DIRECT-TO-CONSUMER ADVERTISEMENT OF PREDICTIVE GENETIC TESTS: INFLUENCE ON CONSUMER ATTITUDES, INTENTIONS AND BEHAVIOR

by

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(Under the Direction of Matthew Perri III)

ABSTRACT

Advertising of predictive genetic tests (PGTs) is being used by biotech companies as a promotional strategy to influence consumers. Opponents, including regulators and genetic experts such as the human genome project researchers, have criticized this move as purely profit making and have suggested physician intervention to regulate inappropriate use of PGTs. In contrast, proponents claim advertisements to be a resource for consumers to make informed decisions and perform positive health behaviors. In light of recent marketing efforts for PGTs, it is critical to understand consumers' perceptions and attitudes about PGTs.

This study involved a series of qualitative focus groups that elicited consumer opinions about advertising of PGTs, beliefs about test inquiry intent and beliefs about having a prescription requirement for a genetic test. Subsequently, a quantitative web-based study was conducted with 410 participants to examine consumer attitudes, intentions and behavior in response to direct to consumer (DTC) advertising of PGTs. Finally, an experimental study was also administered to 206 participants to investigate the impact of prescription requirement on ad effectiveness variables such as attitudes towards the ad and attitudes towards the genetic test.

The results revealed that 57% of the consumers expressed interest in discussing the advertised genetic test with their doctors. Almost 50% were interested in seeking more

information about the advertised genetic test. Only 11.2% of consumers actually performed the information search behavior. Consumer characteristics that correlated with test inquiry intent were attitudes about talking to the physician, subjective norms, attitudes about genetic testing, perceived threat, gender and race. Information seeking intent was explained by need for cognition, beliefs about genetic test advertisements, perceived threat of advertised health condition and genetic testing attitudes. A total of 21.1% of the consumers who were interested in looking for more information about the advertised genetic test actually performed the information search behavior. Overall, consumers approved of DTC advertising of genetic tests, believed they had the right to get such information and expressed interest in seeing more advertisements in the future. However, consumers unanimously rejected prescription requirement for genetic tests, primarily due to insurance discrimination and loss of privacy concerns.

INDEX WORDS: Predictive genetic tests, DTC advertising, Consumer behavior, Information processing, Genetic testing.

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DEDICATION

To Dad and Mom and Sri. Your love and blessings have guided me to realize my potential and accomplish my dreams.

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Chapter 1

Introduction of Topic and Relevant Issues

1.1 Introduction

This research continues the quest to understand how modern technologies impact health behavior and outcomes. Since the dawn of technology, the medical field has been greatly shaped by this ever-changing arena of technological advances. Before the era of modern medical technology, medical diagnosis was based on an analysis of the description of symptoms rather than on a diagnosis by an examination of the patient's body. However, technology has completely revolutionized medicine. Some of the more notable technological advancements came in the 20th century, and included thermometers, stethoscopes, X- rays, respirators and the heart-lung bypass machine. Further, the growth and use of technology in the last 50 years has expanded more than in the previous 2000 years. Electron microscopes, computers, MRI's and artificial heart valves have contributed to reforming healthcare and to increase life expectancy, enhanced quality of life, and improved overall health outcomes for patients (FLORATH *et al.* 2005). More recently, robots and nano-biosensors have been used for patient monitoring (2008d; ALLAN 2004; MATARIÄ‡ *et al.* 2007). Modern age scientists continue to integrate current scientific technology and knowledge into healthcare.

The completion of the Human Genome project in 2003 has opened up an entire new area for the healthcare industry. It has led to an improved understanding of biomedical assays and genetic tests that promise to completely metamorphose the current standards of care. Science and

technology have influenced healthcare in the past and the knowledge and application of genetics is undoubtedly going to shape the future of healthcare.

Recognizing the influence that genetics can have on healthcare, researchers are studying how genomic technologies can be used in the development of new drugs with better safety and efficacy. This science, termed pharmacogenetics, provides a better understanding of how genetic information can be used to select better drugs for patients so that side-effects can be reduced and compliance can be increased. Adverse drug reactions, due at least in part to inter-individual variability in drug response, contributed to 7% of hospitalizations and 100,000 deaths in the United States (LAZAROU *et al.* 1998a; NEBERT 1999). The study of pharmacogenetics can identify patients with increased risks for adverse drug reactions (INGELMAN-SUNDBERG 2008; KALOW 2002)**.** This information can thereby help select appropriate drug therapies for the patient resulting in better tolerance and safety.

A recent area of interest to researchers is predictive genetic testing which is used to detect mutations that can express later in life resulting in a disease. The rationale behind predictive genetic tests (PGTs) is that a positive result can motivate patients to seek regular screenings, watch for symptoms more closely, and take preventive measures (OFFIT 2003). Low and Bower(2008) have shown that positive life changes can occur in some patients taking PGTs for breast cancer (LOW *et al.* 2008). Although PGTs claim to inform and prepare patients about the future, the potential of these genetic tests is clouded by the medical, psychological, ethical and legal issues that need to be addressed for consumers to achieve the best individual outcomes possible.

An issue that has raised concerns in the scientific community and has intensified research related to predictive genetic tests is the direct marketing of these tests to consumers who have

very little or no knowledge about genetics and genetic tests. Even if consumers want to discuss the test and test results with a primary care physician, a major concern among critics is the lack of understanding and knowledge about genetics in primary care practice. This lack of education can not only impact the interpretation and explanation of these results to patients but can also reduce physician confidence in recommending or advising against a certain genetic test (ACTON *et al.* 2000; BURKE 2004).

A second major concern is the issue of discrimination. Although the Genetic Information and Nondiscrimination act (GINA) and Health Insurance and Portability Act (HIPAA) protects consumers from discrimination based on genetic information, critics fear that employer and insurance discrimination can result from these tests (HOLTZMAN and MURPHY 1997; PAUL 1999). This discrimination could potentially trickle down to the entire family who share genetic traits.

Thirdly, PGTs lack certainty. Hence, people who test positive may not necessarily get the disease and those who test negative could possibly develop the disease in the future. Researchers fear that the impact on patients will be significant for both positive and false positive results, especially for untreatable conditions. Critics also believe that those who test negative may disregard routine diagnostic tests in the future (HOLTZMAN and MURPHY 1997; PAUL 1999). A lack of education, discrimination and a lack of predictive certainty are the central issues that could impact both the patient's and the physician's decision to have or prescribe genetic testing. Further, there are unresolved ethical issues such as confidentiality, privacy and DNA storage/disposal that factor on the decision to have genetic testing (WILLIAMS *et al.* 2006).

Industry viewpoint is that genetic tests are similar to other over-the-counter (OTC) diagnostic tests like blood cholesterol and blood glucose tests (LEVITT 2001). Levitt (2001) has cited the president of Myriad Genetics laboratory as not seeing any difference between a blood

cholesterol test and a genetic test. Contrary to industry beliefs, regulators and healthcare researchers think that genetic tests can predict serious future risks in healthy individuals as well as their relatives. Levitt (2001) also argues that when these tests are offered OTC, there is the possibility that DNA samples could be obtained and tested without the subject's knowledge. This not only jeopardizes the privacy and confidentiality of that individual, but it also puts at risk family members and other members of similar genetic and/or ethnic origin.

Since there are unresolved social, ethical and psychological issues surrounding genetic testing, advertising of these tests may not be appropriate at this time due to their ability to increase demand for tests in people who do not need them. A Centers for Disease Control and Prevention study showed that advertising increased demand of BRCA tests but most of the people who expressed interest in testing were not appropriate candidates for the test (CDC 2004b). Currently, there is a lack of regulatory oversight for genetic tests, which question the quality of the test (JAVITT and HUDSON 2006). Also, the absence of a physician mediator, who can assist the patient in decision-making, further aggravates the situation by placing patients in a vulnerable position of having to decide about a subject matter that they might not be able to comprehend (BERG and FRYER-EDWARDS 2008). Thus, misleading advertising about PGTs may influence patients to seek tests, they may not require, especially due to their lack of genetic and medical knowledge.

