University of Kentucky
UKnowledge

University of Kentucky Doctoral Dissertations | Graduate School

2005

CAN INTERACTIVITY MAKE A DIFFERENCE? EFFECTS OF INTERACTIVITY ON YOUNG ADULTS' COMPREHENSION OF ONLINE HEALTH CONTENT

Mia Liza Alcantara Lustria
University of Kentucky

Right click to open a feedback form in a new tab to let us know how this document benefits you.

Recommended Citation
Lustria, Mia Liza Alcantara, "CAN INTERACTIVITY MAKE A DIFFERENCE? EFFECTS OF INTERACTIVITY ON YOUNG ADULTS' COMPREHENSION OF ONLINE HEALTH CONTENT" (2005). *University of Kentucky Doctoral Dissertations*. 317.
https://uknowledge.uky.edu/gradschool_diss/317

This Dissertation is brought to you for free and open access by the Graduate School at UKnowledge. It has been accepted for inclusion in University of Kentucky Doctoral Dissertations by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

ABSTRACT OF DISSERTATION

Mia Liza Alcantara Lustria

The Graduate School

University of Kentucky

2005

CAN INTERACTIVITY MAKE A DIFFERENCE? EFFECTS OF INTERACTIVITY ON YOUNG ADULTS' COMPREHENSION OF ONLINE HEALTH CONTENT

ABSTRACT OF DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Communications and Information Studies
at the University of Kentucky

By
Mia Liza Alcantara Lustria

Lexington, Kentucky

Director: Dr. Donald O. Case, Professor of Library & Information Sciences

Lexington, Kentucky

2005

Copyright © Mia Liza Alcantara Lustria 2005

ABSTRACT OF DISSERTATION

CAN INTERACTIVITY MAKE A DIFFERENCE?
EFFECTS OF INTERACTIVITY ON
YOUNG ADULTS' COMPREHENSION OF ONLINE HEALTH CONTENT

The Internet is growing in popularity as a health information source especially among young adults. Interactivity has been pinpointed as the key feature that makes the Internet a potentially powerful health communication tool. It is being heralded as a hybrid channel that has the capacity not only to disseminate health information to mass audiences both asynchronously and synchronously, but also has the capacity to provide an engaging and stimulating environment that can promote exploratory learning and active processing of information. Despite these exciting claims, there is still a dearth of theoretically-driven empirical studies providing support for or against these assumptions. We still know very little about how interactive technologies actually influence information use, learning and motivational processes.

A popular view is that the communicative efficacy of interactive technologies is influenced more with their match with comprehension processes and individual differences than with the level of interactivity itself. This study was designed to tease out the potential effects of different levels of interactivity on comprehension and to determine whether individual differences in need for cognition would moderate such effects. About 441 young adults (ages 18-26) from the University of Kentucky participated in a 2 by 2 factorial experiment designed to test the effects of two levels of interactivity and two levels of need for cognition on the comprehension of a health website on skin cancer.

Results showed a significant main effect for level of interactivity on comprehension scores holding the covariates, time on task and reading style, constant. Those exposed to the high interactivity site had significantly higher comprehension scores than those exposed to the low interactivity site. There was, however, no significant main effect for need for cognition, neither was there a significant interaction effect between level of interactivity and need for cognition on comprehension scores. Implications of these results and suggestions for future research are also discussed.

KEYWORDS: Interactivity, Health Information Seeking, Internet, Need for Cognition, Comprehension

Mia Liza A. Lustria

April 25, 2005

CAN INTERACTIVITY MAKE A DIFFERENCE?
EFFECTS OF INTERACTIVITY ON
YOUNG ADULTS' COMPREHENSION OF ONLINE HEALTH CONTENT

By

Mia Liza Alcantara Lustria

Dr. Donald O. Case
Director of Dissertation

Dr. Roy L. Moore
Director of Graduate Studies

RULES FOR THE USE OF DISSERTATION

Unpublished dissertations submitted for the Doctor's degree and deposited in the University of Kentucky Library are as a rule open for inspection, but are to be used only with due regard to the rights of the authors. Bibliographic references may be noted, but quotations or summaries of parts may be published only with the permission of the author, and with the usual scholarly acknowledgments.

Extensive copying of publication of the dissertation in whole or in part also requires the consent of the Dean of the Graduate School of the University of Kentucky.

A library that borrows this dissertation for use by its patrons is expected to secure the signature of each user.

Name	**Date**

DISSERTATION

Mia Liza Alcantara Lustria

The Graduate School

University of Kentucky

2005

CAN INTERACTIVITY MAKE A DIFFERENCE? EFFECTS OF INTERACTIVITY ON YOUNG ADULTS' COMPREHENSION OF ONLINE HEALTH CONTENT

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Communications and Information Studies
at the University of Kentucky

By
Mia Liza Alcantara Lustria

Lexington, Kentucky

Director: Dr. Donald O. Case, Professor of Library & Information Sciences

Lexington, Kentucky

2005

Copyright © Mia Liza Alcantara Lustria 2005

DEDICATION

This doctoral dissertation is dedicated to my family…
to my parents, **Placido** and **Josefina**,
for teaching me how to value education and for believing in me …
to my children, **Evan, Erica, Erin,** and **Ethan**,
for loving me unconditionally and for giving me every reason to strive harder …
and to my loving husband, **Yul**,
for sacrificing so many things so that I might pursue my own dreams.
I also dedicate this work to our **Loving Father**,
whose grand design for our lives I have yet to discover, but whose constant presence has given me the strength to carry on with faith and hope.

ACKNOWLEDGMENTS

In August of 2000 I packed up my family and flew them to America to pursue my dreams of earning a doctoral degree in communication. Four and a half years hence I am about to embark on yet a new journey, far richer for not only surviving my doctoral program successfully but also for encountering so many people who have selflessly shared their minds, hearts, and hopes with me. The greatest pleasure of completing my program, is the opportunity to thank some of these people (as there are too many to mention in such little space) who have influenced my growth as a scholar in one way or form.

First, I thank my Dissertation Chair, Dr. Donald O. Case, whose patience, constructive comments and unwavering faith in me carried me through the worst of my self-doubt as a scholar. Dr. Case went above and beyond giving valuable guidance on the dissertation project, but also took a special interest in my growth as an academic, and provided both moral and concrete support for all my academic pursuits.

Second, I thank my dissertation committee and outside reader, Dr. J. David Johnson, Dr. Chike Anyaegbunam, Dr. James Andrews, Dr. Stanley D. Brunn, and Dr. Janet Ford. Their insightful comments on the proposal and careful review of the manuscript helped me tremendously as I struggled to fine-tune my thoughts about the project. Dean Johnson was especially helpful all throughout by patiently answering my incessant questions about methodology and data analysis, and by setting a standard of excellence in scholarship that I will continue to strive for beyond the dissertation.

During my program I was also fortunate to land a research assistantship position, quite by accident I may add, on a large NIH/NIMH research grant. Working with a team of creative and intelligent social science researchers for the past 4 years has done much to help me bridge theory and practice. Dr. Rick Zimmerman, Dr. Philip Palmgreen, and Dr. Seth Noar have all been incredible

mentors, I owe them a great debt of gratitude for giving me valuable training in research and for allowing me the time and space to work on my own project. Mary Lee Matuza, Suzie Allard, and Hung-yi Lu, who I worked with on the project at different times, have been wonderfully supportive friends who have helped make the overall graduate school experience a truly collegial and pleasant one.

At the Institute for HIV Prevention Research I worked with a talented bunch of people whose concern for me went beyond work and whose fun camaraderie made the workplace a very pleasant one. Of these people, I am closest to Dr. Pam Cupp, Laura Harris, Meredith Briggs, Matt Waitkus, Olga Dekhtyar, Nikki Floyd, Rungrat Chaisamrej, Lousetta Carlson, and Emily Youatt.

During the research project I was supported by various external and internal grants which gave me the freedom to be a little bit more ambitious in my methodology. The largest grant was an Information Technology Dissertation Grant award from the Jacobs Foundation, a non-profit organization based in Zurich, Switzerland. I thank Theo E. Brenner, Director of Administration of the Jacobs Foundation, as well as the review committee for taking a leap of faith in me and deciding to fund my dissertation proposal. I also received smaller grants including a Eugene Garfield Doctoral Dissertation Fellowship from the Beta Phi Mu Honor Society. Several internal grants from the University of Kentucky including the Dissertation Enhancement Award and the Commonwealth Research Award, and matching funds from the Department of Communication all contributed towards travel-related research expenses, including the opportunity to conduct my experiment in the Philippines.

It would be remiss of me not to mention my mentors and colleagues at the University of the Philippines Los Baños who helped mold me early on in my career and who wholeheartedly supported my ambitions to get a doctoral degree in the United States. Dr. Ma. Theresa H. Velasco is not only a good friend, but she also taught me very valuable lessons about how to balance teaching, research

and extension, with family life. Prof. Ila Virginia Contado Ongkiko, my other sparring partner, is no longer with us to see me through this latest phase in my career. She inspired me greatly by her passion for and her creative approaches in teaching. My former student, Ivee Bautista Rosario, came here to pursue her own education (because of my influence she often says) and turned out to be one of my most faithful supporters and finest friends.

Lastly, I owe the greatest thanks to my family. To my father, Placido Alcantara, his success in his own academic career as well as vision and tenacity to overcome whatever odds have been great motivating factors for me. My mother, Josefina Agcaoili Alcantara, went above and beyond just believing in her daughter, often willing to travel half way across the world to help me in times of stress and need. My children, Evan, Erica, Erin, and Ethan may not know it, but they too have helped ground all my efforts. It must have been frustrating for them to always have a distracted mother, but they kept me sane with their antics and kept me focused on the big picture. And finally, the person I owe the most is my wonderfully supportive husband, Yul Eric Lustria. When people asked how I was able to balance family and graduate school, I was always quick to direct all the credit to him. He has not only sacrificed a lot to help me through the program, but more importantly, despite seeing me at my worst, he has always been my most faithful advocate.

Finally, to the One with the grand design, who has helped open windows where there were no doors for me, and who knows my greater purpose for this life … thank You for being the one constant that holds everything together and makes every experience, good or bad, truly worth it!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Background

Today, more than ever, the Internet has become an interesting locus of study not only because the technology is developing at an incredible rate, but several years now since its inception, it is still a relatively little understood medium of communication. Users flock to the Internet for a variety of purposes and reasons. In fact, belying early predictions of a growing digital divide, the population of Internet users has grown by leaps and bounds, and is increasingly beginning to mirror the general population (Castells, 2001).

The implications of these developments for health communication are tremendous. There is mounting evidence that the Internet is becoming an increasingly important medium particularly for the delivery of health information, as well as for health education and promotion. A cursory search on popular search engines can yield thousands of listings of health-related websites. The potential ramifications of dubious sources and health consumers ill-trained to sift through the scores of online health sources has become a huge concern among experts in the health community (Ademiluyi, Rees, & Sheard, 2003; Crespo, 2004; Crocco, Villasis-Keever, & Jadad, 2002; Detlefsen, 2004; Eysenbach, Powell, Kuss, & Sa, 2002; Hardey, 2001; Lampe, Doupi, & van den Hoven, 2003;

Morahan-Martin & Anderson, 2000; Pandolfini & Bonati, 2002; Purcell, Wilson, & Delamothe, 2002; Wilson, 2002).

Whatever the case may be, we now see a more proactive citizenry taking advantage of the Internet to make more informed choices about their health and lifestyles. Research has shown that health information sources found on the Internet have had a direct impact on patients' health-related decision making and in the way people interact with their caregivers (Baker, Wagner, Singer, & Bundorf, 2003; Cline & Haynes, 2001; Fox & Fallows, 2003). As such, the Internet is an "emerging and potentially powerful influence on health" (Evers *et al.*, 2003).

A recent report from the Pew Internet & American Life Project, for example, stated that about 93 million Americans (80% of adult Internet users) searched for a major health topic online in 2002, making health information seeking one of the most popular activities on the Internet next to e-mail and researching products or services (Fox & Fallows, 2003).

In addition to seeking general health information, health seekers go online to help prepare themselves for appointments and major procedures, to share information and to provide support. The same study found that health information seeking was more pronounced among women than it was among men. Interestingly, it was found that more than half of online health seekers usually conduct searches on the behalf of someone else (e.g., a spouse, a child, a friend, or other loved one) and rarely for themselves (Fox & Fallows, 2003). In an earlier study, Horrigan & Rainie (2002) reported that 80% of Internet users have

high expectations about the Internet as an information tool for health care information, government services, news, and shopping. In the same study, about 46% of Internet users said that the next time they would need health or medical information, they would most likely go online, compared to 47% who said they would contact a medical professional (Horrigan & Rainie, 2002).

Street *et al.* (1997) notes that these trends imply a new orientation towards health – a shift in emphasis from disease and treatment to wellness and prevention, and the active promotion of healthier lifestyles. This and the active nature of online health information seeking makes the Internet a ripe arena for testing innovations in health education and promotion strategies. In some ways, health information seekers in this new venue are essentially a captive audience for more aggressive medical information services and health interventions -- an opportunity not lost on a growing number of experts (for recent examples see Bowen *et al.*, 2003; Brug, Campbell, & van Assema, 1999; Bull, Kreuter, & Scharff, 1999; Doshi, Patrick, Sallis, & Calfas, 2003; Evers *et al.*, 2003; Fotheringham, Owies, Leslie, & Owen, 2000; Frisby, Bessell, Borland, & Anderson, 2002; Johnson, Ravert, & Everton, 2001; Krishna *et al.*, 2003; Lenert *et al.*, 2003; Levison & Weiss, 2002; Napolitano *et al.*, 2003; Strecher, 1999; Tate, Jackvony, & Wing, 2003; Weis *et al.*, 2003).

Online Health Information Seeking Among Young Adults

While health and access to health information is an issue that should concern individuals of all ages, older individuals are certainly more experienced, more mature and are generally more motivated to seek help when needed. Young adults (who in the context of this study includes those between 18 to 26 years old), however, are a particularly important audience to look at. Oftentimes, because of their youth, these individuals tend to take their health for granted, are at higher risk for certain health issues (e.g., STDs, HIV, nutrition, etc.), and generally are less mature, have low knowledge and are less motivated to seek health information. Given the health literacy drive of the Healthy People 2010 movement, studying the ways we can best reach this population deserves some attention. The following section illustrates the popularity of the Internet as a health information source for this particular demographic.

More than any other age group, young adults are known for seeking health-related information on the Internet. A national survey of more than 6,700 teens and parents of teens conducted by the Digital Market Services, Inc. (a subsidiary of AOL) revealed that the Internet has surpassed the use of the telephone as the primary communication tool among teens between the ages of 18 to 19. According to the poll, 56% of 18 to 19 years olds preferred the Internet over the telephone as a communication channel (Pastore, 2002). Another recent poll conducted for the Yahoo! Corporation and Carat Interactive, revealed that teens are beginning to spend more time online than watching television (Harris

Poll Interactive & Teen Research Unlimited, 2003). The survey of 2,500 teens between the ages of 13 and 24 revealed that youths spend 16.7 hours online average per week, against 13.6 hours watching TV, and 12 hours listening to the radio. Follow-up focus groups with youths revealed that these 'millenials' preferred the Internet for its "limitless possibilities for entertainment, information and community -- and for the feeling of control it gives people'. This demographic also complained that TV was too structured.

A study commissioned by the Kaiser Family Foundation, Generation Rx.com, explored how teens and young adults use the Internet for health information. The study, which was based on a random telephone survey of 1,209 individuals between the ages of 15 to 24, found that 75 percent of young people have used the Internet to search for health information, which is more than those who have played games online (72 percent), downloaded music (72 percent), chatted (67 percent), shopped (50 percent) or checked sports scores (46 percent). The findings also suggest that a significant proportion of youth are acting on what they find with 39 percent of online health seekers revealing that they have changed their own behavior because of information they found on the Internet (Rideout, 2001).

A recent study by Case, Johnson, Andrews, Allard & Kelly (2004) also found that among younger audiences, the Internet and libraries are often the first-choice as sources of information about inherited cancers, in place of medical professionals or family members. A more recent study of young adults' online

health information seeking behaviors found that 53% of college students would like to get health information online, while 28% reported they would like to participate in an online health intervention (Escoffery *et al.*, 2005).

The Internet as A "Hybrid" Channel

What makes the Internet particularly attractive for health communication is its ability to combine the broad reach of mass communication channels with the persuasive capabilities of interpersonal channels. Cassel *et al.* (1998) aptly describe the Internet as a new 'hybrid channel' because of this relative advantage. Specifically, it has the advantages of a mass medium with its ability to communicate one-to-many and many-to-many both synchronously and asynchronously across geographical barriers, providing access to virtually unlimited sources of information. On the other hand, it is a lot more cost-effective than other mass media like television and radio. Through its interactive features, Internet technology also carry persuasive qualities traditionally attributed to interpersonal communication. It facilitates contact among various individuals, and fosters social support across traditional barriers of time and place. Messages can be both widely disseminated, yet personalized, providing the opportunity to individualize these to the particular needs or interests of users (Street *et al.*, 1997). Technologies, like chat and computer-conferencing allow real-time interactions which approach the reflexivity of face-to-face encounters. Interactive features such as games and simulations can create engaging

environments that can help model more healthy behaviors and teach proper management and prevention skills (Street *et al.*, 1997).

Consider this scenario: Samantha discovers that her close friend is recently diagnosed with lung cancer. Concerned and curious, particularly because her close friend maintains basically the same lifestyle as her and is also a chain smoker, she goes online to learn more about the disease. She is overwhelmed by the many links there are to lung cancer, but decides to explore a few authoritative sources. She learns more about lung cancer, its pathology, diagnosis, and treatment as she follows one link to the other. Finally, she is led to a site that has one unobtrusive link at the bottom of the page. She could have totally missed it, had it not been highlighted and given an engaging title: "Are you at risk for lung cancer?" Intrigued, she clicks on the link and is taken to an interactive quiz designed to help individuals assess their risk for the disease. After taking the quiz, she realizes that she is at a higher risk than she had previously thought. Another link at the bottom of the results page points her to several other resources on lung cancer, one of which is an interactive smoking cessation program. Samantha decides to bookmark this webpage for future reference. Later in the week, after giving it much thought, she decides to look up the smoking cessation program, which she discovers offers a whole range of services: a step-by-step guide on how to stop smoking, access to support groups and other resources, and interactive activities to help patients through the quitting process. Realizing that if she doesn't do anything now, she could end up

in the same place as her friend, Samantha decides to try out the program. She is able to do all this in the privacy of her own home and at times most convenient to her.

This scenario illustrates the power of the Internet to not only bring health information to the attention of initially reluctant audiences, but to also create a conducive environment for behavior change. Street and Rimal (1997), lists several features that make interactive technology well-suited for health promotion and education: interactivity, modifiability, sensory vividness, networkability, availability, cost, and ease of use. These technical affordances make it possible to design interactive systems that can help move individuals from knowledge to actual practice – or behavior change.

As it is, however, most health websites currently available simply provide 'information environments' designed to help health seekers learn more about a particular health topic (Street & Rimal, 1997). Nevertheless, there is a steadily growing number of health interventions on the Internet designed to promote behavior change (Brug *et al.*, 1999; Cassell *et al.*, 1998; Doshi *et al.*, 2003; Evers *et al.*, 2003; Gustafson, Bosworth, Chewning, & Hawkins, 1987; Kreuter & Strecher, 1996; Marcus, Owen, Forsyth, Cavill, & Fridinger, 1998). The hope of these programs is that public learning and indepth processing of health information would lead to attitude or behavior change.

Rationale for the Current Study

Current enthusiasm for the Internet as a health communication tool is based on its growing popularity as a source of health information and on widespread assumptions about the capacity of interactive technologies to provide active environments for health education and promotion. Recent emphasis on promoting health literacy (e.g., Healthy People 2010 initiative), likewise underlines the need to explore various communication tools that can help improve the comprehension of health information especially among disadvantaged individuals and at risk populations.

However, before the Internet's potential can be fully realized, Rice and Katz (2001) write that it is important that "the insights of social science research need to be brought to bear on the new systems as they are configured, made available, implemented and used." Internet research in the area of health have largely focused on: the quality of health information sources; health information seeking behavior; the changing face of physician-patient communication; online social support groups; and online clinical and health interventions. Less attention has been paid to the Internet as a channel and what makes it potentially effective for communicating health information and for improving health care and well-being.

Interactivity has been pinpointed as the key feature of Internet technologies that makes it a potentially powerful health communication tool. Combined with its capacity to disseminate information to mass audiences,

Internet technologies also carry the persuasive qualities traditionally attributed to interpersonal channels. Interactive Internet technologies have the capacity to provide messages individualized to the particular needs and interests of users, and to promote active processing of health information.

However, there is still a dearth of theoretically-driven empirical studies providing support for or against this assumption. Reviews of interactive health interventions have found that these technologies were at times "superior to and at times no better than other media with respect to educational and health outcomes" (Street & Rimal, 1997). Aside from methodological issues, a general lack of consensus in how interactivity has been conceptualized has been attributed for these mixed findings. Other scholars have proposed that the communicative efficacy of interactive technologies might be influenced more by individual differences in information processing than with the interactivity of the media itself (Aldrich, Rogers, & Scaife, 1998; Narayanan & Hegarty, 2002).

Certainly, interactivity brings to the table many new capacities for health communication. On the other hand, it may also provide many new challenges for various individuals. Varying skills sets (both cognitive and technical) may, therefore, spell the difference between those who will be able to take full advantage of these new capacities, and those who will need special attention or assistance.

This study aims to answer this basic problem: What does interactivity contribute to desired outcomes such as comprehension of health information? Also, do individual differences moderate the potential effect of interactivity on the comprehension of health information?

The answers to these questions will be of significant importance to the design of online health education and promotion initiatives especially for disadvantaged and at risk groups. It will also be of special significance to the design of online communication materials for young audiences, who are increasingly turning to the Internet for specific health information compared to other communication channels. Understanding how interactive communication technologies on the Web can be improved to target this specific demographic and improve their comprehension of health issues, will also hopefully lead to improved health literacy of future generations.

Copyright © Mia Liza Alcantara Lustria 2005

CHAPTER 2

THEORETICAL PERSPECTIVES AND REVIEW OF LITERATURE

This chapter begins by discussing the concept of interactivity. It then proceeds to discuss its theoretical and conceptual links of interactivity with learning and message processing. This is followed by a discussion of related research on interactivity and individual differences and Street & Rimal's (1997) three-stage model of health promotion using interactive technology. The chapter ends with a discussion of the current study's main objectives and hypotheses.

The Concept of Interactivity

The attention paid to the concept of interactivity by researchers in a variety of fields including: communication, human-computer interaction, advertising, education, and decision sciences attests to a general perception that interactivity is inherently a desirable quality of new media (Andrisani, Gaal, Gillette, & Steward, 2001; Downes & McMillan, 2000; Gillespie, 1998; Ha & James, 1998; Heeter, 1989; Kiousis, 2002; Liu & Shrum, 2002; McMillan, 1999, 2002). The lack of consensus in the operationalization of this concept, however, makes it difficult to examine this quality empirically and to draw solid conclusions about the role of interactivity in promoting a variety of desired outcomes (e.g., information seeking, learning, persuasion, etc.).

Conceptualizations of the term 'interactivity' have been approached from four different stances: the nature of the communication exchange (Burgoon *et al.*, 2002; Jensen, 1998; Rafaeli & Sudweeks, 1997), the system or channel features (Andrisani *et al.*, 2001; Bezjian-Avery, Calder, & Iacobucci, 1998; Chou, 2003; Coyle & Thorson, 2001; Downes & McMillan, 2000; Ha & James, 1998; Massey & Levy, 1999), the user's perceptions and/or actions (Light & Wakeman, 2001; McMillan, 2000; McMillan & Hwang, 2002; Newhagen & Cordes, 1995; Sundar, Kalyanaraman, & Brown, 2003; Tremayne & Dunwoody, 2001) , and a combination of all or any of the above (Heeter, 1989, 2000; Kiousis, 2002; Liu & Shrum, 2002; McMillan, 1999, 2002).

From a broader communication perspective, interactivity is strongly linked to the concept of *feedback* – the degree to which receivers can respond to messages sent by the source. The emphasis on feedback can be traced back to Wiener's Cybernetic theory (Wiener, 1948), which in stark contrast to Shannon and Weaver's (Shannon & Weaver, 1949) transmission model of communication, conceptualized communication as a dynamic, interdependent process between senders and receivers. Conceptualizations of interactivity that emphasize the changing role of senders and receivers, are described as process-oriented definitions.

Rafaeli's (1988) definition of interactivity is one such approach that emphasizes the recursiveness of communication rather than defines interactivity solely in terms of channel characteristics. According to Rafaeli:

> "Interactivity is a variable characteristic of communication settings. Formally stated, *interactivity* is an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions." (p. 111)

From this stance, unmediated, face-to-face interactions, are often held as the gold standard for full interactivity, with other media falling somewhere along a continuum. Different settings may allow: declarative (one-way) communication as exemplified by most mass media communications; reactive (two-way) communication, which allows responses from one participant; or fully interactive communication which allows simultaneous and continuous exchanges (Rafaeli & Sudweeks, 1997). This conceptualization, therefore, suggests that most new technology, as they are currently designed and used, are far from fully interactive(Schultz, 2000).

Process-related conceptualizations of interactivity, have been very useful for studying the social and psychological processes underlying computer-mediated communications and virtual communities (for examples, see the works of Burgoon *et al.*, 2000; Burgoon *et al.*, 1999; Burgoon *et al.*, 2002; Burgoon, Buller, & Floyd, 2001; Rafaeli & Sudweeks, 1997; Walther, 1992, 1996; Walther, Anderson, & Park, 1994). However, when the interest is in studying the role of interactivity for improving the effectiveness of information-delivery systems, then a purely process-oriented conceptualization may not be sufficient and hard

to operationalize, unless defined in terms of channel features that can help simulate responsiveness between users or between user and system. Kiousis (2002) also points out that this approach is restricted because it fails to highlight the elements of interactivity that other scholars find compelling – namely, the technological and individual factors that contribute to interactivity.

Structural-oriented conceptualizations, focus on channel features that simulate Rafaeli's concept of responsiveness or recursiveness and often draw distinctions among different types of media, both old and new.

In his research on virtual reality, Steuer (1992) defines interactivity as one of two dimensions (the other being vividness) that determine *telepresence* -- the mediated perception of an environment. Interactivity, according to Steuer (1992), is the "extent to which users can participate in modifying the form and content of a mediated environment in real time." This perspective proposes that interactivity is a stimulus-driven variable defined by the technological structure of the medium. Furthermore, Steuer (1992) posits that there are three main factors that contribute to interactivity: *speed* (the rate at which input can be assimilated into the mediated environment); *range* (the number of possibilities for action at any given time as determined by the number of attributes of the mediated environment that can be manipulated and the amount of variation possible within each); and *mapping* (the ability of a system to map its controls to changes in the mediated environment in a natural and predictable manner).

User-centered definitions of interactivity, on the other hand, focus on user perceptions or perceived interactivity. Liu and Shrum (2002) believe that interactivity partly resides in the user, and distinguish between the structural and experiential aspects of the construct. Accordingly they define experiential interactivity as the "interactivity of the communication process as perceived by the communication parties" (Liu & Shrum, 2002). User-centered definitions do not necessarily imply a strong correspondence between technical and perceived interactivity, as individual differences and experiences strongly influence the latter.

Most definitions of interactivity agree that interactivity of new communication technology can be defined along three main dimensions: reciprocity/communication exchange, active user control, and synchronicity (Heeter, 1989, 2000; Liu & Shrum, 2002). *Reciprocity or communication exchange* refers to the ability of media to allow two-way interaction through the provision of feedback input devices, and means to communicate with other users, or with the content providers. *Active user control* refers to the ability of the media to allow the user active control over their online experience. For example, navigational tools such as hyperlinks allow users to control the direction and amount of their information exposure. Interaction with elements of the interactive system may also allow users to self-pace their learning experience. *Synchronicity* refers to the amount of time it takes for the system to allow feedback. This concept is the most ambiguous of all three because, for example, while fast download times may

positively affect users' perceptions and online experiences, the asynchronicity of technology such as e-mail (allowing delayed feedback) can also be seen as a relative advantage.

Theoretical Perspectives

Interactivity and Message Processing

The lure of interactive new media, as discussed earlier, partly resides in its ability to engage audiences much more than traditional media are able to. Unlike traditional media such as television or radio, where audiences are passive receivers of information content, with interactive technologies, the audience becomes an active partner in shaping their own information environment. The latter, conceptually, is deemed to be a more ideal situation for enhancing learning, for changing attitudes, or for changing behaviors as scholars in the information processing literature would argue.

Information processing theories posit that persuasion occurs more successfully as a result of the internalization of messages rather than from simple information retention. The Elaboration Likelihood Model of Persuasion (Petty & Cacioppo, 1979, 1986; Petty, Cacioppo, & Goldman, 1981), hypothesizes that messages that are not only attended to but that are internalized or are `elaborated' upon, are more likely to produce greater and more permanent attitude change, compared to messages that are attended to with less scrutiny.

This model's particular contribution to earlier cognitive response theories is the idea that internalization or elaboration can vary according to motivation and/or ability. Thus, ELM provides a useful framework for examining differences in outcomes (whether this be learning, comprehension, or persuasion) given exposure to particular media.

According to ELM, there are two routes to persuasion: the central route and the peripheral route. The central route involves high elaboration (thinking and evaluation about an argument or message), while the peripheral route involves low elaboration (less careful thinking about the merits of an argument and more reliance on simple context cues such as appearance, credibility, or presentation of a message to arrive at an evaluation of the merits of the information presented). The particular route an individual uses to process information is thought to be mediated by either his ability or his motivation. When both ability and motivation are high, individuals are thought to process information following the central route (by carefully and effortfully evaluating message arguments). When ability and/or motivation are low, individuals process information following the peripheral route (using peripheral cues to make evaluations and judgments). When attitudes are formed via the central route, they are thought to be more resistant to change and better predictors of consequent behaviors.

ELM postulates that individuals differ according to their ability to be involved in effortful elaboration (individuals with high need for cognition vs low

need for cognition). In the absence of situational contexts or specific motivations that may affect reception and perception of certain messages, some individuals may be more likely to pay attention to the strength of arguments presented, while others may rely more on peripheral cues to evaluate the messages.

Similarly, another dual process theory, the Heuristic-Systematic Model (Chaiken, Liberman, & Eagly, 1989), proposes two basic modes by which individuals may form attitudes and other social judgments. *Systematic processing* involves the analytic and comprehensive consideration of message arguments, and is therefore responsive to the actual content of the information. This mode tends to be more demanding and effortful, but tends to result in more confidence in the attitudes formed. Like central route processing, systematic processing requires both cognitive ability and capacity. *Heuristic processing*, on the other hand, involves the activation and application of simple judgment rules called *heuristics* (Chaiken *et al.*, 1989). Heuristics are simple "rules of thumb" that make it easy to decide on correct attitudes or courses of action and is based on basic inferential rules or schemas which are presumed to be learned and stored in memory.

The abovementioned information processing models share the following assumptions: 1) persuasion is a complex process involving many steps which occur over time; 2) cognition and information processing are very important in eliciting attitude change; and 3) the receiver has an active role in information processing (agency) (Severin & Tankard, 2001).

Cassell *et al.* (1998) writes that the transactional and response-dependent nature of Internet communications underlines the persuasive capabilities of this medium. From a theoretical perspective, this meshes well with elements needed for persuasion to occur. First of all, health information seeking is commonly a goal-driven activity and there is often an underlying motivation to seek content to fulfill certain information needs. Second, information-seeking on the Net, requires some cognitive effort on the part of the individual. It is a receiver-driven process that requires active participation and information processing of the seeker. Users have the ability to engage content willfully, purposively choosing links and structuring their learning experience to match both their needs and capabilities. It is transactional because it provides the mechanism for users to get immediate feedback synchronously or asynchronously either from the system itself, the health information provider, or from other users.

Interactivity and Learning

As much as `interactivity' has been discussed in a variety of different fields, the concept has perhaps gained the most attention in the field of education. Interactivity research has its roots in computer-aided instruction and hypermedia research and finds its application specifically in instructional design.

However, while media and communication scholars are still trying to grasp the full meaning of the concept, instructional design scholars have essentially decided to draw a clear distinction between what they call *interactions* and *interactivity*. *Interactions* are defined as the behaviors by which individuals

and groups individually influence one another (Wagner, 1994). *Interactivity*, on the other hand, refers to attributes of the technological system (Dempsey & Van Eck, 2002).

Similar to the information processing theories discussed earlier, learning theories in the tradition of constructivism (Bruner, 1966; Piaget, 1970; Salomon, 1979) also lend to the argument that active involvement, information processing, and learner control are key elements to learning or knowledge acquisition especially within multimedia environments. Unlike traditional classroom settings, multimedia environments often provide content in a non-linear fashion, allowing learners (or health seekers in our case) control over the sequence of information presented and over the pace of learning.

Research into the use of hypertext and hypermedia for education have also shown that hypermedia represent a natural fit with respect to how the human mind works (Calisir & Gurel, 2003; Castelli, 1998; Chen & Rada, 1996; Cho, 1995). This area of educational research is based on the notion that learning occurs not only by gaining access to information but by interpreting it and relating it to prior knowledge. Specifically, hypermedia scholars argue that nonlinear hypertext allow users to freely browse through a knowledge base, and redefine both the structure and content of the material to be learned – in a way mirroring more closely the associative power of human memory (Martindale, 1991; Nelson & Palumbo, 1992).

