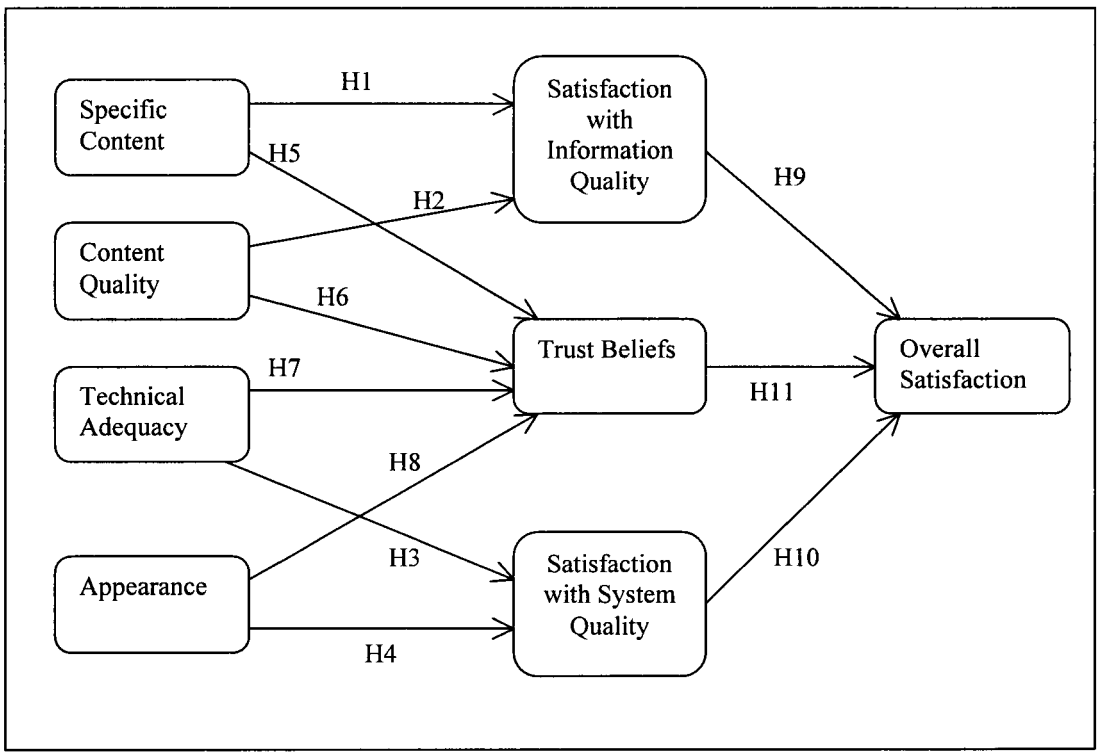

Figure 5-11 : Proposed Simplified Model for Consumer Satisfaction in HIR

The model shown in Figure 5-11 contains hypotheses similar to the hypotheses discussed in section 3.5. H5, H6, H7, H8 are the only new hypotheses in this model, and as discussed in section 3.5.6, Trust Beliefs are expected to be influenced by the Website's

features, as it was found that Website features (e.g. specific content, content quality, technical adequacy, appearance) can lead to either trust or mistrust (Sillence *et al.*, 2004). The hypotheses in the Simplified Model for Consumer Satisfaction in HIR are shown below:

H_1: A higher level of perceived specific content leads to a higher level of satisfaction with information quality

H_2: A higher level of perceived content quality leads to a higher level of satisfaction with information quality

H_3: A higher level of perceived technical adequacy leads to a higher level of satisfaction with system quality

H_4: A higher level of perceived appearance leads to a higher level of satisfaction with system quality

H_5: A higher level of perceived specific content leads to a higher level of trust beliefs

H_6: A higher level of perceived content quality leads to a higher level of trust beliefs

H_7: A higher level of perceived technical adequacy leads to a higher level of trust beliefs

H_8: A higher level of perceived appearance leads to a higher level of trust beliefs

H_9: A higher level of satisfaction with information quality leads to a higher level of overall satisfaction

H_{10}: A higher level of satisfaction with system quality leads to a higher level of overall satisfaction

H_{11}: A higher level of trust beliefs leads to a higher level of overall satisfaction

Just as in section 5.5.4, the measurement model was re-evaluated. Table 5-25 shows the indicator and construct reliabilities for reflective constructs and weights of indicators for formative constructs. Here it is shown that 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).

Table 5-25 : Indicator and Construct Reliability for the Simplified Model

Construct	Item	CR	AVE	Mean	Std.Dev	Weight	t-Stat	Sign. Lev.
Technical Adequacy	TA1	0.78	0.38	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	0.55	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	0.52	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	0.62	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
Construct	**Item**	**CR**	**AVE**	**Mean**	**Std.Dev**	**Loading**	**t-Stat**	**Sign. Lev.**
Trust Beliefs	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 With Information Quality	IQ1	0.97	0.87	0.45	2.88	0.91	28.87	0.000
	IQ2			0.41	2.76	0.98	100.71	0.000
	IQ3			0.00	3.02	0.96	66.46	0.000
	IQ4			-0.10	2.73	0.97	83.66	0.000
Satisfaction With System Quality	SQ1	0.98	0.93	0.42	2.76	0.96	70.60	0.000
	SQ2			0.40	2.73	0.98	169.59	0.000
	SQ3			0.09	2.87	0.96	112.13	0.000
	SQ4			0.19	2.66	0.97	159.04	0.000
Overall Satisfaction With Website	S1	0.98	0.88	-0.02	2.80	0.96	95.97	0.000
	S2			0.01	2.77	0.97	134.53	0.000
	S3			-0.20	2.84	0.94	91.45	0.000
	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

5.6.1 Discriminant Validity of the Simplified Model

The correlation matrix and square root of the average variances extracted on the diagonal elements is shown in Table 5-26, showing adequate discriminant validity for the simplified model. Note that the correlations between constructs and average variances extracted are identical as those displayed for the full model in Table 5-22. In Table 5-26 there are no threats to discriminant validity, since the problematic construct Competence is not present in this model.

Table 5-26 : Simplified Model 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**

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 5-27 shows the item to construct correlations following the methodology recommended by Gefen and Straub (2005). This discriminant validity assessment shows that the item loadings for all reflective constructs are greater than the construct's correlations with other items. As discussed in section 5.5.4, 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 5-27: Simple Model Item - Construct Correlations

Item	Technical Adequacy	Content Quality	Specific Content	Appearance	Trust Beliefs	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, non-bold font denotes item-construct correlations

Figure 5-12 shows all the path coefficients and variance explained in the Simplified Model for consumer satisfaction in HIR. This model provides more than adequate predictive power using five fewer constructs than the originally proposed model of Figure 5-10, without the issues of multicollinearity in the Trust Beliefs dimensions Competence, Integrity and Benevolence. This streamlined model is depicted below:

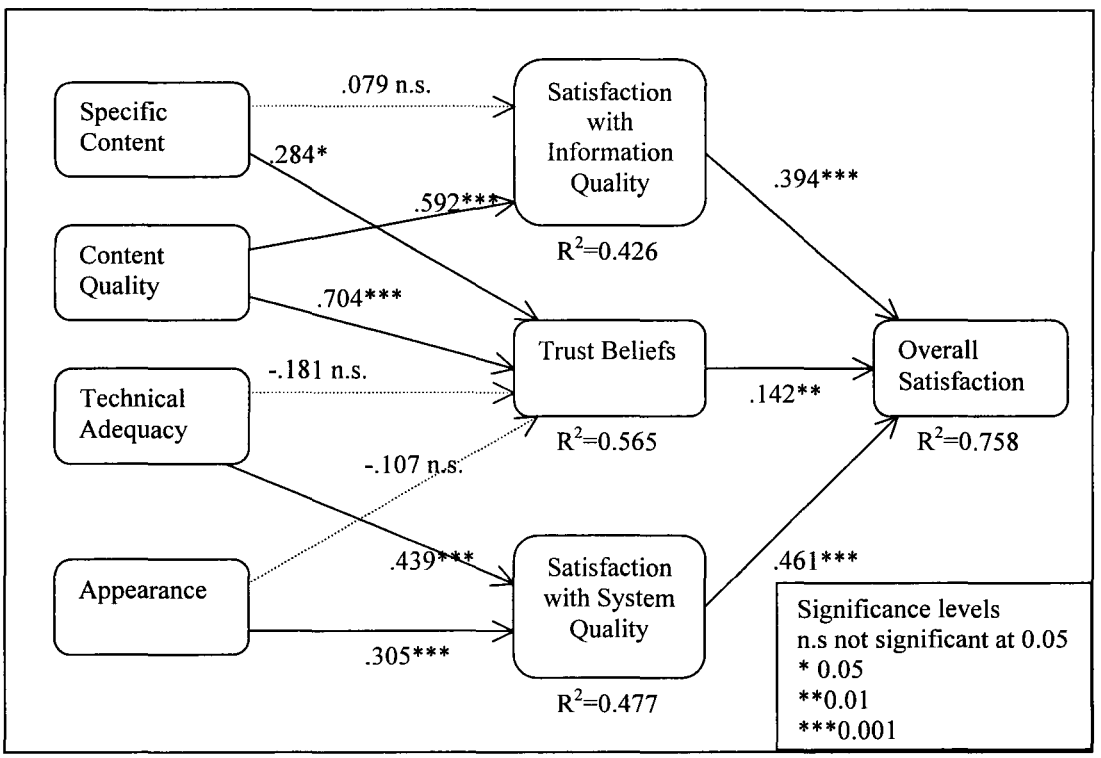

Figure 5-12 : Simplified Model for Consumer Satisfaction in HIR

Note that the overall R^2 of Overall Satisfaction decreased from 0.779 to 0.758, and the R^2 for Trust Beliefs decreased from 0.800 to 0.565 from dropping the Disconfirmation measures and Trust Belief components. Paths from the exogenous

constructs are now directly modeled onto Trust Beliefs in the simplified model, and just as in the full model system quality dimensions (Technical Adequacy, Appearance) do not significantly explain variance in Trust Beliefs. Despite this Specific Content and Content Quality explain 56% of the variance in Trust Beliefs.

5.6.2 Hypotheses Tests for the Simplified Model

The proposed relationships between the constructs in the simplified model were tested as hypotheses using a two tailed t-test at a significance level of 0.05. Table 5-28 itemizes these hypotheses, the corresponding path coefficient and their level of significance. Paths found not to be significant in the simplified model are Specific Content to Satisfaction with Information Quality, and Technical Adequacy and Appearance to Trust.

Table 5-28 : Simplified Hypothesis Tests

Hypothesis	Path	Path Coefficient	Standard Error	t-Statistic	Significance Level	Validation
H1	SC->IQ	0.079	0.112	0.706	0.240	rejected
H2	CQ->IQ	0.592	0.132	4.475	0.000	supported
H3	TA->SQ	0.439	0.093	4.708	0.000	supported
H4	AP->SQ	0.305	0.084	3.622	0.000	supported
H5	SC->T	0.284	0.129	2.207	0.014	supported
H6	CQ->T	0.704	0.096	7.316	0.000	supported
H7	TA->T	-0.181	0.157	1.154	0.125	rejected
H8	AP->T	-0.107	0.109	0.985	0.163	rejected
H9	IQ->S	0.394	0.121	3.265	0.001	supported
H10	SQ->S	0.461	0.106	4.369	0.000	supported
H11	T->S	0.142	0.058	2.444	0.007	supported

The validity and predictive power of the simplified model suggests that it is useful in explaining consumer satisfaction with health information retrieval. The overall predictive power is roughly equivalent to that of the originally proposed model. The simplified model contains fewer insignificant and weak paths than the original model, and does not have to contend with issues of multicollinearity as the original model did. Therefore, the simplified model will be adopted for further analysis. The following sections will explore the effect sizes and the impact of control variables. The findings of the following analyses would likely be identical if we were to use the originally proposed research model instead of the simplified model as the core relationships are unchanged in the two models.

5.6.3 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, 1998b). 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 Table 5-29.

Table 5-29 : Effect Sizes

Overall Satisfaction		**IQ**	**SQ**	**T**	
	R^2 excluded	0.696	0.662	0.743	
	f^2	0.256	0.397	0.062	
(R^2=0.758)	Effect	medium	large	small	
Trust Beliefs		**CQ**	**SC**	**TA**	**AP**
	R^2 excluded	0.364	0.541	0.555	0.561
	f^2	0.462	0.055	0.023	0.009
(R^2=0.565)	Effect	large	small	na	na
Satisfaction with Information Quality		**CQ**	**SC**		
	R^2 excluded	0.271	0.423		
	f^2	0.270	0.005		
(R^2=0.426)	Effect	medium	na		
Satisfaction with System Quality				**TA**	**AP**
	R^2 excluded			0.384	0.432
	f^2			0.178	0.086
(R^2=0.477)	Effect			medium	small

The effect sizes in Table 5-29 show that the dominant paths which explain the most variance in the simplified model illustrated in Figure 5-13 below. Here it can be seen that the dominant paths emanate first from Content Quality, going to Satisfaction with Information Quality and Trust Beliefs to Overall Satisfaction. The second dominant path begins with Technical Adequacy through Satisfaction with System Quality to Overall Satisfaction.

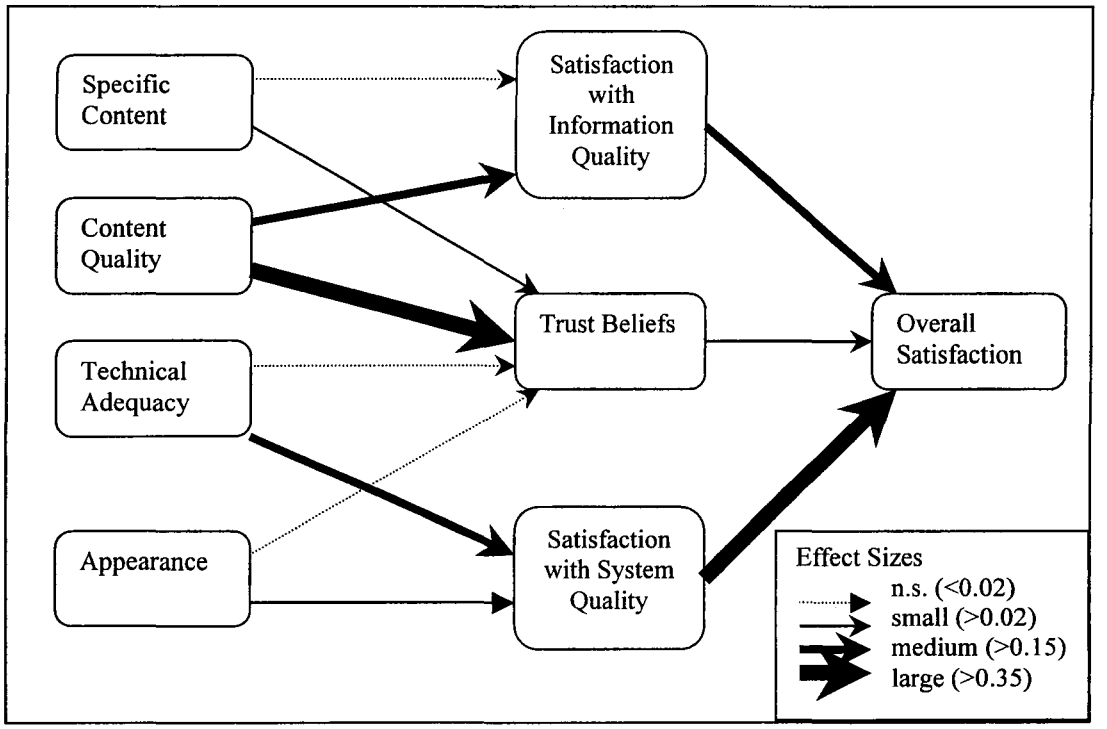

Figure 5-13: Effect Sizes for the Simplified Model

5.6.4 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 simplified model. The variables tested in these models were the control variables discussed in section 5.4, as well as the demographic variables. The impact of control variables was examined on the simplified model of Figure 5-12 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. Table 5-30 summarizes the changes in R^2 for each control variable.

Table 5-30 : Impact of Control Variables on R^2

Control variables	IQ	SQ	T	S
Uncontrolled Model	**0.43**	**0.48**	**0.57**	**0.76**
Age	0.43	0.49	0.57	0.76
Education	0.44	0.48	0.57	0.76
Looked up Health Information	0.43	0.50	0.57	0.76
Internet Use	0.43	0.48	0.57	0.76
Confidence	0.43	0.48	0.57	0.76
Knowledge	0.43	0.49	0.57	0.76
Involvement	0.43	0.49	0.57	0.77
Gender	0.43	0.48	0.56	0.76
Found Answer	0.51	0.49	0.52	0.76
Scenario	0.44	0.49	0.58	0.76

The impact of control variables is shown to be marginal in most cases in Table 5-30, except when the control variable was whether subjects found an answer or not. A further examination of the control variables was 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. Table 5-31 presents the path coefficients and path coefficients' significance levels of control variables.

Table 5-31 : Impact of Control Variables on Model Constructs

		TA	CQ	SC	AP	IQ	SQ	S	T
Age	Beta	0.11	0.05	0.08	0.13	-0.01	-0.01	-0.03	0.03
	T-Stat.	0.85	0.50	0.76	1.04	0.21	0.09	0.61	0.48
	Sig. Lev	0.198	0.308	0.225	0.150	0.418	0.464	0.270	0.317
Education	Beta	0.01	0.04	-0.04	0.00	0.10	0.07	0.04	-0.02
	T-Stat.	0.13	0.47	0.47	0.01	1.51	1.03	1.01	0.30
	Sig. Lev	0.449	0.321	0.320	0.496	0.066	0.152	0.157	0.381
Looked up Health Information	Beta	-0.07	-0.01	-0.13	-0.09	-0.07	***-0.14***	-0.07	-0.06
	T-Stat.	0.54	0.13	1.48	0.82	0.96	***2.20***	1.35	0.94
	Sig. Lev	0.293	0.448	0.070	0.205	0.168	***0.014***	0.089	0.175
Internet Use	Beta	-0.03	0.09	-0.06	-0.01	0.06	-0.07	0.01	-0.09
	T-Stat.	0.25	1.05	0.60	0.06	0.96	1.15	0.39	1.59
	Sig. Lev	0.401	0.148	0.274	0.477	0.170	0.125	0.349	0.057
Confidence	Beta	0.02	-0.02	0.01	0.00	0.02	-0.07	***-0.08***	-0.05
	T-Stat.	0.13	0.18	0.11	0.03	0.38	1.14	***2.32***	0.81
	Sig. Lev	0.448	0.428	0.455	0.488	0.350	0.128	***0.010***	0.208
Knowledge	Beta	0.06	0.09	0.11	0.05	-0.05	-0.12	-0.01	-0.05
	T-Stat.	0.45	0.85	0.92	0.37	0.58	1.61	0.18	0.86
	Sig. Lev	0.326	0.199	0.178	0.356	0.280	0.054	0.429	0.195
Involvement	Beta	0.07	0.14	0.15	-0.01	-0.12	-0.01	***0.10***	-0.01
	T-Stat.	0.57	1.24	1.59	0.04	1.52	1.57	***1.98***	0.23
	Sig. Lev	0.285	0.108	0.056	0.483	0.065	0.059	***0.024***	0.410
Gender	Beta	0.18	0.08	0.09	0.05	-0.06	-0.06	-0.01	0.00
	T-Stat.	1.58	0.64	0.77	0.50	1.18	1.07	0.20	0.02
	Sig. Lev	0.057	0.260	0.221	0.308	0.119	0.142	0.423	0.494
Found Answer	Beta	***-0.37***	***-0.44***	***-0.31***	***-0.32***	***-0.23***	-0.09	-0.07	***0.17***
	T-Stat.	***4.64***	***4.54***	***3.28***	***3.59***	***2.30***	1.22	0.95	***2.12***
	Sig. Lev	***0.000***	***0.000***	***0.001***	***0.000***	***0.011***	0.111	0.172	***0.017***
Scenario	Beta	0.03	0.11	0.09	***-0.20***	***-0.13***	-0.07	-0.01	***0.13***
	T-Stat.	0.23	1.11	0.91	***1.80***	***2.01***	1.11	0.15	***2.08***
	Sig. Lev	0.410	0.133	0.182	***0.036***	***0.023***	0.134	0.440	***0.019***

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, participants who were more involved in the health scenario tended to rate Overall Satisfaction higher, and participants who did not find an

answer tended to rate all of the exogenous constructs lower and trust higher than participants that did find an answer, which is to be expected.

5.6.5 Saturated Model

A saturated model was tested to examine the possibility of additional relationships not included in the simplified model of Figure 5-11. 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 Beliefs to Satisfaction with System Quality, and Satisfaction with Information Quality as well as Satisfaction with System Quality to Satisfaction with Information Quality were added. Table 5-32 summarizes the Simple Model and Saturated Model path coefficients, their significance levels and the R^2 of the constructs in each model.

Table 5-32 : Saturated Model Differences

		Non-Saturated Model				Saturated Model				
Hypothesis	Path	β	t-stat.	Sig. Lev.	Validation	β	t-stat.	Sig. Lev.	Validation	Δ-β
H1	SC->IQ	0.08	0.71	0.240	rejected	-0.17	1.66	0.049	supported	-0.25
H2	CQ->IQ	0.59	4.47	0.000	supported	0.46	3.80	0.000	supported	-0.13
H3	TA->SQ	0.44	4.71	0.000	supported	0.37	3.36	0.000	supported	-0.07
H4	AP->SQ	0.31	3.62	0.000	supported	0.25	2.57	0.005	supported	-0.05
H5	SC->T	0.28	2.21	0.014	supported	0.37	2.73	0.003	supported	0.08
H6	CQ->T	0.70	7.32	0.000	supported	0.60	4.58	0.000	supported	-0.10
H7	TA->T	-0.18	1.15	0.125	rejected	-0.20	1.22	0.112	rejected	-0.01
H8	AP->T	-0.11	0.98	0.163	rejected	-0.14	1.16	0.124	rejected	-0.03
H9	IQ->S	0.39	3.27	0.001	supported	0.28	2.07	0.019	supported	-0.12
H10	SQ->S	0.46	4.37	0.000	supported	0.41	3.69	0.000	supported	-0.05
H11	T->S	0.14	2.44	0.007	supported	0.03	0.52	0.303	rejected	-0.12
New Paths	SC->SQ					0.01	0.10	0.460	rejected	
	CQ->SQ					0.11	0.78	0.218	rejected	
	TA->IQ					0.12	1.14	0.127	rejected	
	AP->IQ					-0.16	1.38	0.084	rejected	
	SC->S					0.11	1.83	0.034	supported	
	CQ->S					0.19	2.02	0.022	supported	
	TA->S					0.19	2.21	0.014	supported	
	AP->S					-0.20	2.38	0.009	supported	
	T->IQ					0.09	1.29	0.098	rejected	
	T->SQ					0.02	0.24	0.407	rejected	
	SQ->IQ					0.56	6.14	0.000	supported	
R^2		IQ	SQ	T	S	IQ	SQ	T	S	
		0.426	0.477	0.565	0.758	0.681	0.477	0.457	0.808	

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. While these additional relationships are significant, their path coefficients are small, and one is even negative (Appearance). The path coefficient from Specific Content to Satisfaction with Information Quality changed from insignificant to significant and negative in the Saturated Model, while the path coefficient from Trust Beliefs to Overall Satisfaction became insignificant. Finally, two additional relationships were found to be significant in the saturated model, specific content on Satisfaction with

System Quality and Satisfaction with System Quality on Satisfaction with Information Quality. These changes in betas and significance can all be explained by the new positions of the constructs in the nomological network (Chin *et al.*, 2003).

The only new relationship which is theoretically plausible is the one between Satisfaction with System Quality to Satisfaction with Information Quality. 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 artefact 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 Simplified Model (Fig. 5-11), and it is argued that they should not to be included in the Model.

5.7 Disconfirmation of Expectations

Recall that the Disconfirmation of Expectations is calculated as the product of the difference (SD) and the effect (e) indicating the respective level of disappointment to delight (as in section 3.1). While the paths from the disconfirmation constructs to Overall Satisfaction were weak in the analysis of the research model shown in Figure 5-10, it is useful to examine these constructs in more detail in an effort to understand what items contributed to different levels of Disconfirmation of Expectations for both Satisfaction with Information Quality and System Quality by examining the means of exogenous construct items. The dataset was divided into three groups, with negative DIQ levels indicating disappointment, DIQ = 0 indicating satisfaction, and positive DIQ levels representing delight, as participants' impression of Information Quality exceeded expectations. Means of each of the items making up the constructs Content Quality and Specific Content were then calculated for the three groups to show the differences as seen in Table 5-33.