While there is notable controversy surrounding genetic testing, there are some positives that advertising may provide. An argument in favor of advertising of drugs and other products is that advertising empowers consumers with information (WILLIAMS-JONES 2006b). Patients have a right to be informed about novel drugs and technologies so that they can play an active role in their healthcare decision-making (JOHNSON and RAMAPRASAD 2000). Gollust et al (2002),

however argue that "complex information, complicated social context surrounding genetics and a lack of consensus about the clinical utility of the tests limits the value and appropriateness of these tests" and their advertisements. Advertising of genetic tests now is at a similar stage as DTC advertising for prescription drugs was in the 1980's. The awareness among consumers is low, there is lack of proper regulations or guidelines for advertisements, and the impact of these advertisements on the consumer is unknown. In order for advertising of PGTs to be successful and to achieve the desired outcomes, it is imperative to understand consumers' perceptions about advertising of genetic tests and willingness to act on information after ad exposure. Many studies in the literature have assessed expert opinions on the appropriateness of genetic testing and the appropriateness of the advertisement of PGTs but none have so far assessed the opinions of consumers about the appropriateness of genetic tests and their advertisements. Also, no study has yet examined the persuasive impact of these advertisements on consumers (LIU and PEARSON 2008).

1.2 Practical issues and problem statement

Despite severe criticisms by the research community, testing companies continue to market genetic tests and take advantage of regulations that are still in the nascent stage. Myriad Genetics launched its first ever advertising campaign for a predictive genetic test for breast cancer to a broad consumer audience in October, 2003 (TSAO 2004). Although the advertising campaign by Myriad Genetics stirred huge rebuttal from physicians, regulatory agencies and consumer groups, it has also driven other laboratories to market their tests as well. Since 2003, numerous biotech companies are selling products directly to consumers after witnessing Myriad's success. Myriad showed a 44% increase in its molecular diagnostic test revenues in

2007 compared to the previous year (Myriad annual report 2007). Further, a recent study shows that the number of websites selling genetic tests have tripled since 2003 with many new companies launching products (LIU and PEARSON 2008). Currently, more than 1200 genetic tests are available in the clinical setting (HOGARTH *et al.* 2008; JAVITT 2007). Of these tests, most are for rare Mendelian (single gene) diseases like Phenylketonuria (PKU) and Cystic Fibrosis (KALB and PENG 2008). One study reported that analysts expect the genetic testing market to be worth 12.5 billion annually by 2009(LIU and PEARSON 2008). This promising potential for genetic tests has induced marketers to develop new tests and bring them to the consumers' attention at the earliest possible stage. Since most people look for health information on the web, the internet is the best and quickest way to reach the target consumers. Liu and Pearson (2008) found that at least two dozen companies advertise and sell genetic tests directly to consumers. These tests range from single gene disorders and complex genetic diseases to complete genetic profiling[1]. Except for the Myriad ads for BRCAI and BRCAII tests that appeared in traditional media (television, magazines, theatre playbills and radio), most companies still prefer the internet as a medium to reach customers. This might be due to increased popularity of this medium among users to find health information (SEWAK *et al.* 2005). Due to the potential of the PGT market and the ease of reaching target consumers through the internet, PGTs are advertised and sold for consumers to order them directly from a lab or through their physicians.

"As personal genetic testing takes off, some worry that marketing is getting ahead of science" (KALB and PENG 2008). There could be several reasons motivating gene testing laboratories to advertise directly to consumers. The literature acknowledges that the successful

[1] A test from Consumer Genetics, a genetic testing company, is now available that predicts whether one can continue to drink a morning cup of coffee based on caffeine metabolism (ANDREW 2006). Tests are also available that can determine the risk of cardiovascular disease (CVD), osteoporosis, Alzheimer's, cancer, thrombosis and many more illnesses

venture of pharmaceutical companies with consumer directed advertising of pharmaceutical products might have led to advertising of genetic tests directly to consumers (TRACY 2007). Other reasons include an evolving healthcare environment and medically knowledgeable consumers exhibiting greater involvement in their healthcare decision making.

Evidence from advertising of BRCA ads has shown that DTC advertising increases awareness about diseases and availability of tests (CDC 2004b; KATZ 2007). Myriad claims that the purpose of advertising the test is to create awareness in the general public and to promote preventive measures from developing the disease. The director of the Center of Biomedical Ethics at the University of Virginia has criticized Myriad for the method they have adopted to increase awareness. He suggests that Myriad should consider alternative ways of raising awareness through schools and hospitals (JEFFREY 2003). Conversely, Myriads head of communication, William A. Hockett said that his company's program (BRCA test) is a way to reach women immediately as they want to start saving lives now and not 10 years from now (JEFFREY 2003). Although there is an ongoing debate among different groups regarding the utility of genetic tests and their advertisements, from a consumer's standpoint, these advertisements can be deemed successful when they are educational and patients can learn from them and make informed decisions regarding their health.

Ellen Matloff at the Yale Medical School's Cancer Center believes that the risk of advertising genetic tests outweighs the benefit of these tests (JEFFREY 2003). PGT advertisements have limited educational value especially due to the complexity of genetic information that cannot be easily understood by the general public (JAVITT and HUDSON 2006). Movies like "GATTACA" and thriller books and novels based on genetics have increased the expectations in the general public about the impact of genetics on health. This could make

patients more vulnerable to claims made by testing companies (GOLLUST *et al.* 2002) or make them even more paranoid of the tests. Most tests that are now available in the market also lack a clinical consensus regarding their appropriateness (GOLLUST *et al.* 2002). Kay Dickersin, the Director of John Hopkins Center of Clinical Trials noted that there isn't enough information about what to do with the results of genetic tests (LENZER 2007) as not everybody would develop the disease and for those who will get the disease, there is nothing much that can be done due to lack of effective treatments (TAYLOR 2004). Scientists have reported increased emotional distress, negative health outcomes in positive and negative risk patients, financial burden and potential for discrimination in patients taking a genetic test (BERG and FRYER-EDWARDS 2008; BIESECKER and BOEHNKE 1993; DAVIS 1997; HOLTZMAN and MURPHY 1997; MASTROMAURO *et al.* 1987; SOBEL and COWAN 2003; TRACY 2007).

Most tests being marketed are not regulated by the US government for clinical validity and clinical utility (HUDSON *et al.* 2007). The HHS Secretary's Advisory committee on Genetics, Health and Society (SACGHS) has urged better oversight of genetic tests and their claims, and recommends strong enforcement efforts against labs that violate regulatory procedures (HHS 2004c). The Federal Trade Commission (FTC) is also looking into possible misleading claims made by test marketers (AMA 2008). The Food and Drug Administration (FDA) believes that some of these tests lack scientific validity (MEADOWS 2006). To bring this awareness in the general public, the FTC recently issued an alert that some tests "lack validity and others provide medical results that are meaningful only in the context of a full medical evaluation" (ANDREW 2006; MEADOWS 2006). There is no evidence whether this warning was successful in increasing public awareness about misleading tests. Healthcare researchers and regulatory agencies fear these PGT advertisements could provide consumers with faulty, confusing information that could

lead them to believe genetic tests are the answer to all healthcare questions. Especially under the current weak regulatory framework, these ads might manipulate the vulnerability of the consumers, causing increased utilization of tests in not- at-risk populations (HUDSON 2007; LIU and PEARSON 2008).