The Cognitive Flexibility Theory (Spiro & Jehng, 1990) provides the rationale for the use of interactive technology especially for learning complex and traditionally ill-structured tasks or knowledge domains. Spiro and Jheng (1990) defines cognitive complexity as the "ability to spontaneously restructure one's knowledge … in adaptive response to radically changing situational demands … this is a function of both the way knowledge is represented and the processes that operate on those mental operations." According to CFT, learning occurs as a result of the individual's having to integrate different aspects or perspectives of the knowledge, learning new ways to apply this knowledge, and creating new knowledge representations. CFT also encourages the use of multiple representations of thematic components of a learning system and the creation of `links' among its various elements. Hypertext, lends itself well to this type of learning because it allows learners to proceed freely through the system, randomly accessing material and processing the information according to individual mental models. In hypertext systems, flexibility is enhanced because users learn or develop knowledge representations without having to proceed sequentially through the system.

This is not to say that all hypertext systems can enhance learning. Poorly designed hypertext systems have been found to either have no effect on learning or lead to disorientation and cognitive overload (Baylor, 2001; Calisir & Gurel, 2003; Dias, Gomes, & Correia, 1999; McDonald & Stevenson, 1996; Waniek, Brunstein, Naumann, & Krems, 2003; Zhang, Han, Zhu, & Zhu, 2002). Research

in this tradition have found it common for information seekers in online environments to be sidetracked or to lose track of where they are going as they explore a site more deeply. The danger of this is that users may not be aware if they have missed important information or, in some cases, may become frustrated in their searches (Baylor, 2001). These potential problems are partly addressed by providing good navigational aids in hypertext systems (Chou, 2000; Dias *et al.*, 1999; Lee, 2002) although research has also shown individual differences in how users may react to variations in site organization.

To counter mediocre or negative effects of hypertext systems and enhance learning in these types of learning environments, Jacobson (1994) suggests several instructional strategies that need to be incorporated:

- Use several cases and rich examples in their full complexity;
- Use multiple forms of knowledge representation, providing examples in several kinds of media to encourage students to look at knowledge in several ways and from several perspectives;
- Link abstract concepts to case examples and brings out the generalizable concepts and strategies applicable to other problems or cases; and
- Avoid the mistake of oversimplification -- present a number of examples to make apparent, rather than hide, the variability of concepts and themes within the domain.

It is clear from the preceding discussion that the use of interactive technology does not automatically lead to desired effects. Interactive technology provides the opportunity for enhancing learning and persuasion, but only to the extent that the design of these information or learning environments carefully addresses issues that have been found to be important in traditional learning environments. One common thread seems to tie these various theoretical perspectives: that cognition and internalization (elaboration), plus active user involvement and control are important precursors of desired outcomes. Thus we predict:

Hypothesis 1: Higher levels of interactivity will lead to greater comprehension of the content of a complex health website.

Interactivity, Comprehension & Individual Differences

The hype over interactivity seems to revolve around the notion that this feature of web delivery systems can elicit learning, comprehension, and/or persuasion by enhancing user involvement and sensory perception through increased perceptual bandwidth. There is less agreement here, however, as there is still a dearth of theoretically-driven empirical studies providing evidence for or against this notion (Aldrich *et al.*, 1998; Bezjian-Avery *et al.*, 1998; Burgoon *et al.*, 2000; Cairncross & Mannion, 2001; Chou, 2003; Dillon & Gabbard, 1998; Evans & Sabry, 2003; Evers *et al.*, 2003; Fiore & Jin, 2003; Flanagan, 1996; Ghose & Dou, 1998; Gnisci, Papa, & Spedaletti, 1999; Jaffe, 1997a; Jimison, 1999; Liu &

Shrum, 2002; McMillan, 1999; Narayanan & Hegarty, 2002; Pavlou & Stewart, 2000; Reeves & Nass, 2000; Schacter & Fagnano, 1999; Stout, Villegas, & Kim, 2001; Street & Rimal, 1997). These mixed findings have been attributed to a general lack of consensus in how interactivity has been operationalized and methodological issues (e.g., small sample sizes, confounding variables, etc.).

Narayanan & Hegarty (2002) propose an alternative view to explain these mixed findings -- that the "communicative efficacy of multi-modal presentations may be more related to their match with comprehension processes (or information-processing) than with the interactivity and dynamism of the presentation media itself". According to Aldrich *et al.* (1998) individuals can interact with interactive technologies in more and varied ways than they can with traditional media. Because interactive presentations allow users a level of control over their whole communicative experience, outcomes may vary from individual to individual. The ways that individuals engage Internet media may also vary according to various psychosocial and situational variables, suggesting that individual differences may significantly influence how people interact with online delivery systems.

The effects of individual differences on information processing of online content has been researched from a variety of stances. In separate but similar studies, Lawless & Kulikowich (1994), Dillon (1991), and Caliser & Gurel (2003) investigated the role of knowledge and interest in the comprehension of a hypermedia text. All of these studies found that individuals with higher

previous knowledge demonstrated higher comprehension of the hypermedia text and were able to navigate the nonlinear hypertext with less difficulty compared to those with lower previous knowledge.

A number of studies have also compared learning of content presented either through traditional print or online sources (Eveland Jr. & Dunwoody, 2002; Sundar, Narayanan, Obregon, & Uppal, 1998; Tewksbury & Althaus, 2000). These studies have suggested that recall and learning of factual information was greater in traditional print sources compared to online sources that provided greater freedom of navigation. The results suggest these differences to be mediated by information processing variables. Particularly, more complex nonlinear hypertext structures seemed to encourage more selective scanning of the text. Thus in nonlinear hypertext environments, readers were more likely to skip important information, compared to readers of the print sources, who were generally disposed to read material from beginning to end.

More current studies by Eveland *et al.* (Eveland Jr., Cortese, Park, & Dunwoody, 2004; Eveland Jr., Marton, & Mihye Seo, 2004) have explored how website organization might promote greater knowledge density structures rather than just simple recall of factual knowledge. The researchers designed two versions (linear vs nonlinear site design) of a health information website covering three separate topics (cancer treatments, nicotine addiction, and asthma). They then randomly assigned a combined sample of college students and adults (N = 172) to one of the two versions to test for learning effects and the

potential influence of two mediating variables: selective scanning and elaboration. Mirroring results of their earlier studies, the researchers found that respondents in the linear site had greater factual recall, whereas the respondents in the nonlinear site were able to better convey how the information they recalled were related to one another (greater knowledge density structures). Their findings on the mediating variables, elaboration and selective scanning, however, were mixed and suggest the need for further research.

The preceding studies all point to an important juncture in online communications research: the need to examine not only the nature of online communications and its technical affordances, but also the need to examine how information seekers process online content differently.

Need for Cognition as an Individual Difference Variable

Need for cognition is one of the most studied individual factors governing message processing, and indirectly, persuasion (Petty & Cacioppo, 1986). This characteristic refers to a predisposition to engage in and enjoy effortful cognitive endeavors. Individuals with high need for cognition have demonstrated a proclivity to enjoy thinking or thoughtfully consider information even when situational influences do not prompt such consideration (Bagozzi, Guerhan Canli, & Priester, 2002). Initial studies of this construct have found that high levels of need for cognition are positively associated with: the tendency to scrutinize written communications more carefully (Cacioppo, Petty, & Morris,

1983; Cohen, Stotland, & Wolfe, 1955); more active and greater information searches (Anderson, 2002; Chang & McDaniel, 1995; Ketterer, 2001; Venkatraman, Marlino, Kardes, & Sklar, 1990; Verplanken, Hazenberg, & Palenewen, 1992); a desire to engage in Web activities that require more effortful cognitive thought (Tuten & Bosnjak, 2001); deeper learning and higher comprehension of complex course material (Diseth & Martinsen, 2003; Leone & Dalton, 1988); and better decision making strategies (Levin, Huneke, & Jasper, 2000; Smith & Levin, 1996), among others. The following are some noteworthy studies.

Chang & McDaniel (1995) assigned subjects to browse freely through a hypercard program containing 105 topics on the Vietnam war. Subjects with greater cognitive complexity and academic ability as well as higher need for cognition were found to conduct more planned and investigative search strategies and to create more complex summaries of the information viewed. These findings validated the role of cognitive complexity and ability and need for cognition as predisposing variables influencing search behaviors in loosely structured information settings such as that in online environments.

Tuten & Bosnjak (2001) surveyed 400 students in three Southeastern universities to determine the relationship of the Big Five personality traits (i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness to new experiences), and need for cognition on their web usage. Need for cognition was found to be significantly and positively related to web activities that had a

cognitive component: searching for product information, current events and news, and learning and education. Those with low need for cognition were found to be less likely to use the Internet for these activities.

Diseth & Martinsen (2003) are careful to explain that need for cognition should predominantly be considered a ***motivational contruct*** rather than an individual difference in cognitive complexity. They explain that need for cognition is an intrinsic and cognitive motivation to elaborate on information. Thus, high need for cognition individuals are more likely to organize, elaborate on, and evaluate information they encounter, and as a result are able to access a greater range of topics and become more knowledgeable. On the other hand, low need for cognition individuals are likely to follow the path of least resistance, preferring to rely on others, or use cognitive heuristics or peripheral cues to aid in their decision making (Cacioppo *et al.*, 1996).

These studies imply a likely fit between this individual difference variable and online health information seeking, which we have established earlier to be an inherently effortful activity. Thus we predict:

Hypothesis 2: Higher levels of need for cognition will lead to greater comprehension of the content of a complex health website.

Hypothesis 3: Higher levels of interactivity will lead to greater comprehension of the content of a complex health website as a function of need for cognition.

A Three-Stage Model of Health Promotion Using Interactive Technology

Newhagen & Rafaeli (1996) suggest that taking a closer look at how individual users access interactive information systems (e.g., their cognitive skills, ability to solve problems and form searches, etc.) will have a significant bearing on our ability to fully exploit the Net's potential as a communication and persuasive medium. Understanding differences in the way individuals process similar content delivered using different levels of interactivity will also better inform us about how to design better interactive health information delivery systems and how to use interactivity more effectively in order to tailor messages for specific health information seekers.

It is important to recognize at this point, however, that the success (or failure for that matter) of any interactive health information program cannot occur in a vacuum. Street and Rimal (1997) offer an "organizing and heuristic" framework that describes the variables and processes that can influence or determine the effectiveness of health promotion using interactivity (see Figure 1). In general, this framework emphasizes that the effectiveness of interactive

technology for promoting a variety of health outcomes will depend on the presence of key influencing factors as well as a host of processes at various levels, including institutional policies down to an individual's preparedness to use and interact with the technology.

Since the current study focuses on the use of interactive technologies and the effects of individual differences, we pay special attention to the technological and user factors that affect utilization and, consequently, user-media-message interaction under stages 1 and 2 of this model.

At Stage 1, Street and Rimal (1997) explain that an individual's predisposition to use interactive technologies may be related to different variables including: sociodemographic characteristics, attitudes towards computers, familiarity with the technology, computer self-efficacy, as well as cost availability, and accessibility of these interactive programs in the community.

Stage 2 of the model explains the processes that influence user-media-message interactions that will consequently affect whether the experience of using the interactive technology will produce the desired results (i.e., learning, motivation, enjoyment, etc.). The following matrix outlines the specific user, media, and message characteristics that will influence the processing of interactive health promotion interventions:

User Characteristics	• Perceived relevance of topic • Perceived need for service • Desire for information • Emotional state • Attitudes towards the medium
Media Characteristics	• Ease of use • Degree of interactivity • Sensory vividness • Speed
Message Characteristics	• Health topic or service • Informational content • Reasoning and evidence provided • Perceived credibility of sources

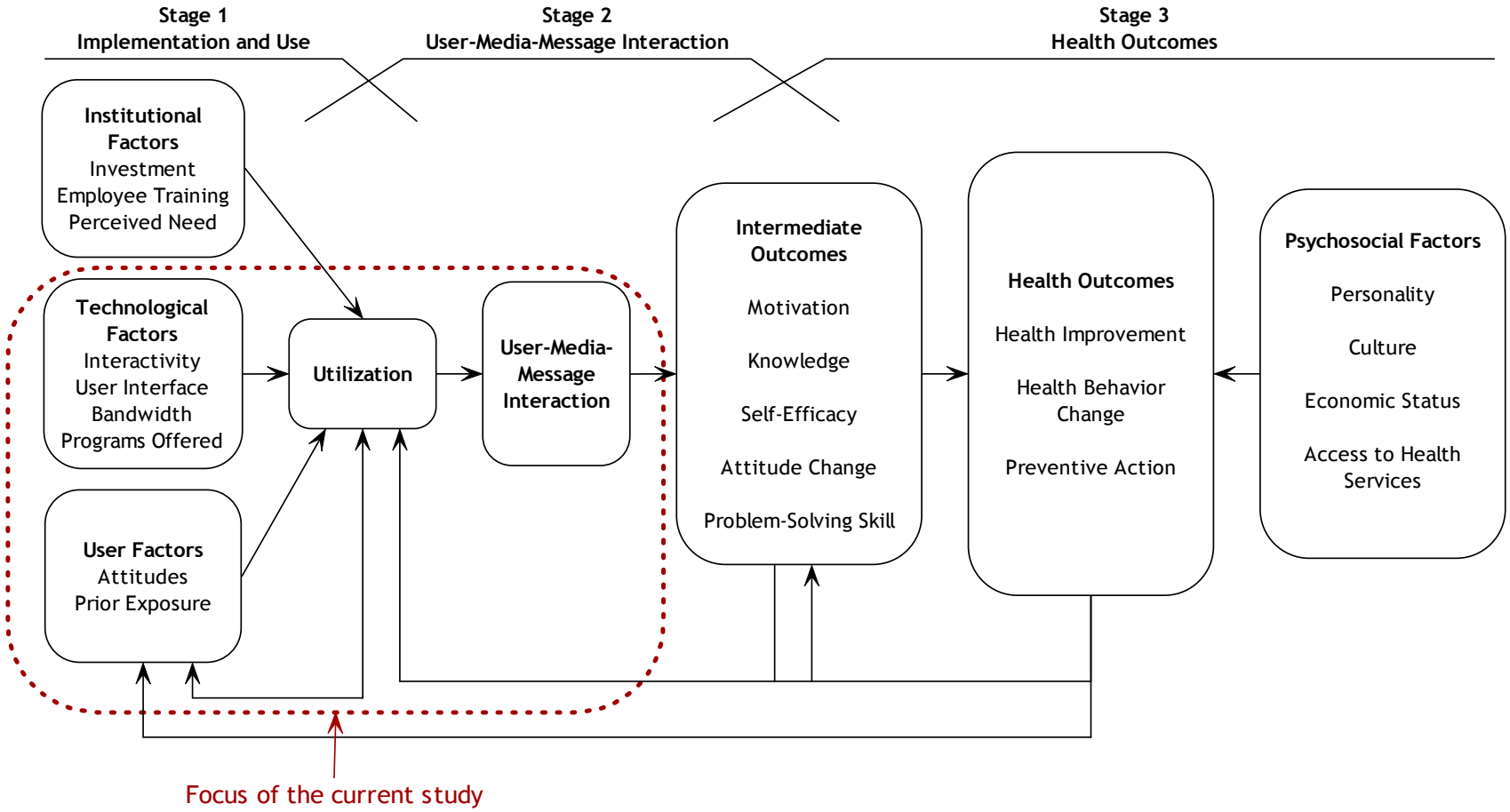


Figure 1. *A three-stage model of health promotion using interactive technology (Street & Rimal, 1997)*

Overview of the Study

This study seeks to determine the effects of level of interactivity on young adults' comprehension of the content of a complex health website. Moreover, it seeks to determine whether young adults' individual differences in need for cognition mediates the effect of level of interactivity on comprehension scores.

Specifically, we propose the following hypotheses:

H1: Higher levels of interactivity will lead to greater comprehension of the content of a complex health website.

H2: Higher need for cognition individuals will have greater comprehension of the content of a complex health website.

H3: Higher levels of interactivity will lead to greater comprehension of the content of a complex health website as a function of need for cognition.

In order to test these hypotheses, an experimental 2 (high interactivity vs low interactivity) by 2 (high need for cognition vs low need for cognition) design was conducted on a sample of undergraduate students at the University of Kentucky.

The following chapter discusses the specific methodologies carried out during the various phases of the dissertation project.

Copyright © Mia Liza Alcantara Lustria 2005

CHAPTER 3

RESEARCH METHODOLOGY

This chapter discusses the study procedures, the operational definition of the main variables of this study, and the data analysis.

The following section outlines the procedures that were used for the dissertation project. The study proceeded in two phases. Phase 1 involved the pilot study, development of the websites, and pretest study. Phase 2 involved the main experiment. Both phases are described in more detail below. Figure 2, on the following page, presents a graphical representation of the study design.

Phase 1: Pilot Study, Website Development, and Pretest Study

Pilot Study

A pilot study was conducted in the Spring of 2004 to determine the general online health information seeking behavior of the intended respondents, to pretest various scales used in the study, as well as to determine the appropriate topic for the websites that were to be developed. A total of 306 undergraduates from the University of Kentucky were surveyed for this purpose. The survey instrument included questions on their general and online health information seeking behavior, Internet use and computer competency, need for cognition, socio-demographic characteristics, and knowledge of and interest in selected health topics. The pilot sample was composed of almost equal numbers of males (n = 153, 50%) and females (n = 151, 49.3%) with a mean

age of 20.13 years. Majority were white (n = 275, 89.9%) and a minority were African American (n = 9, 2.9%) or of another race (n = 15, 4.9%) (Table A in Appendix A). A great majority perceived themselves to have good (n = 160 , 52.3%) or excellent health (n = 124, 40.5 %). The respondents were also fairly computer competent with a mean computer competency score of 3.77. Majority of the respondents said they did not seek health information online (n = 125, 40.8%) or very rarely did (n = 103, 33.7%), and said that when they did go online for health information, they did so mostly for themselves (n = 101, 33.0%).

However, when asked to elaborate on what specific health topics they looked for information online, most of the respondents were able to site at least one of the major health topics provided. Appendix A (Table B) lists the major health topics the respondents in the pilot sample had searched online for. The most popular ones were specific information about a disease or medical problem (n = 208, 75.4%), exercise or fitness (n = 196, 71.0%), and information about diet, vitamins or nutritional supplements (n = 164, 59.4%)

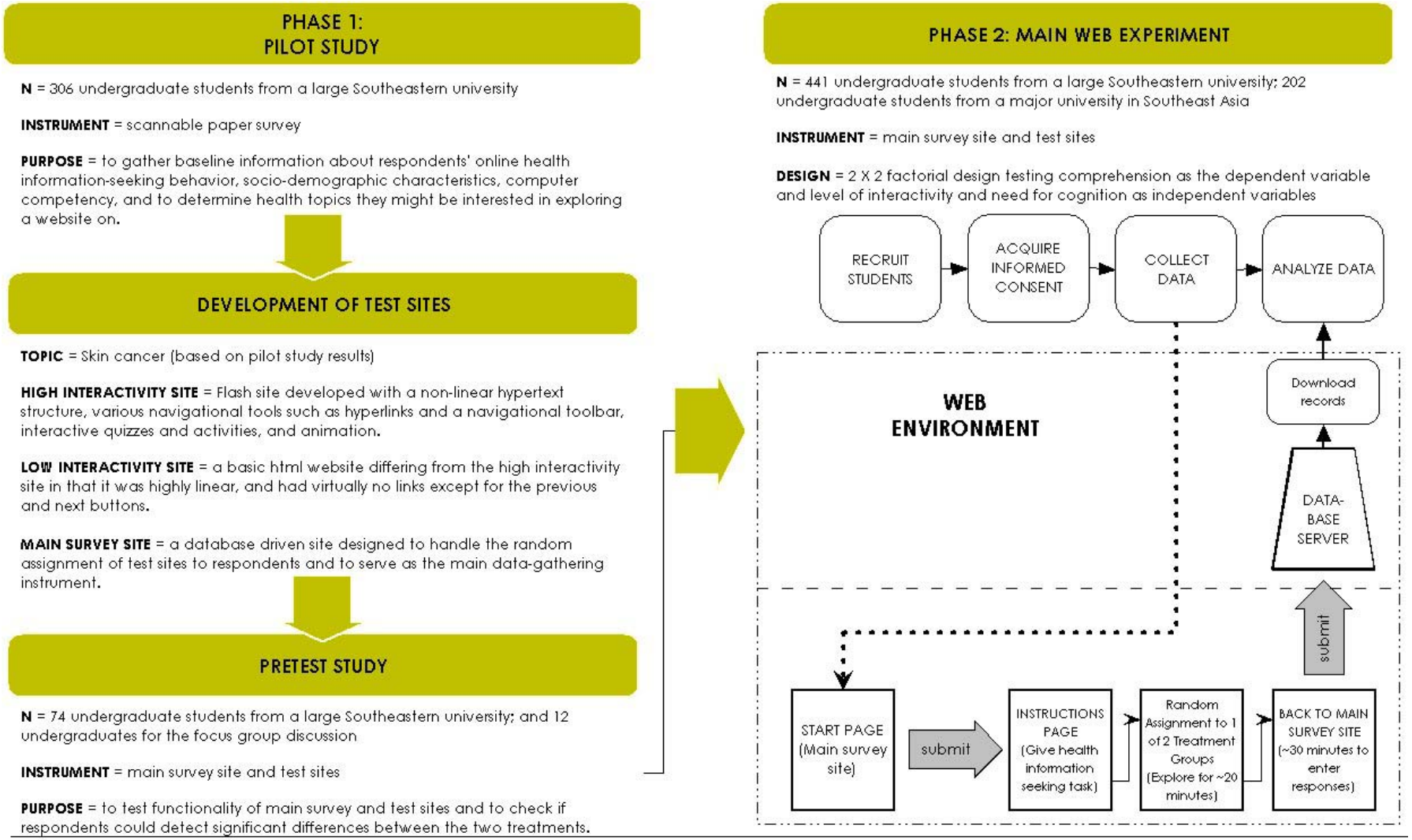


Figure 2. *Graphical representation of the study flow.*

The main purpose of the pilot study was to determine which health topic the test sites should focus on. Two criteria were used to decide on this topic. First, the intended audience should not have had too much previous knowledge on the topic. Second, the intended audience had to be interested in spending more time exploring a potential website on the chosen topic. Tables C and D in Appendix A summarize the results of the survey. Results indicated that the best health topic that met both these criteria was cancer. This was a topic that majority of the respondents did not feel they were very knowledgeable about, but it was also a topic that they were willing to spend the most time exploring a website on. Since this topic is very broad, we decided to narrow down the topic choice to a type of cancer that might be of particular interest to college audiences. Thus the final choice for health topic was skin cancer.

Website Development

Two websites were designed for this study using essentially the same text and graphical content from various existing and credible online sources on skin cancer. The high interactivity site used a very non-linear hypertext structure and included various navigation tools, hyperlinks, and a few interactive activities (e.g., click-through modules, animation, interactive quizzes, and tailored queries) (Figure 3). The low interactivity site used a hierarchical linear hypertext structure with minimal navigation (Figure 4). Therefore, while the sites had essentially the same content, subjects had more control over how this was presented in the high

interactivity site because of the various navigational choices. The high interactivity site was also designed to be more engaging with its array of various interactive elements and activities. See Appendix B for screenshots and descriptions of the various interactive activities.

Figure 3. *Screenshot of the high interactivity site.*

Keeping the content of both websites uniform was an important step in maintaining experimental control and in ensuring that the main outcome

variable of interest, comprehension, would not be confounded by any external elements. Specifically, no external hyperlinks or other interpersonal features (e.g., chat, or e-mail) were included in either of the sites as these could potentially alter the amount and kind of information the user could be exposed to. Nevertheless, the high interactive site included several activities designed to engage the information seeker and to create a richer learning environment. These activities were intended to be more than "bells and whistles" features as each interactive element has a specific purpose. These `interactive' activities were not purely point-and-click, navigational devices, but were intrinsically linked to the text and were designed to enhance the comprehension of the content as suggested by Jacobson (1994) (see p. 23) .

So, `interactivity' here was narrowly defined by features, and yet did not include all the possible features that could make websites truly interactive or that could exploit the interpersonal communication capabilities of websites (e.g., feedback devices, chat, BBSs, etc.). Nevertheless, focusing on a select number of specific interactive features could help facilitate the discovery and examination of the causal factors that might mediate the effectiveness of fully interactive systems.

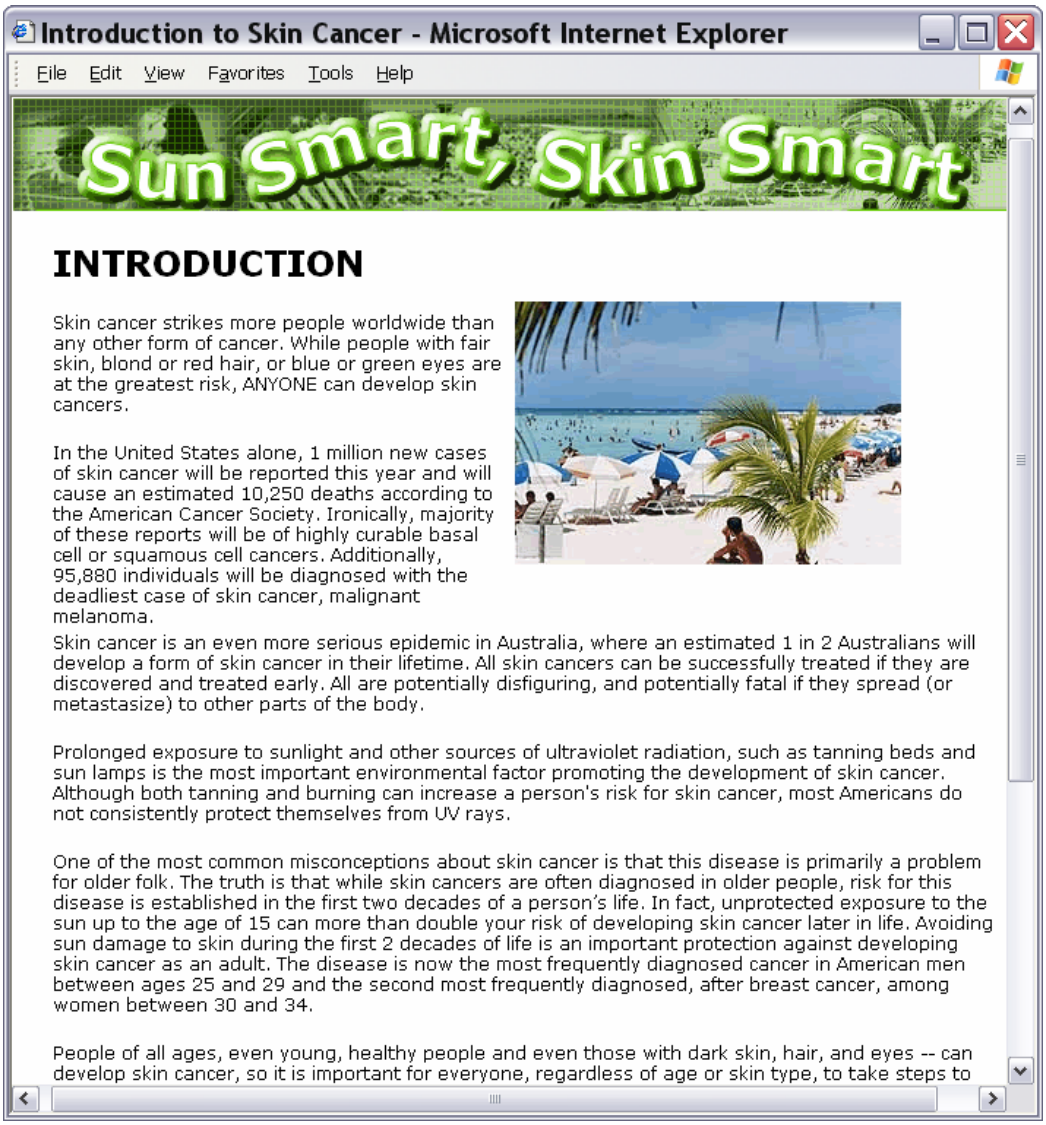


Figure 4. *Screenshot of the low interactivity site.*

Each site contained basically the same text about skin cancer. As discussed earlier, the topic was identified arbitrarily based on the following criteria: it was a health topic that young adults could relate to and was, therefore, an issue that had some salience or relevance to this population; it was a topic that college students, in the pilot study, claimed to have some familiarity with, but did not have indepth knowledge of. Specifically, the websites contained general

information about skin cancer and the risk factors associated with this disease, and also addressed certain risk behaviors such as sun tanning, use of tanning beds, and the non-use of sunscreens, all of which are common among young adults.

Information about skin cancer was collected from credible sources both on the Web and from selected print sources. General content on the websites was adapted from various materials from the National Cancer Institute, American Cancer Society, Skin Cancer Foundation, American Academy of Dermatology, National Library of Medicine of the National Institutes of Health, the National Center for Chronic Disease Prevention and Health Promotion, and the Cool in the Shade website produced by the Texas A&M University College Station. Unless otherwise indicated, specific content was modified for research and educational purposes. Other content reproduced in their original form had specific references to the original sources and were reproduced with permission from the copyright holders. The text selected for both sites were written specifically for young adults and presented in a non-technical fashion.

Great care was taken to ensure the usability of the sites. In other words, while this researcher struggled to achieve differing levels of interactivity for both sites, care was taken to follow common guidelines for effective website and instructional design. The sites varied only in the number of navigational and interactive elements included as well as hypertext structure. Other elements, such as color, fonts, background, and banners were kept uniform on each site.

A third site, which served as the main data gathering instrument, was also designed (Figure 5). This site included: information necessary for soliciting the consent of the respondents to participate in the study, the main instructions for the respondents, as well as the main online survey questions. This database-driven site also managed the random assignment of either treatment to each respondent.

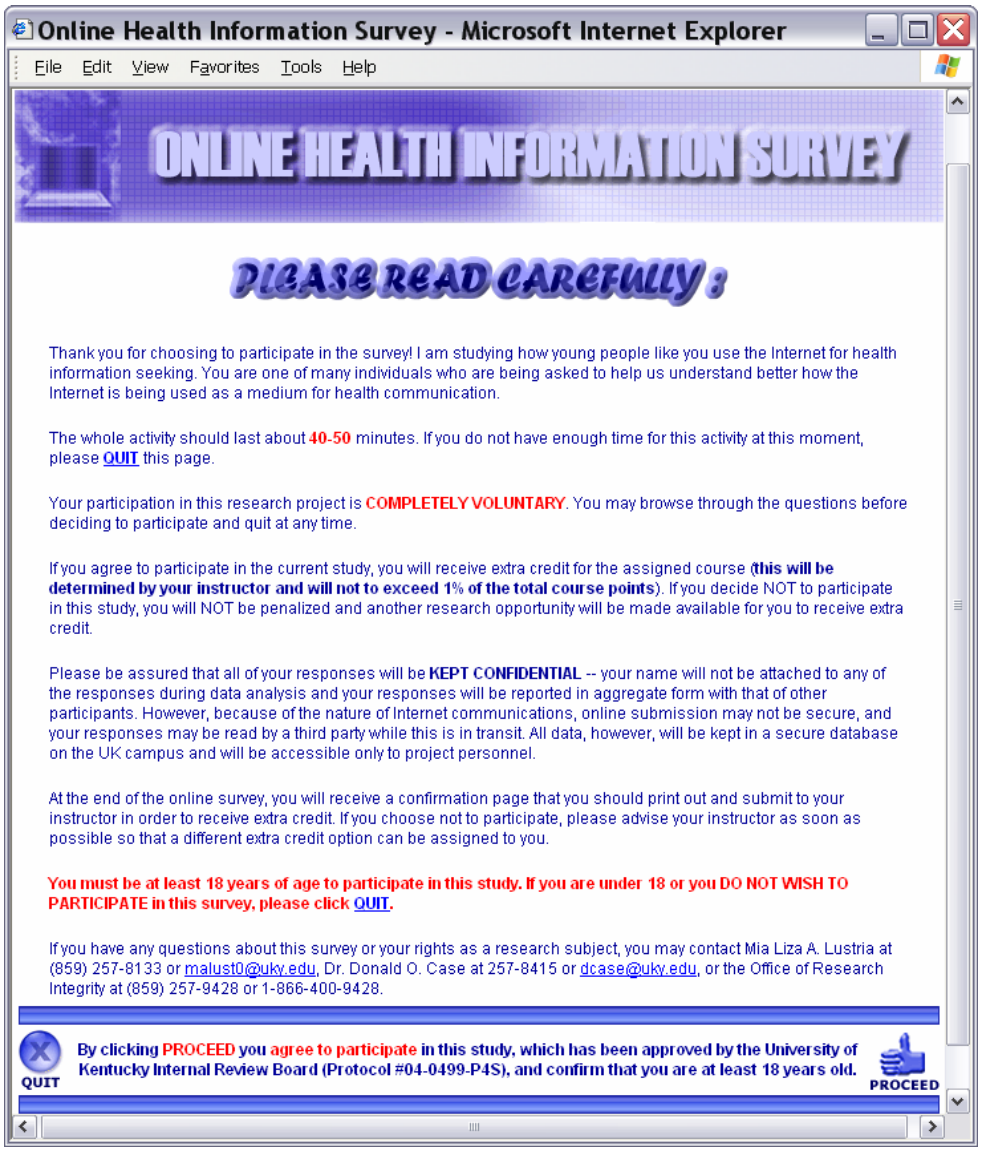


Figure 5. *Screenshot of online survey site.*

Pretest Study

A manipulation check was conducted before the actual experiment in order to test for treatment integrity. In this case, measures were taken to determine whether subjects were able to detect a significant difference in the level of interactivity of the websites –-that the level of interactivity of the 'high interactivity' site would be perceived to be significantly greater than the 'low interactivity' site. It was also necessary to test the readability of the content and to pretest the comprehension questions to ensure that the items were neither too easy nor too difficult to answer. The pretest study was also aimed at testing the functionality of the online survey site and to ensure that the random assignment function of the database-driven site would work properly.

Pretest of Stimulus Materials

The stimulus materials were the two websites on skin cancer: the highly interactive version of the content, and the less interactive version of the content.