The same characterization was completed for Disconfirmation of Expectations of Satisfaction with System Quality (DSQ), which is seen as Table 5-34.

Table 5-33 : Means for Different levels of Disconfirmation of Satisfaction with Information Quality

DIQ	N	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6	SC1	SC2	SC3	SC4	SC5
Disappointed	47	4.09	3.04	3.70	4.26	4.13	4.19	4.23	3.94	4.00	4.13	3.87
Satisfied	66	5.02	4.08	4.82	4.71	4.86	4.55	4.38	4.56	4.09	4.39	4.88
Delighted	28	5.36	4.57	5.18	4.64	5.21	4.79	5.07	5.11	4.68	4.75	5.32
Total	141	4.77	3.83	4.52	4.55	4.69	4.48	4.47	4.46	4.18	4.38	4.63

Table 5-34 : Means for Different levels of Disconfirmation of Satisfaction with System Quality

DSQ	N	TA1	TA2	TA3	TA4	TA5	TA6	AP1	AP2	AP3	AP4	AP5
Disappointed	48	4.29	3.77	3.52	4.63	3.46	5.10	3.58	3.69	4.52	4.44	4.02
Satisfied	63	5.10	4.83	4.73	4.86	4.05	5.44	4.67	5.14	4.94	4.59	4.52
Delighted	30	5.43	5.20	5.03	5.27	4.40	5.57	4.97	5.30	5.40	5.13	4.70
Total	141	4.89	4.55	4.38	4.87	3.92	5.35	4.36	4.68	4.89	4.65	4.39

Correlations between Disconfirmation constructs and items were computed and are illustrated in Table 5-35 and 5-36. Since levels of Disconfirmation are dependent on levels of Performance or in this case Satisfaction with Information Quality and System Quality (as in Figure 3-1), it is useful to examine the partial correlations between Disconfirmation and items excluding the effects of SIQ and SDQ respectively. In Table 5-33 it can be seen that the items CQ1 (useful), CQ3 (clear), CQ5 (concise), SC2 (general information) and SC5 (help information) had partial correlations with DIQ at a 0.05 level and CQ2 (complete) at a 0.1 level.

Table 5-34 shows that the partial correlations between DSQ and TA4 (valid links), TA5 (personalization), and AP5 (proper use of multimedia) were significant at a 0.05 level and TA3 (adequate search facilities) at a 0.1 level.

Table 5-35 : Full and Partial Correlations between items and DIQ

	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6	SC1	SC2	SC3	SC4	SC5
DIQ	0.35	0.40	0.37	0.15	0.30	0.18	0.21	0.31	0.19	0.18	0.38
Partial	0.18	0.17	0.24	0.11	0.19	0.00	0.08	0.18	0.03	0.06	0.28
Sig.	0.032	0.051	0.005	0.220	0.029	0.976	0.353	0.037	0.711	0.521	0.001

Table 5-36 : Full and Partial Correlations between items and DSQ

	TA1	TA2	TA3	TA4	TA5	TA6	AP1	AP2	AP3	AP4	AP5
DSQ	0.36	0.39	0.45	0.25	0.42	0.09	0.38	0.44	0.27	0.23	0.37
Partial	0.12	0.12	0.16	0.19	0.23	-0.06	0.09	0.10	-0.03	-0.01	0.17
Sig.	0.154	0.177	0.070	0.028	0.008	0.457	0.282	0.233	0.760	0.936	0.043

The analysis of the construct items' partial correlations on the disconfirmation constructs show which specific dimensions of system quality and information quality has a significant impact on weather or not participants in the study were dissatisfied, satisfied or disappointed. The implications of these findings will be discussed in more detail in Chapter 6.

5.8 Analysis of Open Ended Questions

The instrument used in this research utilized three open ended questions to collect additional insights on the impressions and opinions of subjects during the experiment. These questions were: "Please describe what you most liked about WEBSITE", Please describe what you disliked about WEBSITE", and "How could WEBSITE be improved?" Note that the word WEBSITE was replaced with the appropriate Website name in these questions. The responses to the questions were examined and are summarized in the following subsections for each of the eight Websites. A summary of comments relating to the research constructs is provided in section 5.8.9. Note that all 170 subjects' responses were examined here instead of the reduced dataset after the removal of outliers. Examples of comments are shown in italics in the following subsections.

5.8.1 Healthbulletin – Asthma Treatment

Based on the open ended comments, subjects generally disliked this Website. Many could not find the answer to the study question and were plagued with difficulties navigating the site due to poor search engine functionality and broken links (e.g. : *the content was horribly organized,* and : *Not very user friendly at all).* Positive comments about this site were that pages loaded quickly and that the alphabetical index was useful. The content of this site was critiqued that it was lacking and trying to promote a book instead of providing any real information (e.g.: *provide real information; not just sales pitches*). Many stated that the site could be improved by providing more information (e.g.: *Include more general information on each topic instead of a few irrelevant articles)*

5.8.2 DrWeil – Phentermine Treatment

Most participants in this treatment commented on the search functionality, the design, layout, colours and the pictures used (e.g.: *looked pretty,* and: *good pictures,* and: *Pleasing Website design – nice colours and clean layout,* and: *imprecise search tool,* and: *easy to find the info I was looking for).* Most subjects found the site easy to use because of concise information and good search functionality. Some subjects were delighted with the site while others were concerned with credibility and reliability of the Website (e.g.: *I have watched and read books on Dr. Weil. I find it very informative,* and: *I felt nervous that it wasn't a legitimate MD*). Comments for improvement of this site suggested that it should not try to sell products and should be dis-associated from Dr. Weil and provide

more objective information instead of opinions (e.g.: *Less focus on Dr. Weil and his foundation; more on the medical information).*

5.8.3 Pillstore – Phentermine Treatment

Subjects agreed that this Website was easy to navigate and find concise, specific information on drugs (e.g.: *Information was easy to obtain*). The layout of the site was described as attractive, professional, rather ugly or too busy (e.g.: *very easy to navigate*, and : *I though that the Website was rather ugly*). Some commented that they found links that did not work, and many commented that they could not accept advice from a site which had the objective of selling drugs (e.g.: *About Us and Contact Us links lead to blank pages,* and : *Wasn't sure the information was completely accurate as they were definitely trying to make a sale of the product*). Suggestions for improvement included relocating the search box, linking to MDs comments and not trying to sell the drug before providing information, i.e. drug ordering should be placed at the bottom of pages.

5.8.4 Medicinenet – Phentermine Treatment

Several comments were made about this Website's organization. Participants generally liked the navigation through the use of A-Z index, tabs and searching (e.g.: *Easy to use*, and *: I liked the organization using tabs*). The colors used did not agree with some users, and others felt the site layout felt crowded and that it provided too much information (e.g.: *too much text per page*, and : *not fond of pastel*, and: *the spreadout of the webpage should be more attractive*). Advertisements on the Website were seen as a

nuisance, especially when animated (e.g.: *don't like the ads that have animation, very distracting*).

5.8.5 DrKoop – Asthma Treatment

The subjects in this treatment group commented that the site felt cluttered, and many of the ads could be mistaken for content (e.g.: *site looks cluttered*, and: *too many ads*). People did not like having the search engine provide advertisements which looked like search engine results. The breadth of this Website was appreciated by a few participants (e.g.: *lots of information*, and: *wide range of topics*). The general feeling towards this Website was that it contained a lot of useful information if one could distinguish it from all the advertsisements. Suggestions for improving this site were to make it clear where you were, have a clearer way of identifying the advertisements and move the ads to the periphery of the page instead in the middle of the contents (e.g.: *a redesign. Advertising could be handled in a more subtle manner*, and: *fewer ads that could be mistaken for content*).

5.8.6 CanadadianHealthNetwork – Phentermine Treatment

Participants in this group generally liked the variety of information on this site and the fact that it was a national Canadian site (e.g.: *variety of information and sources,* and: *lots of info)*. The colors and organization were appreciated by participants (e.g.: *I liked the visual appeal*). Problems encountered with this site were that the navigation did

not seem intuitive and that the search engine did not provide any results relating to Phentermine (e.g.: *search tool is limiting. Was frustrated when my search turned up on results...many dead ends)*. Most suggestions were not surprisingly related to better search engine design and improved indexing of contents.

5.8.7 Lung.ca – Asthma Treatment

This Website was well received by participants, many of whom liked the national scope of the site, the ease of navigation and layout (e.g.: *pages are laid out well, not too much information on one page, easy to move around, can find more details easily*) . Some commented that they liked the fast links and the easy identification of links. Negative perceptions of the site were generally around the clarity of information, some were unsure if asthma symptoms were specific to children or adults in the results they found (e.g.: *information was not as detailed and specific as I would have liked*). Suggestions for improvement of this site were to add dates to the content, add flash demos of the respiratory system, adding links to research groups and make the information more detailed.

5.8.8 MayoClinic Asthma Treatment

Subjects liked the appearance and layout of this Website, as well as its search engine (e.g.: *layout was pleasing to look at*, and: *the appearance was nice,* and: *I liked the search engine*). Some liked the speed of the Website, while others commented that it

was too slow. The most frequent negative comment about this site was that the homepage contained too much information and looked too cluttered (e.g.: *maybe too much info on home page*, and: *A bit too many things to link to / look at on each page*). Suggestions for improvement were around this theme as well, such as streamlining content revamping visuals and presenting smaller pieces of information.

5.8.9 Summary of Comments Related to Research Constructs

When participants took the time to enter open ended comments to the optional questions, these were reflections of what they deemed important enough to want to share their thoughts. While open ended comments provide only anecdotal evidence of what issues were important to subjects in the experiment, they can lend support to the quantitative finding in this research and are therefore tallied as they related to the items for the constructs in the research model. Additionally comments about advertisements were also counted, as they were relatively frequent. Table 5-37 summarizes the numbers of comments for Technical Adequacy (TA), Appearance (AP), Specific Content (SC), Content Quality (CQ), Trust Beliefs (T) and Advertisements (ADS). Both positive and negative comments were coded by which constructs they related to in Table 5-37. Coding did not distinguish between positive and negative comments, because levels of constructs have already been captured by the survey instrument and were discussed in Section 5.5.2, and the purpose of this coding is to compare the relative importance of constructs.

Table 5-37 : Construct Related Open Ended Comments

Treatment	TA	AP	SC	CQ	T	ADS
Healthbulletin - Asthma	13	7	2	11	4	3
DrWeil - Phentermine	21	10	1	8	3	3
Pillstore - Phentermine	16	10	2	11	4	6
Medicinenet - Phentermine	22	14	0	14	2	7
DrKoop - Asthma	17	11	1	13	3	10
Canhealthnetwork - Phentermine	29	11	2	11	1	0
Lung.ca - Asthma	22	6	2	11	0	0
Mayoclinic - Asthma	32	14	0	14	1	2
Total	172	83	10	93	18	31
% of Coded Comments	42%	20%	2%	23%	4%	8%

Interestingly the most frequent comments were Technical Adequacy- related (42%). Appearance-related (20%) and Content Quality-related (23%) comments were also frequent. Specific Content-related (2%) and Trust-related (4%) comments were less frequent combined than comments that were advertising-related (8%). The low frequencies of Specific Content and Trust-related comments correspond to the relatively low path coefficients for these constructs in the research model of Figure 5-12.

5.8.10 Summary of Open Ended Question Analysis

The responses to the open ended questions provided additional insights about how participants felt about the Websites used in the study. The suggestions and concerns stated by the respondents showed subjects' general impressions of what are important characteristics for health information websites. The frequent negative comments about advertising, suggest that future research should examine the impact of advertising on health information websites in more detail. The relative frequencies of comments related

to the exogenous constructs provided support for the relative path sizes found in the research model.

5.9 Summary of Data Analysis and Results

This Chapter described the analysis preformed on the data collected by the online experiment. The result of the analysis performed here is used in the following chapter to answer the research questions in this dissertation, and provide recommendations to academics and practitioners.

Chapter 6 : Discussion and Conclusions

The findings of this research are discussed in this Chapter. The first section of this Chapter provides answers to the four research questions from section 1.1, based on the results of the quantitative analysis and open ended questions. The theoretical and practical contributions of this research are then elaborated upon, and some recommendations are provided. The strengths and weaknesses of this research are then discussed, followed by directions for future research based on this dissertation. Finally the conclusions are presented.

6.1 Answers to Research Questions

6.1.1 Factors Contributing to Consumer Information Satisfaction

Q1: What factors contribute to consumer satisfaction with HIR?

The effects of several factors on satisfaction with online health information were investigated in this research. From the analysis of the open ended questions, it seemed that Technical Adequacy, Content Quality and Appearance were most important to the participants in the experiment. This mirrors the results of the quantitative analysis. The Simplified model presented in Figure 5-12 showed that the factors explaining the most variance in Overall Satisfaction were Content Quality and Technical Adequacy. Content Quality and Technical adequacy were also the dominant paths in the model in Figure 5-13. Appearance has a small effect on Satisfaction with System Quality, which in turn had

a large effect on Overall Satisfaction. The importance of Specific Content was smallest in both the qualitative and quantitative results.

These findings indicate that consumers' satisfaction with health information Websites can be best predicted based on the perceived quality of the information on the Website and the perceived technical adequacy of the Website. The Appearance of the Website plays a minor role in predicting satisfaction, and specific content, such as privacy policies, and contact information is the least important to predicting satisfaction with health information Websites. While the role of specific content in both the analysis of the structural model and the open ended comments was relatively small, it did lead towards explaining some of the trust beliefs respondents had towards the Websites in the experiment. This provides evidence that it is important for Websites to provide specific content to provide their visitors with an impression about their trustworthiness.

6.1.2 Quality in Health Information Websites

Q2: How can quality be evaluated for health information Websites from the consumer's perspective?

The discussion on Quality for health information Websites in section 2.2 reviewed how the quality of health information Websites *should* be evaluated by consumers. These dimensions were mostly checklist type quality criteria, and not items for constructs, such as authorship, attribution and disclosure. The research model developed in this thesis operationalised the criteria from these quality guidelines in the Information and System

Quality framework in section 3.3. The models in this research found that both Satisfaction with System Quality and Satisfaction with Information Quality were highly predictive of Overall Satisfaction. These two constructs tapped into the different dimensions of IS quality, and demonstrated that the suggested IS quality criteria could be organized as items under the four formative constructs used in the model.

Interestingly, many of the suggested health information quality items recommended by academics and contained within the Specific Content construct were found to be less important to consumers, such as details about the Website's owners, policies, and contact information. Despite this, participants in the study generally showed a good understanding on what quality information was and what was not based on the open ended comments. For example, participants using DrWeil.com to find information on Phentermine were impressed with the ease of finding information on the site, and liked the format of the information they found. They were however sceptical of the credibility of the Website because the information was provided as Dr. Weil's opinion, who was trying to sell his book on the Website. Another example is the impression of the participants searching for Phentermine information on Pillstore.com. Here subjects found concise, specific information that they were told to find. However, many commented that the site was too commercial in nature for them to trust the information.

The implications of the findings from this study regarding quality are that consumers have a good idea of what the intentions of a Website are, without having to look through specific quality indicators such as policies or authorship. In some cases, however their impression of quality is biased by the environment it is presented in. If a high quality (by academic standards) health information artefact is presented on a Website of commercial nature, then consumers tend to view it with some scepticism. Frequent comments about the advertising on the Dr.Koop.com Website were evidence of this.

Quality in health information Websites can thus be evaluated using the framework presented in the research model developed in this thesis. From the open ended questions, it seems that consumers view the credibility or trustworthiness as tightly related to quality, with commercialism being a major detractor of credibility. This finding highlights the importance of the next research question.

6.1.3 Impact of Trust on Overall Satisfaction

Q3: How does trust impact satisfaction with HIR?

The widely used construct trust beliefs was used in the model to examine the importance of trust in explaining variance in overall satisfaction. It was found in 5.6.3 that trust beliefs only had a small effect on overall satisfaction, and that its path coefficient was small (.14), yet significant in section 5.6.2. Furthermore trust related comments were relatively infrequent in the open-ended questions in 5.8.9. These findings

suggest that trust is a significant, yet marginal predictor of satisfaction with online health information.

The Competence, Integrity, Benevolence model of Trust Beliefs illustrated in Figure 3-4 was found to be problematic in the context of consumer health information. The full model in Figure 5-10 showed that only two of the three constructs predicting trust beliefs were significant. The path between Competence and Trust Beliefs was found to be insignificant, which was surprising since it seemed reasonable that consumers' impressions of a Website's competence in providing health advice should predict consumers' trust beliefs towards that Website. The correlation and covariance matrix in Appendix G shows that items in Competence (TC1-TC4) and Trust Beliefs (T1-T3) were significantly correlated and they covaried. Yet in the first structural model (Figure 5-10) the path between Competence and Trust Beliefs is small and insignificant. One possible explanation for this enigma is that Trust Beliefs correlates more highly with Benevolence and Integrity than with Competence (this correlation is visible in Table 5-22 on a construct level, and Appendix G on an item level), so that the majority of the variance in Trust Beliefs can be explained without the need for Competence. This would be analogous to predicting GPA and finding that grades for Math and English had significant paths, while grades for Phys. Ed. did not have a significant structural path, even though it is correlated to GPA. This could be a peculiarity of the data set, or something particular to the use of these constructs in the context of health information

retrieval. It was decided to adopt the simplified model, which dropped all three antecedent constructs to trust beliefs to deal with this inconsistency.

The comments from the open ended questions provided some additional insights as to how consumers decided to trust or not to trust a Website. Several respondents commented that they could not trust a Website that was commercial in purpose. These types of comments were referring to the online pharmacy: pillstore.com, and Dr.Weil.com which promotes Dr. Weil's book. Other comments related to trust were directed towards advertising on WebPages. For example in response to what did you most dislike on Dr.Koop.com? One participant wrote "the advertising – detracts from the purpose. Makes it seem less trustworthy." Another participant responded "the number of ads for shady health products, such as botox." For the same question in regards to medicinenet.com one respondent said "the ads. It makes everything they say about drugs suspect."

Overall 8% of the comments in the open ended responses were related to advertising, and its negative impact on satisfaction or trust. In comparison, 4% of the open ended comments were related to trust. Trust and lack of trust are significant to satisfaction of online health information retrieval, yet it seems that other factors, such as satisfaction with system quality and information quality are more important. The negative effect of advertising on satisfaction was not tested in the quantitative model, it is however

suggested that advertising lowers trust beliefs, leading to lower satisfaction with health information retrieval, based on what was said in the open ended comments.

6.1.4 Role of Expectations when determining Quality of Health Information Websites

Q4: What role do expectations play when determining quality of information and Websites in HIR?

The ADM operationalisation was used to examine the disconfirmation of expectations for satisfaction with information quality and satisfaction with system quality. Here subjects were asked the degree of difference between the perceived level of information quality/system quality of the Website they evaluated and their expectations. Participants were also asked how good or bad this difference was.

The full PLS model in Figure 5-10 showed how disconfirmation of expectations for information quality/system quality related to the constructs satisfaction with information quality/system quality and overall satisfaction. Disconfirmation of Expectations for Information Quality was found to be a significant predictor of Overall Satisfaction at the 0.05 level, although it had a small path coefficient. Surprisingly, the data analysis found that the path between disconfirmation of expectation for System Quality and Overall Satisfaction was not significant. This led to the decision to drop disconfirmation in the simplified model.

In section 5.7 the different levels of disconfirmation were explored using partial correlations, excluding the effects of satisfaction with information quality/system quality. This analysis provided insights as to which item in the exogenous constructs were correlated with disconfirmation. The results showed that only a few of the items in the exogenous constructs Content Quality, Specific Content, Technical Adequacy and Appearance were partially correlated at the 0.05 significance level with their respective disconfirmation construct. For the Information Quality disconfirmation of expectations, the responses to the following questions has significant partial correlations:

- The content of the Website is useful
- The content of the Website is clear
- The content of the Website is concise
- In Website, one can find general information (e.g. goals, owners)
- In Website, one can find help information

For the System Quality disconfirmation of expectations, the responses to the following questions had significant partial correlations:

- The Website has valid links (hyperlinks)
- The Website can be personalized or customized to meet one's needs
- Website uses multimedia features correctly

The partial correlations suggest that these items were important in determining whether participants were disappointed, satisfied or delighted with the Information and System Quality of the Website. It is therefore recommended to Website owners to address these questions if they want to meet or beat the expectations of visitors.

When contrasting system quality and information quality items, five of the eleven Information Quality items were significantly correlated and only 3 of eleven System Quality Items were significantly correlated. This could be a reasonable explanation as to why the DIQ to Overall Satisfaction path was significant, while the DSQ to Overall Satisfaction was not. Expectations of Information Quality are more important to overall satisfaction in the health information retrieval context than expectations of System Quality.

6.2 Contributions

The goal of this research is to further our understanding of how consumers evaluate the health related information they find on the Internet. This research provides several contributions to theory and practice, through the theoretical model which was validated through the online experiment. The following sections summarise the main contributions and recommendations.

6.2.1 Contributions to Theory

This research provides a theoretical model of consumer satisfaction with online health information retrieval that was quantitatively validated using data from an online experiment. The simplified model shown in Figure 5-11 demonstrates the main antecedents to satisfaction with online health information. Figure 5-12 shows the dominant paths, which coincide with the highest path coefficients in the simplified model. The overall R^2 of the endogenous construct was 0.758, which means that a large

portion of the variance (76%) in overall satisfaction with online health information retrieval can be explained by the model proposed in this thesis.

The simplified model in Figure 5-11 provides evidence that content quality, technical adequacy and trust are all important to explaining overall satisfaction. An equally valuable finding is that specific content and appearance are less important to explaining variance in overall satisfaction. The frequency and nature of the open ended comments related to these constructs confirmed the relative significance of each of these constructs in the simplified model.

The formation of trust beliefs in the full model was confounded by multicollinearity between the theoretical dimensions competence, integrity, and benevolence. It is recommended to researchers to re-examine the use of these three dimensions in future predictive models of trust.

The simplified model provides an understanding of how trust beliefs are formed in the context of online health information retrieval. Content quality and specific content of Websites contributed to the formation of trust beliefs. These two constructs explained 56.5% of the variance in trust beliefs. Additionally in the originally proposed model, content quality and specific content combined explained 54.3% of the variance in benevolence, and 57.8% of the variance in integrity, both benevolence and integrity in

turn explained 80.0% of the variance in trust beliefs. Both models confirmed that specific content and content quality are important predictors for trust beliefs, while appearance and technical adequacy are not as important.

The iterative nature of the information seeking process (Marchionini, 1998) described in Chapter 1 is supported by the open-ended comments, such as "*for me it is best to access multiple Websites in order to seek congruence between them and reach a more secure position on what information I accept*" and "*Google; then you can pick and choose several Websites on the topic you are looking for and compare*".

The manifestations of relevance in Table 3-1 are confirmed by the model and open-ended comments. Systemic relevance and topical relevance are consequences of technical adequacy, which was found to be a significant predictor of satisfaction with system quality. Several comments about the information retrieval process provided support that without systemic and topical relevance, no further decision can be made regarding the cognitive, situational or motivational relevance, as no adequate information was retrieved. Content quality reflects the cognitive and situational dimensions of relevance, and was likewise found to be a significant predictor of overall satisfaction (through satisfaction with information quality). Aspects of motivational relevance can be seen in the overall satisfaction construct. From this and the open ended comments it can

be seen that this dimension of relevance is influenced by other factors, such as trust, which it seems is impacted by commercialism of a Website, as discussed in 6.1.3.

Overall this research contributes a grounded model of online information retrieval satisfaction that is specific to consumer health information, but could also be utilized in other contexts such as online shopping or travel planning, for example. The model itself is novel in that it combines various bodies of literature into one comprehensive framework for evaluating information satisfaction and system satisfaction. The context where the information is situated was confirmed to be significant by the findings of this research. In other words, the final Webpage containing health information is evaluated by the consumers not only on its content but also on the experience of how the consumer found the Webpage within a given Website, and the impression the consumer has of the Website.

6.2.2 Contributions to Practice

A model of how consumers judge and evaluate health information Websites was proposed and empirically validated, this is important to health information publishers and physicians to obtain a better understanding of how consumers decide if and which online health information is useful to them. The expectations of consumers when evaluating Websites were examined, and findings can be utilized by Website designers.