The Genetics and Public policy center in Washington, D.C is of the opinion that health-related claims for genetic tests are of great concern, especially under two circumstances, 1) when there is no defined system to validate the tests, and 2) when a medical professional who has a greater ability to determine the validity of the test is not a mediator (POPP 2005). Whether advertisements are online or in traditional media, research has shown that marketers of genetic tests have not provided a fair balance of risk and benefit information (BOWEN *et al.* 2005; LIU and PEARSON 2008). Hence, the lack of physician intervention could mean that the patient's source of information about the risks of testing is compromised (BERG and FRYER-EDWARDS 2008). This is significant because when people learn about the limitations and risks of genetic tests, the utilization of tests is reduced (BOWEN *et al.* 2005). Liu and Pearson (2008) believe that the uncertainty in results of PGTs, and the difficulty of interpretation by patients, indicates that the benefits of these tests do not outweigh the risks. Hence, they recommend that PGTs should only be offered by a physician mediator (LIU and PEARSON 2008). The American College of Medical Genetics (ACMG) also recommends that such tests be provided only after qualified healthcare professional intervention (ACMG 2004a). On theother hand,, libertarians argue that those who wish to explore their genome should be freely allowed to do so and that neither the government nor the medical community has the right to deny access to these tests (NATURE BIOTECH 2008c). Currently, there is no official mandate that requires physicians to approve the tests. Of the 46 companies that sell genetic tests directly to consumers, about half require

physician intervention and half do not (LIU and PEARSON 2008). Currently, we do not know what consumers' opinions are regarding requiring a prescription for such tests and whether such a requirement would change their decision to test or inquire to a doctor about the test. It is of interest to know if consumers have a preference for testing based on prescription requirement and whether their attitudes towards the company and tests they offer differ based on the company's requirement of an independent physician ordering the test.

1.3 Research Questions

Past research has documented expert opinions on the issue of appropriateness of genetic tests and the appropriateness of advertising of genetic tests directly to consumers. However, no empirical research exists that has studied the perceptions of consumers about the appropriateness of DTC advertising of genetic tests and the impact of these advertisements on health behavior. Liu and Pearson (2008) have cited in their research that "understanding of the current business practices of genetic tests is incomplete without the knowledge of how consumers respond to these marketing messages."Our research proposes to fill this void in the literature. The above discussion leads us to the following questions:

1) What are consumers' opinions about advertising of genetic tests directly to the public?
2) Will consumers respond to information provided by DTC advertising of PGTs by:
    a) Expressing intentions to talk with their physician (test inquiry intent)?
    b) Seeking more information about the advertised test (information search intent)?
    c) Expressing intentions to take the test?

3) Which consumers (family history, health status, involvement, need for cognition, attitudes towards genetic testing, subjective norms, perceived threat and demographics) are more likely to talk with their physician after exposure to a PGT advertisement?
4) Will consumers respond differently when a prescription is required for an advertised PGT?

To answer these questions, it is critical to understand consumers' beliefs and attitudes about talking with their physicians about the advertised genetic test and consumers' beliefs about prescription requirement for a genetic test. Further, we must develop insights into what impact this type of promotion will have on information processing and the decision making process in consumers. Our research proposes to answer the following specific questions:

Specific Aims

- What are the beliefs/attitudes of consumers about advertising of genetic tests?
- What are consumers' beliefs and attitudes about talking to their physician about the advertised genetic test?
- Will the beliefs and the attitudes of important others impact consumers' decision to talk with their physician about the advertised genetic test?
- Can we identify consumers (based on personality, health and demographic characteristics) who are more likely to talk with their physician compared to others after exposure to an advertisement?
- Can we identify consumers (based on personality, health and demographic characteristics) who are more likely to seek information about the advertised PGT compared to others?
- What are the opinions of consumers about requiring a prescription for a genetic test?

- Does prescription requirement influence intentions to test and test inquiry intentions?
- Will consumers' have more favorable attitudes towards a test and company when the advertising company requires a prescription for their genetic test?

1.4 Impact and Significance

Many in the research community believe that genetic tests have potential limitations that could put consumers at serious risk due to the possibility of inappropriate and invalid tests or the misinterpretation of results (DAVIS 1997; HOLTZMAN 1996). The literature surrounding genetics and genetic testing suggests that physician intervention can facilitate better decisions by consumers and the appropriate utilization of genetic tests. Marketers claim that advertisements provide information to patients, who then perform positive health behavior by making informed decisions (ACMG 2004a; LIU and PEARSON 2008).

Our study is the first to assess perceptions of consumers concerning advertising of PGTs. Our study will specifically assess consumer attitudes towards such advertisements, their opinions whether PGTs should be advertised directly to the public and beliefs about the potential benefits and risks of PGTs. Assessing consumers' beliefs and perceptions about advertisements will enable marketers to ascertain any incentive for them to market such tests to consumers. If consumers do not have a favorable opinion about these tests then there would be no point in directing valuable resources towards such a promotional strategy. It would then become imperative for marketing managers to understand why consumers think negatively about advertising of genetic tests and what can be done to improve their perceptions of these ads.

Our study will also assess consumer information needs in advertisements. This might help marketers understand information that consumers think are critical for decision making about PGTs. Companies may then create ads catered to consumer needs and promote testing.

A review of the genetics literature suggests that utilization of PGTs in consumers without a family history of disease and consumers for whom risks from testing are greater than benefits, can be reduced if consumers consult with their physicians before taking the test (LIU and PEARSON 2008). PGTs can result in risks for patients due to their un-established validity and potential limitations in prediction (JAVITT and HUDSON 2006). Liu and Pearson (2008) think that such risks could be avoided by some expert intervention. Although researchers believe that physician intervention could help consumer's make informed decisions, it would be of interest to understand what consumer's think about talking with their physician about the advertised genetic test.

Our research specifically addresses this question and helps to understand the underlying mechanism involved in test inquiry after exposure to information in an advertisement. Additionally, we assessed factors that promote such positive behavior or act as hindrance to seeking medical advice. This information is critical for policy makers, researchers and physicians to identify issues that inhibit positive health behavior by consumers and find means to resolve them.

One striking difference between PGT ads and prescription drug ads is that patients cannot buy a prescription drug without a prescription whereas many genetic tests can be bought OTC. Almost half the companies that promote these tests do not require prescription and patients can take these tests without physician intervention(LIU and PEARSON 2008). Most researchers believe that considering the complexity of information of genetics and questionable validity of tests,

such tests must require a prescription from a physician before they can be administered (LIU and PEARSON 2008). Some consumer groups and libertarians have argued against such mandate(NATURE BIOTECHNOLOY 2008c). It is timely and appropriate now to understand consumer perceptions about requiring a prescription for a genetic test.

Our study specifically addresses the above question and also evaluates the preferences of consumers towards tests with prescription requirement. Assessing the importance of physician intervention for consumers will help practitioners, researchers, and policy makers understand if prescription requirement has an impact on consumers' decision to take the test. Investigating consumer attitudes and intentions based on prescription requirement will help marketing managers decide whether they should promote tests with or without prescription. Consumers' beliefs about prescription requirement will help policy makers decide whether requiring doctor's prescription would promote positive health behavior and outcomes.

In summary, our research makes a multifaceted contribution to the extant literature. Our study is the first to investigate consumers' perception of advertising of PGTs and validation of claims made by advertisers about these ads being informative in nature. Secondly, our research is unique in measuring the impact of prescription requirement on consumer attitudes and behavioral intentions. Considering that some companies require a doctor's prescription for testing and some do not, this research is very relevant and timely for marketing research and practice, as well as for shaping regulatory policies. This information is critical for policy makers who are working to tighten regulation for these tests, to minimize health risks and to improve health outcomes for patients. Assessing consumers' beliefs, attitudes and intentions provides practitioners and researchers a deeper understanding of many unanswered questions in the realm of direct-to-consumer (DTC) advertising of PGTs. For product managers, this research provides a better

understanding of the impact of their advertisements on consumers and a foundation to develop better strategies in the future.