A convenience sample of 104 undergraduate students enrolled in communication classes during the 2004 summer session at a large Southeastern university were recruited for the pretest and offered class credit for their participation. One session had to be cancelled midway through the experiment due to technical difficulties with the database server and respondents who were not able to complete all experimental activities had to be discarded, so only data from 74 respondents were used for the analysis.

The pretest was conducted during class time in several computer laboratories on campus. Several days prior to each session, the class instructors disseminated basic information about the purpose of the study to their students. Students who were interested in the study were then instructed to proceed to designated computer laboratories on the dates assigned to their particular class. During each actual pretest session, students were again given general information about the study and asked to signify their interest and informed consent by signing appropriate consent forms. They were then instructed to begin the pretest by logging in to the online survey site, which included specific instructions for the rest of the pretest (these instructions were the same instructions given in the main web experiment, thus will be described in more detail in the following sections).

Results of the manipulation check on perceived interactivity showed that the pretest respondents perceived a significant difference in the level of interactivity of the two test sites. Specifically, a one-way analysis of variance was conducted to evaluate the relationship between level of technical interactivity and perceived interactivity. The independent variable, technical interactivity, had two levels: high and low. The dependent variable was perceived interactivity based on mean scores of the perceived interactivity scale.

The means for both of the groups (shown in Table 1), indicated that level of interactivity influenced perceived interactivity in the direction predicted. Higher perceived interactivity scores was reported in the high interactivity group

(*M* = 4.04, *SD* = 0.63) compared to the low interactivity group (*M* = 3.66, *SD* = 0.59).

Table 1.

Means and Standard Deviations for Level of Interactivity and Perceived Interactivity

Variable	Perceived Interactivity		
	N	***M***	***SD***
High interactivity	36	4.04	0.63
Low interactivity	38	3.66	0.59

To assess whether the differences between the perceived interactivity scores of the two groups were significant, a one-way analysis of variance test was performed (Table 2). The results of the ANOVA indicated significant differences in perceived interactivity between the two treatment groups (F (1,72) = 7.24, p = .009, η^2 = .091). The strength of relationship between the level of interactivity and perceived interactivity, as assessed by η^2, was small, with the level of interactivity accounting for 9.1% of the variance of the dependent variable.

Table 2.

One-Way Analysis of Variance of Level of Interactivity on Perceived Interactivity

Variable and Source	***df***	***SS***	***MS***	***F***	***p***	η^2	**Power**
Between groups	1	2.69	2.69	7.24	.009	.091	0.76
Within groups	72	26.74	0.37				
Total	74	1081.76					

***NOTE**: Computed using alpha = .05*

The same subjects were also used to pretest the comprehension questions to be used in the actual experiment. An original pool of 23 questions containing items meant to assess the correct encoding (understanding) of material-asserted meanings were pretested. Items were designed to represent only logical inferences that could be made from exposure to the stimulus materials. Comprehension was assessed using modified true or false items with three response options: "true, false, and I don't know". Items for which 85% or more of the respondents got correct answers (i.e., items that were too easy to answer) were removed from the list, leaving a total of 13 true or false items which were used in the main experiment (see Table 3).

Table 3.

Item Analysis of Comprehension Items in Pretest Study (N=76)

ORIGINAL COMPREHENSION ITEMS	*N*	% correct responses
a. Getting a tan from a tanning bed is safer than getting a tan from sun exposure.	72	96.0
b. People who always burn, never tan, and are fair with red or blonde hair, green or blue eyes and freckles have a greater chance of developing skin cancer.	70	93.3
c. People with darker colored skin can never get skin cancer.	74	98.7
d. You can't die from skin cancer.	70	93.3
e. The development of a new mole or a change in an existing one may be a sign of skin cancer.	69	92.0
f. You have an increased risk of malignant melanoma if your parents, sister or children have had melanoma.	56	74.7
g. If you stay out of the sun, you will never get skin cancer.	71	94.7
h. Malignant melanoma, a serious type of skin cancer, cannot be cured.	44	58.7
i. Melanoma occurs only on the exposed portion of your body: the face, arms, and legs.	60	80.0
j. If you were born with one or more moles, you are more likely to develop malignant melanoma.	19	25.3
k. Skin cancer strikes more people worldwide than any other form of cancer.	60	80.0
l. People who have had skin cancer may have a greater risk of having other types of cancer.	40	53.3
m. While the deadliest for of skin cancer is melanoma, close to 97% of all skin cancer cases are non-melanoma skin cancer.	41	54.7
n. Skin cancers usually develop in individuals in their late 30s.	48	64.0
o. Skin cancer symptoms include sores or changes in the skin that do not heal, ulcers in the skin, discoloring in parts of the skin and changes in existing moles.	72	96.0
p. Ultraviolet (UV) radiation caused by shorter-wave UVB rays is the single most important cause of skin cancer.	23	30.7
q. Darker skinned individuals produce enough melanin to protect themselves from the risk of skin cancer.	58	77.3
r. Most people receive 50 percent of their lifetime ultraviolet (UV) exposure by age 20.	50	66.7

Table 3. Continued …

ORIGINAL COMPREHENSION ITEMS	*N*	% correct responses
s. Reflective surfaces such as sand and pavement can reflect up to 85 percent of the damaging sun rays.	58	77.3
t. You can't get a sunburn on a cloudy day.	71	94.7
u. Suntans are healthy.	68	90.7
v. If you don't feel the hot rays of the sun, you are not likely to get a sunburn.	63	84.0
w. A healthy tan provides a base coat that can actually protect one from getting skin cancer.	68	90.7

NOTE: The shaded items were discarded from the list for the actual experiment.

The stimulus materials were also subjected to readability testing using Flesch Reading Ease Score. This procedure rates text on a 100-point scale, with higher scores signifying greater reading ease. According to this formula, most standard documents have scores of 60 to 70. The main purpose of this manipulation check was to ensure that the content was written for standard or lay audiences and used language that was not too difficult to understand. Table 4 shows the results of the readability analysis of four random text samples of the websites' contents.

The readability analysis implies that, in general, the website contained text that could be understood by 8th to 9th graders with relative ease, although there were sections that were relatively more difficult to understand.

Table 4.

Readability Analysis of Random Text Samples from the Websites

TEXT SAMPLE	FLESCH-KINKAID READING LEVEL	FLESCH READING EASE SCORE
Sample 1	11.99	52.26
Sample 2	6.32	69.50
Sample 3	8.97	58.63
Sample 4	11.17	43.42
AVERAGE	9.61	56.00

Focus Group Interview

Twelve participants in the pretest experiment were invited to participate in a follow up focus group interview to discuss their experiences during the activity and to solicit their suggestions on how to improve the websites or the online survey. The participants were paid $10.00 each for their participation in the 1 ½ hour group discussion. Half of the participants had been exposed to the high interactivity site, while the second half had been exposed to the low interactivity site.

For the most part, majority of the respondents found the whole experiment to be enjoyable and thought-provoking. Regardless of what group they belonged to, majority of the respondents said that the sites were well-researched and well-designed. When the low interactivity group was shown the high interactivity site, however, they all agreed that the latter looked more professional and well-structured compared to the low interactivity site. A few

respondents, however, did not feel that this was a serious impediment to their use of the site. A couple of respondents, in fact, admitted that they preferred the straightforwardness of the low interactivity site compared to the complexity of the high interactivity site. All respondents agreed that the high interactivity site was more `interactive' than the low interactivity site.

During the experiment, we also tracked the number of times respondents actually clicked on or used the interactive elements included in the high interactive site. Surprisingly, only 2 out of 76 respondents who participated in the pretest experiment had clicked on any of the interactive elements. We asked the focus group respondents who had been in the high interactive group why they had not paid any attention to these interactive features. All of them admitted that they had not noticed these features or had thought these were not very important. This was despite the fact that these activities were placed in boxes with attractive icons to the side of the webpages. They suggested placing links to these activities either within the text or on a page by itself, so that these might be more noticeable.

Modification of Websites Based on Results of Pretest

Since the results of the pretest experiment revealed that there was a significant difference in perceived interactivity, then the test sites did not need major modification. However, based on the results of the focus group, we decided to make the interactive elements more noticeable by putting these all on a quick reference page (as shown in Figure 6). A link to this quick reference page,

was also placed on each succeeding webpage of the high interactivity site. This way, this way the users could easily access this page from any point on the website.

Pretest of the Online Survey Site

The online survey site functioned without incident most of the time during the pretest experiment. The random assignment function worked well, with minor tweaking of the browser settings on each machine to allow popups. The only major issue was when the database server crashed during one session. This session, therefore had to be cancelled, resulting in the loss of data from about 28 potential respondents. The problem was later traced to compatibility problems of the database software with the then server hardware, which we were told would be solved once the server was upgraded in the weeks following the pretest.

Figure 6. *Screenshot of the quick reference page on the high interactive site.*

Phase 2: Main Web Experiment

Operational Definition of the Main Variables

The main interest of this study was to learn more about how the level of interactivity of a health website might affect young adults' comprehension of its contents and to determine if individual differences, particularly need for cognition, moderates these potential effects. With this in mind, the main variables of the study were defined and/or measured in the following manner.

Main Independent Variables

Interactivity. Two aspects of interactivity were of particular interest in this study: perceived interactivity and technical interactivity. Technical interactivity refers to the formal features that were manipulated in the stimulus materials or the websites developed for this study. The high interactivity site had a non-linear hypertext structure and included features (e.g., internal hyperlinks, and navigational tools) that allowed users to navigate the site at their own discretion, in a sense allowing them to customize their online experiences. The high interactivity site also provided a rich graphical interface with `interactive' elements (e.g., graphics, mouse-overs, click-through modules, interactive quizzes, and tailored queries) that helped create an environment for active learning. Therefore, the primary dimensions of technical interactivity that were explored in the context of this study were: active user control and sensory stimulation.

Another measure of interactivity that was of interest in this study was perceived interactivity. While it has been useful to look at interactivity from the purview of technical affordances, researchers are also beginning to recognize that user-perspectives – how individuals perceive and/or experience interactivity, may also be informative for evaluating the interactivity of websites. For this study, perceived interactivity was measured using the active control and synchronicity subscales of Liu's (2003) perceived interactivity scale.

The main survey site included five items from the active control and synchronicity subscales of Liu's (2003) perceived interactivity scale (as shown in Table 5). Liu found these sub-scales to be reliable with Cronbach alphas of: 0.75 for the active control dimension items; and 0.86 for the synchronicity dimension items. The original and complete scale also included six items measuring two-way communication. However, since active user control and to a certain extent, synchronicity, were the only dimensions of interactivity that were manipulated in this study, questions about the direction of communication were not included.

Participants were instructed to indicate their agreement or disagreement with the items using a 5-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated higher perceived interactivity. The perceived interactivity scale used for this study yielded a reliability coefficient of alpha = 0.77.

Table 5.

Reliability Analysis of Perceived Interactivity Scale

ITEM	*N*	*M*	*SD*	ALPHA IF DELETED
1. I felt I had a lot of control over where I wanted to go on the website.	441	3.54	1.23	0.70
2. The site offered many different options/activities for learning more about the site.	441	3.75	1.09	0.68
3. When I clicked on links I felt I was getting instantaneous information.	441	3.92	0.88	0.77
4. I was able to find answers to my questions without difficulty.	441	3.89	0.81	0.73
5. The site was interactive.	441	3.25	1.18	0.70

NOTE: 5 = highest possible score; Chronbach alpha of complete scale = 0.77

Need for Cognition. Need for cognition (NFC) was defined as the individual's intrinsic enjoyment of and motivation to thoughtfully consider information (Cacioppo, Petty, Kao, & Rodriguez, 1986). Individuals who have a high need for cognition are those that have a proclivity to enjoy and engage in effortful elaboration even in situations that do not warrant the need for in depth processing of information. People who have low need for cognition, on the other hand, are thought to be "cognitive misers" who do not enjoy elaborating and rely more commonly on non-thoughtful persuasion processes, especially in situations that do not warrant careful elaboration.

In the context of this study, NFC was measured using the 18-item need for cognition scale (Cacioppo, Petty, & Kao, 1984). Participants were required to indicate their agreement or disagreement with the items using a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) (specific items are shown in Table 6). The coefficient alpha for the scale was 0.87.

Table 6.

Reliability Analysis of Need for Cognition Scale

ITEM	*N*	*M*	*SD*	ALPHA IF DELETED
1. Thinking is not my idea of fun.*	441	3.31	1.01	0.86
2. I would rather do something that requires little thought than do something that is sure to challenge my thinking abilities.*	441	3.26	0.99	0.86
3. I try to anticipate and avoid situations where there is a likely chance that I will have to think indepth about something.*	441	3.57	0.88	0.87
4. I only think as hard as I have to.*	441	3.12	0.98	0.87
5. I prefer to think about small, daily projects to long-term ones.*	441	2.90	1.02	0.87
6. I like tasks that require little thought once I've learned them.*	441	2.75	0.92	0.87
7. Learning new ways to think doesn't excite me very much.*	441	3.41	0.93	0.87
8. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.*	441	2.89	1.03	0.87
9. It's enough for me that something gets the job done -- I don't care how or why it works.*	441	3.35	0.98	0.87
10. I would prefer complex to simple problems.	441	2.79	1.03	0.87
11. I like to have responsibility of handling a situation that requires a lot of thinking.	441	3.31	0.94	0.86
12. I find satisfaction in deliberating hard and long for hours.	441	2.81	0.98	0.87
13. The idea of relying on thought to get me to the top appeals to me.	441	3.56	0.86	0.87
14. I really enjoy a task that involves coming up with new solutions to problems.	441	3.51	0.85	0.86
15. I prefer my life to be filled with puzzles that I must solve.	441	2.91	0.92	0.87
16. The notion of thinking abstractly is appealing to me.	441	3.25	0.96	0.87
17. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.	441	3.25	0.90	0.86
18. I usually end up deliberating about issues even when they do not affect me personally.	441	3.31	0.92	0.87

*NOTE: *Reverse coded variables; 5 = highest possible score; Cronbach alpha for complete scale = 0.87*

For the final analysis, the respondents were divided into two groups: high and low need for cognition based on the median (*median* = 3.17). Those who scored below the median were categorized as low need for cognition individuals (low NFC), while those who scored above the median were categorized as high need for cognition individuals (high NFC). Table 7 shows the distribution of respondents based on this median split.

Table 7.

Distribution of Respondents Based on Need for Cognition

Variable	*N*	%
High Need for Cognition	206	46.7
Low Need for Cognition	235	53.3

Dependent Variable

Comprehension. In this study, comprehension referred to the correct encoding (or understanding) of the text. Comprehension was, therefore, defined as the amount of meanings accurately drawn from the message. It is important to note, however, that in order to be considered accurate, these meanings had to be intrinsic to or directly implied by the material.

In this study, this construct was measured using a thirteen-item modified true or false test of comprehension (with three choices: true, false, or I don't know). These 13 items were chosen from an original pool of 23 questions that were pretested and evaluated during Phase 1 of the study to make sure that they

directly measured understanding of only material-asserted concepts. The resulting 13 items that were used in the main survey were later subjected to more sophisticated item analyses techniques to ensure that these were not too easy nor too difficult to understand and to ensure that these adequately discriminated between high and low scorers.

Table 8 shows results of the item analyses. Specifically, two measures were used. Item difficulty was measured by calculating the percentage of test-takers who answered the item correctly, given by the following formula:

$$\text{Item difficulty} = \frac{\text{\# of people responding correctly}}{\text{\# of people taking the test}}$$

Previous studies have shown that items with difficulty values between 0.30 and 0.85 for True or False type questions are most effective in discriminating between different levels of achievement (Kehoe, 1995).

Discrimination index was measured to show how well a test item was able to separate those test takers who showed a high degree of skill, knowledge, or attitudes from those who had low skills, knowledge, etc. The discrimination index (D) compared, for each test item, the performance of those who scored the best from those who scored the worst. Discrimination index was calculated using the following formula:

$$D = \frac{\text{\# correct responses in } 75^{th} \text{ percentile - \# of correct responses in } 25^{th} \text{ percentile}}{\text{\# of people in the } 75^{th} \text{ percentile}}$$

Previous studies have shown that items which discriminate well are those that have difficulties between 0.30 to 0.70 (Kehoe, 1995). As a result of this psychometric analyses, we were able to scale down the original 13-item comprehension test to eight items based on the guidelines discussed above.

An attempt was also made to measure the internal consistency of the comprehension scale using Kuder Richardson 20 coefficient alpha. This reliability test measures the extent to which the scale (or test) is likely to produce consistent scores. The resulting KR 20 alphas, however, were very low, indicating that the item questions tended to be unrelated to one another in terms of who answered them correctly. Rather than interpreting this as an indication of the inadequacy of the comprehension scale, we interpreted this as an indication of the nature of the content being measured. Ideally, KR 20 is more useful for measuring the reliability of homogenous content or tests meant to measure understanding of one underlying construct. Generally, the more diverse the subject matter being tested, the lower the reliability. Also, a scale with lesser number of items is usually expected to yield lower reliability scores.

In this case, we were measuring the comprehension of material from a complex website, which included a variety of different information on skin cancer: different types of skin cancer, risk factors associated with skin cancer, risky behaviors, etc. Additionally, we ran a factor analysis on the scale and this test generated a 6-factor solution, providing further evidence that we were not measuring just one single construct.

In the end, we decided to use the eight items which scored well on item difficulty and discrimination index to measure our main dependent variable, comprehension.

Table 8.

Item Analyses of Comprehension Scale Items

COMPREHENSION TEST ITEMS	No. of correct responses	Item Difficulty[1]	Response frequency of 75th percentile (a)	Response frequency of 25th percentile (b)	No. of respondents in 75th percentile (n)	Discrimination Index[2]	KR 20 Alpha (if deleted)[3]
1. You have an increased risk of malignant melanoma if your parents, sister or children have had melanoma.	319	0.72	123	74	133	0.37	0.33
2. Malignant melanoma, a serious type of skin cancer, cannot be cured.	324	0.73	120	77	133	0.32	0.34
3. If you were born with one or more moles, you are more likely to develop malignant melanoma.	161	0.36	80	28	133	0.39	0.36
4. People who have had skin cancer may have a greater risk of having other types of cancer.	198	0.44	79	44	133	0.26	0.39
5. While the deadliest of skin cancer is melanoma, close to 97% of all skin cancer cases are non-melanoma skin cancer.	212	0.48	94	36	133	0.44	0.34
6. Skin cancers usually develop in individuals in their late 30s.	274	0.62	103	68	133	0.26	0.38
7. Ultraviolet (UV) radiation caused by shorter-wave UVB rays is the single most important cause of skin cancer.	154	0.35	75	26	133	0.37	0.36
8. Darker skinned individuals produce enough melanin to protect themselves from the risk of skin cancer.	379	0.85	126	94	133	0.24	0.31
9. Most people receive 50 percent of their lifetime ultraviolet (UV) exposure by age 20.	264	0.59	106	50	133	0.42	0.33
10. Reflective surfaces such as sand and pavement can reflect up to 85 percent of the damaging sun rays.	324	0.73	124	73	133	0.38	0.30
11. Skin cancer strikes more people worldwide than any other form of cancer.	368	0.83	126	93	133	0.25	0.32
12. Melanoma occurs only on the exposed portion of your body: the face, arms, and legs.	315	0.71	118	66	133	0.39	0.32
13. If you don't feel the hot rays of the sun, you are not likely to get a sunburn.	427	0.96	133	124	133	0.07	0.33

NOTES: *[1] Item Difficulty - items with difficulty values between 0.3 and 0.85 for True or False type questions are most effective.; Discrimination Index - items which discriminate well are those which have difficulties between 0.3 and 0.7; [3]Overall KR20 Alpha = 0.36; Shaded items were removed from the scale.*

Other Variables of Interest

The following section includes a description of the other variables of interest measured in this study.

Computer Competency. A 12-item scale was used to measure respondents' computer competency or ability to do basic computer and Internet activities. Nine of the items on the scale were adapted from Swinyard & Smith's (2003) computer competency scale -- the complete and original 12-item scale was highly reliable with a coefficient alpha of 0.90.

For this study, respondents were asked to evaluate how competent they were in doing various computer/Internet activities using a 5-point Likert-type scale, ranging from 1 – not competent at all, to 5 – very competent. The scale was very reliable with a Chronbach alpha of 0.89 (as shown in Table 9).

Table 9.

Reliability Analysis of Computer Competency Scale

ITEM	*N*	*M*	*SD*	ALPHA IF DELETED
Sending or reading e-mail	440	4.84	0.52	0.89
Using word-processing programs	439	4.76	0.54	0.89
Installing computer software	440	3.66	1.30	0.87
Configuring computer drivers	431	2.54	1.37	0.87
Fixing a system	441	2.63	1.37	0.87
Installing an operating system	441	3.05	1.43	0.87
Troubleshooting software problems	435	2.72	1.33	0.87
Troubleshooting hardware problems	434	2.55	1.32	0.87
Browsing the Internet	433	4.80	0.57	0.89
Using a search engine	433	4.78	0.62	0.89
Making a specific purchase on the Internet	436	4.53	0.90	0.89
Searching for specific information	437	4.66	0.64	0.89

NOTE: 5 = highest possible score; Cronbach alpha for complete scale = 0.89

Health Literacy. In the literature, health literacy has been defined a number of ways. From simple definitions that look at this concept as the "ability to understand and act on health information" (McCray, 2005), to more encompassing definitions that define this as "the degree to which people have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions"(Parker, Ratzan, & Lurie, 2003). The multi-dimensionality of this concept has made measuring health literacy a constant challenge to scholars. Most have relied on proxy measures that often do not capture the full range of health literacy skills such as listening, message processing, and communicating. Often times, these instruments

measure functional health literacy based on the recognition and correct pronunciation of basic health terms.

The Rapid Estimate of Adult Literacy in Medicine (REALM) is one such instrument that is often administered by providers in clinical settings to serve as a short measure of functional health literacy. The original test was designed to test an adult patient's ability to read common medical terms and lay terms for body parts and illnesses. The test includes 66 such terms and takes 2 to 3 minutes to administer and score. REALM has been correlated with other standard tests.

For this study, functional health literacy was measured using 19 terms included in the REALM instrument. Since the online survey was self-administered, respondents were asked to check which of these 19 medical or health terms they were confident they could pronounce correctly (list shown in Table 10). In addition, they were also asked to report which medical or health terms in the same list they were confident that they could explain the meaning of to someone else. Thus, the perfect score for this functional health literacy test was 38. People who scored higher on the modified REALM instrument were categorized as high in functional health literacy.

Table 10.

List of Medical or Health Terms Included in the Modified REALM instrument

MEDICAL/HEALTH TERMS		
fat	flu	enema
osteoporosis	allergic	jaundice
anemia	gonorrhea	impetigo
colitis	constipation	hormones
asthma	syphilis	menstrual
diabetes	hepatitis	antibiotics
alcoholism	epidural	

NOTE: Respondents were instructed to indicate which terms they were confident they could: (a) pronounce correctly; and/or (b) explain the meaning of to someone else.

Time on Task. Time on task was defined as the exact amount of time (in minutes) the respondents spent browsing the test site assigned to them. This was automatically determined by calculating the difference between the time the respondents logged into the site randomly assigned to then and the time they started the survey.

Reading Style. Reading style referred to how deeply respondents read the contents of the websites. Respondents were asked in their reading of the websites whether they tended to: (1) jump sections and read portions that only caught their eye; (2) skim most of the website's contents and read portions that interested them; or (3) read the whole content of the website.

Main Experiment

Overview of Research Design

An experimental 2 (high need for cognition vs low need for cognition) x 2 (highly interactive website vs low interactive website) factorial design was used to test the hypotheses (as shown in Figure 7). The purpose of the design was to correlate comprehension scores with the level of interactivity of websites and individuals' need for cognition scores.

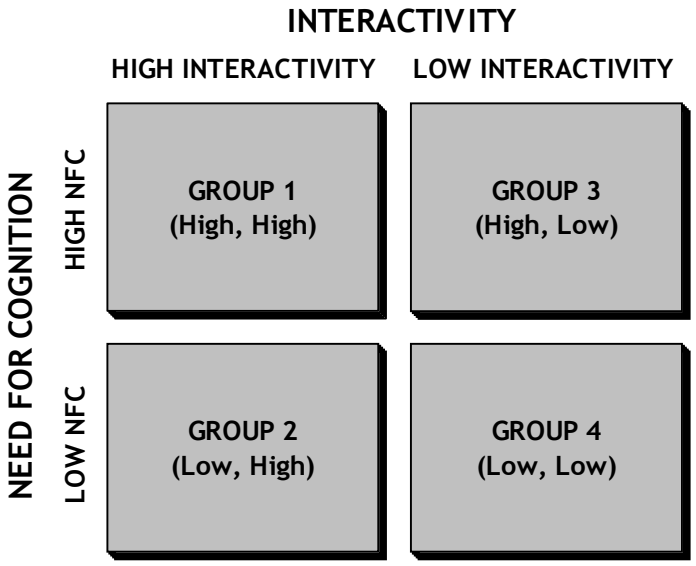


Figure 7. *Design of main experiment.*

Two experiments were conducted: one at a large Southeastern university in the United States, and another at a major university in the Philippines. The latter initially aimed to serve as a comparison group. However, since the conditions in both locations were not the same, the groups were deemed not to be equivalent groups. Therefore, the following sections and chapters will focus

on the procedures, results and discussion of results of the main experiment conducted in the United States. The Philippine experiment is presented in more detail in Appendix B.

Sampling Procedure

A convenience sample of college students, ages 18-26, enrolled in basic communication classes in the Fall semester of 2004 were recruited to participate in the study. Arrangements were made through the basic course director to schedule the experimental sessions during actual class periods. Information about the study were disseminated beforehand to students through their course instructors. In these initial communications, students were invited to participate in a 50-minute experimental activity for extra class credit. Students who declined to participate were offered an alternative activity to earn class credit. Approximately 20 sections with about 25 students each were scheduled to participate in the web experiment. A total of 500 students participated in the experiment. Of this number, 59 students had to be discarded from the final sample because they were either over the age limit (n=12) or unable to finish the entire activity (this included an entire class of 33 students, whose session had to be cancelled midway through the experiment due to technical difficulties with the database server).

The Respondents

This section describes the respondents of the main study in more detail (as shown in Table 11). Of the 441 subjects who were able to complete the experimental activity, 44% (n = 194) were male, and 53.3% (n = 235) were female. Since this sample was limited to a certain age group (in order to represent young adults aged 18-26 years), the mean age of the respondents was 19 years old. Majority of the respondents were white (84.1%), while a minority were African-American (5.4%) or of another ethnicity (4.8%). A great majority of the respondents had access to the Internet from their homes (95.9%), have had 6 or more years of Internet experience (69.6%) and used the Internet most frequently from their homes (M = 4.58) or their schools (M = 4.17). The sample was moderately computer literate with a mean computer competency score of 3.79.

Table 11.

Socio-demographic Characteristics and Computer or Internet Use of Respondents (Overall)

Variable	N=445	%	*M*	*SD*
Gender				
Male	194	44.00		
Female	235	53.30		
Age (range 18-26)	428		19.30	1.16
Race				
White or Caucasian	374	84.10		
African-American	24	5.40		
Other / Multiracial	21	4.80		
Have access to Internet from home				
Yes	423	95.90		
No	18	4.10		
Computer Competency Score[a]	441		3.79	0.71
Years Using the Internet				
Never used the Internet	2	0.50		
< 1 year	1	0.20		
1 year	1	0.20		
2 years	8	1.80		
3 years	14	3.20		
4 years	28	6.30		
5 years	69	15.60		
6 years or more	307	69.60		
Frequency of Using Internet from[b]…	441			
Home			4.58	0.96
School			4.17	1.06
Work			2.16	1.60

NOTES: [a]*Highest mean score was 5;* [b]*Rated with 5 as the highest*

The treatment groups were compared to determine if there were any significant differences with regard to their socio-demographic characteristics or computer or Internet use. Table 12 shows the results of this analysis. Results of chi-square analysis and t-tests provided evidence that there were no significant

differences between the two treatment groups based on socio-demographic characteristics and computer and Internet use.

Table 12.

Socio-demographic Characteristics and Computer or Internet Use of Respondents (By Treatment Group)

Variable	High interactivity group[a]			Low interactivity group[b]		
	N	%	*M*	*N*	%	*M*
Gender						
Male	101	46.50		93	43.90	
Female	116	53.50		119	56.10	
Age (range 18-26)	217		19.23	211		19.36
Race						
White or Caucasian	187	89.50		184	88.90	
African-American	13	6.20		11	5.30	
Other / Multiracial	9	4.30		12	5.80	
Have access to Internet from Home						
Yes	215	96.00		208	95.90	
No	9	4.00		9	4.10	
Computer Competency Score[c]	224		3.80	217		3.78
Years Using the Internet						
Never used the Internet	1	0.40		1	0.50	
< 1 year	1	0.40		0	0.50	
1 year	1	0.40		0	0.00	
2 years	5	2.20		3	1.40	
3 years	8	3.60		6	2.80	
4 years	14	6.30		14	6.50	
5 years	34	15.20		35	16.10	
6 years or more	156	69.60		151	69.60	
Frequency of Using Internet from[d]…						
Home	224		4.56	217		4.60
School	224		4.18	217		4.15
Work	224		2.16	217		2.16

NOTES: [a] *Individuals exposed to the high interactive site;* [b] *Individuals exposed to the low interactive site;* [c] *Highest score is 5.0;* [d] *Rated with 5 as the highest; None of these differences were statistically significant*

Data Gathering Procedure

While all sessions were scheduled during class time and conducted at computer laboratories, all data were gathered online. This section describes the data gathering procedure.

The experiment consisted of an informed consent page, an instructions page, a login page (which triggered the random assignment to treatments), and the main online survey pages. These webpages were uploaded onto a secure server at the University of Kentucky and were delivered to the respondents via a Web browser.

The informed consent page was a short version of the informed consent form that was distributed during each session and which students had to read and sign to signify their consent to participate in the study. This informed consent page informed participants about what was expected of them, how long the entire activity would take, the incentive for their full participation (e.g., extra credit), and other relevant information (e.g., contact details and affiliation of the researcher).

The instructions page contained information about how subjects should proceed with the experiment. Specifically, they were given the following scenario and set of instructions:

> "Imagine yourself in the following scenario: You have just learned that a close friend of yours or a family member has been diagnosed with skin cancer. Concerned, you decide to look for more information about skin cancer to educate yourself and perhaps others close to you. You

decide to search on the Internet for more information about skin cancer and the first site you encounter is a webpage called "Sun Smarts".

You can access this website when you LOGIN on the next page. Then, take **15-20** minutes to explore the site, and gather as much information as you can about skin cancer. Make sure that you do this thoroughly as you will not be allowed to return to the website once you have moved on to the actual online survey. After exploring the site, close the window and go back to the instructions page and click PROCEED to start answering the actual survey questions. This survey will help us document your experiences on the site and will help us understand your online health information seeking behavior. So, please answer the questions as honestly and as completely as possible. After you submit your answers, you will be directed to a confirmation page which you can then print out and submit to your instructor for extra credit."

The scenario above was designed to simulate actual health information-seeking on the Web, which is often a goal-directed task. It also introduced a common motivation for both the high and low need for cognition individuals. So while these groups might have varied in their abilities to elaborate, both groups were somewhat similar in their motivations to explore the websites assigned to them. The common task provided a baseline for motivation to elaborate, while need for cognition was used as a measure for ability to elaborate.

After reading this scenario and the rest of the instructions, logging in, and clicking on proceed, respondents were randomly assigned to one of the two treatment sites. Respondents were told they had about 20 minutes to explore the

site assigned to them. Scripts were embedded into the webpages to track the exact number of minutes each participant spent browsing their assigned test site and answering the main survey.

Once the participants had explored their treatment site, they were asked to close the browser to this site and return to the main survey page to start answering the feedback questions. The main survey pages included questions to measure subjects': perceived interactivity of the site and their general evaluation of the site; comprehension of the topic, attitudes towards the site, and other items related to the main variables of interest. Appendix C includes screen shots of contents of the online survey.

Data Analysis

Data were analyzed using appropriate descriptive and inferential statistics using the SPSS program. Dr. Helena Truszczynska, a statistical consultant at the UK STARRS Center and Olga Dekhtyar, data analyst at the Institute for HIV Prevention Research were also consulted for guidance on the statistical analyses. The main hypotheses were tested using a two-way analysis of covariance to determine main and interaction effects between the independent and dependent variables. All parametric tests conducted were set at an alpha of 0.05 to determine statistical significance.

Copyright © Mia Liza Alcantara Lustria 2005

CHAPTER 4

RESULTS

This chapter presents results of the main experiment conducted to test the relationship of level of interactivity and need for cognition on young adults' comprehension of a complex health website.

The chapter begins with a discussion of the manipulation checks conducted to test the integrity of the experimental manipulations. This is followed by an analysis and discussion of important antecedent variables that may have affected the online health information seeking behavior of the respondents, a correlational analysis of variables of interest, and finally, results of the hypotheses testing.

Manipulation Checks

Perceived Interactivity

To test the effectiveness of the experimental manipulation, a one-way analysis of variance (ANOVA) with perceived interactivity as the dependent variable and level of technical interactivity as the independent variable was performed. Level of technical interactivity was represented by the two treatment groups: high interactivity vs low interactivity.

As expected, the high interactivity group rated their site as more interactive (M = 3.98, SD = 0.58) compared to the low interactivity group (M =

3.35, *SD* = 0.78). Results of the ANOVA (as shown in Table 13) shows that these differences were highly significant (F (1,439) = 94.98, p = .000, partial η^2 = 0.18). This analysis shows that the high interactivity site was indeed perceived to be more interactive than the low interactive site.

Table 13.