The following recommendations for health information Website authors are based on the findings from this study:

- As a bare minimum, content should be useful, clear and concise.
- Information about the Website in terms of its goals and owners should be clear and all hyperlinks should work.
- In order to further please visitors to health information Websites, help information should be provided and personalisation is appreciated.
- Navigation of the Website is critical, and tools such as sitemaps or A-Z indexes are appreciated by consumers, in addition to a quality search tool.
- Multimedia features contribute to the overall impression consumers have of a Website.
- Intrusive advertising such as animated pictures near the content the consumer came to find reduces the opinion the consumer has of the quality of the content, since it instils the belief that the site is more interested in selling products than providing advice.
- Finally, it is important for Website operators to realize that consumers will shop around for information, looking at the content from several different sources. Providing links at the end of articles to other external sources on the same topic provides value to the consumer.

This research provides important evidence to physicians and health professionals. It confirms that some people are accessing the Internet for health information and mistakenly believe content because they like how it is presented. Every treatment, that is each different Website, had some participants that were highly satisfied with the information they found. Recall the Websites were chosen for different levels of exogenous constructs. Without being libellous, some of the chosen Websites were picked precisely because they were seen as unreliable and misleading by authors from the medical field. Consumer education is therefore very important, to guide online health information consumers away from poor quality information.

Even though the quality ratings discussed in section 2.2 are currently being promoted to consumers, it is evident from the data collected here that specific content is not something that is important in predicting the satisfaction consumers have with the health related information they find. This can be interpreted in two ways: first more promotion of the importance of quality indicators could lead consumers to more closely examine specific content making it a significant factor in determining information quality. Or secondly, and this is this researcher's opinion; is coming to the realisation that consumers do not judge the quality of health information as they are *supposed to*. Therefore there should be more efforts on educating Internet users about which Websites are trusted by the medical community. Medical organizations should have Websites providing their patients with information resources that they can rely on in this era, as many already do. It is increasingly important for consumer's point of contact with the

healthcare professionals to promote these trusted resources through direct communication or even advertising in the doctor's office to raise awareness of alternatives to using content found through search engines for health advice.

Two examples of healthcare organizational efforts to provide consumers with credible, trustworthy health information online were examined in this research as the treatments 6 and 7. Treatment 7, lung.ca, was specifically focused around conditions of the lungs and was highly evaluated by respondents seeking an answer to the question of identifying symptoms of childhood asthma. Several commented that they liked the Canadian, and organizational nature of this Website. Treatment 6, used the health portal Canadian-Health-Network.ca. This Website proved unsatisfactory in providing health advice for the side effects of weight loss drugs, since the majority of participants did not find an answer. The idea behind this portal is a good one in the right direction of guiding consumers to quality information, but it failed in several dimensions. First and foremost, neither the search engine nor the topics index enabled participants to locate an answer about weight loss drugs side effects. As well, a more comprehensive inclusion of information sources would improve this site. Secondly, the site was perceived as too slow and out of date. Finally, more search terms or better indexing would vastly improve the usefulness of this portal. Respondents tried various combinations of weight + loss +drugs +techniques +pills and came up with no relevant information.

6.4 Strengths and Limitations of the Study

6.4.1 Strengths

This research benefited from the application of Information Systems methodology and the utilisation of constructs derived from management literature. The design of the study offered several strengths. First, the use of multiple Websites and more than one scenario increased the generalisability of the findings. Additionally, the use of actual real Websites instead of simulated ones made it possible to better assess how consumers perceived the experience of looking for the information assigned to them through the scenarios.

Second, the use of scenarios made 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.

Third, the use of the online survey instrument allowed questions to be randomised for each and every instance of the survey, thus reducing the risk of common methods bias. The utilisation of different scales for the endogenous and exogenous variables further reduced the risks of common methods bias.

Fourth, the open-ended questions allowed this research to qualitatively confirm the quantitative findings in the research model and provide further insights about

consumer behaviour in online health information seeking. These open ended questions suggested that advertising and commercialism may be negative factors which warrant further investigation.

Fifth, the fractional factorial design achieved its objective of obtaining a sample where exogenous constructs contained sufficient variance in order to create a predictive model with a high amount of variance explained in the endogenous constructs. The R^2 of satisfaction with information quality (0.426), satisfaction with system quality (0.477), trust beliefs (0.565), and overall satisfaction (0.758) predicted a large proportion of the variance.

Sixth, the simplified model was 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. The only control variable which added more explanatory power to the model was if the participant found an answer to the question or not. This control variable impacted the variance explained of satisfaction with information quality, but not the overall satisfaction, further strengthening the model since it did not impact the final endogenous construct.

Seventh, the recruitment of participants from online parenting communities and advertising on the McMaster news Website 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.

6.4.2 Limitations

This findings of this research is constrained by several limitations, as with any research. First, the use of the online experiment using live Websites resulted in less control and thus specificity than an experiment in laboratory using carefully created Websites would have. The online experiment using live Websites 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 number of male respondents was relatively small in proportion to female respondents. This could reduce the generalisability of the results over the entire population, even though gender seemed to make no difference in this dataset, as evidenced by the analysis of control variables.

Third, the use of subjective assessments of the exogenous variables can be considered a weakness, as the ideal study would utilise objective measures from for the exogenous constructs and subjective measures from a different source for the endogenous constructs. This was not possible in this research study, because there is no agreement

among researchers on how to measure Websites objectively, and because by using live Websites to provide subjects the real experience of navigating the Websites in search of an answer to the scenario question there was little control on where the participants went within the site, making it impossible to assess which parts of the vast Websites to objectively measure.

Fourth, 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.

Fifth, 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 Websites 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.

Sixth, providing consumers with specific Websites 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 that was looked at.

Seventh, the number of Websites and scenarios may limit the generalisability of the study. It is possible that different results would have been found if other Websites and scenarios were utilised. The breadth of Websites used in this research experiment do however represent several different kinds of health information Websites (commercial, opinion based, non-profit, and organizational) being accessed by consumers today.

Despite these possible weaknesses, the findings of the study provide researchers and practitioners with valuable insights of consumers evaluate health information. This research also provides the basis of further studies to validate the findings of the results in other contexts, possibly also in other areas outside health information retrieval.

6.5 Directions for Future Research

This research lends support to the possibility of several different future research directions. The quantitative analysis found that the trust beliefs concept suffers from multicollinearity among the constructs competence, integrity and benevolence. By collecting more data within and outside the health information context, the use of the trust beliefs model can be further examined, to determine if multicollinearity is particular to this context or fundamentally problematic.

Future refinements of the model presented in this research could include adding advertising or commercialism as constructs or control variables in order examine their

impact on consumers' experience of retrieving, evaluating and judging online health information. It is likely that it would be found that consumers will judge Websites that have more advertising as less trustworthy as well as lower on both system quality and information quality dimensions.

A few participants commented that they wanted to see evidence-based health information on Websites. This researcher believes that there is not yet sufficient public awareness about what evidence based medicine is. However, it would pose an interesting avenue for future research to examine how consumers react to evidence- based medicine. Feelings towards it are likely to be divided between consumers who prefer alternative medicine and those who prefer evidence based medicine.

The research model in this dissertation was specifically tested in the online health information context. It is possible that the model is equally valid in other contexts of online information retrieval, such as online shopping, or online news for example. It will be interesting to see if content quality and technical adequacy are dominant paths in the application of this satisfaction model in other contexts.

6.6 Conclusions

The objective of this research was to develop and empirically validate a model explaining how consumers assess health information on the Internet. This was achieved through the adaptation of theoretical linkages and constructs from management literature, and application of IS statistical methods. This dissertation provided an exploration of the factors leading to consumer satisfaction with online health information. The research questions led to the development of the theoretical model, which uncovered several key findings. Through the application of partial least squares structural equation modeling techniques, it was found that the main determinants of satisfaction with online health information were content quality and technical adequacy. The role of trust played a smaller, but still significant role for the 141 consumers assessing health information Websites in the experiment.

The overall theoretical contribution of this research was to provide a model of how consumer satisfaction with online health information can be explained. The comments from the open ended questions combined with the use of several different Websites provided further insights which formed the basis of several recommendations to practitioners in this field on how to improve their visitors' experiences.

The exploration of consumers' assessments of online health information in this dissertation provides a starting point for future research examining the growing use of online information in peoples' personal health decisions from the consumer's perspective.

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Appendix A - Glossary of Acronyms

ADM	Additive Difference Model
ADS	Advertising
AP	Appearance
AVE	Average Variance Extracted
CQ	Content Quality
CR	Composite Reliability
DIQ	Disconfirmation of Expectations in Satisfaction with Information Quality
DSQ	Disconfirmation of Expectations in Satisfaction with System Quality
eIQ	Effect of difference in the disconfirmation of expectations in Satisfaction with Information Quality
eIS	Effect of difference in the disconfirmation of expectations in Satisfaction with System Quality
GPA	Grade Point Average
IS	Information Systems
IQ	Satisfaction with Information Quality
MIMIC	Multiple Indicators and Multiple Causes
PLS	Partial Least Squares
S	Overall Satisfaction
SC	Specific Content
SDIQ	Degree of difference in the disconfirmation of expectations in Satisfaction with Information Quality
SDSQ	Degree of difference in the disconfirmation of expectations in Satisfaction with System Quality
SEM	Structural Equation Modeling
SQ	Satisfaction with System Quality
T	Trust
TA	Technical Adequacy
TB	Benevolence
TC	Competence
TI	Integrity
VIF	Variance Inflation Factor
WWW	World Wide Web

Appendix B – Survey Questions

Consent Form

A Study in Online Health Information

You are invited to participate in a research study by Michael Bliemel and Dr. Khaled Hassanein, McMaster University, Hamilton, Canada

If you have any questions about this research, please feel free to contact Michael Bliemel at 905-525-9140 ext. 23584 or bliememf@mcmaster.ca

Purpose of the Study

The purpose of this study is to identify and facilitate further understanding of the role of online health information, and make recommendations on the improvement of health Websites.

Procedures

If you volunteer to participate in this study, we will ask you to search for the answer to a general health related question on a Website that we will provide you. You will then complete an online questionnaire about your experience with that Website. Overall participation in this experiment should take no longer than 20 minutes.

Potential Risks and Discomforts

There are no foreseeable physical, psychological, emotional or social risks associated with this study.

Potential Benefits

Both the scientific community and society at large stand to benefit from the findings of this study, as it can provide insights on the use of online health information retrieval. Combined with the theoretical frameworks presented in the paper to be completed, it can serve as the springboard for in depth analysis of consumer issues, needs and concerns.

Compensation for Participation

By participating in this study you will be eligible to enter a draw. The draw will be for two prizes of $200 Canadian each. You will be asked your email address after completing the survey, which will only be used for the purpose of contacting the winners of the draw.

If you do not want to submit your email address, you may still participate in the survey, but will not be entered in the draw.

Participation and Withdrawal

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time, by exiting the survey, without consequences of any kind. You may also refuse to answer any demographic questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

Confidentiality and Anonymity

To ensure anonymity, identifying information will not be collected about subjects by this study. IP addresses will automatically be collected to prevent multiple submissions from one individual. IP addresses and emails will not be used for any other purpose than the draw and identification of multiple submissions. The data collected from each subject's responses will be directly used in data analysis, reporting of findings will not identify any specific individual. Findings may be categorized according to subject groups (i.e. Web experience, sex, etc.), but no data pertaining to individual responses will be released in such a way that subjects can potentially be identified.

Rights of Research Participants

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through a McMaster Student Research Ethics Board. If you have questions regarding your rights as a research participant, contact: SREB Secretariat Telephone: 905-525-9140, ext. 23142 Fax: 905-540-8019, McMaster University, 1280 Main Street W., CNH-111, Hamilton, ON, L8S 4L9 or Email: srebsec@mcmaster.ca

1) I understand the information provided for the study 'Online Health Information' as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study and indicate this by checking the agree box.

○ agree ○ disagree

Demographic Questions

Gender: Male Female

Age
What is your age? 18-20 , 21-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-55. 55-60, 61+

Education
What is the highest level of education you have attained to date?
Grade 10 or less, High school graduate, attending/attended college 1-3 years, Graduated from 4 year college, Postgraduate study or degree

Internet Use
On average, how much time do you spend using the Internet each week?
0-2 hours, 3-4 hours, 5-6 hours, 7-8 hours, 9-10 hours, more than 10 hours

Health Information Use
On average, how often do you look up health related information on the Internet?
Never, Once every few months, Once a month, Once a week, Several times a week

Confidence

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

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) *
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) *
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

* Either Asthma or Phentermine questions were asked, which ever was appropriate to the scenario question

Involvement (Asthma) *

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) *

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

Survey Items

Note that the actual Website name of the site used in the experiment replaces the word WEBSITE

Technical Adequacy

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

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

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

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

Appearance

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

Only based on the information provided by the assigned web site, please indicate your views regarding the overall quality of information.

After using the Web site, the information you obtained made you: (11pont scale)

IQ1: Very dissatisfied vs. Very satisfied
IQ2: Very displeased vs. Very pleased
IQ3: Frustrated vs. Contented
IQ4: Disappointed vs. Delighted

Satisfaction with System Quality
Only based on the information provided by the assigned web site, please indicate your views regarding the overall quality of Web site's features

In terms of the features of the Web site that provided you the information you need, using the web site made you: (11pont scale)
SQ1: Very dissatisfied vs. Very satisfied
SQ2: Very displeased vs. Very pleased
SQ3: Frustrated vs. Contented
SQ4: Disappointed vs. Delighted

Disconfirmation of Expectations of Information Quality

SDIQ: "In comparison to the level of overall quality of the information on the Website that you expected, how big was the difference between what you wanted and what the Website actually provided?"
1="exactly as I desired" ... 7 = "extremely different than I desired"

eIQ: "How good or bad is this difference?"
-5="very bad" ...0="neither bad nor good" ... +5="very good"

DIQ: Disconfirmation is then SDIQ*eIQ

Disconfirmation of Expectations of System Quality

SDSQ: "In comparison to the level of overall quality of the features on the Website that you desired, how big was the difference between what you wanted and what the Website actually provided?"
1="exactly as I desired" ... 7 = "extremely different than I desired"

eSQ: "How good or bad is this difference?"
-5="very bad" ...0="neither bad nor good" ... +5="very good"

DSQ: Disconfirmation is then SDSQ*eSQ

Trust

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Benevolence

TB1:I believe that WEBSITE would act in my best interest
TB2: If I required help, WEBSITE would do it's best to help me
TB3: WEBSITE is interested in my well-being, not just its own

Integrity

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

TI1: WEBSITE is truthful in it's dealings with me
TI2: I would characterize WEBSITE as honest
TI3: WEBSITE would keep its commitments
TI4: WEBSITE is sincere and genuine

Competence

TC1: WEBSITE is competent and effective in providing health advice
TC2: WEBSITE performs its role of giving health advice very well
TC3: Overall, WEBSITE is a capable and proficient Internet health advice provider
TC4: In general, WEBSITE is very knowledgeable about health issues

Trust Beliefs

T1: This Website is trustworthy
T2: I trust this Website keeps my best interests in mind
T3: I find it necessary to be cautious with this Website [reverse]

Overall Satisfaction:

"Thinking of your overall experience with this Website, 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

Open-ended Questions*

Answer to Scenario Question (Asthma)
a) Did you find the answer to the question? Yes, No

b) What are the common symptoms of asthma in children? (Feel free to type or cut and paste your response)

Answer to Scenario Question (Phentermine)
a) Did you find the answer to the question? Yes, No

b) What are potential side effects of Phentermine based weight loss pills? (Feel free to type or cut and paste your response)

Most Liked
Please describe what you liked about WEBSITE

Most Disliked
Please describe what you disliked about WEBSITE

Suggestion for Improvement
How could WEBSITE be improved?

Story
If you would like to describe a memorable good or bad experience with any health information Website you have had in the past, please share it here:

* Either Asthma or Phentermine questions were asked, which ever was appropriate to the scenario question

Appendix C - Sample 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 Website 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 Website 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 Website 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.

Note: These scenarios are based on Berland, Elliott et al. (2001) who published the following:

What are the common symptoms of asthma in children?

- *A child with Asthma can experience the following symptoms: cough, wheezing, chest tightness, shortness of breath or difficulty breathing or an "asthma attack" (pronounced or prolonged presence of these symptoms)*
- *These symptoms can worsen at night, triggered by exercise, environmental irritants, changes in weather, viral illness, or can occur spontaneously at rest*
- *Children with asthma can have intermittent symptoms (twice a week or less) or persistent symptoms (more than twice a week)*
- *Children with intermittent symptoms may have severe exacerbation*

Should I consider weight-loss drugs, and if so what prescription and non prescription drugs are currently available?

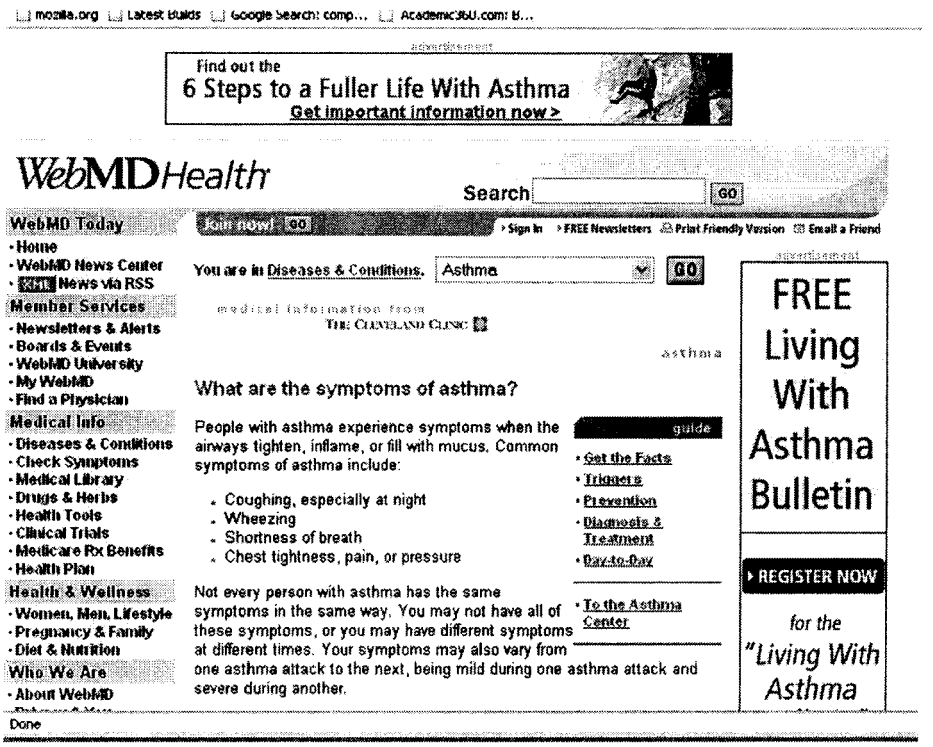
- *Weight-loss drugs are a Food and Drug Administration(FDA)-approved options for patients with a BMI>27 (with concomitant risk factors) or >30 (without risk factors)*
- *FDA-approved prescription drugs for weight loss include sibtramine, orlistat, and phentermine*
- *Phenolpropanolamine (Dexatrim, Acutim) is an over-the counter weight-loss agent approved for short term use <3 months*
- Phenylpropanolamine has been associated with strokes (although the magnitude of the stroke risk is not established)

Appendix D - Websites in the Pilot

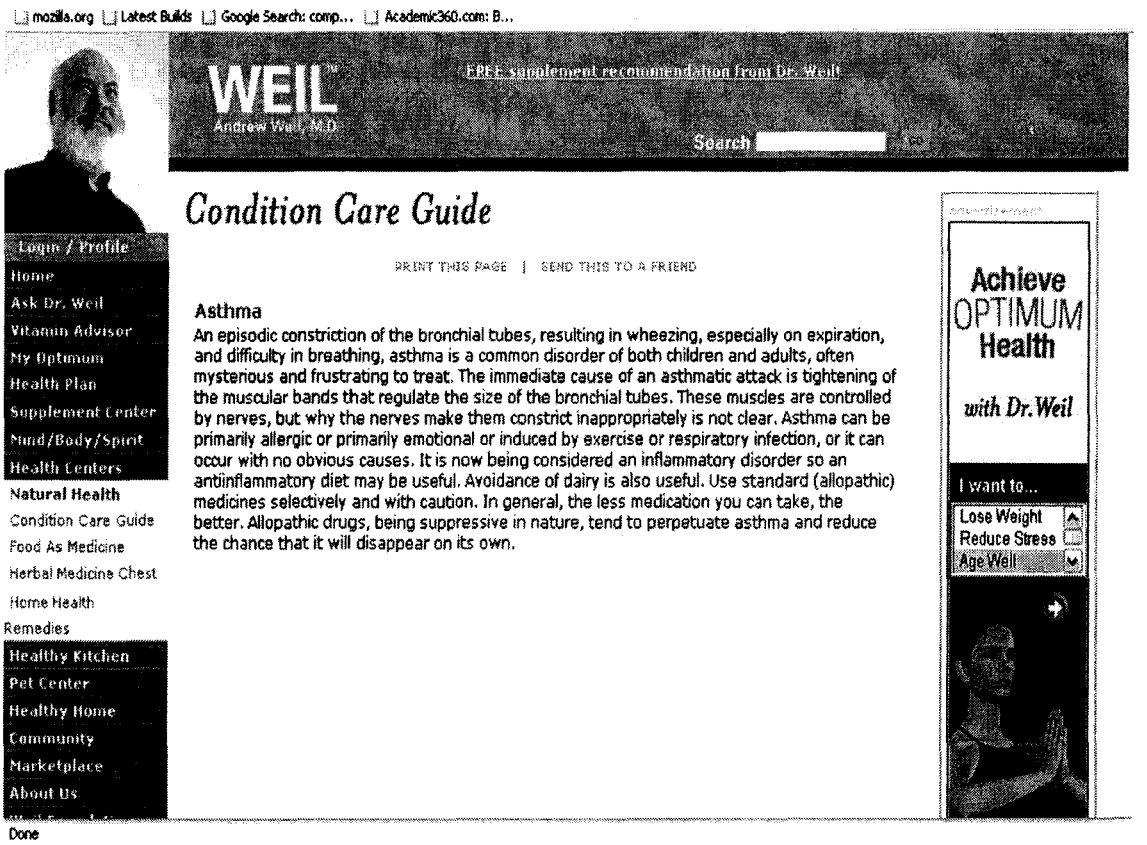
The following are Websites that were used in the experiment. Note that subjects were given the homepage of the Website and asked to find the information by browsing or searching. The images of the WebPages shown here are examples of individual pages that subjects could retrieve off the Websites.