Chapter 2

Literature Review

2.1 A Primer on Genetics and Genetic testing

All organisms have a genome that contains all biological information to build and maintain life. This genetic information is encoded in the double helix strands of the DNA (deoxyribosenucliec acid) by four chemical bases namely Adenine (A), Guanine (G), Cytosine (C) and Thymine (T). A gene is a sequence of the chemical base pairs (A, G, C, and T) of the DNA that codes for specific function. Most genes encode for proteins that are called the "building blocks of life" and are necessary for building and maintaining an organism (http://www.genome.gov).

Sometimes a permanent alteration or mutation in the gene sequence of the DNA can occur. These mutations can either be inherited (hereditary or germline mutations) or acquired (somatic mutations). Rarely mutations can happen in the germ cell after fertilization. These mutations are called De-Novo mutations and can explain genetic disorders with no family history. Hereditary and De -Novo mutations can be passed onto future generations. On the contrary, acquired mutations are not passed onto the next generation. These mutations happen in individual cells during a person's lifetime. They can occur due to environmental factors like exposure to UV rays and other radiations or as a result of unhealthy dietary habits. Genetic changes that happen in more than 1% of the population are called polymorphisms. Most of these polymorphisms are not threatening to an individual's health but some can influence the

development of major health risks like cancer. Current advances in technology have led to the discovery of numerous genetic tests that can detect mutations in the gene and predict disease risks in individuals. This information can then be used by patients to reduce their disease vulnerability by changing their lifestyle and dietary habits or by taking other preventive measures (http://www.genome.gov).

Genetic tests are medical tests to detect changes in genes, chromosomes and proteins that can impact health. Types of testing include pre-implantation, prenatal, newborn, carrier, diagnostic, predictive and forensic testing. Diagnostic genetic tests are performed to confirm or rule out a genetic component that may be responsible for patient's illness and symptoms. For those who have a family history of a genetic disease or belong to ethnic groups known to have increased risk of a disease, carrier testing is offered to confirm if they have a gene responsible for their illness. A prenatal genetic test is used to detect changes in genes and chromosomes of the fetus before birth whereas pre-implantation testing finds out and analyzes genetic changes in the embryo before implantation. Predictive genetic test also referred to as pre-symptomatic testing is used to detect mutations that can appear later in life resulting in a disease. Forensic testing is not for testing gene mutations but to identify an individual for legal purposes. Lineage and forensic testing are the only non-health related genetic tests.
(http://ghr.nlm.nih.gov/handbook/testing/uses).

Prior to direct-to-consumer (DTC) genetic testing, genetic tests were performed as a part of the genetic consultation process. Usually a medical geneticist, physician or a nurse practitioner orders the test and once the test is performed, the laboratory sends the results to the physician or the genetic counselor. A genetic test is usually performed by collecting a sample of blood, hair, amniotic fluid, skin or other tissue. One commonly used procedure is the buccal

smear technique that uses a cotton swab to collect a cell sample from the inner surface of the cheeks (http://ghr.nlm.nih.gov).

2.2 Human Genome Project

The Human Genome project is a product of the co-coordinated effort of the United States Department of Energy (DOE) and The National Institute of Health (NIH). This project started in October of 1990 and was completed in 2003 (AUSTIN 2004; COLLINS 1999). The goals of the project were : 1) to identify all the genes in the human DNA; 2) to determine the sequences of the base pairs that make up the DNA; 3) to store information in databases accessible to all; 4) improve data analysis 5) transfer technologies to the private sector, and 6) address ethical, legal and social issues (ELSI). Reports suggest that three to five percent of the research budget was allocated to study ELSI suggesting the importance and impact of these issues on the application of genomic knowledge in the future (AUSTIN 2004).

The Human Genome Project(HGP) was a global project with contribution from many countries including the United States of America, England, Germany, Japan and China (CAHIL 2000). NIH and DOE contributed to 70% of the sequence and "Wellcome Trust" at the Sanger Centre in Cambridge with other international collaborators completed the remaining (COLLINS 1999). However, in 1998, Celera Genomics which was a privately owned company ventured into the area of DNA mapping using methods different from the publicly funded genome project. Their intent was to map most of the genome before the public funded project and acquire patent rights (CAHIL 2000). This forced the Human Genome Project researchers to accelerate their research and finish their project before Celera. Samples were obtained from thousands of volunteers and sent to various Human Genome Project testing centers around the world for

sequencing and analysis of human DNA. The process was completed in 2003 and a draft of the entire sequence of the human genome was published in Nature and Science (2003). Approximately 25000 genes were determined in this sequence and all publications and databases were made publicly available.

Although a major amount of work on the project is complete, researchers continue to explore the human genome to develop further insights. At a recent convention by National Human Genome Research Institute (NHGRI), it was decided that the Human Genome Project will form the foundation of the future vision of genomics research. The vision is to understand the impact of genomics in the arena of basic biology, health and society (COLLINS *et al.* 2003). This vision is pictured by Collins as the three floors of a house with HGP as the foundation of the building whereas education, training, resources and ELSI form the pillars (Fig 1) (COLLINS *et al.* 2003). The NHGRI vision in the arena of health when expanded includes translation of genetic knowledge to health benefits by: a) identifying genes and pathways involved in a disease and their interaction with the environment; b) applying genomic knowledge to study drug response, classify disease and predict susceptibility to disease, and c) to catalyze the development of novel therapeutics based on the genomic knowledge.

2.3 Pharmacogenomics (PGx)

Although researchers use the term pharmacogenomics and pharmacogenetics interchangeably in the literature, "pharmacogenetics" is defined as the influence of an individual's genetic make-up on their response to pharmaceutical drugs and "pharmacogenomics" is the broader application of genomic knowledge and pharmacogenetics in new drug discovery (MANOLOPOULOS 2007; NEBERT 1999). Though age, health status,

environment and diet have an influence on drug response, researchers believe that individual's genetic makeup is also a very vital factor influencing drug efficacy and safety (MANOLOPOULOS 2007). Pharmacogenomics promises to achieve this safety and efficacy by creating personalized medicine tailor-made based on the genetic make-up of the individual (NEBERT 1999).

One of the major benefits of personalized medicine is the positive impact on health outcomes that can be achieved by reduced side-effects and better tolerance to drugs. Adverse drug reactions, which accounted for 6.7% of all US emergency department visits and 100,000 deaths annually in the US clearly demonstrates the need for personalized medicine (MANOLOPOULOS 2007). Another study on antidepressants suggests that although effective treatments are available, their use is limited by the lack of tolerance for certain drugs among patients (RASMUSSEN-TORVIK and MCALPINE 2007). This means that despite having ways to combat illnesses, millions of patients will continue to suffer from them either due to adverse drug reactions or lack of tolerable treatment options. Pharmacogenomic tests and studies have been anticipated to select or develop personalized drugs for patients thereby decreasing adverse drug reactions and improving their response and tolerance to drugs (RASMUSSEN-TORVIK and MCALPINE 2007).

Another significant use of pharmacogenomics is in the area of immune response and vaccine development. Gene expression changes involved in immune response to vaccines in adults and children is not yet completely understood and pharmacogenomics can provide a good basis to understand this phenomenon (NILSSON and REGNSTRÃ¶M 2008). With rapid advances in technology, the knowledge of pharmacogenomics can be applied in the creation of improved vaccines by understanding how genetic makeup of individuals would result in a different cellular

response (RAPPUOLI 2007). Probably in the future vaccines could be made of genetic material that can initiate an immune response without the risk of causing disease.

Pharmacogenomic studies can also help determine correct drug dosage based on the genetic make-up of the patient. For the pharmaceutical company, pharmacogenomic studies may allow the introduction of older drugs that are effective in some population but were removed from the market due to serious adverse effects (ISSA 2000), provided it is approved by FDA. With reports of 100,000 deaths due to ADR's in the US (LAZAROU *et al.* 1998b) and the soaring costs of treating adverse drug reactions which is estimated to be about $100 billion US dollars (INGELMAN-SUNDBERG 2008), it is more likely that pharmacogenomics could replace the traditional trial-and-error method of appropriate treatment selection in the future.