One-Way Analysis of Variance Summary for Perceived Interactivity

SOURCE	*df*	*SS*	*MS*	*F*	p-value	Partial η^2	Observed Power[a]
Between groups	1	44.65	44.65	94.98	.000	0.18	1.00
Within groups	439	206.40	0.47				
Total	441	6190.32					

NOTE: [a]Computed using alpha = 0.05

Perceived Disorientation

To check potential usability issues related to the different hypertext structures adapted in the two sites, a second manipulation check was conducted with perceived disorientation as the dependent variable, and level of technical interactivity as the independent variable. Perceived disorientation was measured by asking respondents to rate their agreement with the statement "At times I felt confused about where I was, where I was going, or where I had been" using a 5-point Likert-type scale, with 5 as the highest ranking.

Studies have shown that nonlinear hypertext structures, while providing users with greater freedom and choices, may often lead to confusion or cognitive overload especially among respondents low in prior knowledge of the topic

covered by the website (Baylor, 2001; Calisir & Gurel, 2003; Dias *et al.*, 1999; McDonald & Stevenson, 1996; Zhang *et al.*, 2002). This can be improved by including graphical overviews and clear navigational aids Muller-Kalthoff & Moller (2003). Taking note of these potential issues, we took special care in designing the nonlinear high interactive site. Each page had clear navigational aids that gave users clues of where they were at any particular time. A tabbed interface featuring each major topic covered by the website and subtopics under each major issue was also included.

On the other hand, the dilemma of how to present the complex skin cancer information using the hierarchical linear hypertext structure (as was adapted in the low interactivity site) was equally challenging as this presented its own usability issues. Lee & Tedder (2004), for example, found that among participants with more hypertext experience, those exposed to the paged hypertext had experienced the least disorientation, while those exposed to the scrolling hypertext had experienced the most disorientation. Given the amount of skin cancer information made available on the test site, we tried to minimize the scrolling hypertext on the low interactivity site as much as could be allowed.

Regardless of these measures taken to improve the usability of both the high interactivity and low interactivity sites, it was still important to check whether the respondents perceived any significant difficulties in navigating either site. Therefore, a one-way ANOVA was performed on perceived disorientation with level of technical interactivity as the independent variable.

Results show that the low interactivity group rated their site as slightly more confusing (M = 2.27, SD = 0.99) compared to the high interactivity group (M = 2.21, SD = 1.09). This difference (as shown in Table 14), however, was not significant (F (1,439) = 0.39, p = .532, partial η^2 = 0.001) indicating that the respondents from either site did not significantly differ in perceived difficulty in navigating the sites assigned to them.

Table 14.

One-Way Analysis of Variance Summary for Perceived Disorientation

SOURCE	*df*	*SS*	*MS*	*F*	p-value	Partial η^2	Observed Power[a]
Between groups	1	0.43	0.43	0.39	0.53	0.001	0.10
Within groups	439	4766.10	1.09				
Total	441	2690.00					

NOTE: [a]Computed using alpha = 0.05

Antecedent Variables of Interest

The following section describes some important antecedent variables that may affect online health information seeking behavior of the respondents. Street *et al.*'s three-stage model of health promotion using interactive technology (Street *et al.*, 1997), suggests that user factors such as attitudes and prior exposure are important variables that may indirectly affect the outcomes of interactive systems. Specifically, users' cognitive involvement in the message such as perceived health status and perceived risk for the disease can play an important part in the way they process the message. The Comprehensive Model of

Information Seeking (Johnson, 1997), which also draws heavily from the Health Belief and Transtheoretical Models, likewise suggests that background factors (i.e., demographics and direct experience) as well as personal relevance factors (i.e., salience and beliefs) directly affect individuals' health information seeking behavior. Particularly, threat perceptions and general health concerns play important roles in motivating an individual to seek specific health information (Johnson, 1997). Certainly, individuals who may perceive themselves to have a greater risk for contracting the disease or who may have substantial previous knowledge about skin cancer may go about exploring the test sites in entirely different ways. Table 15 presents a general description of the respondents' perceived health status, perceived risk for skin cancer, frequency of online health information seeking, for whom the respondents sought health information for, health literacy scores, and number of skin cancer sources previously read.

In general, the participants perceived themselves to have very good health status (M = 4.26, SD = 0.72). Majority were somewhat worried about skin cancer (N = 282, 63.9%) and had previously read only an average of two sources on the topic. Most of the respondents very rarely sought health information online (50%), and when they did, they did so mostly for themselves (35%). Moreover, the average health literacy score for the sample was 29.56 (SD = 6.38), indicating a moderate score compared to the highest possible score of 38.

Table 15.

Health Status, Health Literacy Score and Online Health Information-Seeking Behavior of Respondents (Overall)

Variable	N=445	%	*M*	*SD*
Perceived Health Status[a]			4.26	0.72
Poor	2	0.50		
Average	64	14.50		
Good	189	42.90		
Excellent	182	41.30		
Perceived Risk for Skin Cancer[b]			0.75	0.55
Not worried at all	133	30.20		
Somewhat worried	282	63.90		
Extremely worried	24	5.40		
Frequency of Online Health Information Seeking[c]			2.32	0.79
Not at all	37	8.40		
Very rarely	222	50.30		
At least monthly	103	23.40		
At least weekly	19	4.30		
Daily	7	1.60		
For Whom Did they Seek Health Information Online for				
Self	155	35.10		
Someone else's	123	27.90		
Both	125	28.30		
Health Literacy Score[d]			29.56	6.38
No. of Sources on Skin Cancer Previously Read[e]			1.94	1.86

NOTES: [a]*Rated with 5.0 as the highest;* [b]*0 – not worried at all and 3 – extremely worried;* [c]*Rated with 5.0 as the highest;* [d]*Highest possible score is 38;* [e]*Highest possible score is 8*

The respondents in each treatment group were also compared on these variables as shown in Table 16. Results show that the average scores on each variable were only slightly different from one another and compared to the mean scores for the total sample. Moreover, consequent inferential statistics found these differences not to be significant. In other words, both the high and the low

interactivity groups were equivalent in terms of perceived health status, perceived risk for skin cancer, frequency of online health information seeking, for whom they sought health information for, health literacy scores, and number of skin cancer sources previously read. This analysis was an important step in establishing the equivalency of the two groups with regard these antecedent variables.

More importantly, these results imply that the group, overall, initially did not have a high motivation for seeking information about skin cancer prior to the web experiment. So, other than being motivated by the common task and contrived scenario given to them at the beginning of the activity, there did not seem to be any significant differences in motivations between the two groups as evidenced by their perceived health status or perceived risk for skin cancer. While we do not wish to trivialize the importance of motivations in health information seeking, the limited initial motivation of the respondents with regard the main topic was not seen as a major setback. In fact, this was the ideal situation, as now, we could examine the potential interaction between the main independent variables more clearly. Specifically, high need for cognition was defined earlier as having the proclivity to engage in effortful elaboration even in situations that DO NOT warrant the need for indepth processing. Again, the common task, therefore, provided the common baseline for *motivation* to elaborate, while need for cognition, provided the common baseline for *ability* to elaborate.

Table 16.

Health Status, Health Literacy Score and Online Health Information-Seeking Behavior of Respondents (By Treatment Group)

Variable	High interactivity group[a]			Low interactivity group[b]		
	N	%	*M*	*N*	%	*M*
Perceived Health Status[c]			4.31			4.21
Poor	1	0.50		1	0.50	
Average	25	11.30		39	18.10	
Good	100	45.00		89	41.40	
Excellent	96	43.20		86	40.00	
Perceived Risk for Skin Cancer[d]			0.73			0.77
Not worried at all	69	30.90		64	29.60	
Somewhat worried	145	65.00		137	63.40	
Extremely worried	9	4.00		15	6.90	
Frequency of Online Health Information Seeking[e]			2.32			2.32
Not at all	14	7.10		23	12.00	
Very rarely	120	61.20		102	53.10	
At least monthly	50	25.50		53	27.60	
At least weekly	9	4.60		10	5.20	
Daily	3	1.50		4	2.10	
For Whom Did they Seek Health Information Online for			1.88			1.98
Self	85	40.50		70	36.30	
Someone else's	66	31.40		57	29.50	
Both	59	28.10		66	34.20	
Health Literacy Score[f]	241		29.80	199		29.29
No. of Sources on Skin Cancer Previously Read[g]	242		1.88	201		2.00

NOTES: [a]*Individuals exposed to the high interactive site;* [b]*Individuals exposed to the low interactive site;* [c]*0 – not worried at all and 3 – extremely worried;* [d]*Rated with 5.0 as the highest;* [e]*Rated with 5.0 as the highest;* [f]*Highest possible score is 38;* [g]*Highest possible score is 8; None of these differences were statistically significant*

Correlational Analysis

Correlation coefficients (Pearson Product Moment Correlations) were computed among the dependent variable (comprehension) and six (continuous) variables of interest, namely: time on task, age, need for cognition, number of sources on skin cancer previously read, health literacy, and computer competency. Results of the correlational analysis presented in Table 17 show that 9 out of the 21 correlations were statistically significant. These correlations, however, were between 0.09 and 0.20, signifying overall weak relationships. Noteworthy among these correlations, time on task was found to have a weak but positive relationship with comprehension, r (422) = 0.20, $p < 0.01$. Moreover, number of skin cancer sources previously read was also found to have a weak but positive relationship with comprehension, r (422) = 0.13, $p < 0.01$.

On the other hand, need for cognition was found to have: a weak but positive relationship with time on task, r (422) = 0.17, $p < 0.01$.; a weak but positive relationship with computer competency, r (422) = -0.15, $p < 0.01$; and a weak but positive relationship with health literacy, r (422) = 0.13, $p < 0.01$.

This analysis was necessary to reveal potential confounding variables that needed to be controlled for in the subsequent analysis.

Table 17.

Correlational Analysis Among Comprehension and Six Other Variables of Interest

VARIABLES	*M*	*SD*	Time to Task	Age	Need for Cognition	No. of Sources on Skin Cancer Read	Health Literacy	Computer Competency
Comprehension	4.67	1.55	0.20**	-0.05	0.03	0.13**	0.05	-0.01
Time on Task	18.46	10.18	1.00	-0.12**	0.17**	0.03	0.10*	-0.07
Age	19.29	1.15		1.00	0.12**	-0.07	-0.04	0.05
Need for Cognition	3.18	0.54			1.00	0.05	0.13**	0.15**
No. of Sources on Skin Cancer Read	1.96	1.88				1.00	0.02	-0.09*
Health Literacy	29.66	6.37					1.00	0.05
Computer Competency	3.81	0.71						1.00

*NOTES: ** Correlation is significant at the 0.01 level (1-tailed); *Correlation is significant at the 0.05 level (1-tailed); Listwise N=422*

Hypotheses Testing

To reiterate, the main hypotheses of this research project are:

H1 : Higher levels of interactivity will lead to greater comprehension of the content of a complex health website.

H2: High need for cognition individuals will have greater comprehension of the content of a complex health website.

H3: Higher levels of interactivity will lead to greater comprehension of the content of a complex health website as a function of need for cognition.

A two-way analysis of covariance (ANCOVA) was conducted to test all three hypotheses. The first independent variable, level of interactivity, had two levels: high and low. The second independent variable, need for cognition, likewise, had two levels: high need for cognition and low need for cognition. A covariate, time on task, which in the preceding correlational analysis emerged as a potential confounding variable, was controlled for in the final analysis. Another covariate, reading style, which emerged as a significant covariate in a series of iterative analyses, was also controlled for. ANCOVA is a statistical test used to control for differences on variables that are not the focus of the main analysis.

Preliminary Test of Assumptions

Green and Salkind (2002) suggest that before conducting an ANCOVA, the homogeneity-of-slopes assumption should first be tested to evaluate the interaction between the covariate and the factor in the prediction of the

dependent variable. In order for results of an ANCOVA to be meaningful, it must be proven that the differences on the dependent variable among groups do not vary as a function of the covariate (as indicated by a non-significant interaction between the covariate and the independent variables).

Therefore, preliminary analyses was run to evaluate the homogeneity-of-slopes assumption of the relationship of the dependent variable (comprehension score) and the covariates (time on task and reading styles) as a function of each independent variable (level of interactivity and need for cognition) respectively. This analysis indicated that the relationship between comprehension scores and time on task did not differ significantly as a function of level of interactivity, F (1,432) = .000, MSE = .001, p = .984, partial η^2 = .000. The analysis also indicated that the relationship between comprehension scores and time on task did not differ significantly as a function of need for cognition, F (1,432) = 1.88, MSE = 4.21, p = .171, partial η^2 = .004. Lastly, the relationship between comprehension scores and reading style did not differ significantly as a function of level of interactivity, F (1,432) = .965, MSE = 2.17, p = .326, partial η^2 = .002. Moreover, the analysis also indicated that the relationship between comprehension scores and reading style did not differ significantly as a function of need for cognition, F (1,432) = .347, MSE = .779, p = .556, partial η^2 = .001.

Results of the ANCOVA

H1 predicted that those assigned to the high interactivity site would have higher comprehension scores than those who were exposed to the low interactivity site. Results show that the mean comprehension scores were in the direction predicted (Table 18). Respondents in the high interactivity group had higher mean comprehension scores (M = 4.79, SD = 1.55 for the high NFC group) and (M = 4.70, SD = 1.48 for the low NFC group). Results of the two-way ANCOVA (as shown in Table 19) shows that the main effect of level of interactivity on comprehension scores was significant, F (1,435) = 6.67, MSE = 14.92, p = 0.01. Based on these results, H1 was supported.

As assessed by the partial η^2, however, the strength of the relationship between level of interactivity and comprehension scores, holding constant time on task and reading style, was not very strong, with level of interactivity accounting for only 1.5% of the variance in the mean comprehension scores.

Table 18.

Mean Comprehension Scores and Standard Deviations as a Function of Level of Interactivity and Need for Cognition

SOURCE	High Need for Cognition	Low Need for Cognition
High Interactivity	M = 4.79	M = 4.70
	SD = 1.55	SD = 1.48
	N = 103	N = 121
Low Interactivity	M = 4.44	M = 4.67
	SD = 1.48	SD = 1.67
	N = 103	N = 114

Table 19.

Analysis of Covariance of Comprehension Scores as a Function of Level of Interactivity and Need for Cognition, With Time on Task and Reading Style as Covariates

SOURCE	*df*	*SS*	*MS*	*F*	p-value	partial η^2	Observed Power[a]
Covariate (Time on task)	1	28.66	28.66	12.82	.000	.029	.947
Covariate (Reading stye)	1	12.24	12.24	5.48	.020	.012	.646
Level of Interactivity (I)	1	14.92	14.92	6.67	.010	.015	.732
Need for Cognition (NFC)	1	4.82	4.82	2.15	.143	.005	.310
I x NFC	1	4.03	4.03	1.80	.180	.004	.268
Error	435						
Total	441						

NOTE: Computed using alpha = 0.05

H2 predicted that higher need for cognition individuals would have higher comprehension scores than those who were lower in need for cognition. Table 18 shows mixed results in that high NFC individuals in the high interactivity group had the highest mean comprehension scores (M = 4.79, SD = 1.55), but the high NFC individuals in the low interactivity group had the lowest mean comprehension scores (M = 4.44, SD = 1.48). Moreover, results of the two-way ANCOVA (as shown in Table 19) shows that the main effect of need for cognition on comprehension scores controlling for time on task and reading style was not significant, F (1,435) = 2.15, MSE = 4.82, p = 0.14, partial η^2 = 0.005. Based on these results, H2 was not supported.

H3 predicted that those assigned to the high interactivity site would have higher comprehension scores than those who were exposed to the low interactivity site as a function of need for cognition. The mean comprehension

scores adjusted for by initial differences in time on task and reading style, however, was not as clearly ordered across the four groups based on need for cognition and level of interactivity (as shown in Table 18). Initially we had expected to find the highest mean scores displayed by the [high interactivity, high NFC group] followed by the [high interactivity, low NFC group], [the low interactivity, high NFC group], and finally by the [low interactivity, low NFC group). Results show, however, that the low interactivity, high NFC group [M = 4.44, SD = 1.48] had slightly lower mean comprehension scores than the low interactivity, low NFC group [M = 4.67, SD = 1.67].

Moreover, results of the ANCOVA revealed that there was no significant interaction between level of interactivity and need for cognition on mean comprehension scores holding constant time on task and reading style (F (1,435) = 1.80, MSE = 4.03, p = 0.18, partial η^2 = .004). Based on these results, H3 was not supported.

Further discussion of these results are presented in the next chapter.

Copyright © Mia Liza Alcantara Lustria 2005

CHAPTER 5

DISCUSSION

Conceptually, Internet technologies hold much promise for improving health knowledge and behavior, especially among the new generation of technologically savvy information seekers. Already, various studies have shown that a growing number of individuals are going online to educate themselves about various medical conditions and treatments, to seek medical advice, or to learn about how to live healthier lifestyles. More than just an information carrier, Internet technologies, have powerful persuasive capacities that can promote deeper learning, change attitudes, and maybe even promote behavior change. Interactive web technologies do not only have the capacity to link individuals to a wealth of health information sources, but also have the capacity to provide an enhanced learning environment that is engaging, visually stimulating, and that promotes exploratory learning and active processing of information.

Despite these exciting claims, we still know very little about how interactive web technologies actually influence information use, learning and motivational processes. There is growing evidence that the potential of interactive media in a variety of contexts are not being fulfilled (Allen, 1998; Cairncross & Mannion, 2001; Dillon & Gabbard, 1998; Downes & McMillan, 2000; Eveland Jr., Cortese *et al.*, 2004; Eveland Jr. & Dunwoody, 2002; Eveland Jr., Marton *et al.*, 2004; Eveland 2003; Jaffe, 1997b; Kirsh, 1997; Stout *et al.*, 2001;

Macias, 2000; Tremayne & Dunwoody, 2001; Velicer, Prochaska, Fava, Laforge, & Rossi, 1999). So while the popular assumption is that interactive technologies have potentially great benefits for learning and persuasion, the theoretical and empirical basis for this assumption is currently relatively weak and calls for further study.

The main goal of this study was to examine the effects of interactivity in the context of health information seeking using an informational health website. The study was designed to mimic information seeking in a highly interactive environment vs a low interactive environment to tease out potential effects of interactivity on comprehension. Moreover, it sought to determine whether individual differences in ability to elaborate, as operationalized by need for cognition, would moderate the effects of level of interactivity on comprehension.

A 2 by 2 factorial experiment (2 levels of interactivity by 2 levels of need for cognition) was designed to test the hypotheses. This chapter discusses the main findings of the study, presents alternative analyses and hypotheses, limitations of the study, and suggestions for future research.

Main Findings

Results of the main analysis shows that the mean comprehension scores were in the direction predicted: respondents in the high interactivity site had higher mean comprehension scores than those in the low interactivity site. Furthermore, the results of the ANCOVA, found that these differences were

significant -- that there was a significant main effect for level of interactivity on mean comprehension scores, controlling for time on task and reading style. The results, however, did not find a significant main effect for the individual difference variable, need for cognition on comprehension scores. Neither did it find a significant interaction between need for cognition and level of interactivity on comprehension scores controlling for time on task or reading style.

On the outset, the significant main effect found for level of interactivity is compelling as interactivity is a characteristic of media that purports to promote greater or more active learning by enhancing sensory stimulation and creating a conducive environment for information processing. As hypothesized, the respondents in the high interactivity treatment group, because they had greater control over their learning environment and because they had the opportunity to interact with more engaging learning activities (i.e., the interactive activities), experienced greater gains in terms of comprehension.

However, this finding may be misleading because the experiment had sufficient power to detect such a small effect size as evidenced by the partial $\eta^2 = 0.15$ for this particular main effect. Moreover, while the focus of the analysis was level of interactivity, we cannot discount the significance of the two covariates we had to control for in the ANCOVA: time on task and reading style, which both had higher significance values and partial etas than any of the independent variables studied. So, the statistical test provides support for a compelling main effect of level of interactivity, but this does not inform us better of why this is so.

Exploratory Analysis

This prompted us to look more closely at these variables in isolation to determine possible alternative explanations.

First, an ANOVA was performed with time on task as the dependent variable and level of interactivity as the independent variable, to determine if there were any significant differences in the amount of time it took for respondents in each treatment group to explore their respective sites. The one-way ANOVA indicated significant differences in time on task for each treatment group (F (1,439) = 28.03, p = .000, partial η^2 = 0.06) (as shown in Table 21). Those exposed to the low interactivity site spent significantly more time exploring their site (M = 21.05 min.) compared to those exposed to the high interactivity site (M = 16.13 min.) (as shown in Table 20).

Table 20.

Mean Time on Task and Standard Deviations as a Function of Level of Interactivity

Level of Interactivity	***N***	***M***	***SD***
High interactivity	224	16.13	8.86
Low interactivity	217	21.05	10.61
Total	441	18.55	10.06

Table 21.

Analysis of Variance of Time on Task as a Function of Level of Interactivity

SOURCE	*df*	*SS*	*MS*	*F*	p-value	partial η^2	Power[a]
Between groups	1	2672.24	2672.24	28.04	.000	.060	1.00
Within groups	439						
Total	441						

NOTE: Computed using alpha = 0.05

Second, the relationship of reading style and level of interactivity was examined. Table 22 shows a crosstabulation of the reading styles of respondents in both treatment groups. A 3 by 2 chi-square test indicated that the relationship between reading style and level of interactivity was significant χ^2 (2, N = 441) = 8.13, p = 0.017, V = 0.11 -- that a greater proportion of respondents in the low interactivity group tended to read the whole content (30.90%) compared to those in the high interactivity site (19.20%).

Table 22.

Crosstabulation of Reading Styles vs Level of Interactivity

READING STYLE	LEVEL OF INTERACTIVITY				Column Totals
	High		Low		
	N	%	*N*	%	
Jumped sections	22	9.80	20	9.20	42
Skimmed content	159	71.00	130	59.90	289
Read whole content	43	19.20	67	30.90	110
Row Totals	224		217		441

Third, the relationship of reading style and level of interactivity on mean comprehension scores was examined. The one-way ANOVA indicated a significant main effect for reading style on mean comprehension scores (F (2,435) = 9.93, p = .000, partial η^2 = 0.044) and a non-significant main effect for level of interactivity (F (1,435) = 1.76, p = 0.19, partial η^2 = 0.004) (as shown in Table 24). To assess pairwise differences among the three levels for the main effect of reading style, the Scheffe follow-up procedure (p = .05) was performed. Results show that comprehension scores of those who read the whole content differed significantly (M = 5.00; SD = 1.32) from those who jumped sections (M = 3.83; SD = 1.71) (as shown in Table 23).

Table 23.

Mean Comprehension Scores and Standard Deviations as a Function of Level of Interactivity and Reading Style

SOURCE	High Interactivity	Low Interactivity
Jumped Sections	M = 3.91 SD = 1.93 N = 22	M = 3.75 SD = 1.48 N = 20
Skimmed Content	M = 4.71 SD = 1.49 N = 159	M = 4.54 SD = 1.63 N = 130
Read Whole Content	M = 5.28 SD = 1.05 N = 43	M = 4.84 SD = 1.45 N = 67

Table 24.

Analysis of Covariance of Comprehension Scores as a Function of Level of Interactivity and Need for Cognition, With Time on Task and Reading Style as Covariates

SOURCE	*df*	*SS*	*MS*	*F*	p-value	partial η^2	Observed Power[a]
Reading Style (RS)	2	45.78	22.89	9.93	0.00	0.044	0.98
Level of Interactivity (I)	1	4.06	4.06	1.76	0.19	0.004	0.26
RS x I	1	1.48	0.74	0.32	0.73	0.001	0.10
Error	435						
Total	441						

NOTE: Computed using alpha = 0.05

These first three exploratory analyses, further support the importance of the covariates of time on task and reading styles on comprehension scores independently of level of interactivity. These suggest that regardless of the level of interactivity of the sites, learning and comprehension are enhanced by the time information seekers spend on the sites and how carefully they read the material.

The analyses show that those in the low interactivity site tended to spend more time exploring the site and also tended to read the material more carefully. This may be because the linear hypertext structure of the low interactivity site, may have forced its users to go through the content more carefully. The only structural cues for the content of this site, usually came at the end of each page, with the appearance of the previous or next buttons. Respondents assigned to the low interactivity site, may have inadvertently thought it was necessary to read the whole content more carefully, lest they miss important information.

On the other hand, with the high interactivity site, respondents were able to have a global overview of the contents of the site because of the various navigational devices provided. They were, thus, able to pick and choose which links to follow and which parts of the content they deemed were more important. The respondents in the high interactivity site also had a clearer idea of how much time they needed to explore each specific section of the site, as they had a clearer idea of the scope of the whole website.

Certainly, interactive systems may provide a whole range of technical affordances that can enhance learning and comprehension of online content, but these also present new challenges to individuals who may be more used to extracting meaning from traditional linear text. Previous studies have shown that some users are sadly incompetent in using hypertext and may find it especially challenging to locate and apply information in nonlinear structures compared to the more straightforward linear structures of traditional media.

This brings up one point of speculation about whether greater interactivity on a website might be a potential distraction for certain types of users. In interactive media environments, knowledge structures are created on the fly by both the reader and the system designer – the reader must not only identify what information they need to enhance their comprehension of the material, but they must also know where to find this information. Researchers have found that these decisions add cognitive burden on information seekers who do not have a requisite amount of domain knowledge or who are not

interested in the content area (Alexander & Jetton, 2003; Calisir & Gurel, 2003; Lawless & Brown, 1997; Lawless & Kulikowich, 1994; Niederhauser, Reynolds, Salmen, & Skolmoski, 2000). Moreover, online environments are infinitely mutable and adaptive with no sense of finality or no established limits (Andrisani *et al.*, 2001). One users' online text (content) may be entirely different from another user's text, as individuals differ in their strategies to traverse the system, in their choices of what elements to interact with, and in their interpretations of the overall meanings of the information they encounter.

Several scholars suggest the need to develop specific online competencies for navigating hypertext structures and reading online content (Coiro, 2003; Detlefsen, 2004; Kovacs, 2004; MacGregor, 1999; Unz & Hesse, 1999). What exactly these competencies and skills should entail (i.e., learning styles, navigational styles, or cognitive styles) still needs much investigation.

Two concepts in the literature emerge as potential process variables that may either hinder comprehension of online content or enhance it – *selective scanning* and *elaborative interrogation*. In their research on information structure and learning of web-based content, Eveland and others have identified that non-linear hypertext structures encourage *selective scanning*, which has been found to be negatively correlated with free recall of content (Eveland Jr., Cortese *et al.*, 2004; Eveland Jr., Marton *et al.*, 2004; Eveland & Dunwoody, 1999; Eveland, 1997; Eveland & Dunwoody, 2000; Tremayne & Dunwoody, 2001). On the other hand, online content with in-text hyperlinks may also promote an instructional strategy

that promotes deeper learning – *elaborative interrogation*. Eveland *et al.* (2004) propose that hyperlinks encourage users to question how various nodes in online content are related, encouraging them to make mental connections between new information and existing information in their minds. In their study they found that while linear structures promoted greater free recall of content, nonlinear structures increased knowledge structure density. Their research suggests the need to measure learning of online content more comprehensively to include not only recall or recognition of knowledge content, but also effects on individual's knowledge structures. They propose that the effects of interactive online content on learning and comprehension may be at a deeper level than just recall of specific information.

These findings also suggest the importance of further studying differences in the way various individuals use interactive information systems and process information delivered using these systems. While the current study was not able to reveal any significant main effects for need for cognition, or any significant interaction effects for this individual difference variable and level of interactivity, we cannot discount that differences in the way individuals process information online may potentially have an effect on the outcomes of their interactions.

Implications for the Design of Health Information Websites

This study has implications for the design of health information websites. In particular, it raises important issues about the accessibility and usability of online health information sources. First of all, while the findings provided evidence that level of interactivity significantly increased comprehension of the online health content, greater time spent browsing the website and more thorough reading of the online content were significantly more important variables contributing to increased comprehension. Review of the literature has also revealed that greater interactivity may in fact create more difficulties for information seekers who are less competent in navigating online environments, who may be less familiar with the content of the website, or who may be less motivated to navigate the site in the first place. For purposes of health education, the challenge, therefore, would be how to strike a balance between providing an engaging and visually appealing website, and providing a site that the least competent information seeker could easily navigate without too much guesswork.

Ironically, while increased user control has been used to explain why high interactivity would theoretically lead to greater comprehension, this was not supported fully in the context of this study. The limitations of putting all control in the hands of information seekers include the following: they may gloss over or totally miss reading relevant information; they may become confused and lost; or they may become frustrated with the site and quit browsing the site sooner.

These insights only strengthen what we already know about site usability, but also lend specific insights for the design of online health content. In particular, we recommend the following tips for designing online health information sources:

1. Keep content simple and reasonable. While the amount of content should depend on the intended audience of a website, as a general rule, "less is more". You can always provide additional links that users can follow if they need more information on specific content. The goal is to get users to focus on and read about the most important concepts first.
2. Clearly mark "must-know" information. You want to ensure that users are able to read about the most important information about a particular health topic. Users who have little or no previous domain knowledge, however, may not realize which information is more relevant. Clear, bold headings or colorful, eye-catching icons can be used to direct their attention towards the most important elements of the website.
3. Provide simple navigational aids that are easy to follow. Do not overload the user with too many navigational choices as this might confuse rather than help the user. Again, the goal is to gently direct the user towards the most important content.
4. Use interactive activities sparingly, and only to help supplement the main message of a website. Do not add interactive features such as animations, video, etc. only to spice up a website. These elements are nice to have, but

there is currently limited empirical basis for saying that these features contribute anything positive to learning or motivational processes. An interactive quiz that helps personalize information may be more valuable, for example, than providing animation that has little to do with enhancing the main message.

5. Use intext hyperlinks to encourage users to explore relevant content further instead of putting more navigational choices somewhere else on a page. This study showed that less than a quarter of those exposed to the high interactivity site actually paid attention to any of the four interactive tools/activities provided on the site. A professional web designer suggested that perhaps most users glossed over these interactive activities because these were placed in boxes to the side of the content. This designer suggested that most users today learn to ignore boxed content as these almost always signifies ads on a website.

Limitations of the Study

Conducting an experimental study of this type, is not without its limitations. First of all, like most experimental research, this study struggles with the tradeoff of having to maintain internal validity at the expense of external validity. In our attempts to control for various conditions and potential confounding variables in order to tease out the specific contribution of interactive online systems on comprehension, we had to create an admittedly

superficial environment for online information seeking. Many of the conditions were contrived and far from what may be the case in reality:

1. The experimental activity was conducted in computer laboratories with high speed computer systems.
2. The students were given a common information task based on a contrived scenario.
3. The students had limited time to explore the websites at will as they had to complete the whole exercise within the limits of their class times.
4. The websites developed, though containing comprehensive and credible information from real sources, were closed information systems that did not have many of the features that live websites may have (e.g., external hyperlinks, e-mail, chat, etc.). Moreover, real websites are neither purely linear or purely non-linear.

For experimental purposes and because of the nature of the hypotheses being tested, there are virtues to this approach, but it would be naïve of us to claim how the findings might apply in real life situations.

Another limitation of the study that may have inadvertently affected the results on the testing of individual differences in online health information seeking, was the homogeneity of the sample population. Being as it was entirely a college population, we can say that the sample was more educated and had greater computer and Internet skills than the general population. Moreover, this homogenous population had less variance in need for cognition, and was less

diverse on a number of counts including race and socio-economic status. The more ideal situation would have been to sample young adults both in and out of school, which may introduce greater variance in individual differences that may have a direct effect on information seeking in online environments.

The study could have also been improved by enlarging upon how comprehension, was measured. We realized later in the study that measuring comprehension of a complex health website presented its own challenges. First was the challenge of how to find the best way to measure comprehension of content which was not necessarily based on one underlying construct. Like most previous studies, we decided to measure comprehension based on the accurate recognition of material-asserted meanings, operationalized by a set of true or false questions. An attempt to purify this comprehension measure was made by conducting various item analyses to ensure that items were not too difficult nor too easy and that the items were able to adequately discriminate between high and low scorers. However, we also found that this overall measure suffered from weak internal consistency, perhaps due to the fact that we were trying to measure understanding of more than just one construct.

The most recent study by Eveland *et al.* (2004) suggests that there are other ways of measuring comprehension of online material other than just using recall and recognition. In their study, the researchers pilot tested a method for calculating knowledge structure density using social network analysis techniques. They suggest that this method is a more accurate way of measuring

the effects of learning from interactive and nonlinear content. Eveland *et al.* (2004) explain that most studies of online learning measure comprehension through recall of knowledge content, but studies of linear vs nonlinear environments manipulate the organization and structure of the content, suggesting a mismatch of dependent and independent variables. Theoretically, it has been explained that nonlinear hypertext structures enhance learning because they mimic the associative structure of human memory. It, therefore, makes sense to look at how it affects knowledge structures, and not just information recall. This may eventually give us a more accurate picture of the benefits of online environments for learning.

Suggestions for Future Study

As the review of the literature has suggested, the theoretical and empirical basis for the positive effects of interactivity on learning and potentially other health outcomes is currently weak. We still have much to learn regarding the exact contributions of interactive health information systems on information use, learning and motivational processes.

The findings and limitations of this study, likewise, bring to the fore persistent questions regarding the role of interactivity particularly in enhancing the comprehension of health information delivered online. Several directions for future research are suggested.

This study could be enriched by testing the effects of level of interactivity on a more heterogenous group of information seekers to introduce variability on a number of characteristics that may directly or indirectly affect performance in online environments. Variability in terms of age, race, socio-economic status, educational attainment, computer competence, Internet experience, health status, perceived risk for the disease, previous knowledge of the disease, among others may introduce new insights on how different individuals engage online content. This approach may inadvertently lead to suggestions for how best to design online health information environments for more disadvantaged and at-risk groups.