Mayoclinic http://www.mayoclinic.com/
Example below was accessed May 2005,

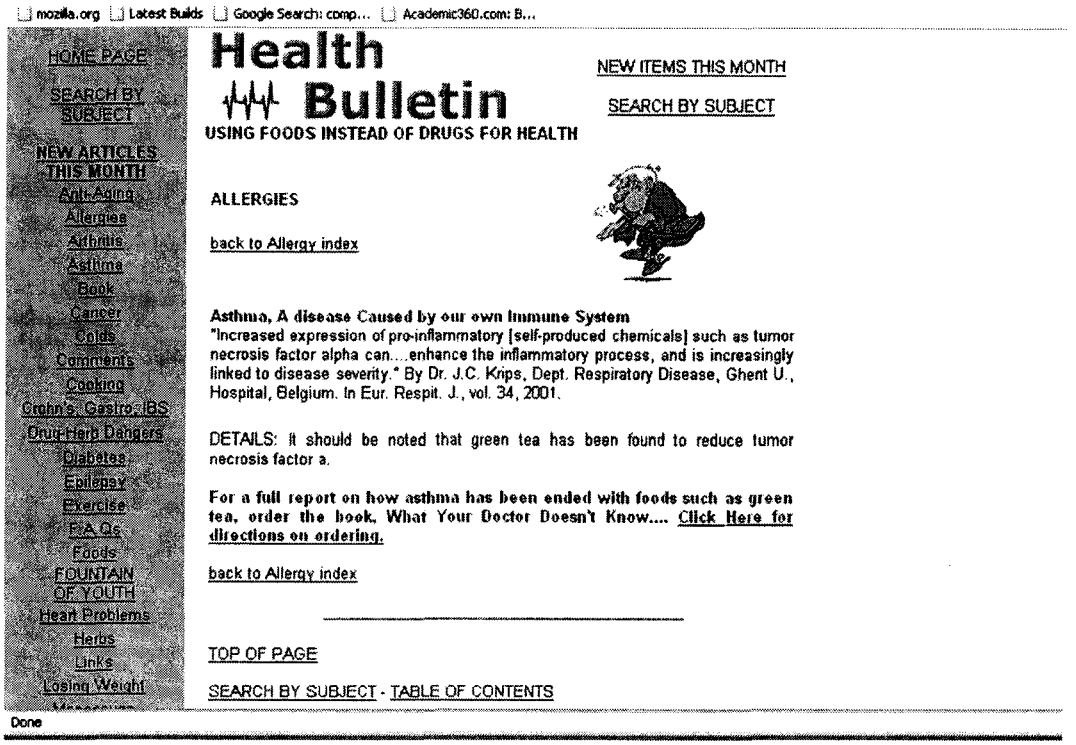
WebMD http://my.webmd.com/webmd_today/home/default
Example below was accessed May 2005



Dr Weil http://www.drweil.com/u/Home/index.html
Example below was accessed May 2005



Health Bulletin http://www.healthbulletin.org/index.html
Example below was accessed May 2005

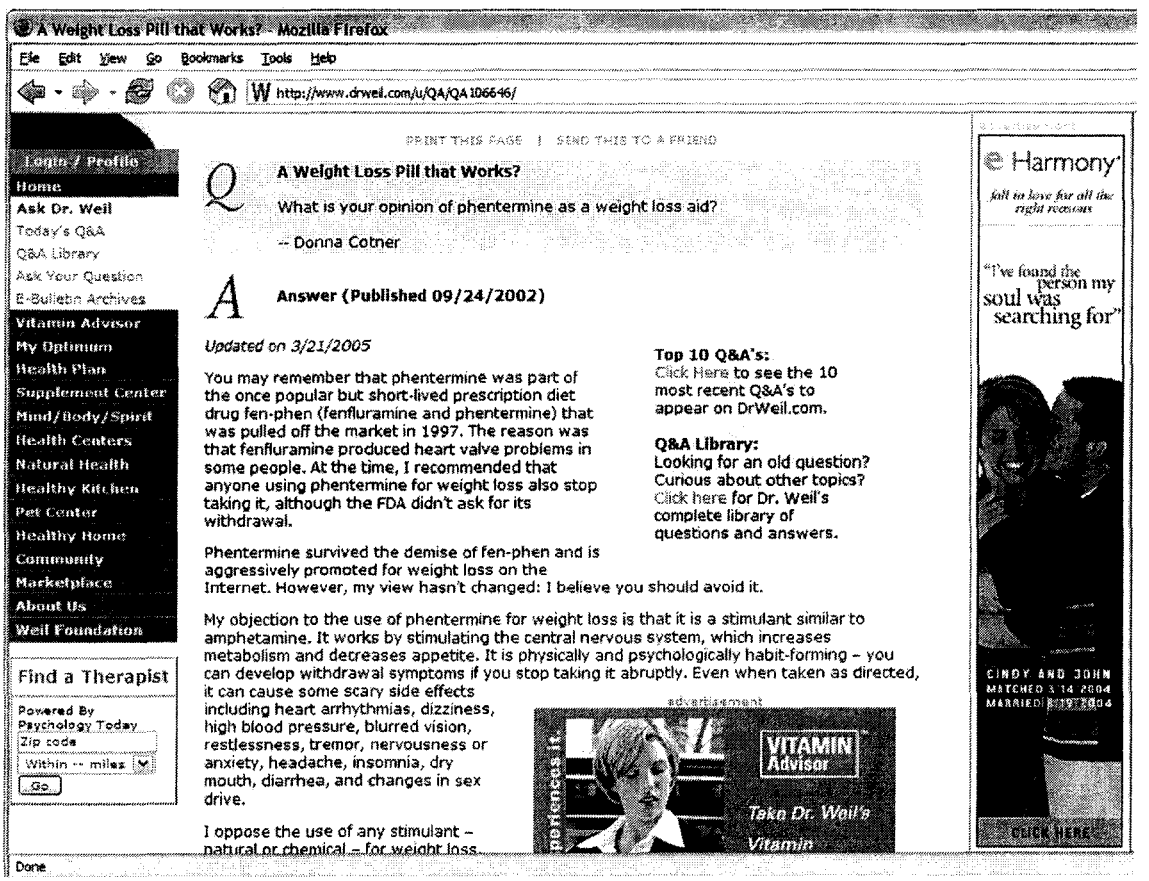


Appendix E – Main Experiment Websites

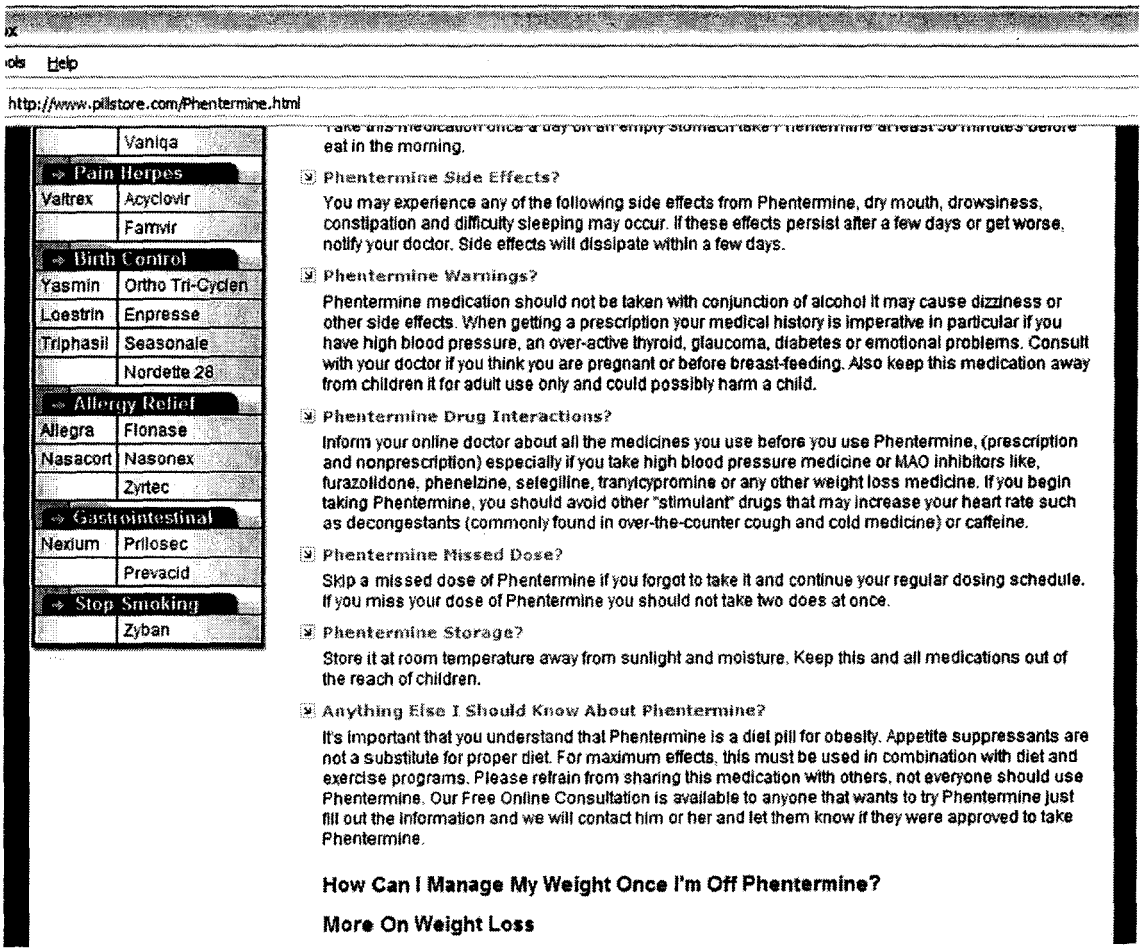
The following are screenshots of typical information expected to be found by subjects on each of the Websites in the main experiment.

Healthbulletin: www.healthbulletin.org : Asthma Scenario
same as Pilot – see Appendix D
MayoClinic: www.mayoclinic.com : Asthma Scenario
same as Pilot – see Appendix D

DrWeil: www.drweil.com : Phentermine Scenario
Example below was accessed May 2005

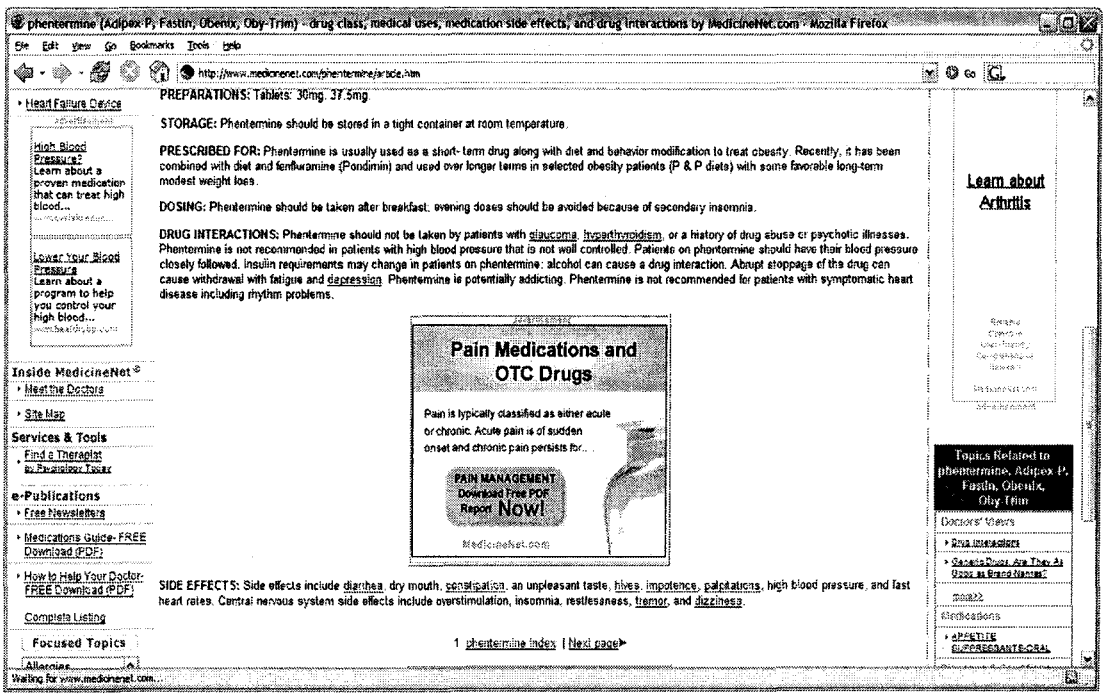


Pillstore: www.pillstore.com – Phentermine Scenario
Example below was accessed May 2005

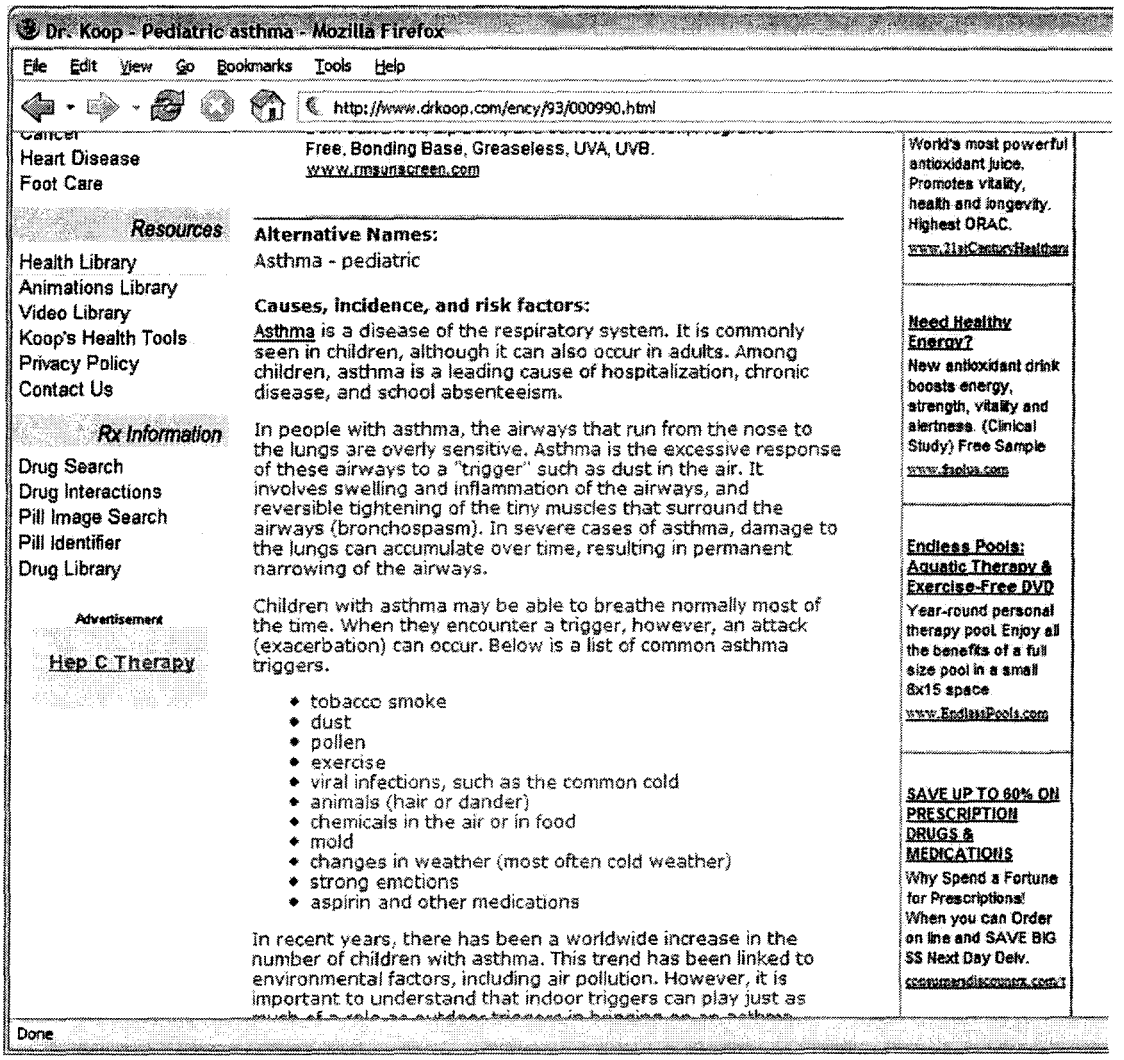


Medicinenet: www.medicinenet.com – Phentermine Scenario
Example below was accessed May 2005

Note the search tool did not work in this Website

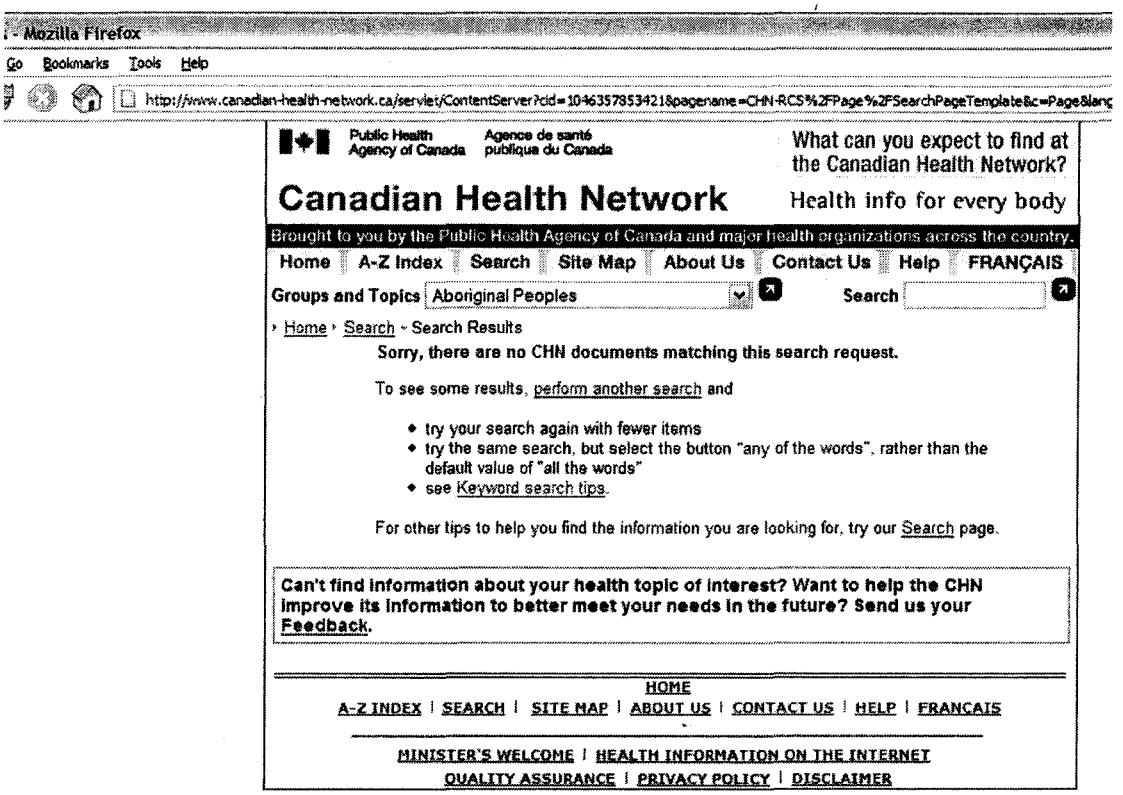


DrKoop: www.drkoop.com – Asthma Scenario
Example below was accessed May 2005

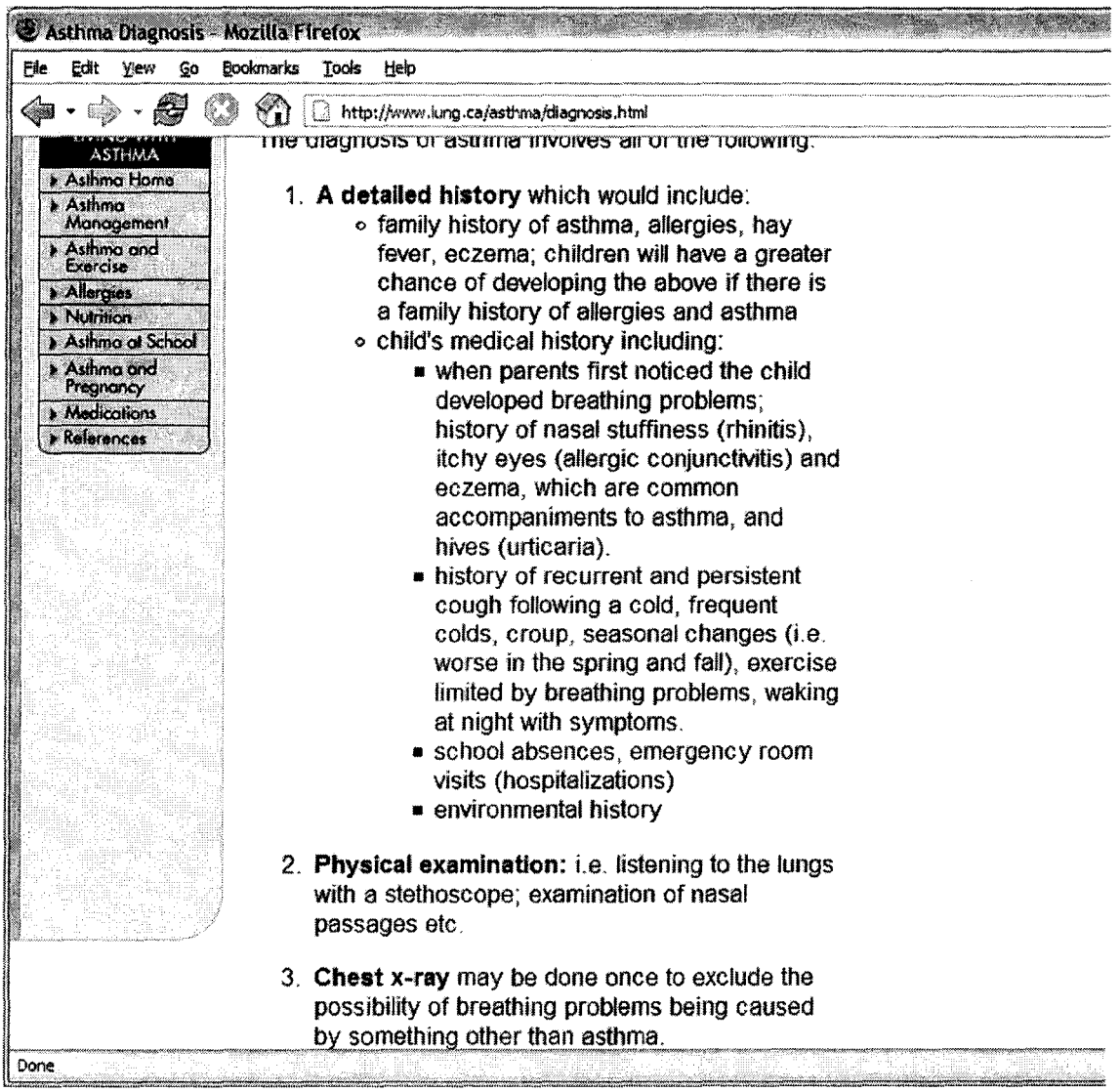


Canadian Health Network: www.canadian-health-network.ca – Phentermine Scenario
Example below was accessed May 2005

Unlikely subjects will find any information on this Website, because searching for phentermine does not provide any hits



Lung: www.lung.ca – Asthma Scenario
Example below was accessed May 2005



Appendix F – Item Means for the Websites

Version	1	2	3	4	5	6	7	8	Average
TA1	4.53	4.83	4.83	4.72	5.27	4.13	5.76	5.05	4.89
TA2	3.42	5.00	5.44	4.44	4.60	3.93	5.65	4.00	4.55
TA3	2.95	5.06	4.44	4.89	4.80	3.40	5.18	4.38	4.38
TA4	4.16	4.83	4.28	4.78	5.13	4.93	5.59	5.29	4.87
TA5	3.05	4.22	3.83	3.78	4.20	4.13	4.06	4.19	3.92
TA6	5.37	5.67	5.17	5.00	5.73	4.33	5.76	5.67	5.35
CQ1	2.95	4.72	4.33	4.94	5.27	4.73	5.76	5.57	4.77
CQ2	2.37	3.78	3.61	3.94	3.87	3.47	5.12	4.48	3.83
CQ3	2.74	5.00	5.11	4.22	4.73	4.27	5.35	4.81	4.52
CQ4	3.89	4.39	4.06	4.50	4.27	4.87	5.35	5.05	4.55
CQ5	3.89	4.78	5.11	4.56	5.00	4.20	5.53	4.52	4.69
CQ6	3.58	4.33	3.67	4.50	4.60	4.67	5.35	5.14	4.48
SC1	4.11	3.94	4.11	4.50	4.27	4.33	5.59	4.86	4.47
SC2	3.74	4.72	4.00	4.72	4.13	4.27	5.35	4.71	4.46
SC3	4.00	4.39	3.61	4.33	3.87	4.13	4.41	4.57	4.18
SC4	3.47	4.89	3.94	4.33	4.67	4.40	5.12	4.33	4.38
SC5	3.00	4.50	4.67	4.89	5.20	4.27	5.94	4.76	4.63
AP1	2.68	4.72	4.94	4.56	3.33	5.07	5.24	4.43	4.36
AP2	3.05	5.11	5.11	5.11	4.33	4.60	5.71	4.52	4.68
AP3	3.58	5.17	5.00	5.17	4.60	4.80	5.71	5.14	4.89
AP4	3.53	4.94	4.44	4.33	4.80	4.73	5.71	4.86	4.65
AP5	3.32	4.44	4.50	4.56	4.60	4.53	5.00	4.33	4.39
TB1	3.53	3.72	3.33	3.94	3.53	5.00	5.06	4.67	4.09
TB2	3.05	4.17	3.50	4.06	3.93	4.40	4.82	4.00	3.97
TB3	3.74	3.78	3.28	3.89	3.33	4.13	5.18	4.43	3.98
TI1	3.84	4.06	3.61	4.17	4.07	4.53	5.12	4.57	4.24
TI2	3.95	4.39	3.50	4.33	4.33	5.20	5.59	4.86	4.50
TI3	3.79	4.11	3.56	4.11	4.07	4.47	4.59	4.52	4.15
TI4	3.68	4.39	3.56	4.28	4.13	4.67	5.53	4.86	4.38
TC1	2.84	4.11	3.50	4.22	4.87	4.40	4.94	5.00	4.22
TC2	2.47	4.28	3.89	4.44	4.20	4.53	5.06	4.43	4.14
TC3	2.74	4.33	3.56	4.67	4.73	4.27	5.00	4.71	4.23
TC4	3.11	4.33	3.83	4.61	4.27	4.93	5.35	5.48	4.49
T1	3.63	3.83	3.33	3.94	3.93	4.93	5.24	5.00	4.23
T2	3.26	3.56	3.11	3.78	3.60	4.47	4.94	4.38	3.88
T3	2.79	2.72	2.33	3.00	2.60	3.93	4.71	4.81	3.38

Version	1	2	3	4	5	6	7	8	Average
IQ1	-2.63	1.33	-0.33	1.44	0.53	-0.67	1.59	2.10	0.45
IQ2	-2.47	1.44	-0.44	1.17	0.27	-0.33	1.59	1.90	0.41
IQ3	-2.68	0.94	-0.28	0.89	0.00	-1.07	1.06	1.00	0.00
IQ4	-2.58	1.00	-0.39	0.89	-0.13	-0.73	0.76	0.38	-0.10
SQ1	-2.11	1.33	0.67	1.67	0.20	-1.07	2.00	0.57	0.42
SQ2	-1.89	1.50	0.44	1.33	0.20	-0.80	2.06	0.38	0.40
SQ3	-2.05	0.78	0.33	1.28	-0.33	-1.07	1.71	0.00	0.09
SQ4	-1.74	0.94	0.56	1.22	0.13	-0.87	1.41	-0.10	0.19
SDIQ	5.16	3.28	2.56	3.44	3.00	3.93	3.76	3.00	3.52
eIQ	-2.00	-0.17	-0.39	0.11	-0.53	-0.93	0.24	-0.48	-0.52
DSQ	-8.32	0.50	-4.11	0.06	-3.13	-7.47	0.88	-5.14	-3.36
SDSQ	4.37	3.11	3.00	3.06	3.13	4.60	3.24	3.38	3.48
eSQ	-1.42	0.33	-0.83	0.50	-0.73	-1.20	0.29	-0.90	-0.50
DIQ	-13.26	-1.11	-1.22	-1.06	-2.80	-6.73	0.29	-3.24	-3.68
S1	-2.47	1.00	-0.67	1.17	0.07	-1.40	1.82	0.29	-0.02
S2	-2.37	1.00	-0.33	0.89	0.00	-1.33	2.00	0.24	0.01
S3	-2.68	0.83	-0.39	0.89	-0.20	-1.60	1.71	-0.14	-0.20
S4	-2.74	0.67	-0.67	0.89	-0.13	-1.33	1.35	0.00	-0.25
S5	-3.37	-0.28	-1.44	0.56	-0.33	-0.40	1.65	0.00	-0.48
S6	-3.58	-0.83	-1.61	1.06	-0.27	0.33	1.47	0.62	-0.38
Version	1	2	3	4	5	6	7	8	Average

The treatments from Table 4-5 are repeated below for convenience.