Although pharmacogenomics is anticipated to offer great benefits, its use in the past has been very minimal. Many genetic polymorphisms that can impact the response to drugs have been studied but considering them as novel genetic biomarkers is especially difficult when most studies that are performed are inadequate to draw any reasonable clinical solutions (KIRCHHEINER *et al.* 2005). Further, it is also not clear how this genetic information can be translated into pharmacotherapy (MANOLOPOULOS 2007). In a 2004 FDA workshop, scientists from around the nation decided that a molecule can be considered a valid biomarker if it is measured using well established tests and if there is a widespread agreement in the scientific community about the physiological, toxicological, pharmacological and clinical significance of the results of the test (ANDERSSON *et al.* 2005; MANOLOPOULOS 2007). Some success has been seen with Cytochrome P450 (CYP) family of liver enzymes (HODGSON and MARSHALL 1998; MANOLOPOULOS 2007). The CYP family of enzymes is responsible for the breakdown of at least thirty different classes of drugs (http://www.ornl.gov). A genetic variation leading to a less active

or inactive form of the enzyme can prevent degradation of drugs thereby increasing toxic effects. Currently clinical researchers use genetic tests for determining variation in the CYP enzymes to monitor patients. Pharmaceutical companies also use genetic tests to screen drugs and study the effect of the variant forms of the enzyme on degradation of chemical compounds (HODGSON and MARSHALL 1998). This could have a negative consequence if pharmaceutical companies try to deceive regulatory agencies by selecting genetically suitable individuals for clinical trials to show increased efficacy and tolerability of drugs.

Currently the use of pharmacogenomics is limited. This could be due to several reasons. Until now, pharmaceutical companies have used the "one drug fits all" approach. This approach may not be possible with advances in pharmacogenomic technologies as genetic tests may identify the patient who will respond better than others to a particular pharmaceutical drug. The latter statement may be a concern for policy makers too when pharmaceutical companies may not have much incentive in developing drugs for conditions affecting a minority group due to specific genetic variations characteristic of that group (ISSA 2000). Even when pharmaceutical companies decide to invest in personalized medicine, it may not be easy to obtain FDA approval. The FDA would require large prospective clinical trials to establish validity of tests.FDA may also consider related pharmacoeconomic studies to confirm that these new technologies are cost-effective compared to already available treatments (Reynolds and Bukaveckas 2007).

Manolopoulos (2007) reported that healthcare professionals are not well educated about technological advances in the field of genetics. This could restrict physicians from adopting genomic methods into clinical practice. An additional problem with physicians including pharmacogenomics in clinical practice is their concern that personalized medicine could make them more liable to lawsuits (EVANS 2007). For the consumers, worry about discrimination and

loss of privacy are major issues that hamper the progress of genetics in healthcare (VASZAR *et al.* 2003). Pharmacogenomics is still in the stage of infancy and all these barriers need to be addressed before effective implementation of this new knowledge is possible in clinical practice.

2.4 Direct- to- Consumer Sale of Predictive Genetic tests

PGTs include tests that determine whether one is a carrier of a disease and whether the individual is more susceptible than others to acquire a disease (LIU and PEARSON 2008). Recently, there has been a surge in the number of companies that sell PGTs directly to consumers. From seven companies that marketed these tests directly to consumer in 2003, the number has now risen to twenty-four (HOGARTH *et al.* 2008). At least fifty genetic tests that are health related are directly sold to consumers. The market for these tests has been estimated to be approximately 12.5 billion dollars by 2009 (LIU and PEARSON 2008). This suggests that marketers have realized the business potential of PGT market and are investing money to develop novel tests that can predict disease risk in individuals for more diseases.

DTC advertising of PGTS may be an effort to obtain maximum market share by increasing consumer awareness of these tests. Although most advertising has been through the internet (LIU and PEARSON 2008; TSAO 2004), October 1, 2003 was the first time when Myriad Genetics, a genetic testing company advertised their genetic tests for breast cancer(BRCA 1 & BRCA II) through print and television to reach a broader audience (TSAO 2004). CDC study (2004) showed that the advertising campaign had an impact on both consumers' and physicians' awareness of the tests (CDC 2004b). The study also reported that many patients were interested in testing based on the information in the ads, although the difference was not significant between pilot and comparison cities. Realizing this interest in consumers to know about their

future, Myriad Genetics has been active since 2007 in DTC advertising of genetic tests directly to consumers. Their advertising campaign was initiated in Hartford-Connecticut, Providence-Rhode Island, New York and Boston-Massachusetts. Motivated by Myriad's success, many other companies have entered into the arena of PGTs and market their tests directly to consumers (LIU and PEARSON 2008). From Myriad's reports that showed a 44% increase in annual revenues compared to the previous year, we can extrapolate that there has been an increase in demand for PGTs (Myriad annual report 2007). Although Myriad claimed that they received many phone calls for information about their tests after the advertisement campaign, the CDC (2004) study suggests that interest in the test was not significantly different in cities where genetic tests were advertised compared to cities where they were not advertised (2004b). Even though Myriad's annual reports provides some evidence of increased testing for BRCA 1 & BRCA II after their advertising campaign, they do not provide any evidence on the characteristics of people that have tested for breast cancer. For example, whether these people have a family history or have poor health status in general is not clear. Under these circumstances, an increase in testing could have been due to an increased awareness of the tests as a result of increased physician advertising that led to physicians suggesting tests to patients. Though it seems that advertisements had an impact on consumers, there isn't any clear evidence if PGT advertisements have an impact on consumer intentions and behavior after exposure to information in these ads.

The rising potential of genetic test market (LIU and PEARSON 2008) and the successful history of prescription drug advertising in improving drug sales for companies (FINDLAY 2001; HOLLON 2005) provides a stronger reason for more genetic test labs to advertise and sell tests directly to consumers. Hence it is critical to study the impact of these advertisements on

consumers so that we can be ready to address the ethical, legal, social and psychological issues that can arise from consumer's understanding and interpretation of the information in the ads.

2.4.1 Regulation of Predictive Genetic tests

Consumers can often misconstrue that healthcare products are regulated by the government and hence can assume a higher quality of these products (JAVITT and HUDSON 2006; WILKES *et al.* 2000). In the case of genetic tests quality of tests is questionable due to insufficient regulation of these tests by the government (BERG and FRYER-EDWARDS 2008; LIU and PEARSON 2008). With more than 1200 genetic tests available in the marketplace and increased incorporation of genetics in healthcare decision making, lack of adequate oversight of these tests can present serious threat to gullible individuals who think these tests have great predictive ability and are well regulated.

Currently the regulations for genetic tests are distributed among different federal agencies with limited oversight of analytical validity (ability of the test to detect consistently the presence or absence of a gene or a genetic change) of the test and no oversight of clinical validity (test of how well the detected genetic change is correlated to the disease in question) and clinical utility (the value of the information to patient, provided by the test about prevention and effective management of the disease) of the test (BERG and FRYER-EDWARDS 2008; JAVITT and HUDSON 2006; LIU and PEARSON 2008). One such agency is the Centers for Medicare and Medicaid services (CMS) that administers the Clinical Laboratory Improvement Amendments (CLIA) of 1988. Based on the CLIA act, the CMS ensures quality laboratory testing including accuracy and reliability of test results (2008a). For complex tests requiring an increased level of skill to perform and interpret the test, the CLIA requires the lab to demonstrate its ability to perform and interpret the test. The CLIA calls this as "proficiency testing" (JAVITT and HUDSON 2006).