Second, we suggest expanding this study to test how different motivational tasks might moderate the effect of interactivity on learning. For example, assigning subjects to one of the following: a specific learning task, a specific searching task, or a general browsing task might reveal how different individuals will engage online content. Specifically, this study might lead to better insights on how differences in motivations might affect an individual's decisions on how to navigate a site or what specific type of interactive activities to explore more deeply. This study might also include another layer of manipulations to investigate how motivations might moderate the effect of level of interactivity on information processing. For instance, it would be interesting to test under what conditions different individuals might depend on either central or peripheral cues in their decision making.

This study has also brought to the fore important questions about the type of literacies current health information seekers must develop in order to use online health information systems more effectively. We talked about the challenges interactive environments pose to information seekers in terms of navigation and also the challenges online reading poses to individuals used to extracting meaning from conventional texts. It would be useful to design a study that would help us discover exactly what competencies or skills individuals must now develop to deal with interactive and online information systems more efficiently. A concomitant goal of this particular study would be to develop a valid measure for web literacy (for lack of a better word), that may in turn be helpful in future studies in interactivity for health communication or education.

Lastly, we recognize that the conceptualization of interactivity in the context of this study was limited to technical interactivity and did not capture all the features of a fully "interactive" site that might include support for communication among users and experts. Perhaps the greatest gains from online health websites arise more from features that support the socio-emotional needs of health information seekers rather than the technical features that make the Internet a dynamic communication channel. It would be interesting to study what draws different types of users to specific health websites, what features engage them the most, and which features are the most helpful in meeting their expectations and needs.

Copyright © Mia Liza Alcantara Lustria 2005

APPENDICES

APPENDIX A

TABLES FOR PILOT STUDY

Table A.

Sociodemographic Characteristics of the Respondents in the Pilot Sample

Variable	N=445	%	*M*	*SD*
Gender				
Male	153	50.00		
Female	151	49.30		
Age (range 18-26)	306		20.13	1.74
Race				
White or Caucasian	275	89.90		
African-American	9	2.90		
Other / Multiracial	15	4.90		
Computer Competency Score[a]	306		3.77	0.75
Perceived Health Status[a]			4.32	0.64
Poor	3	1.00		
Average	19	6.20		
Good	160	52.30		
Excellent	124	40.50		
Frequency of Online Health Information Seeking[c]				
Not at all	125	40.8		
Very rarely	103	33.7		
At least monthly	32	10.5		
At least weekly	8	2.6		
Daily	3	1.0		
For Whom Did they Seek Health Information Online for				
Self	101	33.0		
Someone else's	70	22.9		
Both	72	23.5		

NOTES: [a]*Highest mean score was 5;* [b]*Rated with 5 as the highest*

Table B.

Health Topics Searched Online by Respondents in Pilot Sample (N = 306)

HEALTH TOPIC	*N*	%
Specific disease or medical problem	208	75.40
Exercise or fitness	196	71.00
Diet, nutrition, vitamins or nutritional supplements	164	59.40
Certain medical treatment or procedure	131	47.50
Sexual health	97	35.10
Prescription or over-the-counter drugs	61	22.10
Depression, anxiety, stress, or mental health	57	20.70
A particular doctor	51	18.50
Health insurance	33	12.00
Environmental health hazzards	29	10.50
Problems with drugs or alcohol	26	9.40
Immunizations or vaccinations	17	6.20
How to quit smoking	16	5.80

Table C.

Pilot Study Respondents' Perceived Knowledge of Selected Health Topics

HEALTH TOPICS	*N*	*M*	*S.D.*
Exercise	303	3.97	0.83
Smoking	303	3.67	1.00
Dental health	303	3.62	0.93
Pregnancy	302	3.61	1.02
Binge drinking/alcoholism	300	3.52	1.02
Eating disorders	301	3.42	1.07
Obesity	302	3.38	1.05
Skin care	303	3.35	1.06
AIDS	300	3.30	1.08
Depression/anxiety	300	3.26	1.14
STDs	303	3.21	0.95
Drug abuse (hard drugs)	301	3.16	1.12
Prescription drug abuse	303	3.11	1.11
Cancer	300	3.10	1.00
Heart disease	302	2.92	1.03
Weight loss supplements	303	2.87	1.22

***NOTE**: Rated with 1 – not knowledgeable, 5 – very knowledgeable.*

Table D.

Health Topics Pilot Study Respondents Were Willing to Spend Time Exploring a Website On

HEALTH TOPICS	*N*	*M*	*SD*
Exercise	304	3.56	1.38
Cancer	304	2.88	1.34
Pregnancy	301	2.75	1.31
Skin care	303	2.74	1.42
Depression/anxiety	303	2.70	1.34
STDs	302	2.64	1.26
Heart disease	302	2.59	1.25
AIDS	303	2.58	1.32
Binge drinking/alcoholism	301	2.55	1.30
Dental health	301	2.41	1.17
Eating disorders	301	2.40	1.28
Smoking	304	2.36	1.22
Drug abuse (hard drugs)	302	2.35	1.28
Prescription drug abuse	303	2.34	1.23
Weight loss supplements	304	2.32	1.35
Obesity	304	2.22	1.19

NOTE: Rated using the following scale: 1 – no time at all; 2 - < 6 minutes; 3 - > 5 but < 11 minutes; >10 but < 21 minutes; 5 - > 20 minutes

Copyright © Mia Liza Alcantara Lustria 2005

APPENDIX B
SCREENSHOTS AND DESCRIPTION OF INTERACTIVE TOOLS/ACTIVITIES

1. **"How the sun's rays affect us" –** this was an animated click-through module designed to educate the user on how the sun's rays can damage the skin. It included several animations that demonstrated, for example, how the sun's rays penetrates and affects the skin layer.

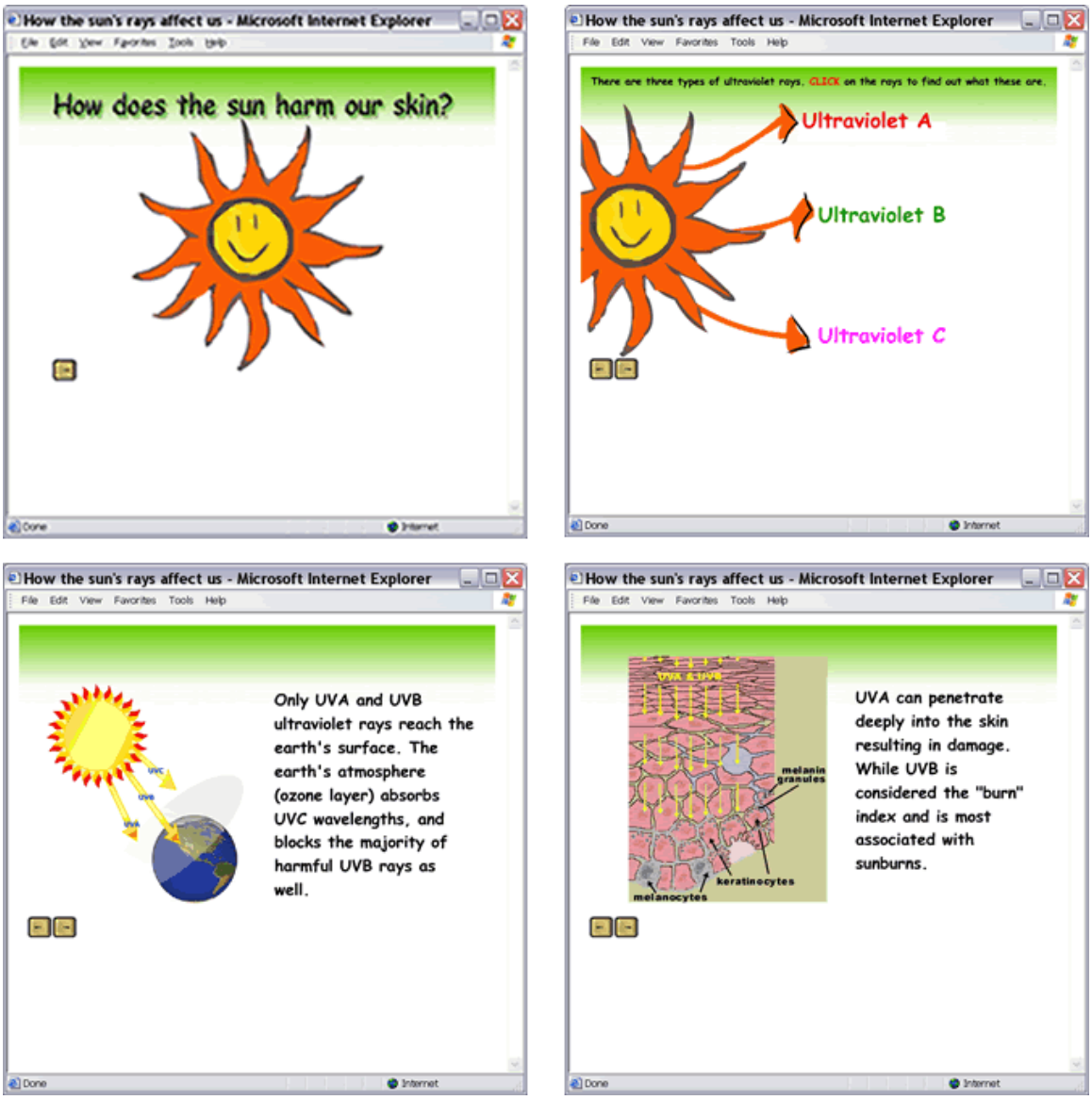


Figure A. *Screenshot of "How the sun's rays affect us" interactive tool.*

2. **"Get the UV index in your area"** – this is a personalized query that allowed users to enter either a city or country so that they might find out what the UV index level might be in these particular areas.

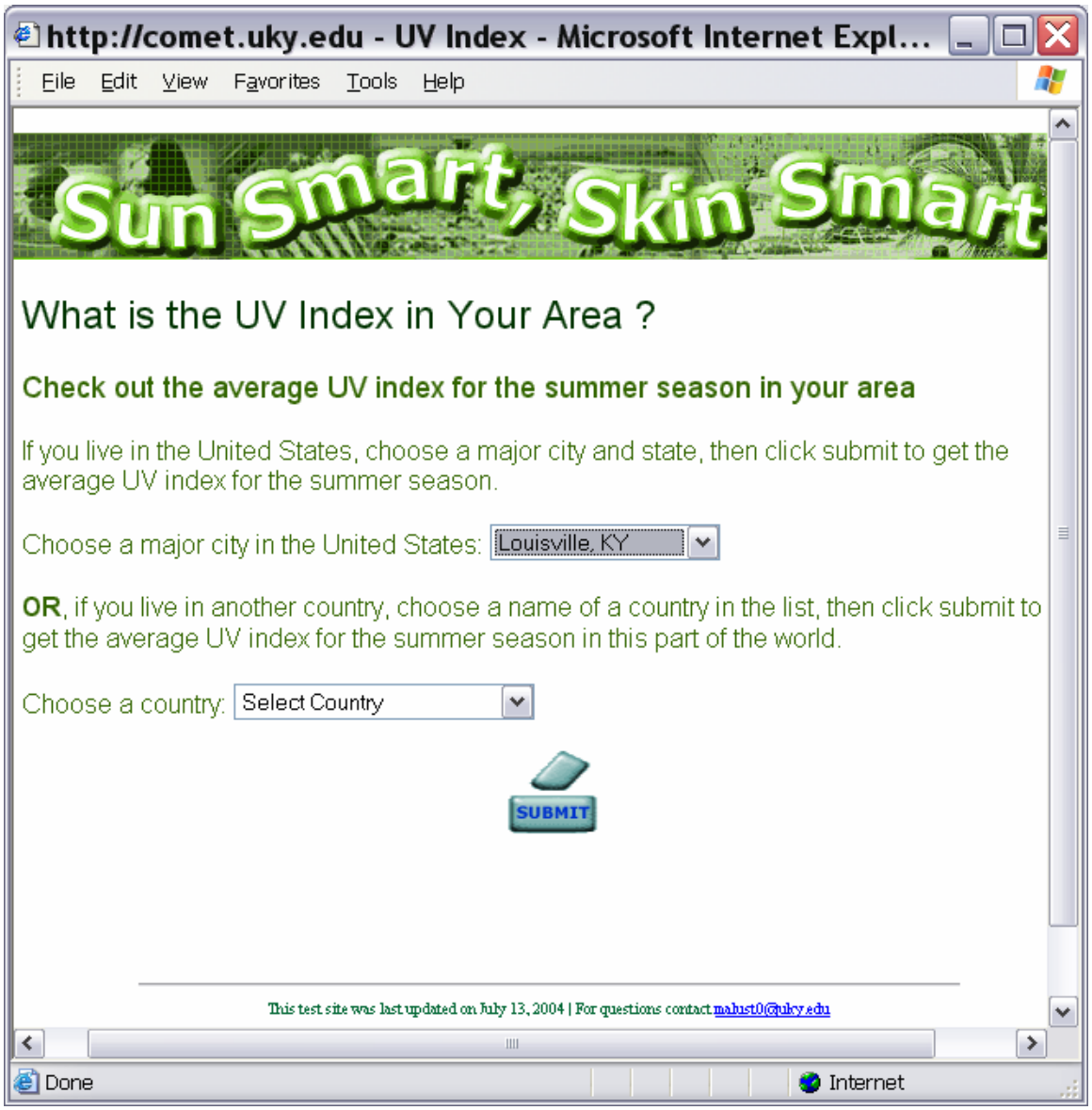


Figure B. *Screenshot of "Get the UV index in your area" interactive activity.*

3. **"Calculate your risk"** – is an interactive, personalized quiz that allowed the user to determine their personal risk factors for skin cancer.

Figure C. *Screenshot of the "Calculate your risk" interactive quiz.*

Here is a screenshot of an example response to a query:

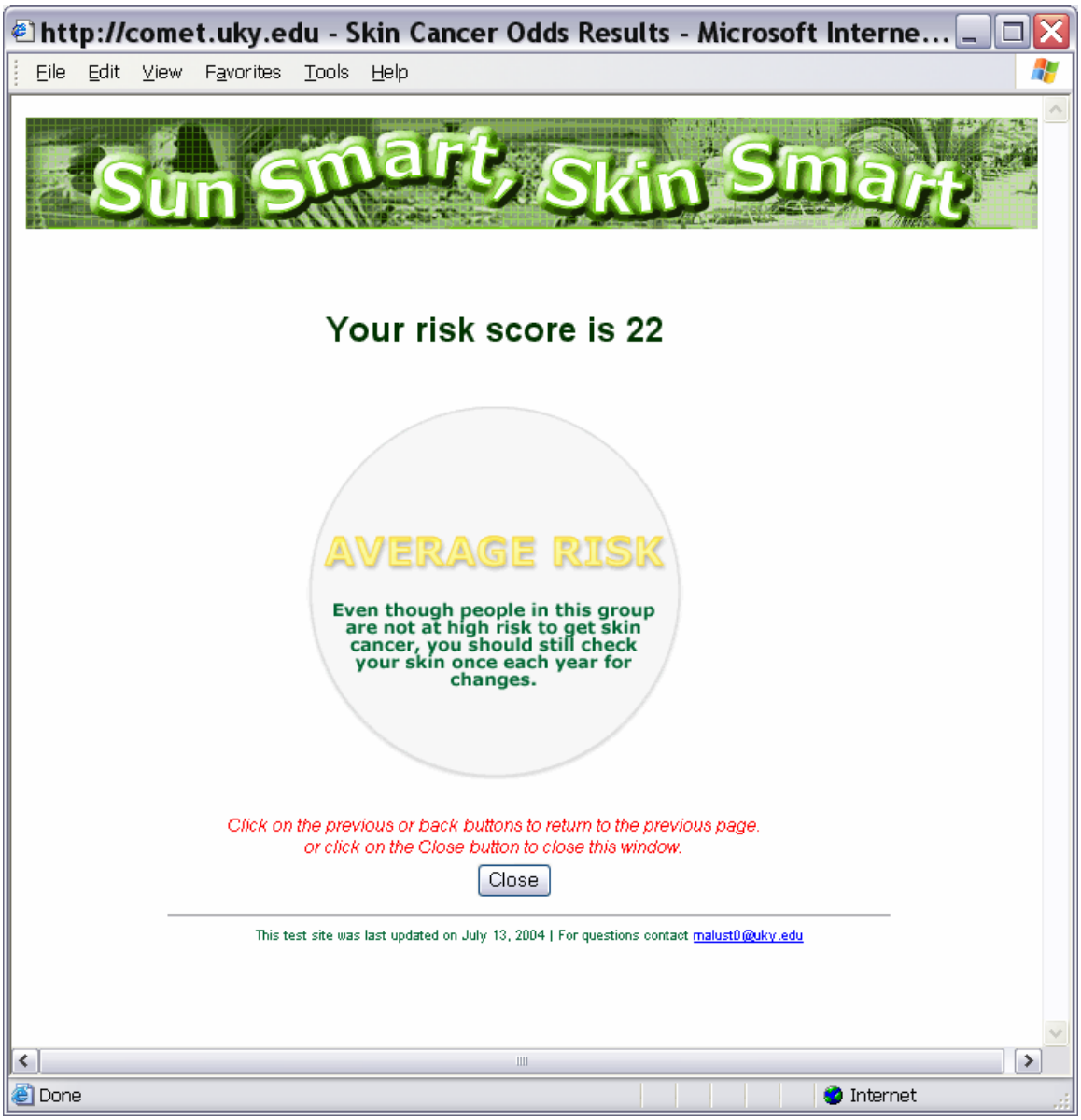


Figure D. *Screenshot of an example response to a query.*

4. "**How to spot a skin cancer**" – this was another click-through module that instructed users on how to personally examine themselves for possible melanomas. It also included graphic photographs of specific skin cancers.

Figure E. *Screenshots of the "How to spot a skin cancer" interactive activity.*

Copyright © Mia Liza Alcantara Lustria 2005

APPENDIX C

THE PHILIPPINE EXPERIMENT

Overview

As discussed earlier, an experiment similar to the main study was also conducted in the Philippines. The initial goal of this study was to widen the sample base to include a more diverse group of individuals, particularly to see if greater variability in race, computer competency or Internet experience might have any significant contributions to the effect of level of interactivity on comprehension.

However, we were unable to use the Philippine sample as a comparison group, as the conditions underwhich they conducted the experimental activity was not equivalent to that experienced by the US sample. The US sample participated in the experiment under very controlled conditions, while the Philippine sample had a more naturalistic setting for the experiment.

The following section describes the Philippine experiment in more detail as well as the main findings and insights from this trial.

Study Design and Data Gathering Procedures

A factorial 2 (high interactivity vs low interactivity) by 2 (high need for cognition vs low need for cognition) experimental design was used to test the hypotheses.

The experiment was conducted at a major university in the Philippines. About 202 undergraduate students enrolled in communication courses were recruited for the study and offered the following incentives for their participation: extra credit as well as a one-hour pass to be used at an Internet café. Due to the lack of computer facilities on campus, however, we had to rent out computer spaces at a large Internet café within the immediate vicinity of the campus. However, we were unable to secure the entire establishment for each experiment, as the number of students in each class were often not enough to fill the entire 35-computer slots. As a result, the participants in the experiment often had to share space with other regular customers of the Internet café. Since it was a thriving business, often used by young adults and adolescents for online gaming, the setting was far from quiet and often very crowded.

In addition, we ran into serious problems with the database server, which often crashed in the middle of experimental sessions. This was exacerbated by the fact that we had a difficult time communicating with our information technology expert based in the United States because of the 12-hour time lag. As a result, several classes had to be re-scheduled even during sessions where the students may have already finished half of the activity.

Aside from these differences in experimental conditions, the manipulations and the main data gathering procedure was exactly the same as the main study. Students were asked to log on to the main survey, give there consent to participate, read the instructions and the scenario, and then explore

the site randomly assigned to them before returning to the main survey. The participants were randomly assigned to one of two versions of the sites on skin cancer – the high interactivity site or the low interactivity site.

The Respondents

A total of 179 respondents remained after removing unusable data from participants who were unable to finish the entire activity. As shown in Table E, the sample was composed of more females (N = 136, 76%) than males (N = 37, 20.7%), which is indicative of the normal distribution of gender in Philippine classrooms. The average age of the respondents was 19 years old. Majority of the respondents did not have access to the Internet from their homes (N = 114, 63.7%), although the sample was moderately computer competent (M = 3.18), and fairly experienced using the Internet, with 84% of the respondents having had experience using the Internet for more than 3 years. Most of their Internet use, however, occurred at school (M = 3.85).

Table E.

Socio-demographic Characteristics of Philippine Respondents

Variable	N=445	%	*M*	*SD*
Gender				
Male	37	20.70		
Female	136	76.00		
Age (range 18-26)	173		19.57	1.35
Have access to Internet from home				
Yes	64	35.80		
No	114	63.70		
Computer Competency Score[a]	179		3.18	0.65
Years Using the Internet				
Never used the Internet	0	0.0		
< 1 year	7	3.90		
1 year	1	0.60		
2 years	9	5.00		
3 years	25	14.00		
4 years	37	20.70		
5 years	32	17.90		
6 years or more	60	33.50		
Frequency of Using Internet from[b]…	179			
Home			2.28	1.43
School			3.85	0.82
Work			2.02	1.45

NOTES: [a] *Highest mean score was 5.0;* [b] *Rated with 5 as the highest*

Table F shows that majority of the Philippine respondents perceived themselves to have good health status (*N* = 82, 45.8%) . Surprisingly, despite the fact that skin cancer is normally not considered to be an issue for darker-skinned individuals, a great majority of the Philippine respondents were still somewhat worried about their risk for the disease (*N* = 122, 68.2%). Most of the respondents said that they rarely looked for health information online (*N* = 91, 50.8%) , and when they did, they did mostly either for themselves or a friend or loved one (*N* = 72, 40.2%). The respondents had a moderate health literacy score

(M = 27.09) and had previously read an average of about three sources on skin cancer.

Table F.

Health Status, Health Literacy Score and Online Health Information-Seeking Behavior of Philippine Respondents

Variable	N=445	%	*M*	*SD*
Perceived Health Status[a]			4.59	0.72
Poor	9	5.00		
Average	68	38.00		
Good	82	45.80		
Excellent	15	8.40		
Perceived Risk for Skin Cancer[b]			0.89	0.56
Not worried at all	38	21.20		
Somewhat worried	122	68.20		
Extremely worried	19	10.60		
Frequency of Online Health Information Seeking[c]			2.41	0.74
Not at all	7	3.90		
Very rarely	91	50.80		
At least monthly	41	22.90		
At least weekly	13	7.30		
Daily	1	0.60		
For Whom Did they Seek Health Information Online for				
Self	38	21.20		
Someone else's	48	26.80		
Both	72	40.20		
Health Literacy Score[d]			27.09	6.24
No. of Sources on Skin Cancer Previously Read[e]			3.37	2.07

NOTES: [a]Rated with 5.0 as the highest; [b]0 – not worried at all and 3 – extremely worried; [c]Rated with 5.0 as the highest; [d]Highest possible score is 38; [e]Highest possible score is 8

Results of the Hypotheses Testing

A two-way ANCOVA was run to test the relationship of level of interactivity on comprehension as a function of need for cognition. In a series of iterative analyses, we discovered that reading style was a significant covariate for this sample, thus this was controlled for in the factorial analysis.

Preliminary analyses was run to evaluate the homogeneity-of-slopes assumption of the relationship of the dependent variable (comprehension score) and the covariate (reading styles) as a function of each independent variable (level of interactivity and need for cognition), respectively. This analysis indicated that the relationship between comprehension scores and reading style did not differ significantly as a function of level of interactivity, F (1,174) = 0.25, MSE = 0.63, p = .618, partial η^2 = .001. Moreover, the analysis also indicated that the relationship between comprehension scores and reading style did not differ significantly as a function of need for cognition, F (1,174) = 0.03, MSE = 0.07, p = 0.87, partial η^2 = .000.

H1 predicted that those assigned to the high interactivity site would have higher comprehension scores than those who were exposed to the low interactivity site. Results show that the mean comprehension scores were in the direction predicted (Table G). Respondents in the high interactivity group had higher mean comprehension scores (M = 5.16, SD = 1.67 for the high NFC group) and (M = 4.43, SD = 1.60 for the low NFC group). Results of the two-way

ANCOVA (as shown in Table H) shows that the main effect of level of interactivity on comprehension scores, however, was not significant, F (1,174) = 0.52, MSE = 1.31, p = 0.48, partial η^2 = .000. Based on these results, H1 was not supported.

Table G.

Mean Comprehension Scores and Standard Deviations as a Function of Level of Interactivity and Need for Cognition (Philippine Sample)

SOURCE	High Need for Cognition	Low Need for Cognition
High Interactivity	*M* = 5.16 *SD* = 1.67 *N* = 44	*M* = 4.55 *SD* = 1.45 *N* = 40
Low Interactivity	*M* = 4.93 *SD* = 1.67 *N* = 56	*M* = 4.43 *SD* = 1.60 *N* = 39

Table H.

Analysis of Covariance of Comprehension Scores as a Function of Level of Interactivity and Need for Cognition, With Reading Style as Covariate (Philippine Sample)

SOURCE	df	SS	MS	F	p-value	partial η^2	Power[a]
Covariate (Reading style)	1	12.29	12.29	4.85	0.03	0.027	0.59
Need for Cognition (NFC)	1	7.99	7.99	3.16	0.08	0.018	0.42
Level of Interactivity (I)	1	1.31	1.31	0.52	0.47	0.003	0.11
I x NFC	1	0.22	0.22	0.09	0.77	0.000	0.06
Error	174						
Total	179						

NOTE: Computed using alpha = 0.05

H2 predicted that higher need for cognition individuals would have higher comprehension scores than those who were lower in need for cognition. Table 31 shows that the means were in the direction predicted with the highest mean comprehension scores garnered by the high need for cognition individuals in each treatment group (M = 5.16, SD = 1.67 for the high interactivity group) and (M = 4.93, SD = 1.67 for the low interactivity group). However, results of the two-way ANCOVA (as shown in Table H) shows that the main effect of need for cognition on comprehension scores controlling for reading style was not significant, F (1,174) = 3.16, MSE = 7.99, p = 0.077, partial η^2 = 0.018. Based on these results, H2 was not supported.

H3 predicted that those assigned to the high interactivity site would have higher comprehension scores than those who were exposed to the low interactivity site as a function of need for cognition. The mean comprehension scores adjusted for by initial differences in reading style, however, was clearly ordered across the four groups based on need for cognition and level of interactivity (as shown in Table G). As expected, the highest mean scores was displayed by the [high interactivity, high NFC group] followed by the [high interactivity, low NFC group], [the low interactivity, high NFC group], and finally by the [low interactivity, low NFC group). Results of the ANCOVA, however, revealed that there was no significant interaction between level of interactivity and need for cognition on mean comprehension scores holding

constant reading style (F (1,174) = 0.09, MSE = 0.22, p = 0.77, partial η^2 = .06). Based on these results, H3 was not supported.

We interpret these findings with some caution as several things may have come into play to affect these results. One, we were unable to control the experimental conditions in the Philippines as faithfully as we were able to in the US experiment. Two, the Philippine experiment, with its smaller sample size, did not have sufficient power to detect the small effects of the experimental manipulations on the dependent variable.

It is interesting to note, however, that although the statistical tests were not able to support any of the hypotheses, reading style still emerged as a significant covariate. This is despite the fact that the conditions underwhich the Philippine experiment was conducted was less than ideal for a controlled experiment. This lends credence to the suggestion made in the main analysis for a need to look at this variable more closely, especially as it applies to learning within online environments.

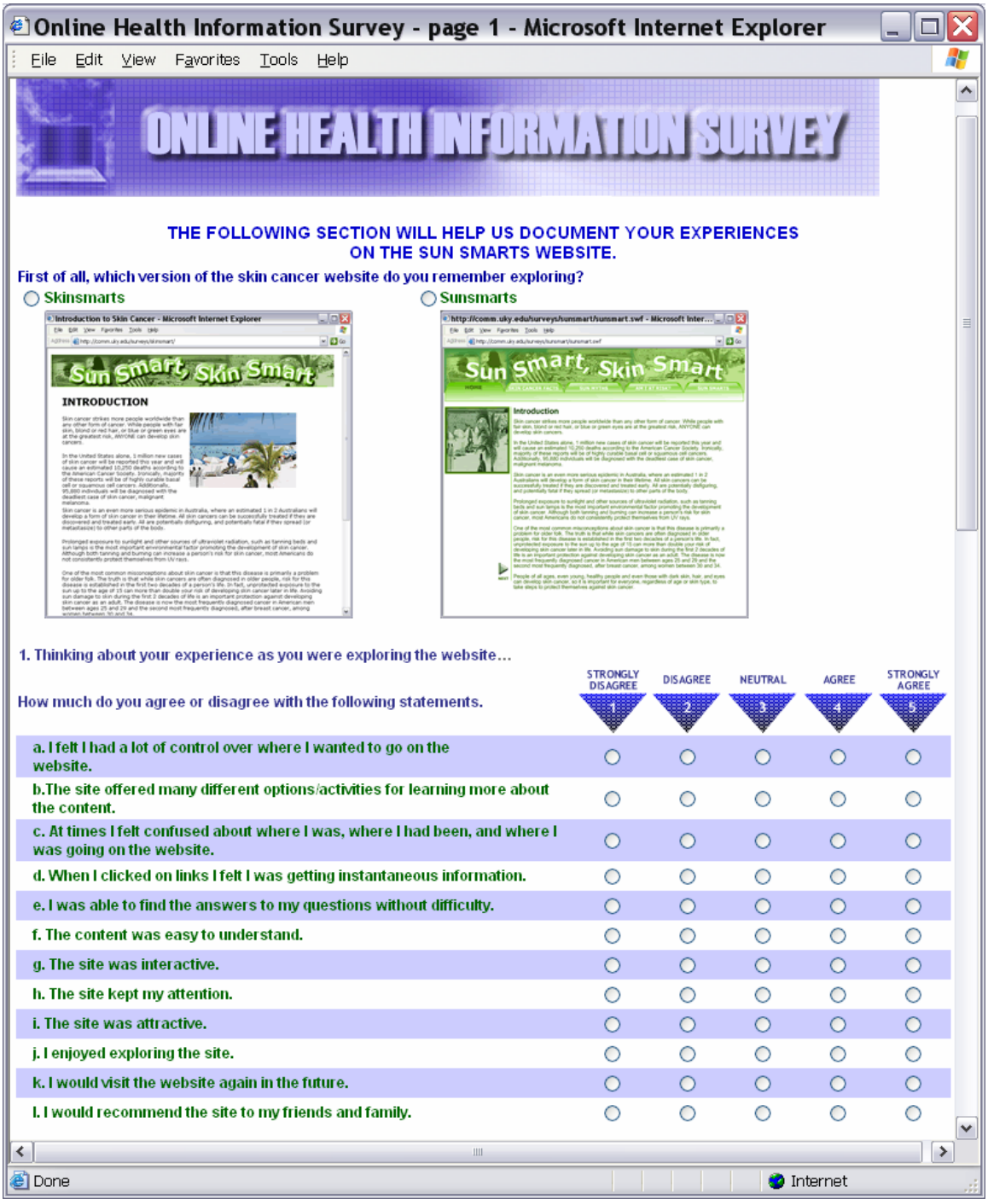
Needless to say, we still believe, that looking at how individuals in different cultures might differ in the way they seek and process health information online, is very worthwhile. Future research, however, must ensure that conditions are ideal to conduct adequate comparisons between independent samples.