Version	Specific Content	Content Quality	Technical Adequacy	Appearance	Website	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

Appendix G – Correlation and Covariance Matrix of Items in the Experiment

Correlations

		CONF1	CONF2	CONF3	KNOW1	KNOW2	KNOW3	INV1
CONF1	Pearson Correlation	1	.816**	.796**	.219**	.242**	.200**	.064
	Covariance	.749	.568	.677	.341	.369	.310	.104
CONF2	Pearson Correlation	.816**	1	.792**	.189**	.252**	.199**	.014
	Covariance	.568	.647	.627	.273	.357	.286	.020
CONF3	Pearson Correlation	.796**	.792**	1	.158	.180**	.140	-.050
	Covariance	.677	.627	.966	.279	.312	.247	-.092
KNOW1	Pearson Correlation	.219**	.189**	.158	1	.779**	.882**	.605**
	Covariance	.341	.273	.279	3.225	2.465	2.840	2.019
KNOW2	Pearson Correlation	.242**	.252**	.180**	.779**	1	.776**	.556**
	Covariance	.369	.357	.312	2.465	3.108	2.453	1.821
KNOW3	Pearson Correlation	.200**	.199**	.140	.882**	.776**	1	.551**
	Covariance	.310	.286	.247	2.840	2.453	3.215	1.838
INV1	Pearson Correlation	.064	.014	-.050	.605**	.556**	.551**	1
	Covariance	.104	.020	-.092	2.019	1.821	1.838	3.453
INV2	Pearson Correlation	.069	.035	-.016	.687**	.639**	.652**	.812**
	Covariance	.113	.053	-.030	2.353	2.146	2.229	2.875
INV3	Pearson Correlation	-.038	-.005	-.006	.422**	.432**	.401**	.557**
	Covariance	-.055	-.006	-.010	1.264	1.269	1.196	1.724
TA1	Pearson Correlation	.125	.102	.116	.114	.066	.162	.075
	Covariance	.147	.111	.154	.278	.156	.392	.189
TA2	Pearson Correlation	.023	-.039	-.053	-.036	-.143	-.037	-.035
	Covariance	.033	-.052	-.086	-.107	-.417	-.109	-.107
TA3	Pearson Correlation	.039	-.054	-.046	.000	-.125	.015	.007
	Covariance	.058	-.074	-.076	.000	-.374	.044	.021
TA4	Pearson Correlation	.169**	.163	.184**	.161	.086	.115	.174**
	Covariance	.193	.173	.239	.382	.200	.273	.426
TA5	Pearson Correlation	-.061	-.052	-.118	.016	-.118	.009	.012
	Covariance	-.057	-.045	-.124	.031	-.223	.018	.023
TA6	Pearson Correlation	.113	.219**	.093	.066	.089	.025	.140
	Covariance	.133	.238	.124	.161	.213	.061	.351
CQ1	Pearson Correlation	-.031	.005	-.066	.053	-.004	.066	.074
	Covariance	-.037	.006	-.089	.132	-.009	.163	.190
CQ2	Pearson Correlation	-.029	-.090	-.087	.070	-.012	.058	.099
	Covariance	-.037	-.104	-.124	.181	-.031	.151	.265
CQ3	Pearson Correlation	.114	.031	.085	.061	.018	.094	.028
	Covariance	.151	.039	.128	.168	.048	.257	.080
CQ4	Pearson Correlation	.073	.063	.060	.098	.065	.072	.130
	Covariance	.069	.055	.064	.193	.126	.141	.265
CQ5	Pearson Correlation	.130	.046	.066	.119	.102	.159	.160
	Covariance	.152	.050	.088	.287	.244	.385	.401
CQ6	Pearson Correlation	.089	.051	.061	.116	.082	.115	.257**
	Covariance	.095	.050	.074	.256	.177	.254	.586
SC1	Pearson Correlation	.121	-.063	.019	.063	-.029	.066	.110
	Covariance	.140	-.068	.025	.152	-.069	.158	.274
SC2	Pearson Correlation	.121	.090	.089	.025	-.086	.089	.114
	Covariance	.143	.099	.120	.062	-.208	.220	.290
SC3	Pearson Correlation	-.022	-.080	-.157	.147	.091	.157	.101
	Covariance	-.023	-.077	-.185	.316	.192	.338	.225
SC4	Pearson Correlation	.086	.053	.004	.084	-.006	.016	.084
	Covariance	.089	.051	.004	.181	-.013	.034	.187
SC5	Pearson Correlation	.053	.015	-.009	.081	-.016	.091	.068
	Covariance	.066	.018	-.013	.209	-.041	.233	.182
AP1	Pearson Correlation	-.009	-.092	-.101	-.101	-.144	-.089	-.061
	Covariance	-.013	-.122	-.164	-.299	-.420	-.264	-.187

Correlations

		CONF1	CONF2	CONF3	KNOW1	KNOW2	KNOW3	INV1
AP2	Pearson Correlation	.075	-.014	-.070	-.026	-.089	-.009	.018
	Covariance	.104	-.018	-.110	-.075	-.253	-.025	.053
AP3	Pearson Correlation	.173*	.057	.113	.100	.030	.069	.036
	Covariance	.197	.061	.147	.235	.071	.163	.089
AP4	Pearson Correlation	.093	.041	.051	.119	.090	.107	.091
	Covariance	.108	.044	.068	.287	.212	.256	.226
AP5	Pearson Correlation	-.059	-.083	-.069	.071	.015	.103	-.031
	Covariance	-.059	-.077	-.078	.147	.030	.212	-.067
TB1	Pearson Correlation	.020	-.038	-.033	-.052	-.120	-.041	.082
	Covariance	.023	-.040	-.043	-.122	-.277	-.098	.201
TB2	Pearson Correlation	-.033	-.132	-.144	.025	-.077	.033	.189*
	Covariance	-.039	-.145	-.193	.061	-.185	.081	.480
TB3	Pearson Correlation	-.051	-.102	-.092	-.024	-.096	.024	.066
	Covariance	-.056	-.105	-.116	-.056	-.217	.055	.156
TI1	Pearson Correlation	.011	-.014	-.053	-.049	-.048	-.026	.110
	Covariance	.010	-.012	-.057	-.095	-.092	-.050	.221
TI2	Pearson Correlation	.051	.009	.014	.023	-.043	.042	.168*
	Covariance	.056	.009	.017	.052	-.095	.094	.392
TI3	Pearson Correlation	.073	.056	.016	.072	.039	.071	.127
	Covariance	.059	.042	.015	.120	.064	.119	.220
TI4	Pearson Correlation	.026	-.009	-.031	.003	-.098	.013	.118
	Covariance	.029	-.010	-.040	.007	-.224	.030	.285
TC1	Pearson Correlation	-.050	-.066	-.084	.071	-.033	.113	.115
	Covariance	-.060	-.074	-.116	.178	-.080	.284	.298
TC2	Pearson Correlation	-.068	-.133	-.130	.032	-.057	.038	.111
	Covariance	-.081	-.148	-.176	.080	-.139	.094	.286
TC3	Pearson Correlation	.132	.040	-.013	.094	.073	.111	.117
	Covariance	.170	.048	-.019	.251	.191	.297	.323
TC4	Pearson Correlation	.052	.060	.010	.006	-.082	-.008	.084
	Covariance	.061	.065	.013	.015	-.194	-.019	.210
T1	Pearson Correlation	.027	-.013	.003	.005	-.034	.026	.098
	Covariance	.030	-.013	.004	.011	-.077	.058	.232
T2	Pearson Correlation	.008	-.086	-.089	.075	-.016	.076	.164
	Covariance	.009	-.090	-.114	.176	-.036	.179	.400
T3	Pearson Correlation	-.015	-.069	-.085	-.008	-.062	-.009	.043
	Covariance	-.021	-.088	-.133	-.022	-.174	-.027	.128
IQ1	Pearson Correlation	.025	.036	.008	.023	-.063	.015	.030
	Covariance	.063	.084	.023	.117	-.322	.078	.159
IQ2	Pearson Correlation	.002	.013	.014	.012	-.075	.016	-.034
	Covariance	.004	.028	.039	.060	-.367	.078	-.173
IQ3	Pearson Correlation	.057	.050	-.007	.028	.004	.092	-.001
	Covariance	.150	.121	-.021	.150	.021	.500	-.007
IQ4	Pearson Correlation	-.006	-.006	-.010	-.062	-.080	-.003	-.053
	Covariance	-.013	-.014	-.027	-.304	-.383	-.013	-.270
SQ1	Pearson Correlation	.049	-.053	-.068	-.050	-.136	-.034	-.024
	Covariance	.116	-.118	-.184	-.250	-.664	-.170	-.126
SQ2	Pearson Correlation	.015	-.025	-.062	-.083	-.126	-.042	-.055
	Covariance	.036	-.055	-.167	-.409	-.607	-.204	-.278
SQ3	Pearson Correlation	-.010	-.053	-.091	-.092	-.106	-.036	-.036
	Covariance	-.024	-.123	-.256	-.476	-.538	-.186	-.190
SQ4	Pearson Correlation	-.009	-.099	-.083	-.103	-.115	-.069	-.061
	Covariance	-.021	-.212	-.217	-.490	-.537	-.328	-.300
S1	Pearson Correlation	-.047	-.078	-.123	-.020	-.122	-.016	.073
	Covariance	-.114	-.176	-.338	-.099	-.603	-.080	.378

Correlations

		CONF1	CONF2	CONF3	KNOW1	KNOW2	KNOW3	INV1
S2	Pearson Correlation	-.041	-.092	-.090	-.057	-.107	-.029	.013
	Covariance	-.098	-.206	-.246	-.284	-.522	-.144	.067
S3	Pearson Correlation	.007	-.009	-.075	-.044	-.095	-.013	.052
	Covariance	.017	-.021	-.210	-.222	-.474	-.068	.274
S4	Pearson Correlation	-.097	-.100	-.096	-.111	-.147	-.079	.008
	Covariance	-.215	-.206	-.241	-.510	-.662	-.360	.039
S5	Pearson Correlation	-.108	-.144	-.180*	-.010	-.077	.018	.127
	Covariance	-.285	-.354	-.543	-.053	-.417	.100	.723
S6	Pearson Correlation	-.071	-.111	-.139	.025	-.051	.051	.173*
	Covariance	-.201	-.290	-.445	.143	-.290	.298	1.043
DSQ	Pearson Correlation	-.084	-.124	-.168*	-.019	-.117	.011	.028
	Covariance	-.837	-1.150	-1.893	-.401	-2.366	.222	.609
DIQ	Pearson Correlation	-.169*	-.196*	-.221*	-.046	-.085	-.015	.043
	Covariance	-1.690	-1.825	-2.511	-.954	-1.733	-.303	.933

Correlations

		INV2	INV3	TA1	TA2	TA3	TA4	TA5
CONF1	Pearson Correlation	.069	-.038	.125	.023	.039	.169*	-.061
	Covariance	.113	-.055	.147	.033	.058	.193	-.057
CONF2	Pearson Correlation	.035	-.005	.102	-.039	-.054	.163	-.052
	Covariance	.053	-.006	.111	-.052	-.074	.173	-.045
CONF3	Pearson Correlation	-.016	-.006	.116	-.053	-.046	.184*	-.118
	Covariance	-.030	-.010	.154	-.086	-.076	.239	-.124
KNOW1	Pearson Correlation	.687*	.422*	.114	-.036	.000	.161	.016
	Covariance	2.353	1.264	.278	-.107	.000	.382	.031
KNOW2	Pearson Correlation	.639*	.432*	.066	-.143	-.125	.086	-.118
	Covariance	2.146	1.269	.156	-.417	-.374	.200	-.223
KNOW3	Pearson Correlation	.652*	.401*	.162	-.037	.015	.115	.009
	Covariance	2.229	1.196	.392	-.109	.044	.273	.018
INV1	Pearson Correlation	.812*	.557*	.075	-.035	.007	.174*	.012
	Covariance	2.875	1.724	.189	-.107	.021	.426	.023
INV2	Pearson Correlation	1	.595*	.131	-.057	.094	.179*	-.004
	Covariance	3.633	1.888	.338	-.179	.304	.450	-.009
INV3	Pearson Correlation	.595*	1	.045	-.185*	-.049	.127	-.001
	Covariance	1.888	2.775	.100	-.512	-.138	.280	-.001
TA1	Pearson Correlation	.131	.045	1	.390*	.452*	.184*	.261*
	Covariance	.338	.100	1.824	.873	1.034	.328	.377
TA2	Pearson Correlation	-.057	-.185*	.390*	1	.551*	.109	.230*
	Covariance	-.179	-.512	.873	2.750	1.547	.238	.407
TA3	Pearson Correlation	.094	-.049	.452*	.551*	1	.244*	.376*
	Covariance	.304	-.138	1.034	1.547	2.867	.545	.680
TA4	Pearson Correlation	.179*	.127	.184*	.109	.244*	1	.336*
	Covariance	.450	.280	.328	.238	.545	1.746	.475
TA5	Pearson Correlation	-.004	-.001	.261*	.230*	.376*	.336*	1
	Covariance	-.009	-.001	.377	.407	.680	.475	1.144
TA6	Pearson Correlation	.106	.199*	.220*	.203*	.131	.287*	.093
	Covariance	.273	.449	.402	.455	.299	.512	.135
CQ1	Pearson Correlation	.090	.095	.274*	.317*	.536*	.441*	.496*
	Covariance	.236	.219	.511	.725	1.252	.805	.732
CQ2	Pearson Correlation	.080	-.035	.250*	.298*	.519*	.354*	.448*
	Covariance	.220	-.084	.489	.715	1.273	.677	.694
CQ3	Pearson Correlation	.026	-.058	.525*	.530*	.604*	.353*	.414*
	Covariance	.076	-.146	1.084	1.344	1.565	.713	.676
CQ4	Pearson Correlation	.148	.115	.301*	.197*	.323*	.457*	.465*
	Covariance	.307	.209	.444	.357	.597	.660	.543
CQ5	Pearson Correlation	.122	.115	.441*	.416*	.419*	.225*	.305*
	Covariance	.313	.259	.802	.929	.956	.401	.440
CQ6	Pearson Correlation	.157	.123	.220*	.184*	.331*	.414*	.393*
	Covariance	.368	.252	.365	.374	.688	.672	.516
SC1	Pearson Correlation	.170*	.138	.292*	.273*	.380*	.282*	.440*
	Covariance	.434	.308	.529	.607	.862	.499	.630
SC2	Pearson Correlation	.071	.062	.389*	.404*	.530*	.464*	.488*
	Covariance	.185	.142	.721	.918	1.229	.841	.715
SC3	Pearson Correlation	.094	.125	.135	.149	.287*	.178*	.480*
	Covariance	.215	.250	.219	.295	.582	.281	.614
SC4	Pearson Correlation	.046	-.002	.225*	.336*	.374*	.381*	.449*
	Covariance	.105	-.003	.362	.665	.755	.601	.572
SC5	Pearson Correlation	.136	.008	.364*	.459*	.613*	.449*	.443*
	Covariance	.372	.019	.703	1.089	1.485	.850	.678
AP1	Pearson Correlation	-.131	-.145	.347*	.475*	.427*	.238*	.396*
	Covariance	-.414	-.399	.774	1.301	1.196	.521	.700

Correlations

		TA6	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6
AP2	Pearson Correlation	.095	.451**	.407**	.603**	.355**	.430**	.315**
	Covariance	.207	1.006	.952	1.488	.626	.935	.624
AP3	Pearson Correlation	.251**	.349**	.328**	.558**	.409**	.365**	.390**
	Covariance	.445	.633	.625	1.120	.587	.645	.629
AP4	Pearson Correlation	.242**	.457**	.423**	.501**	.425**	.419**	.371**
	Covariance	.438	.842	.819	1.024	.620	.755	.609
AP5	Pearson Correlation	.144	.470**	.455**	.509**	.426**	.332**	.338**
	Covariance	.225	.746	.760	.897	.535	.515	.478
TB1	Pearson Correlation	.134	.476**	.556**	.342**	.547**	.246**	.597**
	Covariance	.239	.864	1.059	.688	.785	.436	.963
TB2	Pearson Correlation	.087	.485**	.520**	.455**	.450**	.371**	.518**
	Covariance	.160	.915	1.031	.951	.673	.684	.871
TB3	Pearson Correlation	.132	.461**	.539**	.315**	.497**	.306**	.523**
	Covariance	.229	.817	1.003	.618	.697	.529	.824
TI1	Pearson Correlation	.141	.496**	.509**	.300**	.559**	.268**	.704**
	Covariance	.207	.741	.798	.496	.660	.390	.935
TI2	Pearson Correlation	.066	.540**	.549**	.321**	.501**	.321**	.658**
	Covariance	.113	.937	1.001	.616	.687	.544	1.016
TI3	Pearson Correlation	.150	.365**	.394**	.206**	.445**	.230**	.599**
	Covariance	.190	.470	.533	.294	.454	.290	.686
TI4	Pearson Correlation	.186**	.557**	.595**	.381**	.605**	.313**	.667**
	Covariance	.328	1.002	1.123	.757	.861	.549	1.067
TC1	Pearson Correlation	.075	.740**	.730**	.544**	.528**	.385**	.687**
	Covariance	.143	1.429	1.481	1.164	.808	.726	1.180
TC2	Pearson Correlation	.091	.703**	.712**	.628**	.493**	.481**	.646**
	Covariance	.171	1.340	1.424	1.326	.743	.895	1.096
TC3	Pearson Correlation	.189**	.733**	.692**	.566**	.524**	.390**	.655**
	Covariance	.381	1.503	1.490	1.285	.850	.781	1.195
TC4	Pearson Correlation	.174**	.708**	.601**	.496**	.593**	.332**	.703**
	Covariance	.318	1.319	1.177	1.023	.874	.604	1.166
T1	Pearson Correlation	.156	.554**	.602**	.350**	.599**	.208**	.703**
	Covariance	.269	.973	1.110	.682	.832	.357	1.099
T2	Pearson Correlation	.141	.446**	.549**	.313**	.545**	.286**	.594**
	Covariance	.250	.808	1.044	.627	.781	.505	.958
T3	Pearson Correlation	.036	.382**	.438**	.194**	.496**	.116	.477**
	Covariance	.078	.838	1.009	.472	.861	.249	.931
IQ1	Pearson Correlation	.228**	.604**	.590**	.503**	.435**	.347**	.444**
	Covariance	.890	2.402	2.462	2.217	1.369	1.348	1.572
IQ2	Pearson Correlation	.217**	.601**	.599**	.514**	.408**	.347**	.426**
	Covariance	.810	2.294	2.399	2.171	1.231	1.294	1.446
IQ3	Pearson Correlation	.189**	.574**	.578**	.517**	.299**	.372**	.341**
	Covariance	.771	2.393	2.529	2.386	.986	1.514	1.264
IQ4	Pearson Correlation	.174**	.564**	.562**	.506**	.301**	.327**	.310**
	Covariance	.643	2.127	2.226	2.116	.897	1.205	1.040
SQ1	Pearson Correlation	.228**	.518**	.507**	.588**	.281**	.467**	.274**
	Covariance	.851	1.974	2.029	2.482	.848	1.739	.928
SQ2	Pearson Correlation	.247**	.487**	.471**	.566**	.278**	.435**	.264**
	Covariance	.913	1.835	1.862	2.361	.828	1.598	.885
SQ3	Pearson Correlation	.174**	.416**	.436**	.498**	.215**	.358**	.199**
	Covariance	.677	1.648	1.815	2.184	.675	1.384	.702
SQ4	Pearson Correlation	.188**	.439**	.447**	.554**	.271**	.408**	.228**
	Covariance	.674	1.608	1.719	2.250	.788	1.460	.744
S1	Pearson Correlation	.253**	.626**	.586**	.551**	.401**	.445**	.377**
	Covariance	.958	2.417	2.375	2.354	1.226	1.679	1.296