Considering that genetic test results are complex and difficult to interpret accurately, they should be labeled as complex tests and require proficiency testing as well. But that is not the case. Despite consistent recommendations by government advisory bodies like the NIH, the Secretary's Advisory Committee on Genetics, Health and Society (SACGHS) and the Department of Energy (DOE) to increase oversight of genetic tests, the CMS has failed to keep its promise of establishing a genetics specialty for molecular and biological tests (2004c; FOX 2008; JAVITT and HUDSON 2006; LIU and PEARSON 2008). This has resulted in lack of proficiency testing guidelines for genetic testing laboratories, thereby creating a situation for laboratories to get away with tests that are sub-standard and unreliable. (http://www.dnapolicy.org/images/issuebriefpdfs/Who_Regulates_Genetic_Tests_Issue_Brief.pdf.)(http://ghr.nlm.nih.gov/handbook/basics/dna)

The FDA also exercises some control over limited types of genetic tests. Currently the FDA controls test kits similar to in vitro diagnostic devices (IVD) (GNIADY 2008). Test kits are genetic tests that contain reagents for the test, information on performing the test and identifying the mutations. These test kits are sold by the manufacturers to other labs or physicians and requires substantiation of clinical validity and analytical validity before FDA approval can be obtained. In contrast to test kits, Home-brew tests are genetic tests that are developed in house by the laboratories and are excluded from stringent CLIA and FDA regulations. These tests do not require any pre-market approval and can be sold to anybody based on the sole discretion of the lab director. The lack of clear regulations empowers the lab director to decide whether a new test is to be developed and marketed as a test kit or home-brew test. It is fairly easy to interpret that many labs would develop home-brew tests to sidestep the FDA approval process. Javitt (2007) has provided evidence to the previous statement in her paper, where she indicates that only 8

genetic tests kits have been approved by FDA, suggesting the preference of test manufacturers to develop home-brew tests rather than test kits. The FDA also regulates "analyte specific reagents" (ASR's) as medical devices. ASR's are active ingredients of home brew tests and can be obtained commercially or developed in house by laboratories. The extent of FDA control for ASR's is ambiguous too. Currently the FDA regulates home brew tests that use commercially developed ASR's similar to devices but does not exercise any control on in house ASR's used in home brew tests. The FDA also requires that home brew tests manufactured using commercially developed ASR's be ordered only through a healthcare professional. Although the FDA exercises some control over genetic tests, the agency recently stated that they lack the statutory authority to regulate home-brew tests (JAVITT and HUDSON 2006). Most of the members of the US government task force established in 1995 by NIH and DOE to review genetic testing in the US also believe that FDA is not the right agency to monitor genetic tests as they do not have the expertise or resources to regulate genetic tests (WADMAN 1997).

This lack of a coherent framework of regulations to evaluate the validity of genetic tests question the quality of tests and competence of testing labs. The gaps in the regulatory system not only deteriorates the level of confidence and trust physicians and patients have on the tests but also creates a situation where individuals are subjected to increased risks from tests that may not have any medical value for them.

Recent direct-to-consumer advertising of genetic tests has revealed more inadequacies within the regulatory system. The FDA usually regulates advertising of prescription drugs and the Federal trade Commission (FTC) ensures fairness and correctness of advertisements for non-prescription healthcare products. The lack of FDA involvement in genetic tests and the absence of any regulatory guidelines for genetic tests and their advertisements makes FTC's job more

difficult. FTC relies on FDA labeling requirements to enforce regulations against false and misleading claims in advertisements. Hence, an absence of proper oversight of genetic tests trickles down to lack of clear guidelines for assessing the appropriateness of claims made in advertisements about the effectiveness and ability of the genetic tests. In 2006 FTC issued a consumer alert warning to consumers stating that some genetic tests that are advertised are not valid and "the results of these tests can be meaningful only in context of a full medical evaluation" (http://www.ftc.gov/bcp/edu/pubs/consumer/health/hea02.shtm). On another occasion, the FDA sent a warning letter to Laboratory Corporation of America stating that their test to assess ovarian cancer was illegally marketed and posed a serious threat to the public (2008a). This test was claimed to be diagnostic for ovarian cancer and hence the FDA required proof of clinical validity of the test.

Apart from federal regulations, certain states also exercise differential level of control on direct to consumer selling and advertising of genetic tests. A recent Genetics and Public Policy (GPPC) report indicates that 26 US states including the District of Columbia do not have any restrictions on genetic testing whereas, 11 states including California and New York explicitly prohibit access to genetic tests (GPPC 2007). In June 2008, California issued "cease and desist" letters to 13 genetic testing companies ordering them to stop selling genetic tests to California residents without an order from a registered physician (AMA 2008; WADMAN 2008). The literature review on the regulations of genetic testing clearly indicates the fragmented nature of the regulatory system (FOX 2008; GNIADY 2008; JAVITT 2006; JAVITT 2007; LIU and PEARSON 2008; WADMAN 2008; WILKES *et al.* 2000). Liu and Pearson (2008) point out that there isn't lack of recommendations by government bodies to develop and implement stronger regulations but policy makers and legislators seem to be "either unsure of how to proceed or unwilling to create"

regulatory policies (LIU and PEARSON 2008). Critics think that this under-regulated environment for genetic tests and their advertisements is a "powerful incentive for companies to create consumer need, to make optimistic claims to attract consumers and to provide incomplete risk information to underplay potential harms to boost consumer confidence" (CAULFIELD and GOLD 2000; MELZER and ZIMMERN 2002; MOYNIHAN *et al.* 2002; WILLIAMS-JONES 2006a). Although there is a consensus among researchers that federal agencies need to step up regulations and develop guidelines for DTC marketing of genetic tests, one also needs to be wary of excessive regulations that can impede the development of innovative genetic tests in the future.

2.4.2 Meaning of test results and limitations

FDA website states that results of genetic tests are not "black and white", meaning they are not easy for consumers to comprehend and interpret on their own (http://www.ftc.gov/bcp/edu/pubs/consumer/health/hea02.shtm). The CDC study showed that most consumers perceive their knowledge about genetics to be very minimal. Approximately 70% said that they had little or no knowledge about genetics and genetic testing (2004b). Approximately 5% said that they knew a lot about genetic testing but Liu and Pearson (2008) point out that consumers can sometimes be "unaware of their own ignorance of genetics" and thus be overconfident of themselves. Considering that consumers have very little knowledge about genetics, it would not be hard to believe that they may not have the expertise to understand the results of the test. Liu and Pearson (2008) further suggest that genetic test results are complex and require interpretation by a medical geneticist or at least by a qualified physician.

Genetic test results can have different meaning for different genetic disorders. For a single gene disorder like Huntington's disease or cystic fibrosis, positive results could mean a100% chance of developing the disease in the future (HOLTZMAN 2006). For other genetic

disorders, genetic tests detect the probability of developing the disease in the future. Having a high probability for cancer or a positive result does not mean the person will get the disease. It just means that the individual is at a high risk for the disease compared to others (BERG and FRYER-EDWARDS 2008). A negative result means that the individual is neither a carrier nor at a high risk for the disease. It does not mean that the individual will never develop the disease but the individual has smaller risk than the average population (BERG and FRYER-EDWARDS 2008).

It is very critical that genetic test results are analyzed accurately because it can be very important for patient's in future healthcare decision making. A predictive breast cancer test that indicates a higher risk for breast cancer can lead to women choosing prophylactic mastectomy. A prenatal diagnostic genetic test may lead to termination of pregnancy. A negative test for breast cancer gene can lead to patients avoiding regular screening for breast cancer. The impact of the results of genetic tests thus can have profound consequences.

2.4.3 Costs of tests

Pricing of a test is based on numerous factors. Depending on the nature and complexity of the test and whether a person's whole family has to be tested to derive a meaningful result for the individual, costs of a test can range from $250 to $3200 (ANDREW 2007). Although many states cover the costs for newborn screening (HOLTZMAN 2006), other PGTs are not covered by public insurance. Private insurance covers for tests, at least in part, provided the test has been ordered by a physician (BERG and FRYER-EDWARDS 2008).