Copyright © Mia Liza Alcantara Lustria 2005

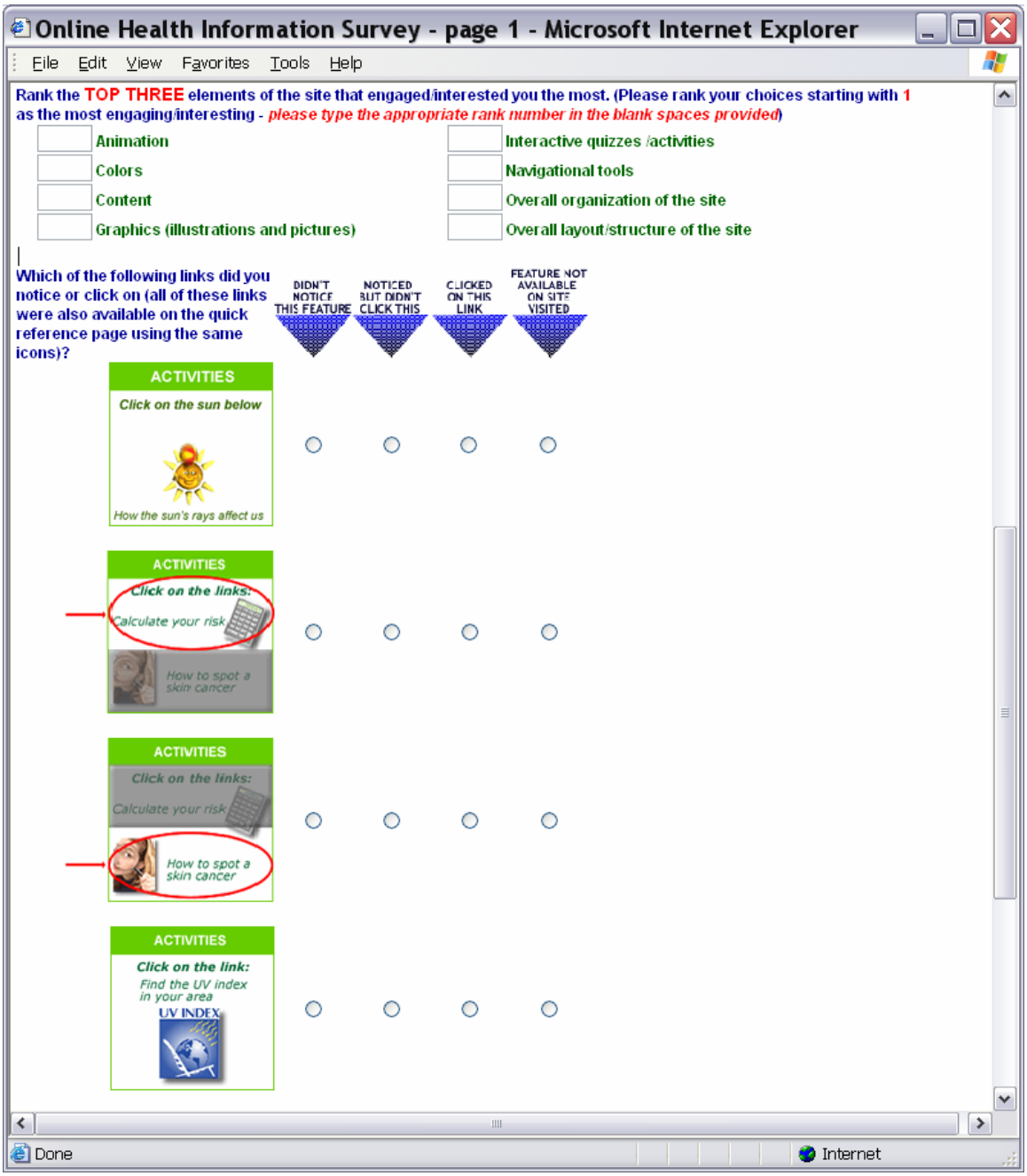
APPENDIX D

SCREENSHOTS OF THE ONLINE SURVEY

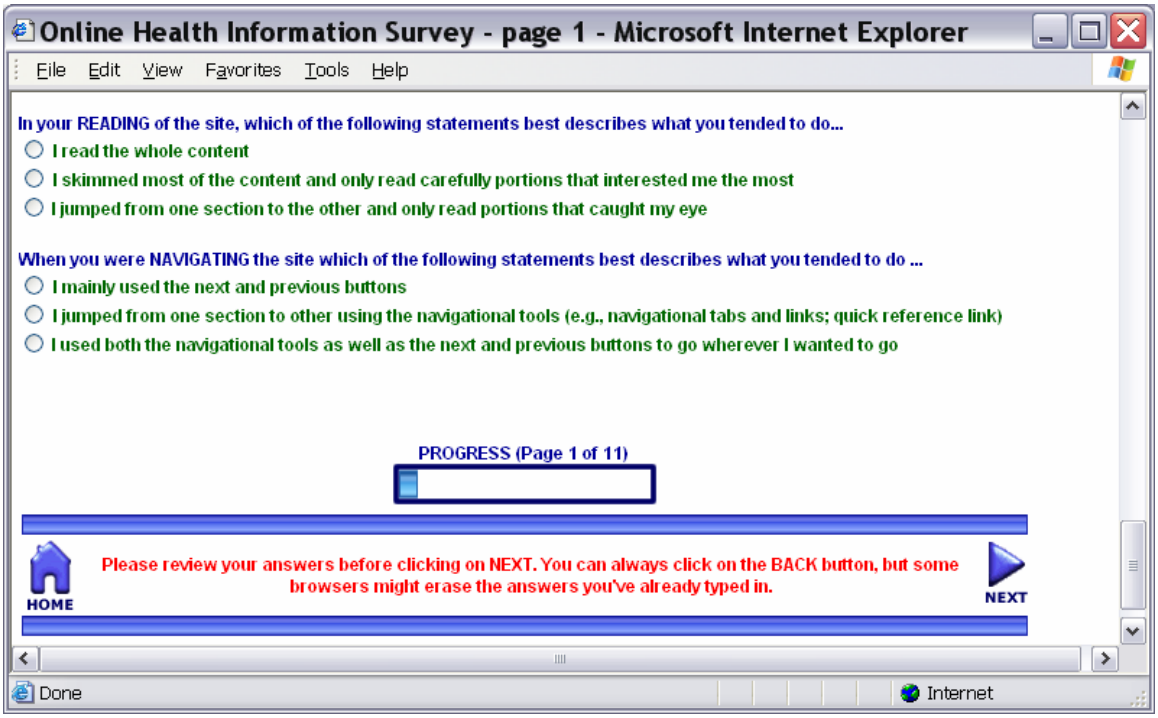
Page 1



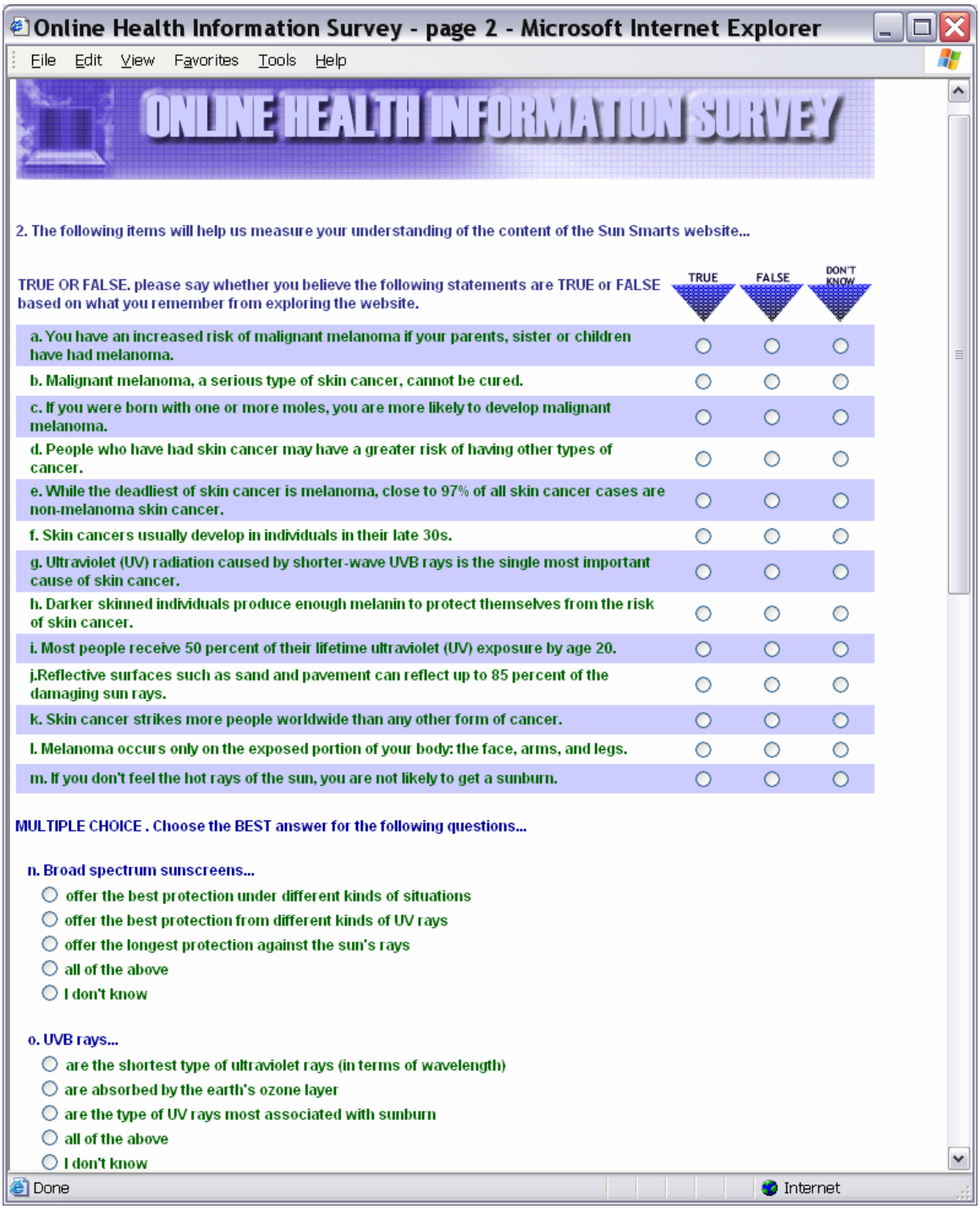
Page 1 continued



Page 1 continued

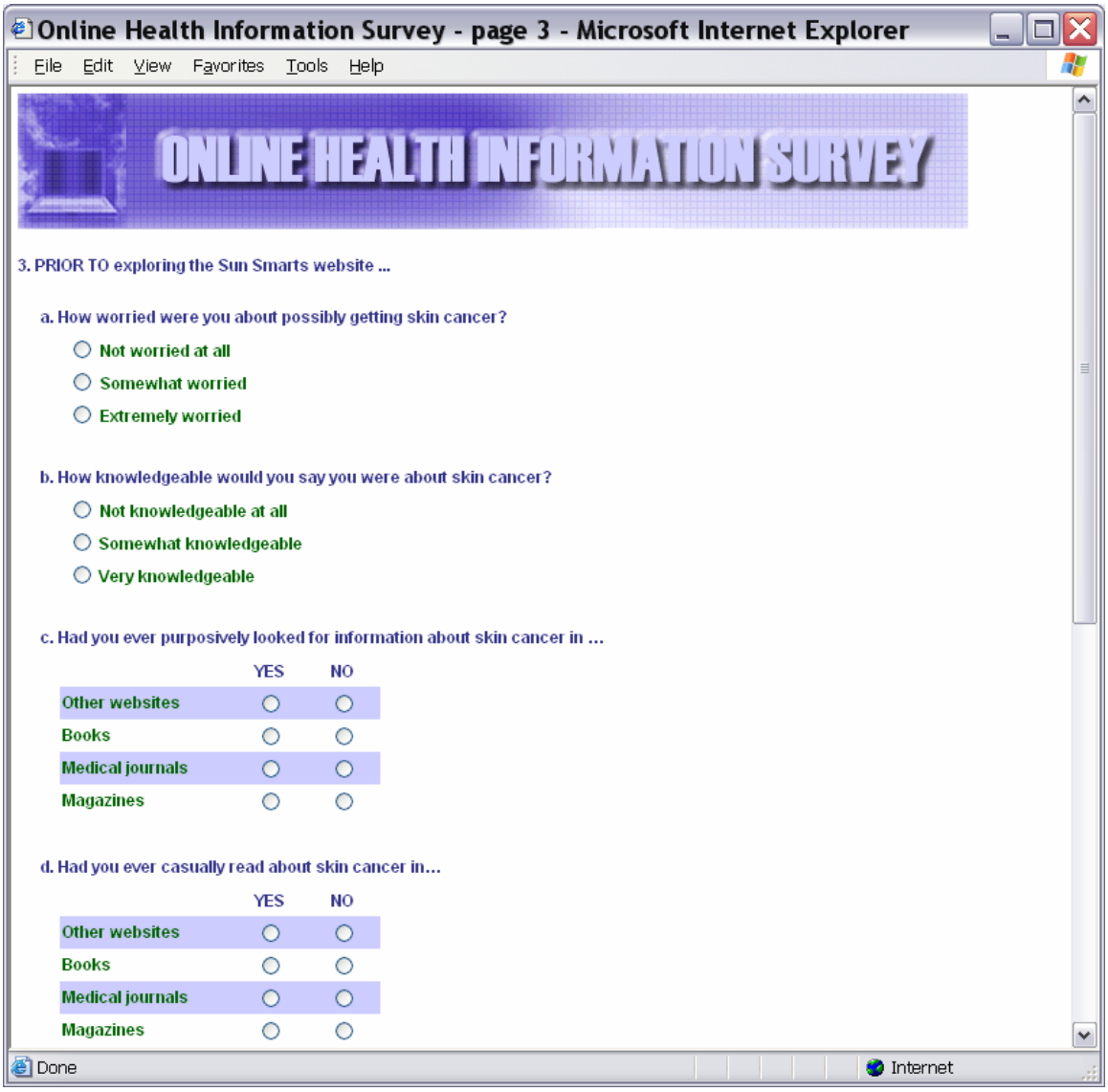


Page 2

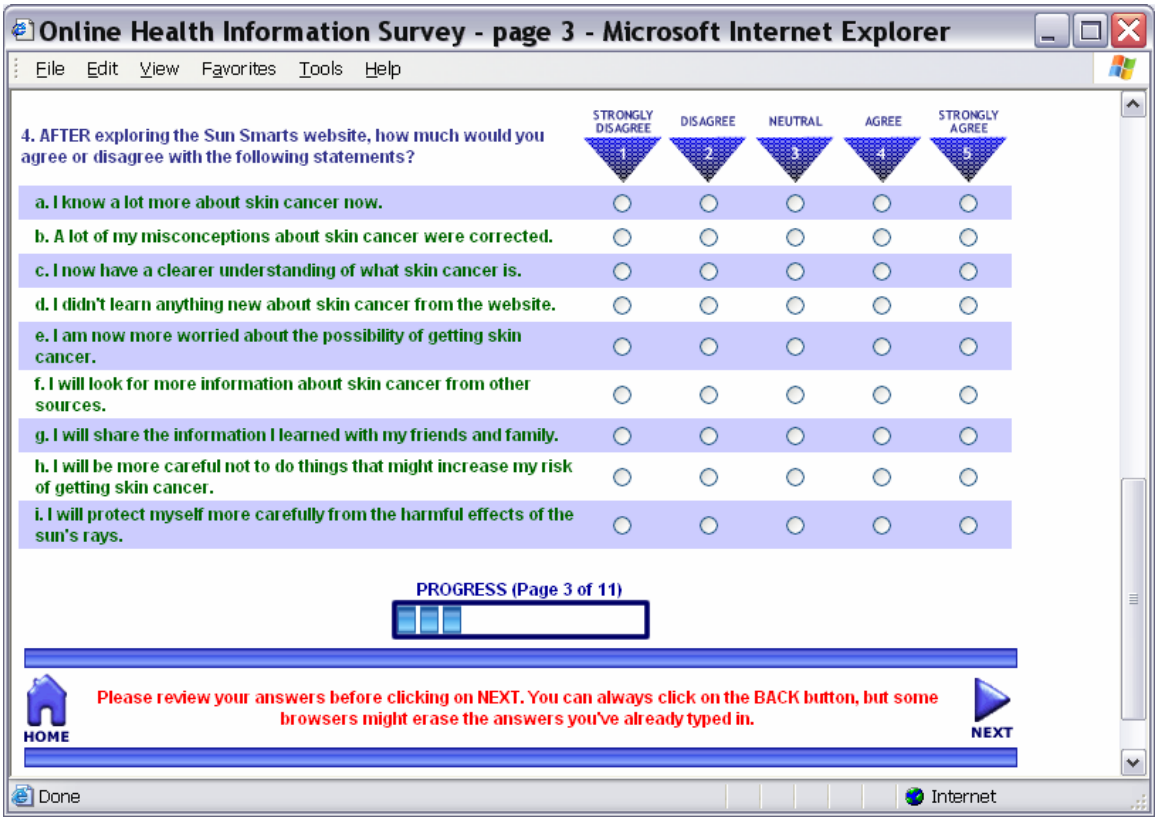

Online Health Information Survey - page 2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
2. The following items will help us measure your understanding of the content of the Sun Smarts website...
TRUE OR FALSE. please say whether you believe the following statements are TRUE or FALSE based on what you remember from exploring the website.
TRUE
FALSE
DON'T KNOW
a. You have an increased risk of malignant melanoma if your parents, sister or children have had melanoma.
b. Malignant melanoma, a serious type of skin cancer, cannot be cured.
c. If you were born with one or more moles, you are more likely to develop malignant melanoma.
d. People who have had skin cancer may have a greater risk of having other types of cancer.
e. While the deadliest of skin cancer is melanoma, close to 97% of all skin cancer cases are non-melanoma skin cancer.
f. Skin cancers usually develop in individuals in their late 30s.
g. Ultraviolet (UV) radiation caused by shorter-wave UVB rays is the single most important cause of skin cancer.
h. Darker skinned individuals produce enough melanin to protect themselves from the risk of skin cancer.
i. Most people receive 50 percent of their lifetime ultraviolet (UV) exposure by age 20.
j.Reflective surfaces such as sand and pavement can reflect up to 85 percent of the damaging sun rays.
k. Skin cancer strikes more people worldwide than any other form of cancer.
l. Melanoma occurs only on the exposed portion of your body: the face, arms, and legs.
m. If you don't feel the hot rays of the sun, you are not likely to get a sunburn.
MULTIPLE CHOICE . Choose the BEST answer for the following questions...
n. Broad spectrum sunscreens...
offer the best protection under different kinds of situations
offer the best protection from different kinds of UV rays
offer the longest protection against the sun's rays
all of the above
I don't know
o. UVB rays...
are the shortest type of ultraviolet rays (in terms of wavelength)
are absorbed by the earth's ozone layer
are the type of UV rays most associated with sunburn
all of the above
I don't know
Done
Internet

Page 2 continued

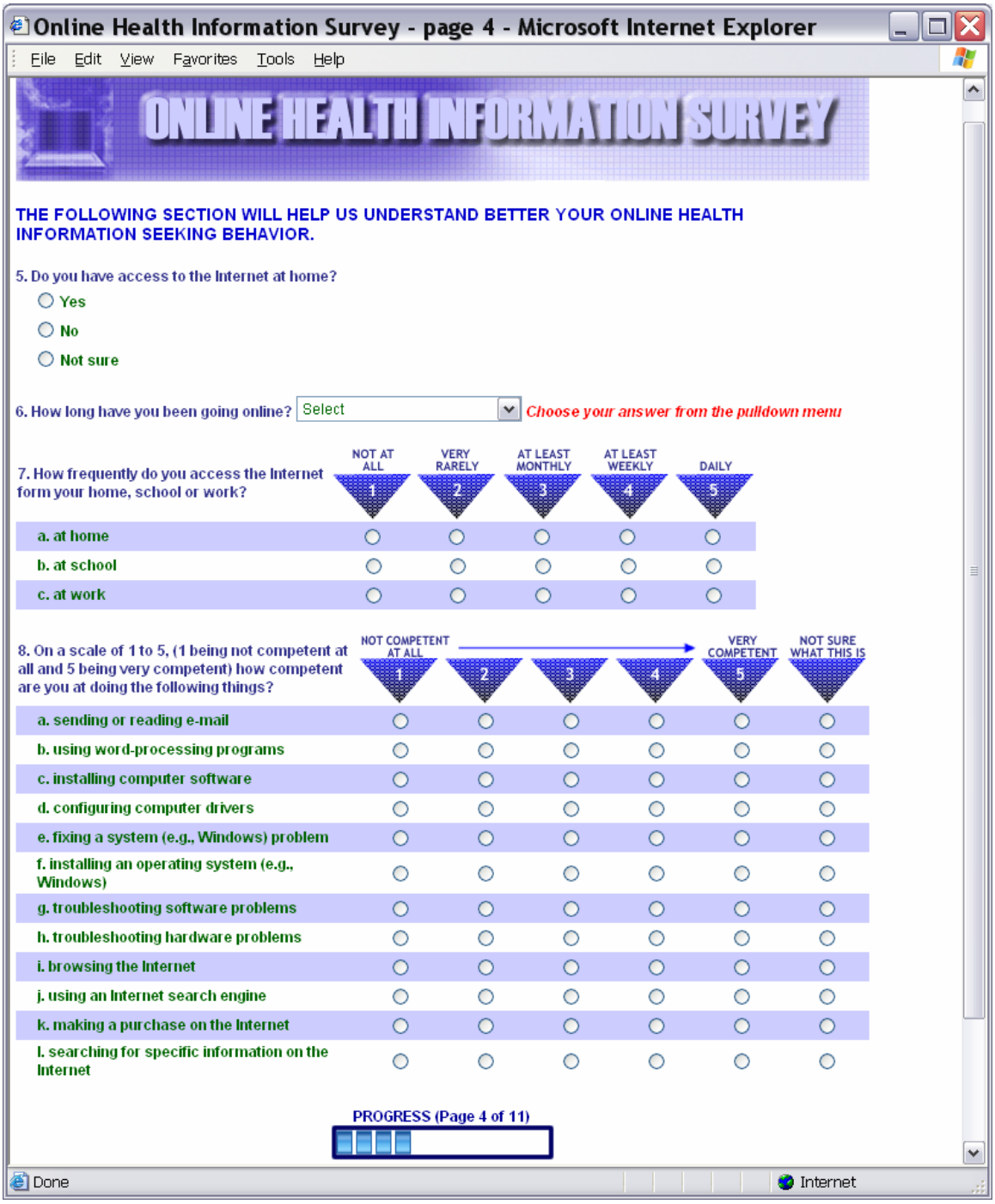
Page 3


Online Health Information Survey - page 3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
3. PRIOR TO exploring the Sun Smarts website ...
a. How worried were you about possibly getting skin cancer?
Not worried at all
Somewhat worried
Extremely worried
b. How knowledgeable would you say you were about skin cancer?
Not knowledgeable at all
Somewhat knowledgeable
Very knowledgeable
c. Had you ever purposively looked for information about skin cancer in ...
YES NO
Other websites
Books
Medical journals
Magazines
d. Had you ever casually read about skin cancer in...
YES NO
Other websites
Books
Medical journals
Magazines
Done
Internet

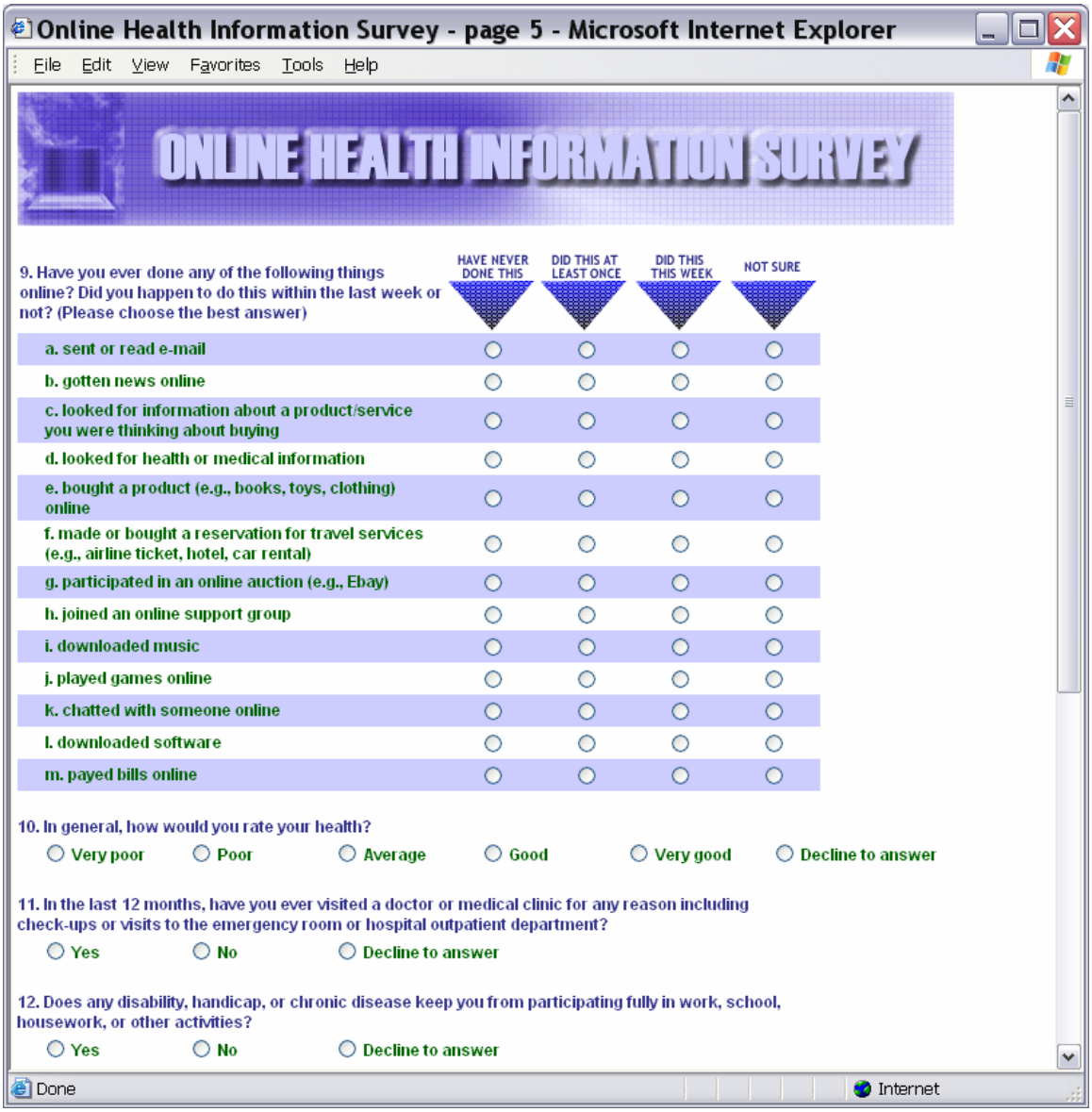
Page 3 continued



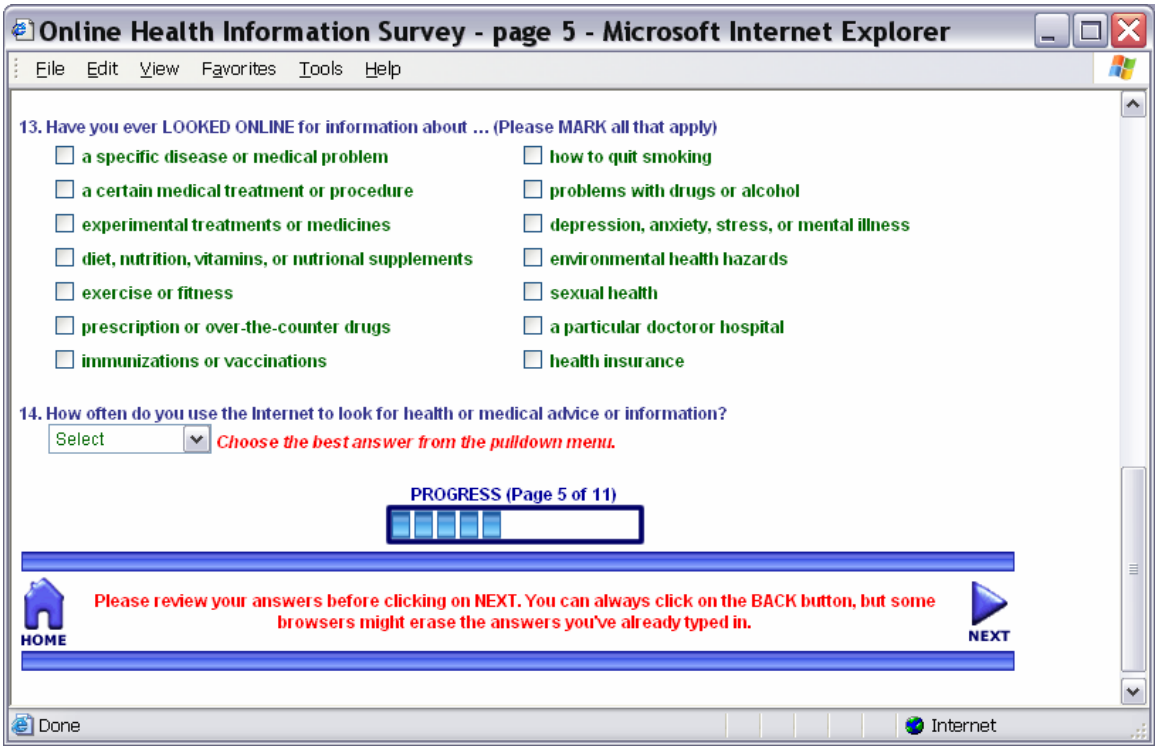
Page 4


Online Health Information Survey - page 4 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
THE FOLLOWING SECTION WILL HELP US UNDERSTAND BETTER YOUR ONLINE HEALTH INFORMATION SEEKING BEHAVIOR.
5. Do you have access to the Internet at home?
Yes
No
Not sure
6. How long have you been going online? Select Choose your answer from the pulldown menu
7. How frequently do you access the Internet form your home, school or work?
NOT AT ALL 1
VERY RARELY 2
AT LEAST MONTHLY 3
AT LEAST WEEKLY 4
DAILY 5
a. at home
b. at school
c. at work
8. On a scale of 1 to 5, (1 being not competent at all and 5 being very competent) how competent are you at doing the following things?
NOT COMPETENT AT ALL 1
2
3
4
VERY COMPETENT 5
NOT SURE WHAT THIS IS
a. sending or reading e-mail
b. using word-processing programs
c. installing computer software
d. configuring computer drivers
e. fixing a system (e.g., Windows) problem
f. installing an operating system (e.g., Windows)
g. troubleshooting software problems
h. troubleshooting hardware problems
i. browsing the Internet
j. using an Internet search engine
k. making a purchase on the Internet
l. searching for specific information on the Internet
PROGRESS (Page 4 of 11)
Done
Internet

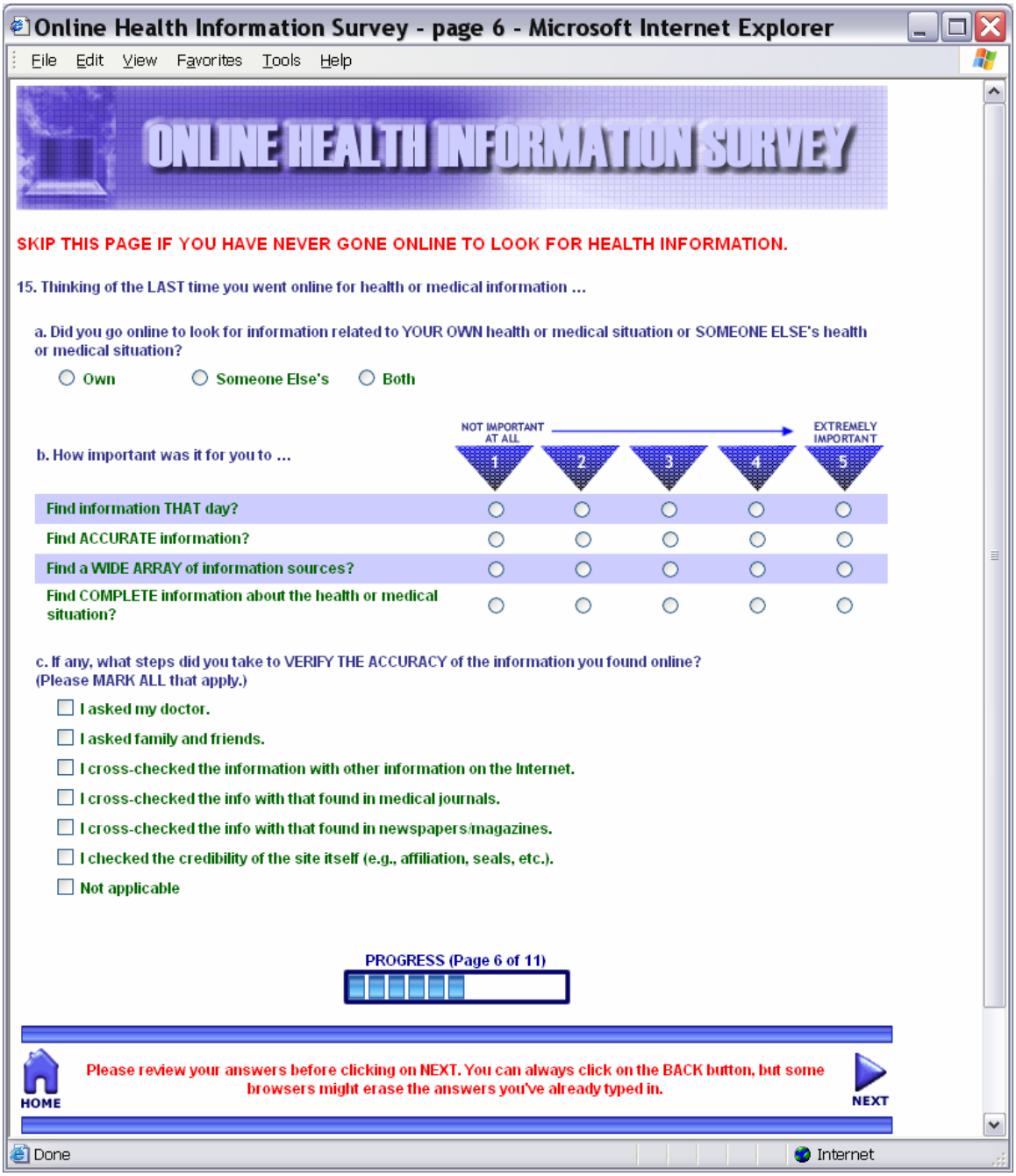
Page 5


Online Health Information Survey - page 5 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
9. Have you ever done any of the following things online? Did you happen to do this within the last week or not? (Please choose the best answer)
HAVE NEVER DONE THIS
DID THIS AT LEAST ONCE
DID THIS THIS WEEK
NOT SURE
a. sent or read e-mail
b. gotten news online
c. looked for information about a product/service you were thinking about buying
d. looked for health or medical information
e. bought a product (e.g., books, toys, clothing) online
f. made or bought a reservation for travel services (e.g., airline ticket, hotel, car rental)
g. participated in an online auction (e.g., Ebay)
h. joined an online support group
i. downloaded music
j. played games online
k. chatted with someone online
l. downloaded software
m. payed bills online
10. In general, how would you rate your health?
Very poor
Poor
Average
Good
Very good
Decline to answer
11. In the last 12 months, have you ever visited a doctor or medical clinic for any reason including check-ups or visits to the emergency room or hospital outpatient department?
Yes
No
Decline to answer
12. Does any disability, handicap, or chronic disease keep you from participating fully in work, school, housework, or other activities?
Yes
No
Decline to answer
Done
Internet