Correlations

		INV2	INV3	TA1	TA2	TA3	TA4	TA5
AP2	Pearson Correlation	.005	-.143	.437**	.647**	.534**	.238**	.432**
	Covariance	.014	-.385	.952	1.733	1.459	.507	.746
AP3	Pearson Correlation	.021	.033	.288**	.450**	.394**	.346**	.314**
	Covariance	.052	.072	.510	.980	.877	.600	.442
AP4	Pearson Correlation	.083	.078	.343**	.315**	.293**	.301**	.371**
	Covariance	.212	.173	.620	.698	.663	.531	.530
AP5	Pearson Correlation	.011	-.019	.289**	.460**	.480**	.406**	.477**
	Covariance	.024	-.036	.449	.878	.935	.617	.588
TB1	Pearson Correlation	-.026	.021	.255**	.095	.250**	.406**	.478**
	Covariance	-.064	.047	.453	.206	.557	.705	.672
TB2	Pearson Correlation	.130	.057	.304**	.278**	.384**	.318**	.599**
	Covariance	.340	.130	.561	.630	.890	.575	.876
TB3	Pearson Correlation	.063	.165	.238**	.140	.322**	.306**	.394**
	Covariance	.153	.353	.412	.297	.701	.519	.541
TI1	Pearson Correlation	.082	.102	.306**	.169**	.316**	.323**	.368**
	Covariance	.169	.184	.447	.303	.578	.461	.426
TI2	Pearson Correlation	.050	.072	.343**	.152	.301**	.334**	.300**
	Covariance	.121	.151	.583	.316	.641	.554	.404
TI3	Pearson Correlation	.011	-.050	.222**	.095	.063	.283**	.377**
	Covariance	.019	-.077	.280	.147	.100	.349	.376
TI4	Pearson Correlation	.065	.012	.348**	.204**	.361**	.396**	.468**
	Covariance	.161	.027	.612	.439	.795	.681	.652
TC1	Pearson Correlation	.153	.065	.319**	.286**	.543**	.383**	.474**
	Covariance	.408	.151	.602	.665	1.287	.708	.710
TC2	Pearson Correlation	.073	-.034	.379**	.434**	.584**	.386**	.501**
	Covariance	.192	-.079	.708	.993	1.367	.705	.740
TC3	Pearson Correlation	.128	-.013	.315**	.322**	.529**	.438**	.452**
	Covariance	.363	-.032	.632	.793	1.331	.860	.718
TC4	Pearson Correlation	.048	.040	.319**	.243**	.386**	.434**	.447**
	Covariance	.123	.091	.581	.545	.883	.774	.646
T1	Pearson Correlation	.021	.085	.284**	.086	.211**	.333**	.380**
	Covariance	.050	.181	.489	.182	.455	.559	.518
T2	Pearson Correlation	.096	.113	.259**	.116	.217**	.353**	.441**
	Covariance	.240	.247	.459	.252	.482	.612	.619
T3	Pearson Correlation	.030	.156	.159	-.001	.187**	.260**	.257**
	Covariance	.090	.412	.341	-.003	.502	.545	.437
IQ1	Pearson Correlation	.052	-.019	.377**	.309**	.410**	.301**	.433**
	Covariance	.287	-.089	1.469	1.476	1.999	1.146	1.335
IQ2	Pearson Correlation	-.041	-.026	.354**	.314**	.403**	.326**	.470**
	Covariance	-.215	-.118	1.323	1.438	1.884	1.192	1.389
IQ3	Pearson Correlation	.002	-.018	.419**	.350**	.433**	.261**	.473**
	Covariance	.014	-.093	1.707	1.750	2.214	1.043	1.529
IQ4	Pearson Correlation	-.071	-.072	.353**	.294**	.437**	.261**	.476**
	Covariance	-.370	-.327	1.304	1.333	2.024	.944	1.392
SQ1	Pearson Correlation	-.067	-.073	.464**	.506**	.618**	.192**	.434**
	Covariance	-.351	-.338	1.731	2.320	2.889	.700	1.283
SQ2	Pearson Correlation	-.103	-.067	.432**	.499**	.542**	.229**	.407**
	Covariance	-.535	-.305	1.593	2.256	2.501	.826	1.189
SQ3	Pearson Correlation	-.077	-.085	.432**	.479**	.496**	.129	.416**
	Covariance	-.421	-.404	1.673	2.282	2.410	.490	1.278
SQ4	Pearson Correlation	-.088	-.075	.450**	.456**	.541**	.160	.433**
	Covariance	-.444	-.333	1.613	2.009	2.433	.562	1.229
S1	Pearson Correlation	.068	.024	.485**	.449**	.617**	.287**	.527**
	Covariance	.360	.110	1.833	2.083	2.922	1.061	1.577

Correlations

		INV2	INV3	TA1	TA2	TA3	TA4	TA5
S2	Pearson Correlation	.021	.022	.477**	.450**	.577**	.324**	.521**
	Covariance	.112	.103	1.787	2.071	2.709	1.188	1.544
S3	Pearson Correlation	.048	-.020	.473**	.450**	.573**	.278**	.512**
	Covariance	.260	-.097	1.814	2.116	2.755	1.044	1.556
S4	Pearson Correlation	-.004	-.037	.419**	.369**	.550**	.288**	.526**
	Covariance	-.018	-.157	1.445	1.565	2.381	.973	1.438
S5	Pearson Correlation	.092	.071	.419**	.312**	.540**	.324**	.518**
	Covariance	.540	.361	1.734	1.587	2.800	1.313	1.698
S6	Pearson Correlation	.114	.066	.404**	.298**	.497**	.317**	.485**
	Covariance	.703	.359	1.773	1.603	2.733	1.362	1.684
DSQ	Pearson Correlation	.027	-.022	.365**	.393**	.455**	.255**	.422**
	Covariance	.593	-.429	5.661	7.485	8.854	3.872	5.193
DIQ	Pearson Correlation	.028	-.070	.357**	.364**	.416**	.258**	.467**
	Covariance	.628	-1.350	5.584	6.989	8.148	3.943	5.782

Correlations

		TA6	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6
CONF1	Pearson Correlation	.113	-.031	-.029	.114	.073	.130	.089
	Covariance	.133	-.037	-.037	.151	.069	.152	.095
CONF2	Pearson Correlation	.219*	.005	-.090	.031	.063	.046	.051
	Covariance	.238	.006	-.104	.039	.055	.050	.050
CONF3	Pearson Correlation	.093	-.066	-.087	.085	.060	.066	.061
	Covariance	.124	-.089	-.124	.128	.064	.088	.074
KNOW1	Pearson Correlation	.066	.053	.070	.061	.098	.119	.116
	Covariance	.161	.132	.181	.168	.193	.287	.256
KNOW2	Pearson Correlation	.089	-.004	-.012	.018	.065	.102	.082
	Covariance	.213	-.009	-.031	.048	.126	.244	.177
KNOW3	Pearson Correlation	.025	.066	.058	.094	.072	.159	.115
	Covariance	.061	.163	.151	.257	.141	.385	.254
INV1	Pearson Correlation	.140	.074	.099	.028	.130	.160	.257*
	Covariance	.351	.190	.265	.080	.265	.401	.586
INV2	Pearson Correlation	.106	.090	.080	.026	.148	.122	.157
	Covariance	.273	.236	.220	.076	.307	.313	.368
INV3	Pearson Correlation	.199*	.095	-.035	-.058	.115	.115	.123
	Covariance	.449	.219	-.084	-.146	.209	.259	.252
TA1	Pearson Correlation	.220*	.274*	.250*	.525*	.301*	.441*	.220*
	Covariance	.402	.511	.489	1.084	.444	.802	.365
TA2	Pearson Correlation	.203*	.317*	.298*	.530*	.197*	.416*	.184*
	Covariance	.455	.725	.715	1.344	.357	.929	.374
TA3	Pearson Correlation	.131	.536*	.519*	.604*	.323*	.419*	.331*
	Covariance	.299	1.252	1.273	1.565	.597	.956	.688
TA4	Pearson Correlation	.287*	.441*	.354*	.353*	.457*	.225*	.414*
	Covariance	.512	.805	.677	.713	.660	.401	.672
TA5	Pearson Correlation	.093	.496*	.448*	.414*	.465*	.305*	.393*
	Covariance	.135	.732	.694	.676	.543	.440	.516
TA6	Pearson Correlation	1	.162	.129	.194*	.119	.147	.139
	Covariance	1.830	.302	.254	.401	.176	.269	.230
CQ1	Pearson Correlation	.162	1	.681*	.574*	.528*	.430*	.603*
	Covariance	.302	1.905	1.361	1.211	.796	.800	1.023
CQ2	Pearson Correlation	.129	.681*	1	.540*	.447*	.375*	.608*
	Covariance	.254	1.361	2.099	1.196	.708	.732	1.081
CQ3	Pearson Correlation	.194*	.574*	.540*	1	.398*	.658*	.401*
	Covariance	.401	1.211	1.196	2.337	.665	1.356	.752
CQ4	Pearson Correlation	.119	.528*	.447*	.398*	1	.228*	.663*
	Covariance	.176	.796	.708	.665	1.193	.336	.889
CQ5	Pearson Correlation	.147	.430*	.375*	.658*	.228*	1	.362*
	Covariance	.269	.800	.732	1.356	.336	1.816	.599
CQ6	Pearson Correlation	.139	.603*	.608*	.401*	.663*	.362*	1
	Covariance	.230	1.023	1.081	.752	.889	.599	1.508
SC1	Pearson Correlation	.093	.321*	.461*	.299*	.351*	.279*	.407*
	Covariance	.169	.593	.895	.613	.514	.504	.669
SC2	Pearson Correlation	.293*	.524*	.450*	.468*	.475*	.426*	.501*
	Covariance	.543	.991	.893	.981	.711	.788	.844
SC3	Pearson Correlation	.036	.344*	.322*	.191*	.445*	.247*	.414*
	Covariance	.058	.569	.559	.350	.581	.399	.608
SC4	Pearson Correlation	.120	.395*	.314*	.320*	.368*	.229*	.414*
	Covariance	.194	.650	.543	.583	.479	.368	.606
SC5	Pearson Correlation	.230*	.713*	.586*	.545*	.477*	.395*	.523*
	Covariance	.446	1.409	1.215	1.192	.746	.763	.919
AP1	Pearson Correlation	.080	.434*	.381*	.578*	.376*	.375*	.256*
	Covariance	.178	.990	.912	1.461	.680	.835	.520

Correlations

		AP3	AP4	AP5	TB1	TB2	TB3	TI1
S2	Pearson Correlation	.407**	.400**	.464**	.409**	.567**	.492**	.397**
	Covariance	1.480	1.484	1.480	1.492	2.150	1.750	1.189
S3	Pearson Correlation	.353**	.339**	.398**	.357**	.536**	.428**	.376**
	Covariance	1.314	1.288	1.299	1.333	2.080	1.560	1.155
S4	Pearson Correlation	.365**	.370**	.439**	.381**	.568**	.442**	.378**
	Covariance	1.223	1.263	1.290	1.280	1.986	1.452	1.046
S5	Pearson Correlation	.307**	.353**	.424**	.462**	.561**	.478**	.404**
	Covariance	1.234	1.445	1.497	1.859	2.351	1.883	1.339
S6	Pearson Correlation	.310**	.331**	.401**	.517**	.581**	.508**	.433**
	Covariance	1.323	1.437	1.500	2.207	2.582	2.120	1.522
DSQ	Pearson Correlation	.272**	.228**	.371**	.235**	.484**	.321**	.256**
	Covariance	4.104	3.502	4.906	3.548	7.604	4.742	3.181
DIQ	Pearson Correlation	.335**	.254**	.343**	.317**	.509**	.310**	.288**
	Covariance	5.084	3.933	4.575	4.813	8.052	4.600	3.608

Correlations

		TA6	CQ1	CQ2	CQ3	CQ4	CQ5	CQ6
S2	Pearson Correlation	.214*	.632*	.593*	.580*	.415*	.475*	.386*
	Covariance	.802	2.418	2.381	2.457	1.256	1.776	1.315
S3	Pearson Correlation	.171*	.574*	.573*	.554*	.365*	.424*	.363*
	Covariance	.657	2.247	2.359	2.404	1.131	1.623	1.266
S4	Pearson Correlation	.162	.624*	.583*	.552*	.351*	.396*	.354*
	Covariance	.560	2.200	2.157	2.158	.979	1.365	1.112
S5	Pearson Correlation	.190*	.636*	.567*	.490*	.455*	.396*	.414*
	Covariance	.787	2.690	2.517	2.294	1.522	1.634	1.559
S6	Pearson Correlation	.156	.622*	.573*	.488*	.462*	.403*	.442*
	Covariance	.687	2.791	2.699	2.421	1.639	1.765	1.762
DSQ	Pearson Correlation	.088	.363*	.335*	.343*	.184*	.284*	.161
	Covariance	1.372	5.760	5.588	6.024	2.306	4.401	2.273
DIQ	Pearson Correlation	.114	.490*	.479*	.489*	.289*	.374*	.239*
	Covariance	1.779	7.830	8.026	8.655	3.646	5.836	3.397

Correlations

		SC1	SC2	SC3	SC4	SC5	AP1	AP2
CONF1	Pearson Correlation	.121	.121	-.022	.086	.053	-.009	.075
	Covariance	.140	.143	-.023	.089	.066	-.013	.104
CONF2	Pearson Correlation	-.063	.090	-.080	.053	.015	-.092	-.014
	Covariance	-.068	.099	-.077	.051	.018	-.122	-.018
CONF3	Pearson Correlation	.019	.089	-.157	.004	-.009	-.101	-.070
	Covariance	.025	.120	-.185	.004	-.013	-.164	-.110
KNOW1	Pearson Correlation	.063	.025	.147	.084	.081	-.101	-.026
	Covariance	.152	.062	.316	.181	.209	-.299	-.075
KNOW2	Pearson Correlation	-.029	-.086	.091	-.006	-.016	-.144	-.089
	Covariance	-.069	-.208	.192	-.013	-.041	-.420	-.253
KNOW3	Pearson Correlation	.066	.089	.157	.016	.091	-.089	-.009
	Covariance	.158	.220	.338	.034	.233	-.264	-.025
INV1	Pearson Correlation	.110	.114	.101	.084	.068	-.061	.018
	Covariance	.274	.290	.225	.187	.182	-.187	.053
INV2	Pearson Correlation	.170*	.071	.094	.046	.136	-.131	.005
	Covariance	.434	.185	.215	.105	.372	-.414	.014
INV3	Pearson Correlation	.138	.062	.125	-.002	.008	-.145	-.143
	Covariance	.308	.142	.250	-.003	.019	-.399	-.385
TA1	Pearson Correlation	.292*	.389*	.135	.225*	.364*	.347*	.437*
	Covariance	.529	.721	.219	.362	.703	.774	.952
TA2	Pearson Correlation	.273*	.404*	.149	.336*	.459*	.475*	.647*
	Covariance	.607	.918	.295	.665	1.089	1.301	1.733
TA3	Pearson Correlation	.380*	.530*	.287*	.374*	.613*	.427*	.534*
	Covariance	.862	1.229	.582	.755	1.485	1.196	1.459
TA4	Pearson Correlation	.282*	.464*	.178*	.381*	.449*	.238*	.238*
	Covariance	.499	.841	.281	.601	.850	.521	.507
TA5	Pearson Correlation	.440*	.488*	.480*	.449*	.443*	.396*	.432*
	Covariance	.630	.715	.614	.572	.678	.700	.746
TA6	Pearson Correlation	.093	.293*	.036	.120	.230*	.080	.095
	Covariance	.169	.543	.058	.194	.446	.178	.207
CQ1	Pearson Correlation	.321*	.524*	.344*	.395*	.713*	.434*	.451*
	Covariance	.593	.991	.569	.650	1.409	.990	1.006
CQ2	Pearson Correlation	.461*	.450*	.322*	.314*	.586*	.381*	.407*
	Covariance	.895	.893	.559	.543	1.215	.912	.952
CQ3	Pearson Correlation	.299*	.468*	.191*	.320*	.545*	.578*	.603*
	Covariance	.613	.981	.350	.583	1.192	1.461	1.488
CQ4	Pearson Correlation	.351*	.475*	.445*	.368*	.477*	.376*	.355*
	Covariance	.514	.711	.581	.479	.746	.680	.626
CQ5	Pearson Correlation	.279*	.426*	.247*	.229*	.395*	.375*	.430*
	Covariance	.504	.788	.399	.368	.763	.835	.935
CQ6	Pearson Correlation	.407*	.501*	.414*	.414*	.523*	.256*	.315*
	Covariance	.669	.844	.608	.606	.919	.520	.624
SC1	Pearson Correlation	1	.547*	.398*	.457*	.355*	.317*	.390*
	Covariance	1.794	1.004	.638	.730	.681	.701	.843
SC2	Pearson Correlation	.547*	1	.433*	.448*	.575*	.446*	.490*
	Covariance	1.004	1.879	.711	.733	1.128	1.011	1.084
SC3	Pearson Correlation	.398*	.433*	1	.408*	.255*	.195*	.218*
	Covariance	.638	.711	1.433	.583	.437	.385	.421
SC4	Pearson Correlation	.457*	.448*	.408*	1	.391*	.293*	.341*
	Covariance	.730	.733	.583	1.422	.668	.577	.657
SC5	Pearson Correlation	.355*	.575*	.255*	.391*	1	.398*	.490*
	Covariance	.681	1.128	.437	.668	2.049	.941	1.131
AP1	Pearson Correlation	.317*	.446*	.195*	.293*	.398*	1	.721*
	Covariance	.701	1.011	.385	.577	.941	2.733	1.923

Correlations

		SC1	SC2	SC3	SC4	SC5	AP1	AP2
AP2	Pearson Correlation	.390**	.490**	.218**	.341**	.490**	.721**	1
	Covariance	.843	1.084	.421	.657	1.131	1.923	2.605
AP3	Pearson Correlation	.337**	.385**	.176**	.413**	.420**	.574**	.570**
	Covariance	.593	.692	.276	.647	.789	1.246	1.209
AP4	Pearson Correlation	.247**	.412**	.267**	.262**	.448**	.552**	.452**
	Covariance	.442	.754	.426	.417	.857	1.219	.974
AP5	Pearson Correlation	.418**	.542**	.286**	.444**	.487**	.507**	.510**
	Covariance	.645	.855	.395	.609	.802	.965	.947
TB1	Pearson Correlation	.454**	.464**	.394**	.251**	.425**	.254**	.250**
	Covariance	.799	.836	.619	.394	.799	.552	.530
TB2	Pearson Correlation	.545**	.529**	.400**	.475**	.465**	.403**	.436**
	Covariance	.999	.992	.655	.775	.911	.910	.962
TB3	Pearson Correlation	.504**	.448**	.383**	.290**	.307**	.293**	.269**
	Covariance	.867	.788	.590	.444	.564	.622	.557
TI1	Pearson Correlation	.434**	.488**	.270**	.311**	.473**	.231**	.290**
	Covariance	.629	.724	.350	.402	.732	.412	.506
TI2	Pearson Correlation	.368**	.499**	.339**	.254**	.465**	.238**	.302**
	Covariance	.620	.859	.510	.381	.837	.495	.612
TI3	Pearson Correlation	.424**	.482**	.334**	.360**	.287**	.173**	.198**
	Covariance	.530	.617	.373	.401	.384	.267	.298
TI4	Pearson Correlation	.449**	.573**	.355**	.403**	.571**	.297**	.382**
	Covariance	.784	1.022	.553	.626	1.064	.639	.802
TC1	Pearson Correlation	.368**	.487**	.339**	.310**	.611**	.327**	.417**
	Covariance	.689	.934	.568	.517	1.225	.756	.942
TC2	Pearson Correlation	.419**	.501**	.300**	.384**	.652**	.509**	.552**
	Covariance	.776	.948	.496	.632	1.288	1.163	1.231
TC3	Pearson Correlation	.390**	.476**	.402**	.393**	.652**	.439**	.508**
	Covariance	.775	.970	.715	.697	1.387	1.079	1.218
TC4	Pearson Correlation	.358**	.448**	.335**	.360**	.552**	.352**	.407**
	Covariance	.648	.830	.541	.579	1.067	.786	.886
T1	Pearson Correlation	.444**	.476**	.349**	.334**	.454**	.276**	.289**
	Covariance	.757	.830	.531	.507	.827	.582	.594
T2	Pearson Correlation	.500**	.436**	.400**	.271**	.387**	.264**	.225**
	Covariance	.878	.785	.629	.424	.727	.572	.476
T3	Pearson Correlation	.352**	.338**	.306**	.146	.286**	.151	.132
	Covariance	.748	.736	.582	.276	.649	.396	.337
IQ1	Pearson Correlation	.279**	.418**	.232**	.325**	.447**	.326**	.395**
	Covariance	1.075	1.650	.799	1.117	1.845	1.552	1.836
IQ2	Pearson Correlation	.314**	.432**	.252**	.319**	.432**	.372**	.419**
	Covariance	1.163	1.638	.834	1.051	1.710	1.700	1.868
IQ3	Pearson Correlation	.314**	.447**	.287**	.355**	.450**	.378**	.471**
	Covariance	1.271	1.850	1.036	1.279	1.943	1.886	2.293
IQ4	Pearson Correlation	.284**	.451**	.235**	.331**	.407**	.406**	.420**
	Covariance	1.040	1.689	.768	1.080	1.592	1.836	1.854
SQ1	Pearson Correlation	.393**	.549**	.215**	.353**	.516**	.533**	.618**
	Covariance	1.453	2.077	.711	1.163	2.041	2.433	2.756
SQ2	Pearson Correlation	.313**	.509**	.199**	.370**	.518**	.515**	.570**
	Covariance	1.145	1.905	.649	1.204	2.022	2.324	2.509
SQ3	Pearson Correlation	.335**	.440**	.185**	.308**	.425**	.466**	.561**
	Covariance	1.288	1.732	.635	1.053	1.746	2.212	2.599
SQ4	Pearson Correlation	.344**	.497**	.196**	.331**	.449**	.514**	.544**
	Covariance	1.224	1.811	.623	1.049	1.707	2.259	2.333
S1	Pearson Correlation	.384**	.513**	.287**	.435**	.596**	.391**	.488**
	Covariance	1.439	1.967	.961	1.451	2.385	1.808	2.200

Correlations

		SC1	SC2	SC3	SC4	SC5	AP1	AP2
S2	Pearson Correlation	.375**	.513**	.301**	.418**	.577**	.404**	.472**
	Covariance	1.393	1.951	.997	1.380	2.291	1.852	2.112
S3	Pearson Correlation	.353**	.505**	.282**	.421**	.588**	.379**	.499**
	Covariance	1.344	1.964	.957	1.425	2.391	1.779	2.286
S4	Pearson Correlation	.351**	.498**	.255**	.399**	.541**	.358**	.412**
	Covariance	1.203	1.744	.780	1.215	1.979	1.512	1.699
S5	Pearson Correlation	.374**	.511**	.345**	.431**	.570**	.418**	.421**
	Covariance	1.534	2.145	1.265	1.575	2.499	2.119	2.081
S6	Pearson Correlation	.378**	.512**	.324**	.362**	.559**	.398**	.380**
	Covariance	1.645	2.278	1.261	1.402	2.601	2.140	1.991
DSQ	Pearson Correlation	.312**	.434**	.182**	.304**	.443**	.378**	.440**
	Covariance	4.806	6.839	2.500	4.166	7.294	7.182	8.155
DIQ	Pearson Correlation	.252**	.409**	.201**	.271**	.491**	.370**	.458**
	Covariance	3.907	6.488	2.779	3.743	8.126	7.069	8.545