2.4.4 Genetic Discrimination

Even before the human genome project had begun, there was a concern in Americans about genetic discrimination that can result from misuse of genetic information (BERG and FRYER-EDWARDS 2008; HUDSON 2007). Some cases of genetic discrimination have been

documented before HIPAA regulations in 1996 prohibited health insurers from increasing premiums or denying health coverage based on genetic tests (HALL and RICH 2000). According to HIPAA, genetic risk information is regarded as protected health information and cannot be used by group health insurers to be applied as "preexisting condition" exclusions in absence of disease symptoms (HALL and RICH 2000; HUDSON 2007).

Although HIPAA does fairly well to address issues of genetic discrimination for individuals within a group, there are also a couple of major limitations. HIPAA does not address increases in premiums and coverage denial for the entire group of patients with a genetic predisposition for a disease. HIPAA also does not address the use of genetic risk information for "underwriting in the individual insurance market" that is when people purchase insurance directly from the provider and not the employer (HUDSON 2007).

The Americans with disabilities act of 1990 (ADA) provides some protection to employees against employer discrimination based on genetic information (HELMUTH 1999). The ADA act not only protects consumers with physical and mental disabilities against employer discrimination but also protects consumers with perceived disabilities (ZEITZ 1991). Perceived disability can be defined as myths and fears about disease and disabilities. This third prong of the ADA definition is considered to be relevant to genetic discrimination as issues in genetic testing are more close to fears and perceptions of disease rather than real disability (BLANCK and MARTI 1996; ZEITZ 1991). Although the Americans with disabilities act (ADA) provides some protection against employer discrimination, some experts think that this protection is somewhat vague and needs further clarification to assure employee rights against discrimination due to genetic factors (HUDSON 2007).

Thirty-five US states have passed laws addressing employment discrimination and 47 states have laws addressing health insurance discrimination (HUDSON 2007). Despite the laws passed by the states, legal experts think that there is a clear inconsistency and narrowness in the scope of these state laws (HOFFMAN 2001). For example, some states totally ban genetic testing before employment decisions are made whereas some states accept genetic testing if informed consent is obtained from employees before conducting a genetic test (HOFFMAN 2001). Some state laws address genetic discrimination based on physical DNA tests but do not address discrimination based on family history of genetic disease (HOFFMAN 2001). The lack of a precise all inclusive definition of genetic tests is also a major problem that critics consider would be exploited by insurers and employers to discriminate against people (HOFFMAN 2001; HUDSON 2007).

This lack of a comprehensive protection system for consumers is a deterring factor when it comes to people participating in medical research or using the test for clinical care and improved health (HUDSON 2007). This contention has been supported by the fact that consumers usually have a negative opinion about insurance companies and employers when it comes to genetic testing. Hudson (2007) has shown in her survey that 93% percent of people surveyed believed that insurers should not be permitted to use results of genetic tests to modify or deny coverage. Similarly 93% believed that employers should not be allowed to discriminate based on genetic information. 75% of the people also agreed that there should be a law to prevent insurance and employment discrimination from happening (HUDSON 2007). Apse et al (2004) showed that more than half the people surveyed expressed concerns for genetic discrimination and most of them cited that they would either pay out-of-pocket, use false identity or request for test results not being included in the medical records. Surprisingly, not only consumers but even

physicians prefer to take tests by paying out-of-pocket rather than billing their insurance companies (APSE *et al.* 2004; MATLOFF *et al.* 2000). Matloff et al (2000) in their research have shown that 68% of cancer genetic specialists would pay out-of-pocket and 26% would use aliases if they have to get a PGT. This clearly shows the impact of fear of discrimination on the consumers' minds and leads us to believe that legal protections are either inadequate or are not enough to provide assurance to the general public about the safety and privacy of their genetic information.

The new Genetic Information and Nondiscrimination Act (GINA) was proposed to expand on the weakness of the HIPAA and ADA. The Genetic Information and Nondiscrimination Act, that was under consideration until May 20th 2008 is believed to be unique in providing assurance to consumers that it is against the law to discriminate based on genetic information (2008b; HUDSON 2007). The GINA legislation has been introduced six times in the past 12 years and although accepted twice by the US Senate, was unfortunately rejected by the House of Representatives. The enactment of the Genetic Information and Nondiscrimination Act into law by President Bush (2008b; University of Texas2008) on May 21st 2008 provided some respite to critics who have raised concerns about genetic discrimination at the workplace and by insurance companies. The goal of GINA is to prevent insurance and employment discrimination before it becomes "entrenched in society" and encourage genetic testing among Americans (2008b). The new GINA guidelines expand protection from earlier laws. It states that employers and insurance providers cannot discriminate on the basis of health factors, including genetic information. They can also not discriminate based on the mere fact that an individual or family member has ordered a genetic test. GINA covers for discrimination based on test results of a family member and also prohibits discrimination based on individual and non-employer

based plans. GINA also restricts insurers or employers from using requesting, requiring, disclosing or purchasing identifiable genetic information prior to a) enrollment for a job, b) for purposes of underwriting or raising premium rates and c)for creation, renewal or replacement of the plan (2008b). Violation of these laws will lead to civil action under the Employee Retirement Income Security Act (ERISA) to enforce GINA rights. If claimant wins the case, the health plan or the job will be reinstated and penalties of $100 per day will be imposed on the employer or insurance company for each day of non-compliance. For unintentional violations penalties are capped at the lesser of 10% of the amount paid by the employer for its group health plans during the prior year or $500,000. No cap has yet been decided for intentional misconduct (2008b). In addition to the claimant, the Department of Labor will also be able to sue the employer and the Health Insurance Company (2008b). The Equal Employment Opportunity Commission will enact final regulations within one year and GINA will become effective 18 months after the enactment, which is November 21, 2010. For health plans, the GINA will be effective for plan years after May 21, 2009.

(http://74.125.47.132/search?q=cache:ddut7XJaJdIJ:www.buckconsultants.com/buckconsultants/Portals/0/Documents/PUBLICATIONS/Newsletters/FYI/2008/FYI_05_27_08.pdf+genetic+information+and+nondiscrimination+act+and+penalties&cd=1&hl=en&ct=clnk&gl=us&client=firefox-a)

The GINA proposes to change how the consumer will look at genetics and genetic tests in the future. Only time can tell if implementation of GINA changes consumers perceptions and fears of discrimination and encourages them to use genetic tests to improve their health.

2.4.5 Consumer related Research in Predictive genetic testing

Direct-to-consumer PGTs and DTC advertising of predictive genetic tests is a recent phenomenon. Since the only source of information about these tests for the patients prior to DTC advertising is physicians, we would expect the awareness of genetic tests to be low. Conversely, 61% of the people in Philadelphia had heard about a genetic test for cancer risk (PETERS *et al.* 2004). CDC study after the advertising campaign by Myriad in 2003 also showed a 39-45% awareness of genetic tests for breast cancer in women in advertised cities and 31-24% awareness in cities where the ads were not run (2004b). Although research has not yet differentiated between characteristics of people who are more aware of genetic tests compared to others, it does indicate that the development in the area of genetics and genetic tests has managed to reach the general public. In addition to advertisements, this awareness can also be due to increased media attention to genetics driven by zeal and hype about discoveries of disease causing genes.