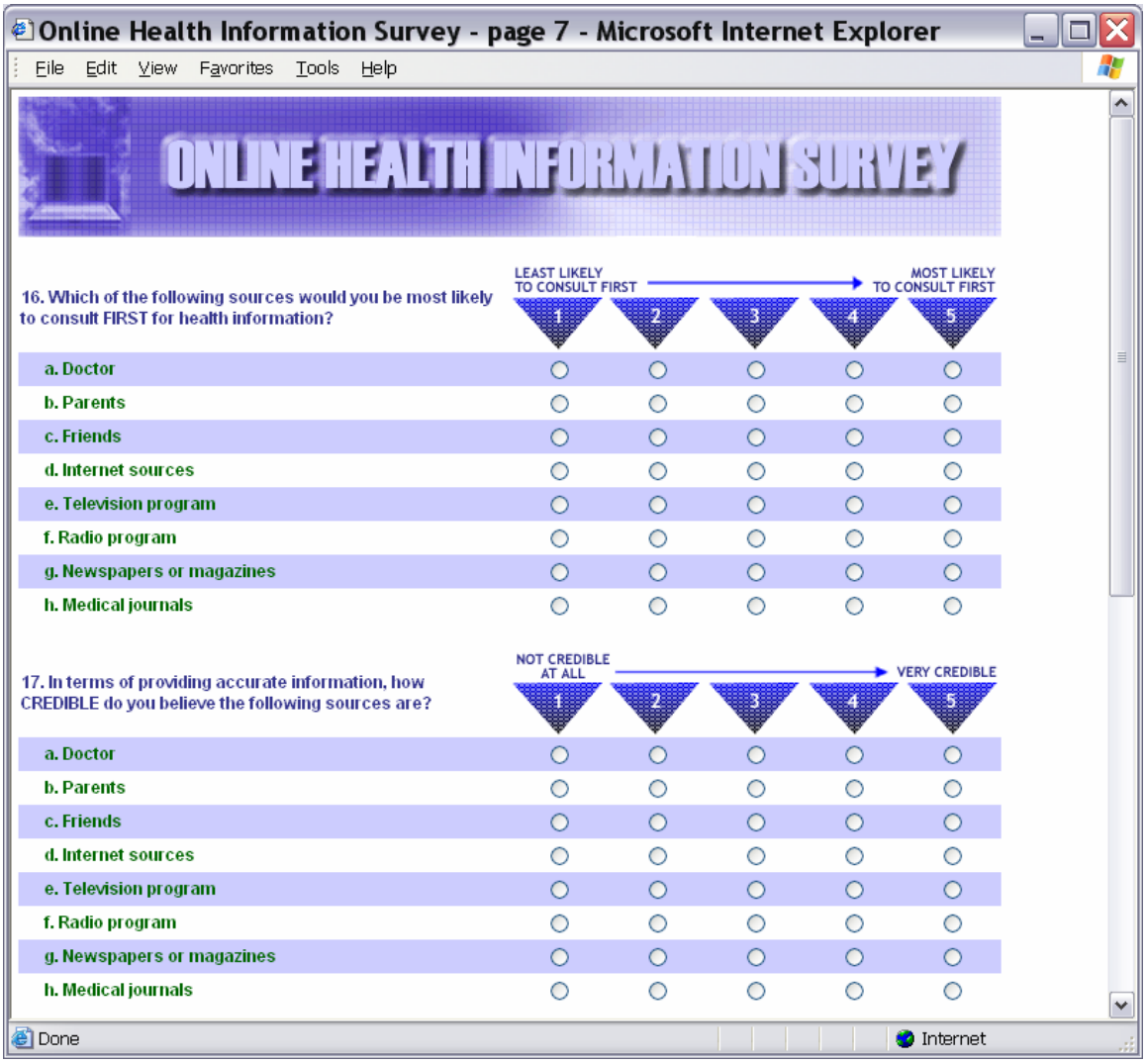
Page 5 continued



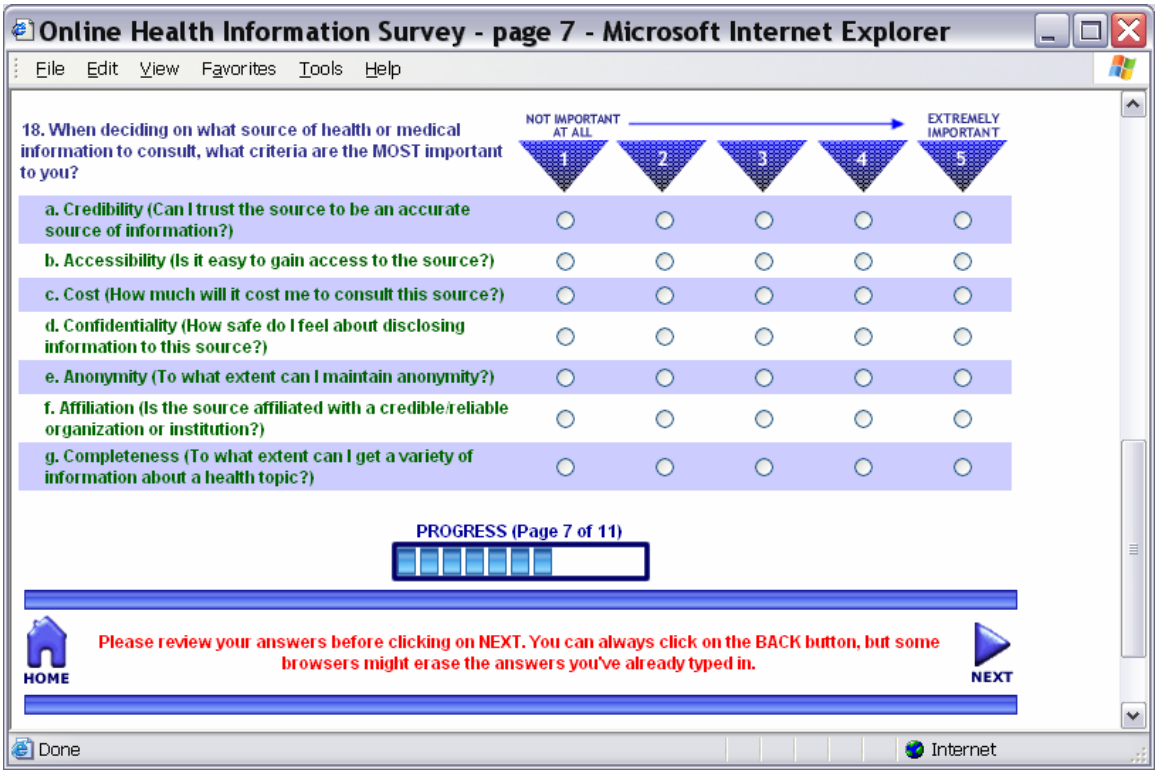
Page 6


Online Health Information Survey - page 6 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
SKIP THIS PAGE IF YOU HAVE NEVER GONE ONLINE TO LOOK FOR HEALTH INFORMATION.
15. Thinking of the LAST time you went online for health or medical information ...
a. Did you go online to look for information related to YOUR OWN health or medical situation or SOMEONE ELSE's health or medical situation?
Own
Someone Else's
Both
b. How important was it for you to ...
NOT IMPORTANT AT ALL
EXTREMELY IMPORTANT
1
2
3
4
5
Find information THAT day?
Find ACCURATE information?
Find a WIDE ARRAY of information sources?
Find COMPLETE information about the health or medical situation?
c. If any, what steps did you take to VERIFY THE ACCURACY of the information you found online? (Please MARK ALL that apply.)
I asked my doctor.
I asked family and friends.
I cross-checked the information with other information on the Internet.
I cross-checked the info with that found in medical journals.
I cross-checked the info with that found in newspapers/magazines.
I checked the credibility of the site itself (e.g., affiliation, seals, etc.).
Not applicable
PROGRESS (Page 6 of 11)
HOME
Please review your answers before clicking on NEXT. You can always click on the BACK button, but some browsers might erase the answers you've already typed in.
NEXT
Done
Internet

Page 7


Online Health Information Survey - page 7 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
16. Which of the following sources would you be most likely to consult FIRST for health information?
LEAST LIKELY TO CONSULT FIRST
MOST LIKELY TO CONSULT FIRST
1 2 3 4 5
a. Doctor
b. Parents
c. Friends
d. Internet sources
e. Television program
f. Radio program
g. Newspapers or magazines
h. Medical journals
17. In terms of providing accurate information, how CREDIBLE do you believe the following sources are?
NOT CREDIBLE AT ALL
VERY CREDIBLE
1 2 3 4 5
a. Doctor
b. Parents
c. Friends
d. Internet sources
e. Television program
f. Radio program
g. Newspapers or magazines
h. Medical journals
Done
Internet

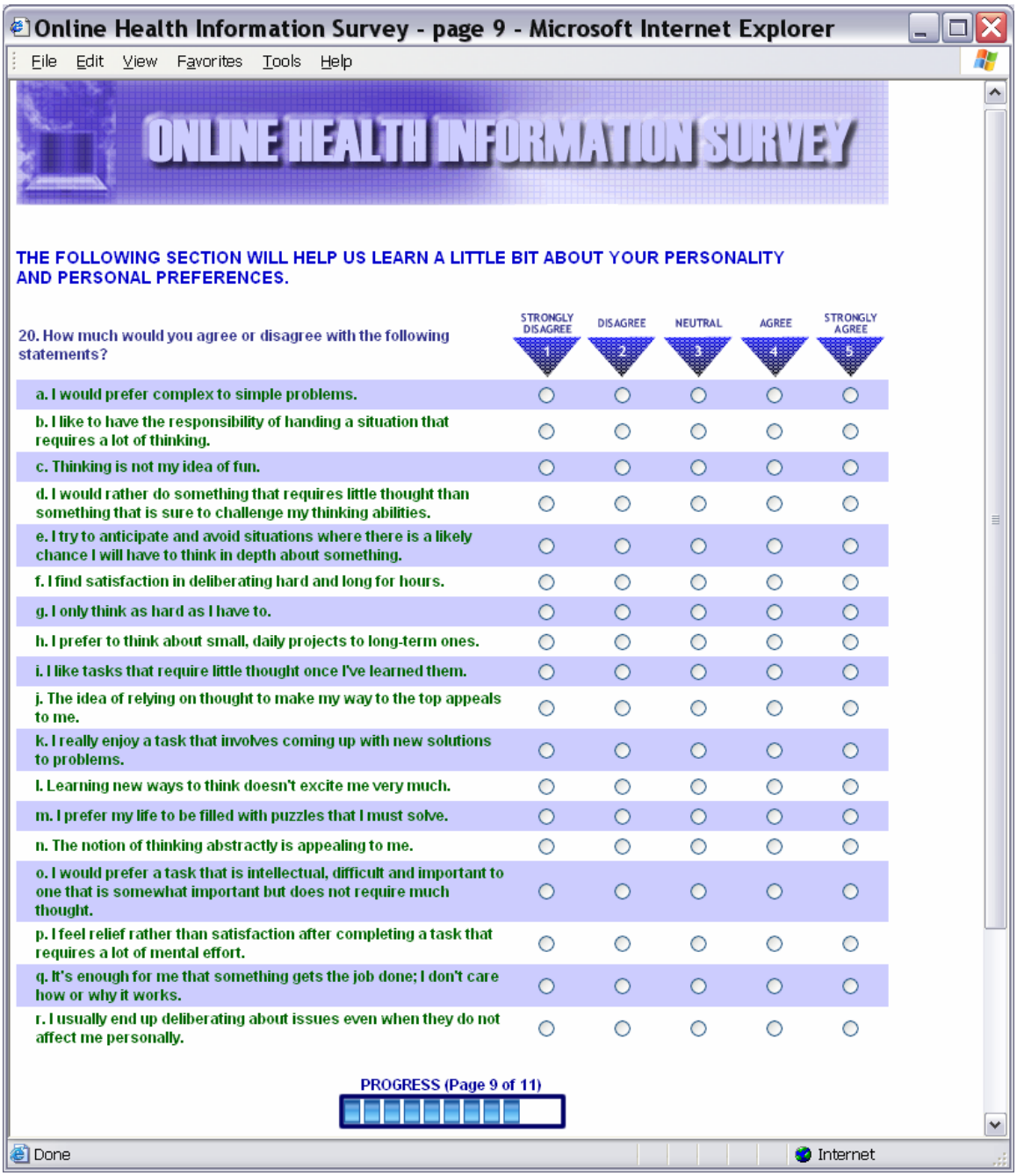
Page 7 continued



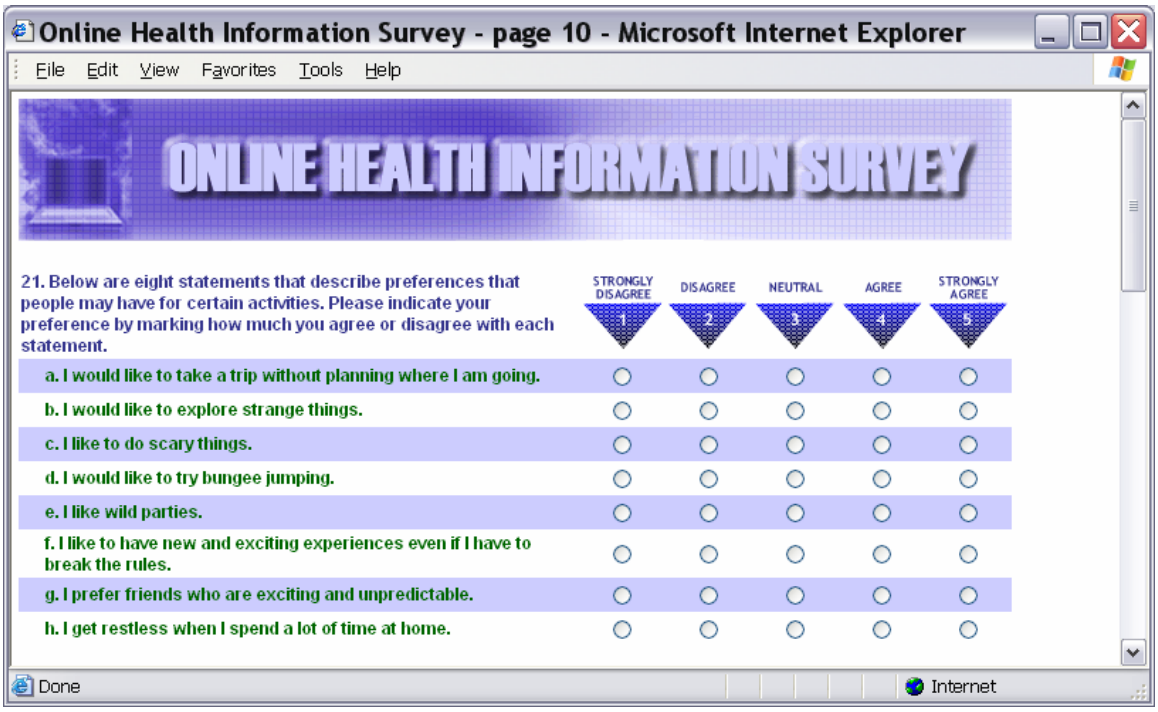
Page 8


Online Health Information Survey - page 8 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
19. Please check which of the following words you have COMPLETE CONFIDENCE that you can: pronounce correctly and explain the meaning of (please be as HONEST as possible; leave blank items you are unsure of):
I am completely confident I can PRONOUNCE these words correctly:
I am completely confident I can EXPLAIN the meaning of these words correctly:
a. Fat
b. Flu
c. Enema
d. Osteoporosis
e. Allergic
f. Jaundice
g. Anemia
h. Gonorrhea
i. Impetigo
j. Colitis
k. Constipation
l. Hormones
m. Asthma
n. Syphilis
o. Menstrual
p. Diabetes
q. Hepatitis
r. Antibiotics
s. Alcoholism
t. Epidural
PROGRESS (Page 8 of 11)
HOME
Please review your answers before clicking on NEXT. You can always click on the BACK button, but some browsers might erase the answers you've already typed in.
NEXT
Done
Internet

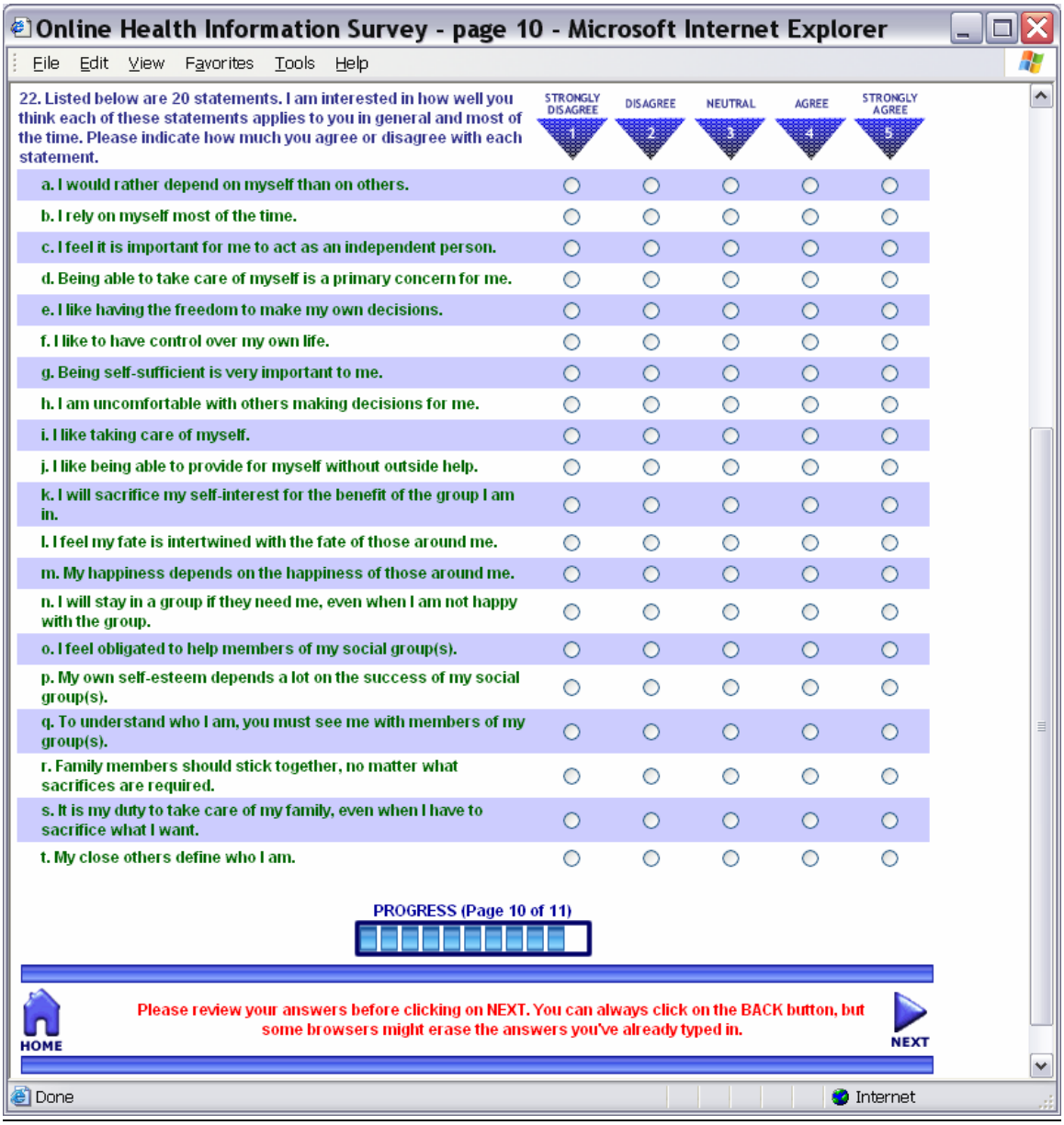
Page 9


Online Health Information Survey - page 9 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
THE FOLLOWING SECTION WILL HELP US LEARN A LITTLE BIT ABOUT YOUR PERSONALITY AND PERSONAL PREFERENCES.
20. How much would you agree or disagree with the following statements?
STRONGLY DISAGREE 1
DISAGREE 2
NEUTRAL 3
AGREE 4
STRONGLY AGREE 5
a. I would prefer complex to simple problems.
b. I like to have the responsibility of handing a situation that requires a lot of thinking.
c. Thinking is not my idea of fun.
d. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.
e. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.
f. I find satisfaction in deliberating hard and long for hours.
g. I only think as hard as I have to.
h. I prefer to think about small, daily projects to long-term ones.
i. I like tasks that require little thought once I've learned them.
j. The idea of relying on thought to make my way to the top appeals to me.
k. I really enjoy a task that involves coming up with new solutions to problems.
l. Learning new ways to think doesn't excite me very much.
m. I prefer my life to be filled with puzzles that I must solve.
n. The notion of thinking abstractly is appealing to me.
o. I would prefer a task that is intellectual, difficult and important to one that is somewhat important but does not require much thought.
p. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.
q. It's enough for me that something gets the job done; I don't care how or why it works.
r. I usually end up deliberating about issues even when they do not affect me personally.
PROGRESS (Page 9 of 11)
Done
Internet

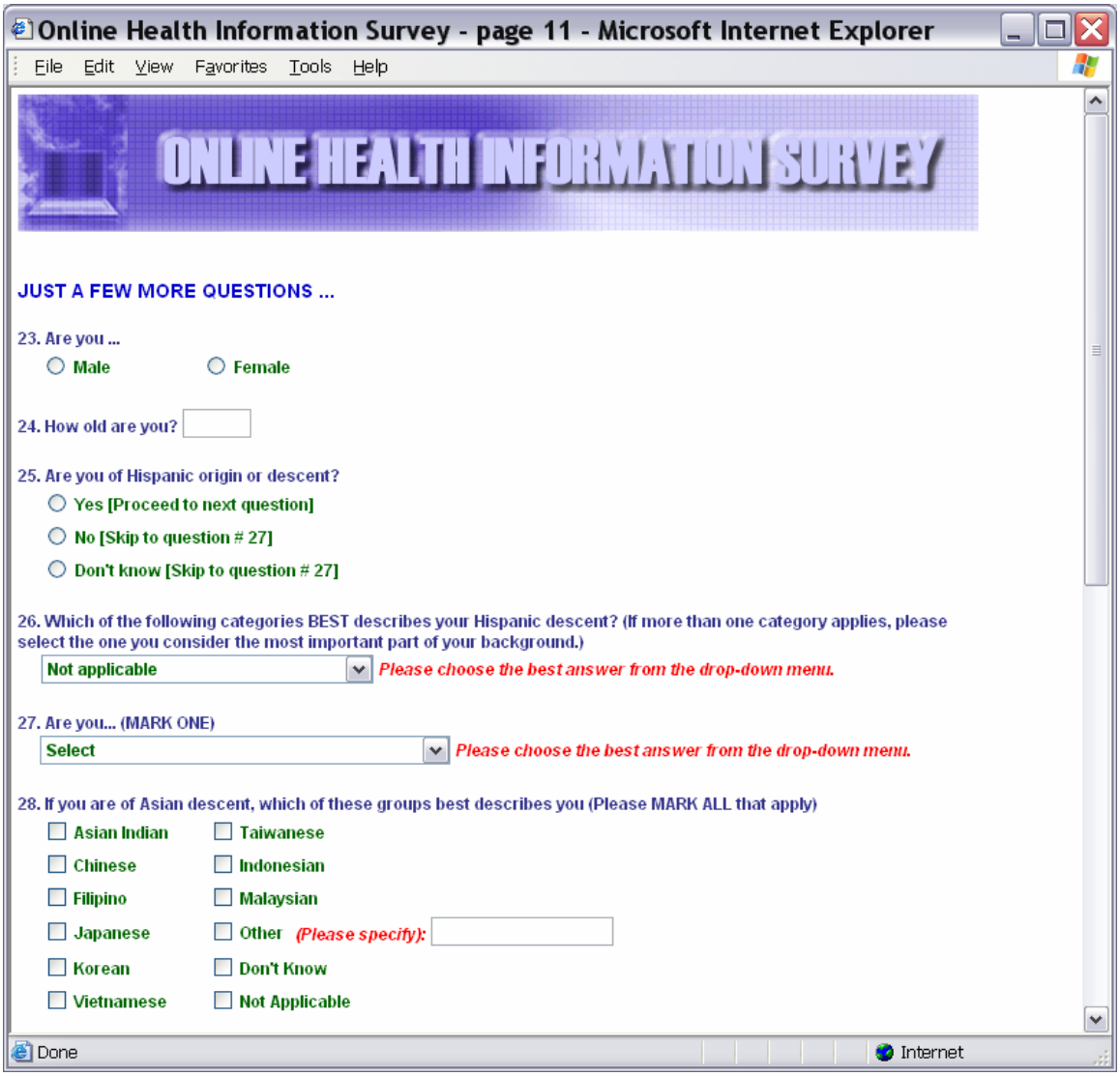
Page 10


Online Health Information Survey - page 10 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
21. Below are eight statements that describe preferences that people may have for certain activities. Please indicate your preference by marking how much you agree or disagree with each statement.
STRONGLY DISAGREE 1
DISAGREE 2
NEUTRAL 3
AGREE 4
STRONGLY AGREE 5
a. I would like to take a trip without planning where I am going.
b. I would like to explore strange things.
c. I like to do scary things.
d. I would like to try bungee jumping.
e. I like wild parties.
f. I like to have new and exciting experiences even if I have to break the rules.
g. I prefer friends who are exciting and unpredictable.
h. I get restless when I spend a lot of time at home.
Done
Internet

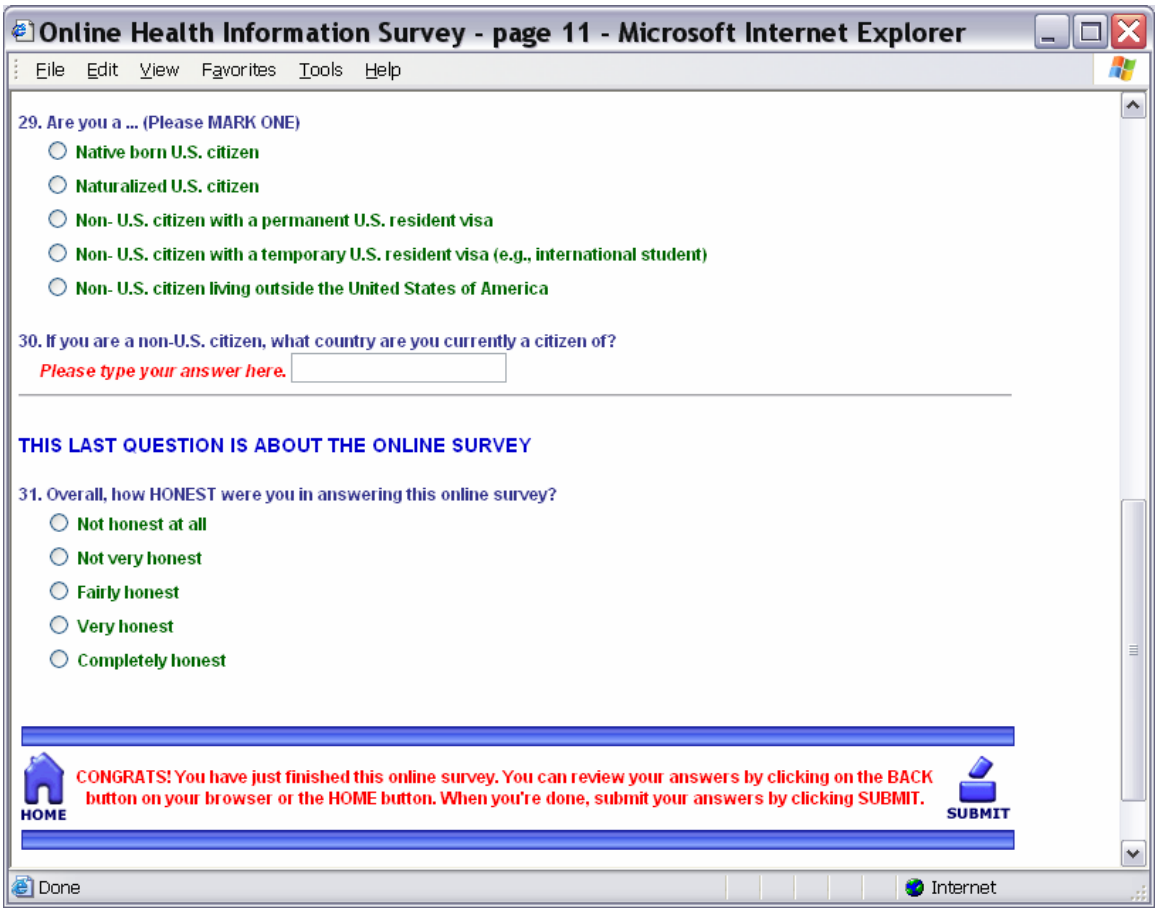
Page 10 continued



Page 11


Online Health Information Survey - page 11 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
ONLINE HEALTH INFORMATION SURVEY
JUST A FEW MORE QUESTIONS ...
23. Are you ...
Male
Female
24. How old are you?
25. Are you of Hispanic origin or descent?
Yes [Proceed to next question]
No [Skip to question # 27]
Don't know [Skip to question # 27]
26. Which of the following categories BEST describes your Hispanic descent? (If more than one category applies, please select the one you consider the most important part of your background.)
Not applicable
Please choose the best answer from the drop-down menu.
27. Are you... (MARK ONE)
Select
Please choose the best answer from the drop-down menu.
28. If you are of Asian descent, which of these groups best describes you (Please MARK ALL that apply)
Asian Indian
Taiwanese
Chinese
Indonesian
Filipino
Malaysian
Japanese
Other (Please specify):
Korean
Don't Know
Vietnamese
Not Applicable
Done
Internet

Page 11 continued



Copyright © Mia Liza Alcantara Lustria 2005

REFERENCES

Ademiluyi, G., Rees, C. E., & Sheard, C. E. (2003). Evaluating the reliability and validity of three tools to assess the quality of health information on the Internet. *Patient Education and Counseling, 50*(2), 151-155.

Aldrich, F., Rogers, Y., & Scaife, M. (1998). Getting to grips with "interactivity": Helping teachers assess the educational value of CD-ROMs. *British Journal of Educational Technology, 29*(4), 321.

Alexander, P. A., & Jetton, T. L. (2003). Learning from traditional and alternative texts: New conceptualizations for the information age. In A. C. Graesser & M. A. Gernsbacher (Eds.), *Handbook of discourse processes* (pp. 199-241). Mahwah, NJ, US: Lawrence Erlbaum Associates, Publishers.

Allen, R. (1998). The Web: Interactive and multimedia education. *Computer Networks and Isdn Systems, 30*(16-18), 1717-1727.

Anderson, M. H. (2002). *The effects of individuals' social network characteristics and information processing characteristics on their sensemaking of complex, ambiguous issues.* Unpublished Dissertation, University of Minnesota, Minnesota.

Andrisani, D., Gaal, A. V., Gillette, D., & Steward, S. (2001). Making the most of interactivity online. *Technical Communication, 48*(3), 309-323.

Bagozzi, R. P., Guerhan Canli, Z., & Priester, J. R. (2002). *The social psychology of consumer behaviour*. Buckingham, England: Open University Press.

Baker, L., Wagner, T. H., Singer, S., & Bundorf, M. K. (2003). Use of the Internet and e-mail for health care information: Results from a national survey. *Journal of the American Medical Association, 289*(18), 2400-2406.

Baylor, A. L. (2001). Perceived disorientation and incidental learning in a web-based environment: Internal and external factors. *Journal of Educational Multimedia and Hypermedia, 10*(3), 227-251.

Bezjian-Avery, A., Calder, B., & Iacobucci, D. (1998). New media interactive advertising vs. traditional advertising. *Journal of Advertising Research, 38*(4), 23-33.

Bowen, D. J., Ludwig, A., Bush, N., Unruh, H. K., Meischke, H., Wooldridge, J. A., & Robbins, R. (2003). Early experience with a web-based intervention to inform risk of breast cancer. *Journal of Health Psychology, 8*(1), 175-186.

Brug, J., Campbell, M., & van Assema, P. (1999). The application and impact of computer-generated personalized nutrition education: A review of the literature. *Patient Education and Counseling, 36*(2), 145-156.

Bruner, J. S. (1966). *Toward a theory of instruction*. Cambridge: Mass. Belknap Press of Harvard University.

Bull, F. C., Kreuter, M. W., & Scharff, D. P. (1999). Effects of tailored, personalized and general health messages on physical activity. *Patient Education and Counseling, 36*(2), 181-192.

Burgoon, J. K., Bonito, J. A., Bengtsson, B., Cederberg, C., Lundeberg, M., & Allspach, L. (2000). Interactivity in human-computer interaction: A study of credibility, understanding, and influence. *Computers in Human Behavior, 16*(6), 553-574.

Burgoon, J. K., Bonito, J. A., Bengtsson, B., Ramirez, A., Dunbar, N. E., & Miczo, N. (1999). Testing the interactivity model: Communication processes, partner assessments, and the quality of collaborative work. *Journal of Management Information Systems, 16*(3), 33-56.

Burgoon, J. K., Bonito, J. A., Ramirez, A., Dunbar, N. E., Kam, K., & Fischer, J. (2002). Testing the interactivity principle: Effects of mediation, propinquity, and verbal and nonverbal modalities in interpersonal interaction. *Journal of Communication, 52*(3), 657-677.

Burgoon, J. K., Buller, D. B., & Floyd, K. (2001). Does participation affect deception success? A test of the interactivity principle. *Human Communication Research, 27*(4), 503-534.

Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment, 48*(3), 306-307.

Cacioppo, J. T., Petty, R. E., Kao, C. F., & Rodriguez, R. (1986). Central and peripheral routes to persuasion: An individual difference perspective. *Journal of Personality and Social Psychology, 51*(5), 1032-1043.

Cacioppo, J. T., Petty, R. E., & Morris, K. J. (1983). Effects of need for cognition on message evaluation, recall, and persuasion. *Journal of Personality and Social Psychology, 45*(4), 805-818.