Correlations

		AP3	AP4	AP5	TB1	TB2	TB3	TI1
CONF1	Pearson Correlation	.173*	.093	-.059	.020	-.033	-.051	.011
	Covariance	.197	.108	-.059	.023	-.039	-.056	.010
CONF2	Pearson Correlation	.057	.041	-.083	-.038	-.132	-.102	-.014
	Covariance	.061	.044	-.077	-.040	-.145	-.105	-.012
CONF3	Pearson Correlation	.113	.051	-.069	-.033	-.144	-.092	-.053
	Covariance	.147	.068	-.078	-.043	-.193	-.116	-.057
KNOW1	Pearson Correlation	.100	.119	.071	-.052	.025	-.024	-.049
	Covariance	.235	.287	.147	-.122	.061	-.056	-.095
KNOW2	Pearson Correlation	.030	.090	.015	-.120	-.077	-.096	-.048
	Covariance	.071	.212	.030	-.277	-.185	-.217	-.092
KNOW3	Pearson Correlation	.069	.107	.103	-.041	.033	.024	-.026
	Covariance	.163	.256	.212	-.098	.081	.055	-.050
INV1	Pearson Correlation	.036	.091	-.031	.082	.189*	.066	.110
	Covariance	.089	.226	-.067	.201	.480	.156	.221
INV2	Pearson Correlation	.021	.083	.011	-.026	.130	.063	.082
	Covariance	.052	.212	.024	-.064	.340	.153	.169
INV3	Pearson Correlation	.033	.078	-.019	.021	.057	.165	.102
	Covariance	.072	.173	-.036	.047	.130	.353	.184
TA1	Pearson Correlation	.288*	.343*	.289*	.255*	.304*	.238*	.306*
	Covariance	.510	.620	.449	.453	.561	.412	.447
TA2	Pearson Correlation	.450*	.315*	.460*	.095	.278*	.140	.169*
	Covariance	.980	.698	.878	.206	.630	.297	.303
TA3	Pearson Correlation	.394*	.293*	.480*	.250*	.384*	.322*	.316*
	Covariance	.877	.663	.935	.557	.890	.701	.578
TA4	Pearson Correlation	.346*	.301*	.406*	.406*	.318*	.306*	.323*
	Covariance	.600	.531	.617	.705	.575	.519	.461
TA5	Pearson Correlation	.314*	.371*	.477*	.478*	.599*	.394*	.368*
	Covariance	.442	.530	.588	.672	.876	.541	.426
TA6	Pearson Correlation	.251*	.242*	.144	.134	.087	.132	.141
	Covariance	.445	.438	.225	.239	.160	.229	.207
CQ1	Pearson Correlation	.349*	.457*	.470*	.476*	.485*	.461*	.496*
	Covariance	.633	.842	.746	.864	.915	.817	.741
CQ2	Pearson Correlation	.328*	.423*	.455*	.556*	.520*	.539*	.509*
	Covariance	.625	.819	.760	1.059	1.031	1.003	.798
CQ3	Pearson Correlation	.558*	.501*	.509*	.342*	.455*	.315*	.300*
	Covariance	1.120	1.024	.897	.688	.951	.618	.496
CQ4	Pearson Correlation	.409*	.425*	.426*	.547*	.450*	.497*	.559*
	Covariance	.587	.620	.535	.785	.673	.697	.860
CQ5	Pearson Correlation	.365*	.419*	.332*	.246*	.371*	.306*	.268*
	Covariance	.645	.755	.515	.436	.684	.529	.390
CQ6	Pearson Correlation	.390*	.371*	.338*	.597*	.518*	.523*	.704*
	Covariance	.629	.609	.478	.963	.871	.824	.935
SC1	Pearson Correlation	.337*	.247*	.418*	.454*	.545*	.504*	.434*
	Covariance	.593	.442	.645	.799	.999	.867	.629
SC2	Pearson Correlation	.385*	.412*	.542*	.464*	.529*	.448*	.486*
	Covariance	.692	.754	.855	.836	.992	.788	.724
SC3	Pearson Correlation	.176*	.267*	.286*	.394*	.400*	.383*	.270*
	Covariance	.276	.426	.395	.619	.655	.590	.350
SC4	Pearson Correlation	.413*	.262*	.444*	.251*	.475*	.290*	.311*
	Covariance	.647	.417	.609	.394	.775	.444	.402
SC5	Pearson Correlation	.420*	.448*	.487*	.425*	.465*	.307*	.473*
	Covariance	.789	.857	.802	.799	.911	.564	.732
AP1	Pearson Correlation	.574*	.552*	.507*	.254*	.403*	.293*	.231*
	Covariance	1.246	1.219	.965	.552	.910	.622	.412

Correlations

		AP3	AP4	AP5	TB1	TB2	TB3	TI1
AP2	Pearson Correlation	.570**	.452**	.510**	.250**	.436**	.269**	.290**
	Covariance	1.209	.974	.947	.530	.962	.557	.506
AP3	Pearson Correlation	1	.638**	.477**	.258**	.444**	.295**	.340**
	Covariance	1.724	1.120	.720	.446	.797	.498	.483
AP4	Pearson Correlation	.638**	1	.358**	.295**	.378**	.341**	.325**
	Covariance	1.120	1.786	.551	.518	.690	.585	.470
AP5	Pearson Correlation	.477**	.358**	1	.297**	.520**	.329**	.343**
	Covariance	.720	.551	1.325	.449	.818	.487	.427
TB1	Pearson Correlation	.258**	.295**	.297**	1	.578**	.712**	.627**
	Covariance	.446	.518	.449	1.727	1.038	1.202	.892
TB2	Pearson Correlation	.444**	.378**	.520**	.578**	1	.577**	.507**
	Covariance	.797	.690	.818	1.038	1.871	1.014	.750
TB3	Pearson Correlation	.295**	.341**	.329**	.712**	.577**	1	.646**
	Covariance	.498	.585	.487	1.202	1.014	1.650	.898
TI1	Pearson Correlation	.340**	.325**	.343**	.627**	.507**	.646**	1
	Covariance	.483	.470	.427	.892	.750	.898	1.170
TI2	Pearson Correlation	.310**	.398**	.337**	.650**	.524**	.630**	.714**
	Covariance	.511	.669	.488	1.075	.900	1.018	.971
TI3	Pearson Correlation	.205**	.311**	.338**	.595**	.490**	.551**	.637**
	Covariance	.252	.388	.363	.729	.626	.660	.642
TI4	Pearson Correlation	.346**	.369**	.390**	.672**	.604**	.676**	.766**
	Covariance	.591	.641	.585	1.150	1.075	1.130	1.078
TC1	Pearson Correlation	.359**	.385**	.509**	.537**	.578**	.547**	.611**
	Covariance	.659	.720	.821	.987	1.106	.983	.925
TC2	Pearson Correlation	.501**	.468**	.526**	.551**	.615**	.521**	.551**
	Covariance	.908	.864	.837	1.001	1.161	.924	.823
TC3	Pearson Correlation	.419**	.419**	.472**	.519**	.502**	.470**	.529**
	Covariance	.818	.832	.808	1.014	1.021	.898	.850
TC4	Pearson Correlation	.408**	.376**	.359**	.610**	.603**	.579**	.613**
	Covariance	.724	.678	.558	1.083	1.114	1.003	.895
T1	Pearson Correlation	.288**	.337**	.315**	.692**	.533**	.676**	.738**
	Covariance	.481	.572	.461	1.157	.928	1.105	1.016
T2	Pearson Correlation	.312**	.383**	.306**	.794**	.555**	.736**	.695**
	Covariance	.537	.672	.462	1.368	.997	1.240	.986
T3	Pearson Correlation	.273**	.208**	.218**	.616**	.406**	.529**	.511**
	Covariance	.570	.441	.400	1.286	.882	1.080	.878
IQ1	Pearson Correlation	.379**	.395**	.287**	.410**	.449**	.446**	.410**
	Covariance	1.434	1.521	.953	1.551	1.770	1.652	1.277
IQ2	Pearson Correlation	.382**	.385**	.320**	.444**	.413**	.515**	.370**
	Covariance	1.387	1.423	1.017	1.612	1.562	1.830	1.107
IQ3	Pearson Correlation	.364**	.340**	.333**	.346**	.464**	.431**	.311**
	Covariance	1.443	1.371	1.157	1.371	1.914	1.671	1.014
IQ4	Pearson Correlation	.347**	.342**	.332**	.331**	.448**	.402**	.269**
	Covariance	1.247	1.251	1.046	1.188	1.676	1.412	.796
SQ1	Pearson Correlation	.495**	.405**	.415**	.318**	.468**	.401**	.325**
	Covariance	1.795	1.496	1.321	1.154	1.769	1.423	.970
SQ2	Pearson Correlation	.489**	.397**	.411**	.288**	.455**	.390**	.315**
	Covariance	1.750	1.449	1.291	1.034	1.697	1.366	.930
SQ3	Pearson Correlation	.402**	.310**	.355**	.254**	.445**	.392**	.290**
	Covariance	1.516	1.187	1.174	.956	1.745	1.445	.901
SQ4	Pearson Correlation	.467**	.381**	.396**	.251**	.485**	.374**	.285**
	Covariance	1.628	1.353	1.210	.875	1.763	1.276	.818
S1	Pearson Correlation	.390**	.371**	.431**	.399**	.575**	.481**	.391**
	Covariance	1.433	1.385	1.387	1.466	2.199	1.728	1.184

Correlations

		S3	S4	S5	S6	DSQ	DIQ
S2	Pearson Correlation	.918**	.937**	.832**	.787**	.549**	.639**
	Covariance	7.224	6.639	7.071	7.091	17.505	20.488
S3	Pearson Correlation	1	.893**	.812**	.776**	.568**	.649**
	Covariance	8.060	6.479	7.068	7.159	18.528	21.328
S4	Pearson Correlation	.893**	1	.808**	.771**	.544**	.637**
	Covariance	6.479	6.531	6.329	6.404	15.967	18.844
S5	Pearson Correlation	.812**	.808**	1	.935**	.516**	.619**
	Covariance	7.068	6.329	9.394	9.314	18.196	21.948
S6	Pearson Correlation	.776**	.771**	.935**	1	.468**	.597**
	Covariance	7.159	6.404	9.314	10.552	17.468	22.452
DSQ	Pearson Correlation	.568**	.544**	.516**	.468**	1	.776**
	Covariance	18.528	15.967	18.196	17.468	132.147	103.223
DIQ	Pearson Correlation	.649**	.637**	.619**	.597**	.776**	1
	Covariance	21.328	18.844	21.948	22.452	103.223	133.890

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		TI2	TI3	TI4	TC1	TC2	TC3	TC4
CONF1	Pearson Correlation	.051	.073	.026	-.050	-.068	.132	.052
	Covariance	.056	.059	.029	-.060	-.081	.170	.061
CONF2	Pearson Correlation	.009	.056	-.009	-.066	-.133	.040	.060
	Covariance	.009	.042	-.010	-.074	-.148	.048	.065
CONF3	Pearson Correlation	.014	.016	-.031	-.084	-.130	-.013	.010
	Covariance	.017	.015	-.040	-.116	-.176	-.019	.013
KNOW1	Pearson Correlation	.023	.072	.003	.071	.032	.094	.006
	Covariance	.052	.120	.007	.178	.080	.251	.015
KNOW2	Pearson Correlation	-.043	.039	-.098	-.033	-.057	.073	-.082
	Covariance	-.095	.064	-.224	-.080	-.139	.191	-.194
KNOW3	Pearson Correlation	.042	.071	.013	.113	.038	.111	-.008
	Covariance	.094	.119	.030	.284	.094	.297	-.019
INV1	Pearson Correlation	.168*	.127	.118	.115	.111	.117	.084
	Covariance	.392	.220	.285	.298	.286	.323	.210
INV2	Pearson Correlation	.050	.011	.065	.153	.073	.128	.048
	Covariance	.121	.019	.161	.408	.192	.363	.123
INV3	Pearson Correlation	.072	-.050	.012	.065	-.034	-.013	.040
	Covariance	.151	-.077	.027	.151	-.079	-.032	.091
TA1	Pearson Correlation	.343*	.222*	.348*	.319*	.379*	.315*	.319*
	Covariance	.583	.280	.612	.602	.708	.632	.581
TA2	Pearson Correlation	.152	.095	.204*	.286*	.434*	.322*	.243*
	Covariance	.316	.147	.439	.665	.993	.793	.545
TA3	Pearson Correlation	.301*	.063	.361*	.543*	.584*	.529*	.386*
	Covariance	.641	.100	.795	1.287	1.367	1.331	.883
TA4	Pearson Correlation	.334*	.283*	.396*	.383*	.386*	.438*	.434*
	Covariance	.554	.349	.681	.708	.705	.860	.774
TA5	Pearson Correlation	.300*	.377*	.468*	.474*	.501*	.452*	.447*
	Covariance	.404	.376	.652	.710	.740	.718	.646
TA6	Pearson Correlation	.066	.150	.186*	.075	.091	.189*	.174*
	Covariance	.113	.190	.328	.143	.171	.381	.318
CQ1	Pearson Correlation	.540*	.365*	.557*	.740*	.703*	.733*	.708*
	Covariance	.937	.470	1.002	1.429	1.340	1.503	1.319
CQ2	Pearson Correlation	.549*	.394*	.595*	.730*	.712*	.692*	.601*
	Covariance	1.001	.533	1.123	1.481	1.424	1.490	1.177
CQ3	Pearson Correlation	.321*	.206*	.381*	.544*	.628*	.566*	.496*
	Covariance	.616	.294	.757	1.164	1.326	1.285	1.023
CQ4	Pearson Correlation	.501*	.445*	.605*	.528*	.493*	.524*	.593*
	Covariance	.687	.454	.861	.808	.743	.850	.874
CQ5	Pearson Correlation	.321*	.230*	.313*	.385*	.481*	.390*	.332*
	Covariance	.544	.290	.549	.726	.895	.781	.604
CQ6	Pearson Correlation	.658*	.599*	.667*	.687*	.646*	.655*	.703*
	Covariance	1.016	.686	1.067	1.180	1.096	1.195	1.166
SC1	Pearson Correlation	.368*	.424*	.449*	.368*	.419*	.390*	.358*
	Covariance	.620	.530	.784	.689	.776	.775	.648
SC2	Pearson Correlation	.499*	.482*	.573*	.487*	.501*	.476*	.448*
	Covariance	.859	.617	1.022	.934	.948	.970	.830
SC3	Pearson Correlation	.339*	.334*	.355*	.339*	.300*	.402*	.335*
	Covariance	.510	.373	.553	.568	.496	.715	.541
SC4	Pearson Correlation	.254*	.360*	.403*	.310*	.384*	.393*	.360*
	Covariance	.381	.401	.626	.517	.632	.697	.579
SC5	Pearson Correlation	.465*	.287*	.571*	.611*	.652*	.652*	.552*
	Covariance	.837	.384	1.064	1.225	1.288	1.387	1.067
AP1	Pearson Correlation	.238*	.173*	.297*	.327*	.509*	.439*	.352*
	Covariance	.495	.267	.639	.756	1.163	1.079	.786

Correlations

		TI2	TI3	TI4	TC1	TC2	TC3	TC4
AP2	Pearson Correlation	.302**	.198**	.362**	.417**	.552**	.508**	.407**
	Covariance	.612	.298	.802	.942	1.231	1.218	.886
AP3	Pearson Correlation	.310**	.205**	.346**	.359**	.501**	.419**	.408**
	Covariance	.511	.252	.591	.659	.908	.818	.724
AP4	Pearson Correlation	.398**	.311**	.369**	.385**	.468**	.419**	.376**
	Covariance	.669	.388	.641	.720	.864	.832	.678
AP5	Pearson Correlation	.337**	.338**	.390**	.509**	.526**	.472**	.359**
	Covariance	.488	.363	.585	.821	.837	.808	.558
TB1	Pearson Correlation	.650**	.595**	.672**	.537**	.551**	.519**	.610**
	Covariance	1.075	.729	1.150	.987	1.001	1.014	1.083
TB2	Pearson Correlation	.524**	.490**	.604**	.578**	.615**	.502**	.603**
	Covariance	.900	.626	1.075	1.106	1.161	1.021	1.114
TB3	Pearson Correlation	.630**	.551**	.676**	.547**	.521**	.470**	.579**
	Covariance	1.018	.660	1.130	.983	.924	.898	1.003
TI1	Pearson Correlation	.714**	.637**	.766**	.611**	.551**	.529**	.613**
	Covariance	.971	.642	1.078	.925	.823	.850	.895
TI2	Pearson Correlation	1	.605**	.772**	.639**	.629**	.567**	.662**
	Covariance	1.580	.710	1.263	1.124	1.092	1.060	1.123
TI3	Pearson Correlation	.605**	1	.635**	.429**	.410**	.423**	.475**
	Covariance	.710	.871	.771	.560	.529	.586	.598
TI4	Pearson Correlation	.772**	.635**	1	.667**	.621**	.588**	.758**
	Covariance	1.263	.771	1.695	1.215	1.117	1.138	1.333
TC1	Pearson Correlation	.639**	.429**	.667**	1	.804**	.713**	.733**
	Covariance	1.124	.560	1.215	1.958	1.554	1.484	1.384
TC2	Pearson Correlation	.629**	.410**	.621**	.804**	1	.739**	.702**
	Covariance	1.092	.529	1.117	1.554	1.908	1.517	1.309
TC3	Pearson Correlation	.567**	.423**	.588**	.713**	.739**	1	.708**
	Covariance	1.060	.586	1.138	1.484	1.517	2.209	1.420
TC4	Pearson Correlation	.662**	.475**	.758**	.733**	.702**	.708**	1
	Covariance	1.123	.598	1.333	1.384	1.309	1.420	1.823
T1	Pearson Correlation	.767**	.651**	.852**	.654**	.579**	.610**	.745**
	Covariance	1.228	.773	1.412	1.164	1.018	1.154	1.281
T2	Pearson Correlation	.665**	.604**	.701**	.516**	.557**	.505**	.602**
	Covariance	1.097	.740	1.197	.948	1.010	.986	1.067
T3	Pearson Correlation	.522**	.434**	.554**	.441**	.418**	.373**	.528**
	Covariance	1.041	.643	1.145	.979	.917	.881	1.133
IQ1	Pearson Correlation	.468**	.350**	.512**	.555**	.567**	.569**	.612**
	Covariance	1.695	.940	1.921	2.237	2.258	2.438	2.380
IQ2	Pearson Correlation	.485**	.372**	.510**	.536**	.620**	.578**	.571**
	Covariance	1.684	.960	1.834	2.073	2.370	2.374	2.133
IQ3	Pearson Correlation	.395**	.317**	.442**	.492**	.572**	.560**	.499**
	Covariance	1.500	.893	1.736	2.079	2.386	2.514	2.036
IQ4	Pearson Correlation	.380**	.272**	.404**	.456**	.545**	.510**	.439**
	Covariance	1.307	.693	1.438	1.743	2.057	2.073	1.620
SQ1	Pearson Correlation	.381**	.258**	.442**	.447**	.570**	.538**	.425**
	Covariance	1.324	.666	1.589	1.729	2.176	2.209	1.587
SQ2	Pearson Correlation	.369**	.260**	.445**	.446**	.561**	.517**	.421**
	Covariance	1.266	.661	1.580	1.703	2.114	2.098	1.551
SQ3	Pearson Correlation	.331**	.257**	.412**	.369**	.492**	.449**	.397**
	Covariance	1.193	.687	1.539	1.481	1.952	1.916	1.537
SQ4	Pearson Correlation	.322**	.254**	.381**	.404**	.510**	.452**	.372**
	Covariance	1.074	.628	1.319	1.500	1.873	1.783	1.334
S1	Pearson Correlation	.491**	.313**	.550**	.580**	.679**	.598**	.557**
	Covariance	1.725	.817	2.001	2.269	2.624	2.484	2.103

Correlations

		TI2	TI3	TI4	TC1	TC2	TC3	TC4
S2	Pearson Correlation	.473**	.325**	.545**	.587**	.675**	.594**	.548**
	Covariance	1.650	.841	1.966	2.275	2.584	2.447	2.050
S3	Pearson Correlation	.455**	.284**	.515**	.523**	.639**	.565**	.519**
	Covariance	1.622	.751	1.905	2.080	2.507	2.383	1.991
S4	Pearson Correlation	.462**	.300**	.499**	.565**	.631**	.529**	.516**
	Covariance	1.483	.716	1.660	2.019	2.228	2.009	1.779
S5	Pearson Correlation	.482**	.280**	.528**	.553**	.639**	.616**	.567**
	Covariance	1.859	.801	2.107	2.371	2.705	2.807	2.345
S6	Pearson Correlation	.527**	.318**	.540**	.562**	.635**	.600**	.613**
	Covariance	2.151	.965	2.283	2.556	2.848	2.897	2.689
DSQ	Pearson Correlation	.287**	.073	.335**	.346**	.428**	.384**	.278**
	Covariance	4.141	.783	5.018	5.566	6.802	6.564	4.314
DIQ	Pearson Correlation	.316**	.162	.375**	.421**	.528**	.462**	.390**
	Covariance	4.595	1.752	5.655	6.822	8.433	7.953	6.086

Correlations

		T1	T2	T3	IQ1	IQ2	IQ3	IQ4
CONF1	Pearson Correlation	.027	.008	-.015	.025	.002	.057	-.006
	Covariance	.030	.009	-.021	.063	.004	.150	-.013
CONF2	Pearson Correlation	-.013	-.086	-.069	.036	.013	.050	-.006
	Covariance	-.013	-.090	-.088	.084	.028	.121	-.014
CONF3	Pearson Correlation	.003	-.089	-.085	.008	.014	-.007	-.010
	Covariance	.004	-.114	-.133	.023	.039	-.021	-.027
KNOW1	Pearson Correlation	.005	.075	-.008	.023	.012	.028	-.062
	Covariance	.011	.176	-.022	.117	.060	.150	-.304
KNOW2	Pearson Correlation	-.034	-.016	-.062	-.063	-.075	.004	-.080
	Covariance	-.077	-.036	-.174	-.322	-.367	.021	-.383
KNOW3	Pearson Correlation	.026	.076	-.009	.015	.016	.092	-.003
	Covariance	.058	.179	-.027	.078	.078	.500	-.013
INV1	Pearson Correlation	.098	.164	.043	.030	-.034	-.001	-.053
	Covariance	.232	.400	.128	.159	-.173	-.007	-.270
INV2	Pearson Correlation	.021	.096	.030	.052	-.041	.002	-.071
	Covariance	.050	.240	.090	.287	-.215	.014	-.370
INV3	Pearson Correlation	.085	.113	.156	-.019	-.026	-.018	-.072
	Covariance	.181	.247	.412	-.089	-.118	-.093	-.327
TA1	Pearson Correlation	.284*	.259*	.159	.377*	.354*	.419*	.353*
	Covariance	.489	.459	.341	1.469	1.323	1.707	1.304
TA2	Pearson Correlation	.086	.116	-.001	.309*	.314*	.350*	.294*
	Covariance	.182	.252	-.003	1.476	1.438	1.750	1.333
TA3	Pearson Correlation	.211*	.217*	.187*	.410*	.403*	.433*	.437*
	Covariance	.455	.482	.502	1.999	1.884	2.214	2.024
TA4	Pearson Correlation	.333*	.353*	.260*	.301*	.326*	.261*	.261*
	Covariance	.559	.612	.545	1.146	1.192	1.043	.944
TA5	Pearson Correlation	.380*	.441*	.257*	.433*	.470*	.473*	.476*
	Covariance	.518	.619	.437	1.335	1.389	1.529	1.392
TA6	Pearson Correlation	.156	.141	.036	.228*	.217*	.189*	.174*
	Covariance	.269	.250	.078	.890	.810	.771	.643
CQ1	Pearson Correlation	.554*	.446*	.382*	.604*	.601*	.574*	.564*
	Covariance	.973	.808	.838	2.402	2.294	2.393	2.127
CQ2	Pearson Correlation	.602*	.549*	.438*	.590*	.599*	.578*	.562*
	Covariance	1.110	1.044	1.009	2.462	2.399	2.529	2.226
CQ3	Pearson Correlation	.350*	.313*	.194*	.503*	.514*	.517*	.506*
	Covariance	.682	.627	.472	2.217	2.171	2.386	2.116
CQ4	Pearson Correlation	.599*	.545*	.496*	.435*	.408*	.299*	.301*
	Covariance	.832	.781	.861	1.369	1.231	.986	.897
CQ5	Pearson Correlation	.208*	.286*	.116	.347*	.347*	.372*	.327*
	Covariance	.357	.505	.249	1.348	1.294	1.514	1.205
CQ6	Pearson Correlation	.703*	.594*	.477*	.444*	.426*	.341*	.310*
	Covariance	1.099	.958	.931	1.572	1.446	1.264	1.040
SC1	Pearson Correlation	.444*	.500*	.352*	.279*	.314*	.314*	.284*
	Covariance	.757	.878	.748	1.075	1.163	1.271	1.040
SC2	Pearson Correlation	.476*	.436*	.338*	.418*	.432*	.447*	.451*
	Covariance	.830	.785	.736	1.650	1.638	1.850	1.689
SC3	Pearson Correlation	.349*	.400*	.306*	.232*	.252*	.287*	.235*
	Covariance	.531	.629	.582	.799	.834	1.036	.768
SC4	Pearson Correlation	.334*	.271*	.146	.325*	.319*	.355*	.331*
	Covariance	.507	.424	.276	1.117	1.051	1.279	1.080
SC5	Pearson Correlation	.454*	.387*	.286*	.447*	.432*	.450*	.407*
	Covariance	.827	.727	.649	1.845	1.710	1.943	1.592
AP1	Pearson Correlation	.276*	.264*	.151	.326*	.372*	.378*	.406*
	Covariance	.582	.572	.396	1.552	1.700	1.886	1.836

Correlations

		T1	T2	T3	IQ1	IQ2	IQ3	IQ4
AP2	Pearson Correlation	.289**	.225**	.132	.395**	.419**	.471**	.420**
	Covariance	.594	.476	.337	1.836	1.868	2.293	1.854
AP3	Pearson Correlation	.288**	.312**	.273**	.379**	.382**	.364**	.347**
	Covariance	.481	.537	.570	1.434	1.387	1.443	1.247
AP4	Pearson Correlation	.337**	.383**	.208**	.395**	.385**	.340**	.342**
	Covariance	.572	.672	.441	1.521	1.423	1.371	1.251
AP5	Pearson Correlation	.315**	.306**	.218**	.287**	.320**	.333**	.332**
	Covariance	.461	.462	.400	.953	1.017	1.157	1.046
TB1	Pearson Correlation	.692**	.794**	.616**	.410**	.444**	.346**	.331**
	Covariance	1.157	1.368	1.286	1.551	1.612	1.371	1.188
TB2	Pearson Correlation	.533**	.555**	.406**	.449**	.413**	.464**	.448**
	Covariance	.928	.997	.882	1.770	1.562	1.914	1.676
TB3	Pearson Correlation	.676**	.736**	.529**	.446**	.515**	.431**	.402**
	Covariance	1.105	1.240	1.080	1.652	1.830	1.671	1.412
TI1	Pearson Correlation	.738**	.695**	.511**	.410**	.370**	.311**	.269**
	Covariance	1.016	.986	.878	1.277	1.107	1.014	.796
TI2	Pearson Correlation	.767**	.665**	.522**	.468**	.485**	.395**	.380**
	Covariance	1.228	1.097	1.041	1.695	1.684	1.500	1.307
TI3	Pearson Correlation	.651**	.604**	.434**	.350**	.372**	.317**	.272**
	Covariance	.773	.740	.643	.940	.960	.893	.693
TI4	Pearson Correlation	.852**	.701**	.554**	.512**	.510**	.442**	.404**
	Covariance	1.412	1.197	1.145	1.921	1.834	1.736	1.438
TC1	Pearson Correlation	.654**	.516**	.441**	.555**	.536**	.492**	.456**
	Covariance	1.164	.948	.979	2.237	2.073	2.079	1.743
TC2	Pearson Correlation	.579**	.557**	.418**	.567**	.620**	.572**	.545**
	Covariance	1.018	1.010	.917	2.258	2.370	2.386	2.057
TC3	Pearson Correlation	.610**	.505**	.373**	.569**	.578**	.560**	.510**
	Covariance	1.154	.986	.881	2.438	2.374	2.514	2.073
TC4	Pearson Correlation	.745**	.602**	.528**	.612**	.571**	.499**	.439**
	Covariance	1.281	1.067	1.133	2.380	2.133	2.036	1.620
T1	Pearson Correlation	1	.710**	.586**	.440**	.491**	.402**	.351**
	Covariance	1.620	1.185	1.184	1.612	1.727	1.543	1.223
T2	Pearson Correlation	.710**	1	.602**	.449**	.437**	.368**	.341**
	Covariance	1.185	1.721	1.254	1.697	1.586	1.457	1.224
T3	Pearson Correlation	.586**	.602**	1	.351**	.395**	.369**	.295**
	Covariance	1.184	1.254	2.524	1.606	1.734	1.771	1.281
IQ1	Pearson Correlation	.440**	.449**	.351**	1	.879**	.754**	.765**
	Covariance	1.612	1.697	1.606	8.306	7.008	6.557	6.030
IQ2	Pearson Correlation	.491**	.437**	.395**	.879**	1	.834**	.856**
	Covariance	1.727	1.586	1.734	7.008	7.644	6.964	6.470
IQ3	Pearson Correlation	.402**	.368**	.369**	.754**	.834**	1	.902**
	Covariance	1.543	1.457	1.771	6.557	6.964	9.114	7.443
IQ4	Pearson Correlation	.351**	.341**	.295**	.765**	.856**	.902**	1
	Covariance	1.223	1.224	1.281	6.030	6.470	7.443	7.476
SQ1	Pearson Correlation	.349**	.343**	.248**	.635**	.703**	.711**	.688**
	Covariance	1.226	1.244	1.089	5.055	5.370	5.929	5.199
SQ2	Pearson Correlation	.360**	.325**	.238**	.602**	.698**	.729**	.708**
	Covariance	1.250	1.163	1.030	4.732	5.261	6.007	5.283
SQ3	Pearson Correlation	.341**	.310**	.214**	.548**	.632**	.751**	.679**
	Covariance	1.245	1.167	.974	4.533	5.015	6.507	5.330
SQ4	Pearson Correlation	.310**	.306**	.208**	.541**	.627**	.705**	.732**
	Covariance	1.049	1.066	.876	4.142	4.606	5.657	5.319
S1	Pearson Correlation	.423**	.416**	.328**	.742**	.737**	.737**	.717**
	Covariance	1.505	1.526	1.458	5.981	5.702	6.221	5.484

Correlations

		T1	T2	T3	IQ1	IQ2	IQ3	IQ4
S2	Pearson Correlation	.426**	.419**	.347**	.714**	.739**	.747**	.743**
	Covariance	1.504	1.523	1.530	5.708	5.666	6.250	5.630
S3	Pearson Correlation	.402**	.400**	.318**	.653**	.671**	.792**	.711**
	Covariance	1.453	1.490	1.434	5.347	5.268	6.786	5.516
S4	Pearson Correlation	.389**	.394**	.279**	.694**	.714**	.729**	.779**
	Covariance	1.264	1.320	1.131	5.112	5.046	5.621	5.447
S5	Pearson Correlation	.468**	.470**	.387**	.667**	.675**	.696**	.663**
	Covariance	1.825	1.891	1.886	5.888	5.721	6.436	5.559
S6	Pearson Correlation	.496**	.510**	.419**	.649**	.652**	.672**	.634**
	Covariance	2.052	2.175	2.162	6.079	5.852	6.586	5.633
DSQ	Pearson Correlation	.168**	.292**	.151	.406**	.394**	.476**	.448**
	Covariance	2.461	4.399	2.754	13.463	12.507	16.529	14.085
DIQ	Pearson Correlation	.282**	.321**	.279**	.548**	.523**	.612**	.560**
	Covariance	4.148	4.867	5.120	18.271	16.725	21.386	17.703

Correlations

		SQ1	SQ2	SQ3	SQ4	S1	S2
CONF1	Pearson Correlation	.049	.015	-.010	-.009	-.047	-.041
	Covariance	.116	.036	-.024	-.021	-.114	-.098
CONF2	Pearson Correlation	-.053	-.025	-.053	-.099	-.078	-.092
	Covariance	-.118	-.055	-.123	-.212	-.176	-.206
CONF3	Pearson Correlation	-.068	-.062	-.091	-.093	-.123	-.090
	Covariance	-.184	-.167	-.256	-.217	-.338	-.246
KNOW1	Pearson Correlation	-.050	-.083	-.092	-.103	-.020	-.057
	Covariance	-.250	-.409	-.476	-.490	-.099	-.284
KNOW2	Pearson Correlation	-.136	-.126	-.106	-.115	-.122	-.107
	Covariance	-.664	-.607	-.538	-.537	-.603	-.522
KNOW3	Pearson Correlation	-.034	-.042	-.036	-.069	-.016	-.029
	Covariance	-.170	-.204	-.186	-.328	-.080	-.144
INV1	Pearson Correlation	-.024	-.055	-.036	-.061	.073	.013
	Covariance	-.126	-.278	-.190	-.300	.378	.067
INV2	Pearson Correlation	-.067	-.103	-.077	-.088	.068	.021
	Covariance	-.351	-.535	-.421	-.444	.360	.112
INV3	Pearson Correlation	-.073	-.067	-.085	-.075	.024	.022
	Covariance	-.338	-.305	-.404	-.333	.110	.103
TA1	Pearson Correlation	.464**	.432**	.432**	.450**	.485**	.477**
	Covariance	1.731	1.593	1.673	1.613	1.833	1.787
TA2	Pearson Correlation	.506**	.499**	.479**	.456**	.449**	.450**
	Covariance	2.320	2.256	2.282	2.009	2.083	2.071
TA3	Pearson Correlation	.618**	.542**	.496**	.541**	.617**	.577**
	Covariance	2.889	2.501	2.410	2.433	2.922	2.709
TA4	Pearson Correlation	.192*	.229**	.129	.160	.287**	.324**
	Covariance	.700	.826	.490	.562	1.061	1.188
TA5	Pearson Correlation	.434**	.407**	.416**	.433**	.527**	.521**
	Covariance	1.283	1.189	1.278	1.229	1.577	1.544
TA6	Pearson Correlation	.228**	.247**	.174*	.188*	.253**	.214**
	Covariance	.851	.913	.677	.674	.958	.802
CQ1	Pearson Correlation	.518**	.487**	.416**	.439**	.626**	.632**
	Covariance	1.974	1.835	1.648	1.608	2.417	2.418
CQ2	Pearson Correlation	.507**	.471**	.436**	.447**	.586**	.593**
	Covariance	2.029	1.862	1.815	1.719	2.375	2.381
CQ3	Pearson Correlation	.586**	.566**	.498**	.554**	.551**	.580**
	Covariance	2.482	2.361	2.184	2.250	2.354	2.457
CQ4	Pearson Correlation	.281**	.278**	.215**	.271**	.401**	.415**
	Covariance	.848	.828	.675	.788	1.226	1.256
CQ5	Pearson Correlation	.467**	.435**	.358**	.408**	.445**	.475**
	Covariance	1.739	1.598	1.384	1.460	1.679	1.776
CQ6	Pearson Correlation	.274**	.264**	.199**	.228**	.377**	.386**
	Covariance	.928	.885	.702	.744	1.296	1.315
SC1	Pearson Correlation	.393**	.313**	.335**	.344**	.384**	.375**
	Covariance	1.453	1.145	1.288	1.224	1.439	1.393
SC2	Pearson Correlation	.549**	.509**	.440**	.497**	.513**	.513**
	Covariance	2.077	1.905	1.732	1.811	1.967	1.951
SC3	Pearson Correlation	.215**	.199**	.185**	.196**	.287**	.301**
	Covariance	.711	.649	.635	.623	.961	.997
SC4	Pearson Correlation	.353**	.370**	.308**	.331**	.435**	.418**
	Covariance	1.163	1.204	1.053	1.049	1.451	1.380
SC5	Pearson Correlation	.516**	.518**	.425**	.449**	.596**	.577**
	Covariance	2.041	2.022	1.746	1.707	2.385	2.291
AP1	Pearson Correlation	.533**	.515**	.466**	.514**	.391**	.404**
	Covariance	2.433	2.324	2.212	2.259	1.808	1.852

Correlations

		SQ1	SQ2	SQ3	SQ4	S1	S2
AP2	Pearson Correlation	.618**	.570**	.561**	.544**	.488**	.472**
	Covariance	2.756	2.509	2.599	2.333	2.200	2.112
AP3	Pearson Correlation	.495**	.489**	.402**	.467**	.390**	.407**
	Covariance	1.795	1.750	1.516	1.628	1.433	1.480
AP4	Pearson Correlation	.405**	.397**	.310**	.381**	.371**	.400**
	Covariance	1.496	1.449	1.187	1.353	1.385	1.484
AP5	Pearson Correlation	.415**	.411**	.355**	.396**	.431**	.464**
	Covariance	1.321	1.291	1.174	1.210	1.387	1.480
TB1	Pearson Correlation	.318**	.288**	.254**	.251**	.399**	.409**
	Covariance	1.154	1.034	.956	.875	1.466	1.492
TB2	Pearson Correlation	.468**	.455**	.445**	.485**	.575**	.567**
	Covariance	1.769	1.697	1.745	1.763	2.199	2.150
TB3	Pearson Correlation	.401**	.390**	.392**	.374**	.481**	.492**
	Covariance	1.423	1.366	1.445	1.276	1.728	1.750
TI1	Pearson Correlation	.325**	.315**	.290**	.285**	.391**	.397**
	Covariance	.970	.930	.901	.818	1.184	1.189
TI2	Pearson Correlation	.381**	.369**	.331**	.322**	.491**	.473**
	Covariance	1.324	1.266	1.193	1.074	1.725	1.650
TI3	Pearson Correlation	.258**	.260**	.257**	.254**	.313**	.325**
	Covariance	.666	.661	.687	.628	.817	.841
TI4	Pearson Correlation	.442**	.445**	.412**	.381**	.550**	.545**
	Covariance	1.589	1.580	1.539	1.319	2.001	1.966
TC1	Pearson Correlation	.447**	.446**	.369**	.404**	.580**	.587**
	Covariance	1.729	1.703	1.481	1.500	2.269	2.275
TC2	Pearson Correlation	.570**	.561**	.492**	.510**	.679**	.675**
	Covariance	2.176	2.114	1.952	1.873	2.624	2.584
TC3	Pearson Correlation	.538**	.517**	.449**	.452**	.598**	.594**
	Covariance	2.209	2.098	1.916	1.783	2.484	2.447
TC4	Pearson Correlation	.425**	.421**	.397**	.372**	.557**	.548**
	Covariance	1.587	1.551	1.537	1.334	2.103	2.050
T1	Pearson Correlation	.349**	.360**	.341**	.310**	.423**	.426**
	Covariance	1.226	1.250	1.245	1.049	1.505	1.504
T2	Pearson Correlation	.343**	.325**	.310**	.306**	.416**	.419**
	Covariance	1.244	1.163	1.167	1.066	1.526	1.523
T3	Pearson Correlation	.248**	.236**	.214**	.208**	.328**	.347**
	Covariance	1.089	1.030	.974	.876	1.458	1.530
IQ1	Pearson Correlation	.635**	.602**	.548**	.541**	.742**	.714**
	Covariance	5.055	4.732	4.533	4.142	5.981	5.708
IQ2	Pearson Correlation	.703**	.698**	.632**	.627**	.737**	.739**
	Covariance	5.370	5.261	5.015	4.606	5.702	5.666
IQ3	Pearson Correlation	.711**	.729**	.751**	.705**	.737**	.747**
	Covariance	5.929	6.007	6.507	5.657	6.221	6.250
IQ4	Pearson Correlation	.688**	.708**	.679**	.732**	.717**	.743**
	Covariance	5.199	5.283	5.330	5.319	5.484	5.630
SQ1	Pearson Correlation	1	.927**	.874**	.889**	.802**	.769**
	Covariance	7.631	6.987	6.928	6.526	6.195	5.887
SQ2	Pearson Correlation	.927**	1	.918**	.928**	.781**	.801**
	Covariance	6.987	7.443	7.187	6.722	5.959	6.059
SQ3	Pearson Correlation	.874**	.918**	1	.920**	.734**	.730**
	Covariance	6.928	7.187	8.236	7.012	5.895	5.806
SQ4	Pearson Correlation	.889**	.928**	.920**	1	.739**	.766**
	Covariance	6.526	6.722	7.012	7.056	5.490	5.640
S1	Pearson Correlation	.802**	.781**	.734**	.739**	1	.953**
	Covariance	6.195	5.959	5.895	5.490	7.821	7.386

Correlations

		SQ1	SQ2	SQ3	SQ4	S1	S2
S2	Pearson Correlation	.769**	.801**	.730**	.766**	.953**	1
	Covariance	5.887	6.059	5.806	5.640	7.386	7.686
S3	Pearson Correlation	.747**	.786**	.792**	.755**	.908**	.918**
	Covariance	5.862	6.088	6.453	5.695	7.210	7.224
S4	Pearson Correlation	.721**	.750**	.719**	.767**	.898**	.937**
	Covariance	5.090	5.230	5.271	5.205	6.416	6.639
S5	Pearson Correlation	.707**	.692**	.652**	.660**	.848**	.832**
	Covariance	5.989	5.789	5.734	5.372	7.268	7.071
S6	Pearson Correlation	.657**	.653**	.633**	.639**	.807**	.787**
	Covariance	5.897	5.784	5.904	5.517	7.328	7.091
DSQ	Pearson Correlation	.600**	.579**	.566**	.545**	.607**	.549**
	Covariance	19.052	18.162	18.674	16.655	19.521	17.505
DIQ	Pearson Correlation	.586**	.601**	.593**	.579**	.660**	.639**
	Covariance	18.794	18.963	19.680	17.803	21.364	20.488

Correlations

		S3	S4	S5	S6	DSQ	DIQ
CONF1	Pearson Correlation	.007	-.097	-.108	-.071	-.084	-.169*
	Covariance	.017	-.215	-.285	-.201	-.837	-1.690
CONF2	Pearson Correlation	-.009	-.100	-.144	-.111	-.124	-.196*
	Covariance	-.021	-.206	-.354	-.290	-1.150	-1.825
CONF3	Pearson Correlation	-.075	-.096	-.180*	-.139	-.168*	-.221*
	Covariance	-.210	-.241	-.543	-.445	-1.893	-2.511
KNOW1	Pearson Correlation	-.044	-.111	-.010	.025	-.019	-.046
	Covariance	-.222	-.510	-.053	.143	-.401	-.954
KNOW2	Pearson Correlation	-.095	-.147	-.077	-.051	-.117	-.085
	Covariance	-.474	-.662	-.417	-.290	-2.366	-1.733
KNOW3	Pearson Correlation	-.013	-.079	.018	.051	.011	-.015
	Covariance	-.068	-.360	.100	.298	.222	-.303
INV1	Pearson Correlation	.052	.008	.127	.173*	.028	.043
	Covariance	.274	.039	.723	1.043	.609	.933
INV2	Pearson Correlation	.048	-.004	.092	.114	.027	.028
	Covariance	.260	-.018	.540	.703	.593	.628
INV3	Pearson Correlation	-.020	-.037	.071	.066	-.022	-.070
	Covariance	-.097	-.157	.361	.359	-.429	-1.350
TA1	Pearson Correlation	.473**	.419**	.419**	.404**	.365**	.357**
	Covariance	1.814	1.445	1.734	1.773	5.661	5.584
TA2	Pearson Correlation	.450**	.369**	.312**	.298**	.393**	.364**
	Covariance	2.116	1.565	1.587	1.603	7.485	6.989
TA3	Pearson Correlation	.573**	.550**	.540**	.497**	.455**	.416**
	Covariance	2.755	2.381	2.800	2.733	8.854	8.148
TA4	Pearson Correlation	.278**	.288**	.324**	.317**	.255**	.258**
	Covariance	1.044	.973	1.313	1.362	3.872	3.943
TA5	Pearson Correlation	.512**	.526**	.518**	.485**	.422**	.467**
	Covariance	1.556	1.438	1.698	1.684	5.193	5.782
TA6	Pearson Correlation	.171*	.162	.190*	.156	.088	.114
	Covariance	.657	.560	.787	.687	1.372	1.779
CQ1	Pearson Correlation	.574**	.624**	.636**	.622**	.363**	.490**
	Covariance	2.247	2.200	2.690	2.791	5.760	7.830
CQ2	Pearson Correlation	.573**	.583**	.567**	.573**	.335**	.479**
	Covariance	2.359	2.157	2.517	2.699	5.588	8.026
CQ3	Pearson Correlation	.554**	.552**	.490**	.488**	.343**	.489**
	Covariance	2.404	2.158	2.294	2.421	6.024	8.655
CQ4	Pearson Correlation	.365**	.351**	.455**	.462**	.184**	.289**
	Covariance	1.131	.979	1.522	1.639	2.306	3.646
CQ5	Pearson Correlation	.424**	.396**	.396**	.403**	.284**	.374**
	Covariance	1.623	1.365	1.634	1.765	4.401	5.836
CQ6	Pearson Correlation	.363**	.354**	.414**	.442**	.161	.239**
	Covariance	1.266	1.112	1.559	1.762	2.273	3.397
SC1	Pearson Correlation	.353**	.351**	.374**	.378**	.312**	.252**
	Covariance	1.344	1.203	1.534	1.645	4.806	3.907
SC2	Pearson Correlation	.505**	.498**	.511**	.512**	.434**	.409**
	Covariance	1.964	1.744	2.145	2.278	6.839	6.488
SC3	Pearson Correlation	.282**	.255**	.345**	.324**	.182**	.201**
	Covariance	.957	.780	1.265	1.261	2.500	2.779
SC4	Pearson Correlation	.421**	.399**	.431**	.362**	.304**	.271**
	Covariance	1.425	1.215	1.575	1.402	4.166	3.743
SC5	Pearson Correlation	.588**	.541**	.570**	.559**	.443**	.491**
	Covariance	2.391	1.979	2.499	2.601	7.294	8.126
AP1	Pearson Correlation	.379**	.358**	.418**	.398**	.378**	.370**
	Covariance	1.779	1.512	2.119	2.140	7.182	7.069

Correlations

		S3	S4	S5	S6	DSQ	DIQ
AP2	Pearson Correlation	.499**	.412**	.421**	.380**	.440**	.458**
	Covariance	2.286	1.699	2.081	1.991	8.155	8.545
AP3	Pearson Correlation	.353**	.365**	.307**	.310**	.272**	.335**
	Covariance	1.314	1.223	1.234	1.323	4.104	5.084
AP4	Pearson Correlation	.339**	.370**	.353**	.331**	.228**	.254**
	Covariance	1.288	1.263	1.445	1.437	3.502	3.933
AP5	Pearson Correlation	.398**	.439**	.424**	.401**	.371**	.343**
	Covariance	1.299	1.290	1.497	1.500	4.906	4.575
TB1	Pearson Correlation	.357**	.381**	.462**	.517**	.235**	.317**
	Covariance	1.333	1.280	1.859	2.207	3.548	4.813
TB2	Pearson Correlation	.536**	.568**	.561**	.581**	.484**	.509**
	Covariance	2.080	1.986	2.351	2.582	7.604	8.052
TB3	Pearson Correlation	.428**	.442**	.478**	.508**	.321**	.310**
	Covariance	1.560	1.452	1.883	2.120	4.742	4.600
TI1	Pearson Correlation	.376**	.378**	.404**	.433**	.256**	.288**
	Covariance	1.155	1.046	1.339	1.522	3.181	3.608
TI2	Pearson Correlation	.455**	.462**	.482**	.527**	.287**	.316**
	Covariance	1.622	1.483	1.859	2.151	4.141	4.595
TI3	Pearson Correlation	.284**	.300**	.280**	.318**	.073	.162
	Covariance	.751	.716	.801	.965	.783	1.752
TI4	Pearson Correlation	.515**	.499**	.528**	.540**	.335**	.375**
	Covariance	1.905	1.660	2.107	2.283	5.018	5.655
TC1	Pearson Correlation	.523**	.565**	.553**	.562**	.346**	.421**
	Covariance	2.080	2.019	2.371	2.556	5.566	6.822
TC2	Pearson Correlation	.639**	.631**	.639**	.635**	.428**	.528**
	Covariance	2.507	2.228	2.705	2.848	6.802	8.433
TC3	Pearson Correlation	.565**	.529**	.616**	.600**	.384**	.462**
	Covariance	2.383	2.009	2.807	2.897	6.564	7.953
TC4	Pearson Correlation	.519**	.516**	.567**	.613**	.278**	.390**
	Covariance	1.991	1.779	2.345	2.689	4.314	6.086
T1	Pearson Correlation	.402**	.389**	.468**	.496**	.168**	.282**
	Covariance	1.453	1.264	1.825	2.052	2.461	4.148
T2	Pearson Correlation	.400**	.394**	.470**	.510**	.292**	.321**
	Covariance	1.490	1.320	1.891	2.175	4.399	4.867
T3	Pearson Correlation	.318**	.279**	.387**	.419**	.151	.279**
	Covariance	1.434	1.131	1.886	2.162	2.754	5.120
IQ1	Pearson Correlation	.653**	.694**	.667**	.649**	.406**	.548**
	Covariance	5.347	5.112	5.888	6.079	13.463	18.271
IQ2	Pearson Correlation	.671**	.714**	.675**	.652**	.394**	.523**
	Covariance	5.268	5.046	5.721	5.852	12.507	16.725
IQ3	Pearson Correlation	.792**	.729**	.696**	.672**	.476**	.612**
	Covariance	6.786	5.621	6.436	6.586	16.529	21.386
IQ4	Pearson Correlation	.711**	.779**	.663**	.634**	.448**	.560**
	Covariance	5.516	5.447	5.559	5.633	14.085	17.703
SQ1	Pearson Correlation	.747**	.721**	.707**	.657**	.600**	.588**
	Covariance	5.862	5.090	5.989	5.897	19.052	18.794
SQ2	Pearson Correlation	.786**	.750**	.692**	.653**	.579**	.601**
	Covariance	6.088	5.230	5.789	5.784	18.162	18.963
SQ3	Pearson Correlation	.792**	.719**	.652**	.633**	.566**	.593**
	Covariance	6.453	5.271	5.734	5.904	18.674	19.680
SQ4	Pearson Correlation	.755**	.767**	.660**	.639**	.545**	.579**
	Covariance	5.695	5.205	5.372	5.517	16.655	17.803
S1	Pearson Correlation	.908**	.898**	.848**	.807**	.607**	.660**
	Covariance	7.210	6.416	7.268	7.328	19.521	21.364