Cairncross, S., & Mannion, M. (2001). Interactive multimedia and learning: Realizing the benefits. *Innovations in Education & Teaching International, 38*(2), 156-164.

Calisir, F., & Gurel, Z. (2003). Influence of text structure and prior knowledge of the learner on reading comprehension, browsing and perceived control. *Computers in Human Behavior, 19*(2), 135-145.

Case, D. O., Johnson, J. D., Andrews, J. E., Allard, S. L., & Kelly, K. M. (2004). From two-step flow to the Internet: The changing array of sources for genetics information seeking. *Journal of the American Society for Information Science & Technology, 55*(8), 660-669.

Cassell, M. M., Jackson, C., & Cheuvront, B. (1998). Health communication on the Internet: An effective channel for health behavior change? *Journal of Health Communication, 3*(1), 71-79.

Castelli, C. C., Luigi Molinari, Andrea. (1998). Cognitive variables and patterns of hypertext performances: Lessons learned for educational hypermedia construction. *Journal of Educational Multimedia and Hypermedia, 7*(2-3), 177-206.

Castells, M. (2001). *The Internet galaxy: Reflections on the Internet, business, and society*. Oxford, UK: Oxford University Press.

Chaiken, S., Liberman, A., & Eagly, A. H. (1989). Heuristic and systematic information processing within and beyond the persuasion context. In J. A. Bargh (Ed.), *Unintended thought* (pp. 212-252). New York: Guilford Press.

Chang, C. K., & McDaniel, E. D. (1995). Information search strategies in loosely structured settings. *Journal of Educational Computing Research, 12*(1), 95-107.

Chen, C., & Rada, R. (1996). Interacting with hypertext: A meta-analysis of experimental studies. *Human-Computer Interaction, 11*(2), 125-156.

Cho, Y. (1995, June 17-19). *Learner control, cognitive processes, and hypertext learning environments.* Paper presented at the National Educational Computing Conference, NECC '95, Baltimore, MD.

Chou, C. (2003). Interactivity and interactive functions in web-based learning systems: A technical framework for designers. *British Journal of Educational Technology, 34*(3), 265-279.

Chou, C. L., Hua Sun, Chuen-Tsai. (2000). Navigation maps in hierarchical-structured hypertext courseware. *International Journal of Instructional Media, 27*(2), 165-182.

Cline, R. J. W., & Haynes, K. M. (2001). Consumer health information seeking on the Internet: The state of the art. *Health Education Research, 16*(6), 671-692.

Cohen, A., Stotland, E., & Wolfe, D. (1955). An experimental investigation of need for cognition. *Journal of Abnormal and Social Psychology, 51*, 291-294.

Coiro, J. (2003). Reading comprehension on the Internet: Expanding our understanding of reading comprehension to encompass new literacies. *Reading Teacher, 56*(5), 458-464.

Coyle, J. R., & Thorson, E. (2001). The effects of progressive levels of interactivity and vividness in web marketing sites. *Journal of Advertising, 30*(3), 65-81.

Crespo, J. (2004). Training the health information seeker: Quality issues in health information web sites. *Library Trends, 53*(2), 360-374.

Crocco, A. G., Villasis-Keever, M., & Jadad, A. R. (2002). Analysis of cases of harm associated with use of health information on the Internet. *Journal of the American Medical Association, 287*(21), 2869-2871.

Dempsey, J. V., & Van Eck, R. N. (2002). Instructional design online: Evolving expectations. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (pp. 281-293). Upple Saddle River, NJ: Prentice Hall.

Detlefsen, E. G. (2004). Where am I to go? Use of the Internet for consumer health information by two vulnerable communities. *Library Trends, 53*(2), 283-300.

Dias, P., Gomes, M. J., & Correia, A. P. (1999). Disorientation in hypermedia environments: Mechanisms to support navigation. *Journal of Educational Computing Research, 20*(2), 93-117.

Dillon, A. (1991). Readers' models of text structure: The case of academic materials. *International Journal of Man-Machine Studies, 35*, 913-925.

Dillon, A., & Gabbard, R. (1998). Hypermedia as an educational technology: A review of the quantitative research literature on learner comprehension, control, and style. *Review of Educational Research, 68*(3), 322-349.

Diseth, A., & Martinsen, O. (2003). Approaches to learning, cognitive style, and motives as predictors of academic achievement. *Educational Psychology, 23*(2), 195-207.

Doshi, A., Patrick, K., Sallis, J. F., & Calfas, K. (2003). Evaluation of physical activity web sites for use of behavior change theories. *Annals of Behavioral Medicine, 25*(2), 105-111.

Downes, E. J., & McMillan, S. J. (2000). Defining interactivity: A qualitative identification of key dimensions. *New Media & Society, 2*(2), 157-179.

Escoffery, C., Miner, K. R., Adame, D. D., Butler, S., McCormick, L., & Mendell, E. (2005). Internet use for health information among college students. *Journal of American College Health, 53*(4), 183-188.

Evans, C., & Sabry, K. (2003). Evaluation of the interactivity of Web-based learning systems: Principles and process. *Innovations in Education and Teaching International, 40*(1), 89-99.

Eveland Jr., W. P., Cortese, J., Park, H., & Dunwoody, S. (2004). How web site organization influences free recall, factual knowledge, and knowledge structure density. *Human Communication Research, 30*(2), 208-233.

Eveland Jr., W. P., & Dunwoody, S. (2002). An investigation of elaboration and selective scanning as mediators of learning from the web versus print. *Journal of Broadcasting & Electronic Media, 46*(1), 34-53.

Eveland Jr., W. P., Marton, K., & Mihye Seo, K. (2004). Moving beyond "just the facts": The influence of online news on the content and structure of public affairs knowledge. *Communication Research, 31*(1), 82-108.

Eveland, W. P., & Dunwoody, S. (1999). *Using hypermedia research to advance the study of learning on the World Wide Web. Research Monograph No. 15.* Madison, WI: National Institute for Science Education.

Eveland, W. P., Jr. (1997). Interactions and nonlinearity in mass communication: Connecting theory and methodology. *Journalism and Mass Communication Quarterly, 74*(2), 400-416.

Eveland , W. P., Jr. (2003). A 'mix of attributes' approach to the study of media effects and new communication technologies. *Journal of Communication, 53*(3), 395-410.

Eveland, W. P., Jr. , & Dunwoody, S. (2000). Examining information processing on the World Wide Web using think aloud protocols. *Media Psychology, 2*(3), 219-245.

Evers, K. E., Prochaska, J. M., Prochaska, J. O., Driskell, M. M., Cummins, C. O., & Velicer, W. F. (2003). Strengths and weaknesses of health behavior change programs on the Internet. *Journal of Health Psychology, 8*(1), 63-70.

Eysenbach, G., Powell, J., Kuss, O., & Sa, E.-R. (2002). Empirical studies assessing the quality of health information for consumers on the World Wide Web: A systematic review. *Journal of the American Medical Association,, 287*(20), 2691-2700.

Fiore, A. M., & Jin, H. J. (2003). Influence of image interactivity on approach responses towards an online retailer. *Internet Research-Electronic Networking Applications and Policy, 13*(1), 38-48.

Flanagan, R. C. (1996). *Learning through direct vs. indirect experience: The role of interactivity and physicality in media effects.* Flanagan,-Robin-Chase: Columbia U, US.

Fotheringham, M. J., Owies, D., Leslie, E., & Owen, N. (2000). Interactive health communication in preventive medicine: Internet-based strategies in teaching and research. *American Journal of Preventive Medicine, 19*(2), 113-120.

Fox, S., & Fallows, D. (2003, July 16). *Internet health sources: Health searches and email have become more commonplace, but there is room for improvement in searches and overall Internet access*. Pew Internet and American Life Project.

Retrieved October 5, 2003, from the World Wide Web: http://www.pewinternet.org/reports/pdfs/PIP_Health_Report_July_2003.pdf

Frisby, G., Bessell, T. L., Borland, R., & Anderson, J. N. (2002, August 13). Smoking cessation and the Internet: A qualitative method examining online consumer behavior. *Journal of Medical Internet Research, 4.* Retrieved October 5, 2003, from the World Wide Web: http://www.jmir.org/2002/2/e8/

Ghose, S., & Dou, W. Y. (1998). Interactive functions and their impacts on the appeal of Internet Presence Sites. *Journal of Advertising Research, 38*(2), 29-43.

Gillespie, T. (1998). Forms interactivity for the World Wide Web. *Library Journal, 123*(13), 125-125.

Gnisci, A., Papa, F., & Spedaletti, S. (1999). Usability aspects, socio-relational context and learning performance in the virtual classroom: A laboratory experiment. *Behaviour & Information Technology, 18*(6), 431-443.

Green, S. B., & Salkind, N. J. (2002). *Using SPSS for Windows and Macintosh: Analyzing and understanding data*. Upper Saddle River, NJ: Prentice Hall.

Gustafson, D. H., Bosworth, K., Chewning, B., & Hawkins, R. P. (1987). Computer-based health promotion: Combining technological advances with problem-solving techniques to effect successful health behavior changes. *Annual Review of Public Health, 8*, 387-415.

Ha, L., & James, E. L. (1998). Interactivity reexamined: A baseline analysis of early business web sites. *Journal of Broadcasting & Electronic Media, 42*(4), 456-473.

Hardey, M. (2001). 'E-health': The Internet and the transformation of patients into consumers and producers of health knowledge. *Information Communication & Society, 4*(3), 388-405.

Harris Poll Interactive, & Teen Research Unlimited. (2003). *Born to be wired: The role of new media for a digital generation (Executive Summary)*. Presented on July 24, 2003 at the Yahoo! Campus, Sunnyvale, California: Research commissioned by Yahoo! and Carat Interactive.

Heeter, C. (1989). Implications of new interactive technologies for conceptualizing communication. In J. Bryant (Ed.), *Media use in the information age: Emerging patterns of adoption and consumer use* (pp. 217-235). Hillsdale, NJ: Lawrence Erlbaum Associates.

Heeter, C. (2000, Fall). Interactivity in the context of designed experiences. *Journal of Interactive Advertising, 1 (1)*. Retrieved December 4, 2003 from the World Wide Web: http://jiad.org/vol1/no1/heeter/

Horrigan, J. B., & Rainie, L. (2002, December 29). *Most expect to find key information online, most find the information they seek, many now turn to the Internet first*. Pew Research Center. Retrieved January 5, 2003, from the World Wide Web: http://www.pewinternet.org/reports/pdfs/PIP_Expectations.pdf

Jacobson, M. J. (1994). Issues in hypertext and hypermedia research: Toward a framework for linking theory-to-design. *Journal of Educational Multimedia and Hypermedia, 3*(2), 141-154.

Jaffe, J. M. (1997a). Media interactivity and self-efficacy: An examination of hypermedia first aid instruction. *Journal of Health Communication, 2*(4), 235-251.

Jensen, J. F. (1998). 'Interactivity'. Tracking a new concept in media and communication studies. *Nordicom Review : Proceedings of the XIII Nordic Conference on Mass Communication Research, 19*(1), 185-204.

Jimison, H. A., L Coye, M Mulley, A, Jr Eng, T R. (1999). Health care providers and purchasers and evaluation of interactive health communication applications. Science Panel on Interactive Communication and Health. *American Journal of Preventive Medicine, 16*(1), 16-22.

Johnson, J. D. (1997). *Cancer-related information seeking*. Cresskill, N.J.: Hampton Press.

Johnson, K. B., Ravert, R. D., & Everton, A. (2001). Hopkins teen central: Assessment of an Internet-based support system for children with cystic fibrosis. *Pediatrics, 107*(2). Retrieved December 5, 2003 from the World Wide Web: http://pediatrics.aappublications.org/cgi/content/abstract/107/2/e24

Kehoe, J. (1995). *Basic item analysis for multiple-choice tests*. Retrieved March 14, 2005, from the World Wide Web: http://PAREonline.net/getvn.asp?v=4&n=10

Ketterer, S. (2001). *The effects of links, story type and personality variables on readers' perceptions and use of crime stories in online newspapers.* Unpublished Dissertation, University of Missouri, Columbia, US.

Kiousis, S. (2002). Interactivity: A concept explication. *New Media & Society, 4*(3), 355-383.

Kirsh, D. (1997). Interactivity and multimedia interfaces. *Instructional Science, 25*(2), 79-96.

Kovacs, D. K. (2004). Why develop web-based health information workshops for consumers? *Library Trends, 53*(2), 348-359.

Kreuter, M. W., & Strecher, V. J. (1996). Do tailored behavior change messages enhance the effectiveness of health risk appraisal? Results from a randomized trial. *Health Education Research, 11*(1), 97-105.

Krishna, S., Francisco, B. D., Balas, E. A., Konig, P., Graff, G. R., & Madsen, R. W. (2003). Internet-enabled interactive multimedia asthma education program: A randomized trial. *Pediatrics, 111*(3), 503-510.

Lampe, K., Doupi, P., & van den Hoven, M. J. (2003). Internet health resources: From quality to trust. *Methods of Information in Medicine, 42*(2), 134-142.

Lawless, K. A., & Brown, S. W. (1997). Multimedia learning environments: Issues of learner control and navigation. *Instructional Science, 25*(2), 117-131.

Lawless, K. A., & Kulikowich, J. M. (1994, February). *Reading comprehension, navigation, and hypertext.* Paper presented at the Annual Meeting of the Southwestern Educational Research Association, San Antonio, Texas.

Lee, M. J. (2002). Effective tailored-communication in learning from hypertext: Introducing expanding hypertext based on individuals' sensation-seeking and working memory capacity. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 62*(10A), p. 3224.

Lee, M. J., & Tedder, M. C. (2004). Introducing expanding hypertext based on working memory capacity and the feeling of disorientation: Tailored communication through effective hypertext design. *Journal of Educational Computing Research, 30*(3), 171-195.

Lenert, L., Munoz, R. F., Stoddard, J., Delucchi, K., Bansod, A., Skoczen, S., & Perez-Stable, E. J. (2003). Design and pilot evaluation of an Internet smoking cessation program. *Journal of the American Medical Informatics Association, 10*(1), 16-20.

Leone, C., & Dalton, C. H. (1988). Some effects of the need for cognition on course grades. *Perceptual and Motor Skills, 67*(1), 175-178.

Levin, I. P., Huneke, M. E., & Jasper, J. D. (2000). Information processing at successive stages of decision making: Need for cognition and inclusion-exclusion effects. *Organizational Behavior & Human Decision Processes, 82*(2), 171-193.

Levison, S. P., & Weiss, L. B. (2002). From the wall to the web: The use of bulletin boards and a web site to disseminate information about sex, gender and women's health. *American Journal of Obstetrics and Gynecology, 187*(3), S34-S36.

Light, A., & Wakeman, I. (2001). Beyond the interface: Users' perceptions of interaction and audience on websites. *Interacting with Computers, 13*(3), 325-351.

Liu, Y. P. (2003). Developing a scale to measure the interactivity of websites. *Journal of Advertising Research, 43*(2), 207-216.

Liu, Y. P., & Shrum, L. J. (2002). What is interactivity and is it always such a good thing? Implications of definition, person, and situation for the influence of interactivity on advertising effectiveness. *Journal of Advertising, 31*(4), 53-64.

MacGregor, S. K. (1999). Hypermedia navigation profiles: Cognitive characteristics and information processing strategies. *Journal of Educational Computing Research, 20*(2), 189-206.

Macias, W. A. M. (2000). *The effect of interactivity on comprehension and persuasion of interactive advertising.* Unpublished Dissertation, University of Texas Austin, Austin.

Marcus, B. H., Owen, N., Forsyth, L. H., Cavill, N. A., & Fridinger, F. (1998). Physical activity interventions using mass media, print media, and information technology. *American Journal of Preventive Medicine, 15*(4), 362-378.

Martindale, C. (1991). *Cognitive psychology: A neural-network approach*. Pacific Grove, CA: Brooks/Cole.

Massey, B. L., & Levy, M. R. (1999). Interactivity, online journalism and English-language web newspapers in Asia. *Journalism & Mass Communication Quarterly, 76*(1), 138-151.

McCray, A. T. (2005). Promoting health literacy. *Journal of the American Medical Informatics Association, 12*(2), 152-163.

McDonald, S., & Stevenson, R. J. (1996). Disorientation in hypertext: The effects of three text structures on navigation performance. *Applied Ergonomics, 27*(1), 61-68.

McMillan, S. J. (1999). Health communication and the Internet: Relations between interactive characteristics of the medium and site creators, content, and purpose. *Health Communication, 11*(4), 375-390.

McMillan, S. J. (2000). *Interactivity is in the eye of the beholder: Function, perception, involvement, and attitude toward the web site.* Paper presented at the 2000 Conference of the American Academy of Advertising, Michigan State University, East Lansing, MI.

McMillan, S. J. (2002). A four-part model of cyber-interactivity: Some cyber-places are more interactive than others. *New Media & Society, 4*(2), 271-291.

McMillan, S. J., & Hwang, J. S. (2002). Measures of perceived interactivity: An exploration of the role of direction of communication, user control, and

time in shaping perceptions of interactivity. *Journal of Advertising, 31*(3), 29-42.

Morahan-Martin, J., & Anderson, C. D. (2000). Information and misinformation online: Recommendations for facilitating accurate mental health information retrieval and evaluation. *CyberPsychology & Behavior, 3*(5), 731-747.

Muller-Kalthoff, T., & Moller, J. (2003). The effects of graphical overviews, prior knowledge, and self-concept on hypertext disorientation and learning achievement. *Journal of Educational Multimedia and Hypermedia, 12*(2), 117-134.

Napolitano, M. A., Fotheringham, M., Tate, D., Sciamanna, C., Leslie, E., Owen, N., Bauman, A., & Marcus, B. (2003). Evaluation of an Internet-based physical activity intervention: A preliminary investigation. *Annals of Behavioral Medicine, 25*(2), 92-99.

Narayanan, N. H., & Hegarty, M. (2002). Multimedia design for communication of dynamic information. *International Journal of Human-Computer Studies, 57*(4), 279-315.

Nelson, W. A., & Palumbo, D. B. (1992). Learning, instruction, and hypermedia. *Journal of Educational Multimedia & Hypermedia, 1*, 287-299.

Newhagen, J. E., & Cordes, J. W. (1995). Nightly@nbc.com: Audience scope and the perception of interactivity in viewer mail on the Internet. *Journal of Communication, 45*(3), 164-176.

Newhagen, J. E., & Rafaeli, S. (1996). Why communication researchers should study the Internet: A dialogue. *Journal of Communication, 46*(1), 4-14.

Niederhauser, D. S., Reynolds, R. E., Salmen, D. J., & Skolmoski, P. (2000). The influence of cognitive load on learning from hypertext. *Journal of Educational Computing Research, 23*(3), 237-255.

Pandolfini, C., & Bonati, M. (2002). Follow up of quality of public oriented health information on the World Wide Web: Systematic re-evaluation. *British Medical Journal, 324*(7337), 582-583.

Parker, R. M., Ratzan, S. C., & Lurie, N. (2003). Health literacy: A policy challenge for advancing high-quality health care. *Health Affairs, 22*(4), 147-153.

Pastore, M. (2002, January 25). *Internet key to communication among youth*. ClickZ Stats Demographics. Retrieved February 28, 2003, from the World Wide Web: http://www.clickz.com/stats/big_picture/demographics/article.php/5901_961881

Pavlou, P. A., & Stewart, D. W. (2000, Fall). Measuring the effects and effectiveness of interactive advertising: A research agenda. *Journal of Interactive Advertising, 1.* Retrieved December 4, 2003 from the World Wide Web: http://www.jiad.org/vol1/no1/pavlou

Petty, R. E., & Cacioppo, J. T. (1979). Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology, 37*(10), 1915-1926.

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. *Advances in Experimental Psychology, 19*, 123-205.

Petty, R. E., Cacioppo, J. T., & Goldman, R. (1981). Personal involvement as a determinant of argument-based persuasion. *Journal of Personality and Social Psychology, 41*(5), 847-855.

Piaget, J. (1970). *Science of education and the psychology of the child*. New York: Orion Press.

Purcell, G. P., Wilson, P., & Delamothe, T. (2002). The quality of health information on the internet. *British Medical Journal, 324*(7337), 557-558.

Rafaeli, S. (1988). Interactivity: From new media to communication. In S. Pingree (Ed.), *Advancing Communication Science: Merging Mass and Interpersonal Processes* (Vol. 16, pp. 110-134). Newbury Park, CA: Sage Publications.

Rafaeli, S., & Sudweeks, F. (1997, March). Networked interactivity. *Journal of Computer-Mediated Communication, 2.* Retrieved December 4, 2003 from the World Wide Web: http://www.ascusc.org/jcmc/vol2/issue4/rafaeli.sudweeks.html

Reeves, B., & Nass, C. (2000). Perceptual bandwidth. *Communications of the ACM, 43*(3), 65-71.

Rice, R. E., & Katz, J. E. (2001). *The Internet and health communication: Experiences and expectations*. Thousand Oaks, Calif.: Sage Publications.

Rideout, V. (2001, December). *Generation Rx.com: How young people use the Internet for health information* [online report]. Kaiser Family Foundation. Retrieved October, 2003 from the World Wide Web: http://www.kff.org/content/2001/20011211a/GenerationRx.pdf

Salomon, G. (1979). *Interaction of media, cognition, and learning* (1st ed.). San Francisco: Jossey-Bass Publishers.

Schacter, J., & Fagnano, C. (1999). Does computer technology improve student learning and achievement? How, when, and under what conditions? *Journal of Educational Computing Research, 20*(4), 329-343.

Schultz, T. (2000). Mass media and the concept of interactivity: An exploratory study of online forums and reader email. *Media Culture & Society, 22*(2), 205-221.

Severin, W. J., & Tankard, J. W. (2001). *Communication theories : Origins, methods, uses* (5th ed.). New York: Hastings House.

Shannon, C., & Weaver, W. (Eds.). (1949). *Mathematical theory of communication*. Urbana, IL: University of Illinois Press.

Smith, S. M., & Levin, I. P. (1996). Need for cognition and choice framing effects. *Journal of Behavioral Decision Making, 9*(4), 283-290.

Spiro, R. J., & Jehng, J. (1990). Cognitive flexibility and hypertext: Theory and technology for the non-linear and multidimensional traversal of complex subject matter. In R. J. Spiro (Ed.), *Cognition, education, and multimedia : exploring ideas in high technology* (pp. 165). Hillsdale, N.J.: L. Erlbaum.

Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. *Journal of Communication, 42*(4), 73-93.

Stout, P. A., Villegas, J., & Kim, H. (2001). Enhancing learning through use of interactive tools on health-related websites. *Health Education Research, 16*(6), 721-733.

Strecher, V. J. (1999). Computer-tailored smoking cessation materials: A review and discussion. *Patient Education and Counseling, 36*(2), 107-117.

Street, R. L., Gold, W. R., & Manning, T. (1997). *Health promotion and interactive technology : Theoretical applications and future directions*. Mahwah, N.J.: Lawrence Erlbaum Associates.

Street, R. L., & Rimal, R. N. (1997). Health promotion and interactive technology: A conceptual foundation. In T. Manning (Ed.), *Health Promotion and Interactive Technology: Theoretical Applications and Future Directions* (pp. 1-18). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Sundar, S. S., Kalyanaraman, S., & Brown, J. (2003). Explicating Web site interactivity: Impression formation effects in political campaign sites. *Communication Research, 30*(1), 30-59.

Sundar, S. S., Narayanan, S., Obregon, R., & Uppal, C. (1998). Does Web advertising work? Memory for print vs. online media. *Journalism & Mass Communication Quarterly, 75*, 822-835.

Tate, D. F., Jackvony, E. H., & Wing, R. R. (2003). Effects of Internet behavioral counseling on weight loss in adults at risk for Type 2 diabetes: A randomized trial. *Journal of the American Medical Association, 289*(14), 1833-1836.

Tewksbury, D., & Althaus, S. (2000). Differences in knowledge acquisition among readers of the paper and online versions of a national newspaper. *Journalism & Mass Communication Quarterly, 77*, 477-479.

Tremayne, M., & Dunwoody, S. (2001). Interactivity, information processing, and learning on the World Wide Web. *Science Communication, 23*(2), 111-134.

Tuten, T. L., & Bosnjak, M. (2001). Understanding differences in web usage: The role of need for cognition and the five factor model of personality. *Social Behavior & Personality, 29*(4), 391-398.

Unz, D. C., & Hesse, F. W. (1999). The use of hypertext for learning. *Journal of Educational Computing Research, 20*(3), 279-295.

Velicer, W. F., Prochaska, J. O., Fava, J. L., Laforge, R. G., & Rossi, J. S. (1999). Interactive versus noninteractive interventions and dose-response relationships for stage-matched smoking cessation programs in a managed care setting. *Health Psychology, 18*(1), 21-28.

Venkatraman, M. P., Marlino, D., Kardes, F. R., & Sklar, K. B. (1990). The interactive effects of message appeal and individual differences on information processing and persuasion. *Psychology and Marketing, 7*(2), 85-96.

Verplanken, B., Hazenberg, P. T., & Palenewen, G. R. (1992). Need for cognition and external information search effort. *Journal of Research in Personality, 26*(2), 128-136.

Wagner, E. D. (1994). In support of a function definition of interaction. *The American Journal of Distance Education, 8*(20), 6-29.

Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction. *Communication Research, 19*(1), 52-90.

Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*(1), 3-43.

Walther, J. B., Anderson, J. F., & Park, D. W. (1994). Interpersonal effects in computer-mediated interaction: A meta-analysis of social and anti-social communication. *Communication Research, 21*(4), 460-487.

Waniek, J., Brunstein, A., Naumann, A., & Krems, J. F. (2003). Interaction between text structure representation and situation model in hypertext reading. *Swiss Journal of Psychology, 62*(2), 103-111.

Weis, R., Stamm, K., Smith, C., Nilan, M., Clark, F., Weis, J., & Kennedy, K. (2003). Communities of care and caring: The case of MSWatch.com(R). *Journal of Health Psychology, 8*(1), 135-148.

Wiener, N. (1948). *Cybernetics*. New York: John Wiley.

Wilson, P. (2002). How to find the good and avoid the bad or ugly: A short guide to tools for rating quality of health information on the Internet. *British Medical Journal, 324*(7337), 598-600.

Zhang, Z., Han, M., Zhu, Z., & Zhu, W. (2002). Effects of text structure and time stress on web reading performance. *Psychological Science China, 25*(4), 422-424.

Copyright © Mia Liza Alcantara Lustria 2005

VITA

Mia Liza Alcantara Lustria

Personal History

Date of Birth: March 4, 1970

Place of Birth: Quezon City, Philippines

Education

1990 M.S. Development Communication
University of the Philippines Los Baños, Laguna, Philippines

1986 B.S. Development Communication, *Cum Laude*
University of the Philippines Los Baños, Laguna, Philippines

Professional History

Research

Summer 2001-2005 **Research Assistant,** Project: Targeting Mass Media Campaigns for Risky Sexual Behavior
College of Communications and Information Studies, University of Kentucky, Lexington, Kentucky

Summer 2004 **Research Assistant,** Project: Journalism Quality Enhancement Project
College of Communications and Information Studies, University of Kentucky, Lexington, Kentucky

Teaching

Fall 2000-Summer 2001 **Teaching Assistant**
College of Communications and Information Studies, University of Kentucky, Lexington, Kentucky

Fall 2001-Spring 2001	**Communication Consultant (COMMSULT)** College of Communications and Information Studies, University of Kentucky, Lexington, Kentucky
1990-Fall 2000	**Assistant Professor** College of Development Communication, University of the Philippines Los Baños College, Laguna, Philippines
1998-2000	**Instruction Coordinator** College of Development Communication, U.P. Los Baños, Laguna, Philippines
1998-Fall 2000	**Affiliate Faculty** University of the Philippines Open University, Los Baños, Laguna, Philippines

Training (Extension and Outreach)

1998-Fall 2000	**Training Coordinator** College of Development Communication, U.P. Los Baños, Laguna, Philippines
1997-2000	**Affiliate Training Faculty** Johns Hopkins University Strategic Communication for Family Health Training Program

Honors and Awards

Fall 2004	Commonwealth Research Award
Summer 2004	University of Kentucky Dissertation Enhancement Award
Summer-Fall 2004	Beta Phi Mu Eugene Garfield Dissertation Fellowship
Summer-Fall 2004	Jacobs Foundation Information Technology Dissertation Grant
Spring 2004	Bruce Westley Memoral Graduate Scholarship
Fall 2001- Spring 2003	P.E.O. International Peace Scholarship

June 1994-June 1995	Southeast Asian Ministers of Education Organization Regional Center for Graduate Study and Research in Agriculture Scholarship
April 1990	Joaquin J. Gonzalez medal (*for acquiring the highest general average among the graduating class of the College of Agriculture in 1990)*
1982-1986	College of Agriculture Special Undergraduate Scholarship (CASUS) program

Publications

Peer-Reviewed Publications (accepted for publication)

LUSTRIA, Mia Liza A., & Case, Donald O. (February, 2005). The SPARC initiative: A survey of participants and features analysis of their journals. *Journal of Academic Librarianship*.

Noar, S. M., Zimmerman, R. S., Palmgreen, P., LUSTRIA, M. L. A., & Horosewski, M. L. (2005). Integrating personality and psychosocial approaches to understanding safer sexual behavior: Implications for message design. *Health Communication*.

Manuscripts Under Review

Noar, S. M., Zimmerman, R. S., & Palmgreen, P., LUSTRIA, M.L.A., & Hung-Yi, L. (2005). What makes an effective HIV prevention public service announcement? A test of four theoretically-driven approaches. *Human Communication Research.*

Zimmerman, R. S., Palmgreen, P., Noar, S. M., LUSTRIA, M. L. A., Hung-Yi, L., & Horosewski, M. L. (2005). Short-term results of a televised two-city safer sex mass media campaign targeting high sensation-seeking and impulsive decision-making young adults. *Health Education & Behavior*.

Noar, S. M., Clark, A., Cole, C., & LUSTRIA, M.L.A. (2005). Review of interactive safer sex websites on the internet: Practice and potential. *Social Science & Medicine*.

Professional Presentations

LUSTRIA, M.L.A. (2005, May). *Promoting health literacy online: Can interactivity really make a difference?* Paper presented at the Fifty Fifth Annual Conference of the International Communication Association, New York, NY.

Noar, S. M., Zimmerman, R. S., & Palmgreen, P., LUSTRIA, M.L.A., & Hung-Yi, L. (2005, May). *What makes an effective HIV prevention public service announcement? A test of four theoretically driven approaches.* Paper presented at the Fifty Fifth Annual Conference of the International Communication Association, New York, NY.

Zimmerman, R. S., Palmgreen, P., Noar, S. M., LUSTRIA, M. L. A., Hung-Yi, L., & Horosewski, M. L. (2005, May). *Short-term results of a televised two-city safer sex mass media campaign targeting high sensation-seeking and impulsive decision-making young adults.* Paper presented at the Fifty Fifth Annual Conference of the International Communication Association, New York, NY.

Zimmerman, R. S., Palmgreen, P., Noar, S. M., LUSTRIA, M. L. A., Hung-Yi, L., & Horosewski, M. L. (2005, April). *Effects of a televised 2-city mass media campaign targeting risk-taking heterosexually active young adults.* Paper presented at the Seventh International AIDS Impact Conference, Cape Town, South Africa.

LUSTRIA, M.L.A. (2005, January). *Online Health Information Seeking Behavior of Young Adults: Comparing Individuals from Both Sides of the Digital Divide.* Paper presented at the 2005 ALISE Conference, Boston, MA.

LUSTRIA, Mia Liza A., *Promoting health literacy using interactive web technologies: Examining the effects of interactivity on comprehension using an individual differences perspective (Research design and preliminary results)*. Poster paper presented at the 2004 American Society for Information Science and Technology Annual Meeting (November 12-17) Providence, Rhode Island

Noar, S. M., Zimmerman, R. S., Palmgreen, P., LUSTRIA, M. L. A., & Matuza, M. L. (2004). *Understanding condom use in young adults: Integrating personality and psychosocial theoretical approaches.* Poster paper presented at the Fifty Fourth Annual Conference of the International Communication Association, New Orleans, LA.

LUSTRIA, Mia Liza A., *Computer-mediated scholarly communication: The social shaping of scientific communication in the information age*. Paper presented at the 26th Annual Research Conference (2004) of the College of Communication and Information, University of Tennessee, Knoxville, TN

LUSTRIA, Mia Liza A., *Scholarly publishing at the crossroads: Prospects for change*. Poster paper presented at the 2004 ALISE Conference (January 6-9, 2004) held at the W.S. Grant Hotel, San Diego, California

Zimmerman, R. S., Palmgreen, P., Noar, S. M., LUSTRIA, M. L. A., Matuza, M. L., & Allard, S. A. (2003). *Sensation seeking and impulsive vs. rational decision-making as moderators of perceived effectiveness of HIV/STD public service announcements*. Poster paper presented at the One Hundred and Thirty-First Annual Meeting of the American Public Health Association, San Francisco, CA.

Noar, S. M., Zimmerman, R. S., Palmgreen, P., Allard, S. L., LUSTRIA, M. L. A., Matuza, M. L., & Cupp, P. K. (2003). *Development of a safer sex mass media campaign targeting high sensation-seeking and impulsive decision-making young adults.* Paper presented at the 2003 National HIV Prevention Conference, Atlanta, GA.

LUSTRIA, M.L.A., (2003) *Scientific communities at the borderlands of the information age: New communication technologies and the challenge for a new scholarly communication model*. Paper presented at the Communication Graduate Student Symposium, University of Kentucky, Lexington, KY

LUSTRIA, M.L.A., (2002) *Wanted Filipino bride: A case study of an unconventional interracial marriage*. Paper presented at the Communication Graduate Student Symposium, University of Kentucky, Lexington, KY

Copyright © Mia Liza Alcantara Lustria 2005