Past research has determined consumer attitudes and behavioral intentions related to genetic testing (BUNN *et al.* 2002; FROST *et al.* 2001b; KINNEY *et al.* 2000; NORDIN *et al.* 2004) but none have studied the impact of advertisement exposure on attitudes, intentions and behavior. One study on test intentions showed that people affected by a disease had greater intentions to test than the general public. The reason cited for testing was to know if the disease was hereditary and if their children and relatives would be affected by it in the future (KINNEY *et al.* 2000; NORDIN *et al.* 2004). Nordin et al (2004) also reported higher attitude scores in affected individuals compared to general public, suggesting that beliefs and attitudes predict test intentions. Bunn et al(2002) reported that perceived benefits and barriers to genetic testing contributed directly to intentions to test whereas demographics, family history of disease and attitudes had an indirect effect on intentions to test (BUNN *et al.* 2002). Frost et al also observed

that the higher the chance of a disease after a positive result, greater was the intentions to test (FROST *et al.* 2001a). This finding was not significant though. Barsevik et al (2008) measured intentions to communicate test results to family members suggesting attitudes, subjective norms and perceived behavioral control to be significant predictors of intentions (BARSEVICK *et al.* 2008). Lal et al (2007) showed that consumers not only exhibited interest to test them but also showed interest to test their children and family members (LAL *et al.* 2007).

As far as knowledge of genetics is concerned, contradictory reports have been seen in the literature. Rose et al (2005) reported that 72% of respondents in the study stated their knowledge about genetic tests was high compared to 8-16% in the CDC study (2004b; ROSE *et al.* 2005). Rose et al (2005) observed that with higher knowledge, attitudes were seen to be directly related to consumer's knowledge about genetic tests whereas other studies showed that higher knowledge decreased attitudes and intentions to test (ANDRYKOWSKI *et al.* 1997; ARMSTRONG *et al.* 2000; ARMSTRONG *et al.* 2002; GELLER *et al.* 1995). Although researchers have measured intentions in the past, no one has measured consumers' intention and behavior regarding seeking more information about a genetic test and talking to the doctor about the genetic test. Ajzen and Fishbein (1980) stated that attitudes towards different behaviors are based on different set of salient beliefs and these beliefs have to correspond to attitude in action, target, context and time (Ajzen & Fishbein 1980, pg80). For example, in the case of intentions to communicate test results with family members; action is to communicate, target is family members, context is test results and time is time after obtaining the test results. Ajzen and Fishbein (1980) suggest that behavioral criterion will vary based on variations in action, target, context and time (Ajzen & Fishbein 1980, pg 30). Hence to measure intentions to talk with the physician, salient beliefs will

have to be elicited differently compared to beliefs for other intentional or behavioral measures (Ajzen & Fishbein 1980).

2.4.6 Physician research in predictive genetic testing

Researchers and physicians argue that genetic tests should be provided only through a physician (2004a; LIU and PEARSON 2008). Currently, some genetic testing companies refrain from using a physician as a mediator but it is believed that over time, these companies will support policies requiring physician intervention on account of their own interest. Wong (2002) showed that pharmaceutical manufacturers have frequently used the "Learned Intermediary" doctrine to defend themselves from claims arising from drug complications in patients (Wong 2002). Genetic testing companies may want to follow suit and support physician intervention to prevent being sued by patients for providing inaccurate and misleading information through genetic tests. However, if genetic testing companies decide to involve a physician in the process, they need to be careful on deciding whether they should advertise these tests to consumers. Recently, a New Jersey court made a decision in favor of the claimant rejecting the Learned Intermediary doctrine defense of the pharmaceutical company suggesting that the pharmaceutical company had not provided fair risk-benefit information in their ads (Goetz 2008). This suggests that with the advent of DTC advertising, it is not just the physician but also the advertising companies that are held responsible to provide balanced and correct risk benefit information to patients. Currently some companies require physician intervention and others don't (LIU and PEARSON 2008). More studies are required to confirm if either is better than the other.

The American College of Medical Genetics (ACMG) recently suggested that health care professionals alone should order and interpret genetic tests (2004a) but primary care physicians are reluctant to take this new responsibility (BAYLEY 2004). Primary care physicians report that

they do not have sufficient time to counsel patients on genetics and genetic tests (ACTON *et al.* 2000). Physicians especially in practice for less than 10 years were more confident in discussing genetics with patients than those with more than 20 years of practice (ACTON *et al.* 2000). This reflects less knowledge in genetics and a lack of interest in physicians to integrate genetic testing into their practices. Two other studies provide support to the earlier statement by showing that only 29% of US physicians consider themselves qualified to provide genetic counseling to patients (FREEDMAN *et al.* 2003) and almost 48% report having no formal education in genetics (BOTTORFF *et al.* 2005). Freedman et al (2003) showed in their research that although most of the physicians considered themselves to be qualified to recommend genetic tests to their patients; they also suggested lack of proper guidelines to recommend genetic tests and manage patients with positive results.

With researchers recommending policies requiring physician intervention for genetic tests, the evidence on the knowledge of physicians about genetics and their interest to incorporate genetics in their regular routine is discouraging. This leads to the question, why physicians should order these tests, when they themselves are inadequately trained and less confident to recommend or counsel patients? Some reasons could be that physicians possess more knowledge about genetics and medicine compared to patients. They can search for information about genetic tests and evaluate the information more critically than consumers. Since they have the patient's interest in mind they can communicate the information more accurately and honestly compared to a testing company. Finally, if the primary care physician is less confident, then they can always refer the patients to medical geneticists or oncologists who posses greater knowledge about genetics and genetic tests and can appropriately guide the patients.

2.5 Direct-to-consumer Advertising of Genetic tests

There is a dearth of information in the literature on advertising of genetic tests. This could be due to recent use of this strategy by genetic testing companies. The CDC study (2004) showed that advertising increased awareness of genetic tests in consumers and physicians (39-45% in advertised cities compared to 21-24% in comparison cities). It also showed that physicians in advertised cities reported greater inquiry of tests and ordered more tests compared to physicians in comparison cities. One major drawback of the CDC study is that there is no way to ascertain that the results were due to advertisement exposure. Hence, it would be incorrect to interpret that advertisement led to increased awareness and intentions in consumers.

Both the CDC study (2004) and Vadaparampil et al (2007) showed that many physicians have reported seeing or hearing advertisements for genetic tests (2000; 2004b; VADAPARAMPIL *et al.* 2007). Vadaparampil et al (2007) also measured if physicians thought that these advertisements were considered by them to be important in health care decision making for which most responded negatively suggesting negative attitudes towards advertising of genetic tests (2000; VADAPARAMPIL *et al.* 2007). Other than these studies the area of advertising of genetics is open for exploration.

Chapter 3

Theoretical model and Hypothesis

3.1 Information Processing Model

Consumers are continuously exposed to healthcare information through media and the internet. This information plays a vital role in consumers' decision making process. From a marketer's perspective, it becomes essential to understand how consumers process, interpret and integrate information to make choices. McGuire's Information Processing Model provides a good basis to understand information processing and behavioral intentions in individuals exposed to advertisements of genetic tests (MCGUIRE 1999).

The model was originally developed as a six stage process (Exposure, Attention, Comprehension, Yielding, Attitude and Behavior) leading to choice (SEVERIN 1997) (p.207). Over the years the model has evolved to a thirteen stage model as shown in Figure 1 (MCGUIRE 1999, p.153).

The model (see **Fig 32)** conceptualizes that based on internal factors including individual characteristics and personality, the decision making process will proceed through the various stages of the model and a failure in any of the steps will break the sequence and prevent any subsequent steps to occur (MCGUIRE 1976). McGuire's Communication persuasion matrix, that is an extension of this model, describes input variables that can impact the steps in the information processing process. These variables are source, message, audience, channel and final target characteristics (MCGUIRE 1999, p.153). "Source characteristics" are credibility, attractiveness and power; "message characteristics" include argument and style; audience

characteristics include demographics, ability, personality and motivation to process information; “channel characteristics” are modality and context. Finally the “target characteristics” are the desired outcomes of a persuasive communication (MCGUIRE 1999) (p.153).

Based on personality, demographics and individual characteristics, people may have different levels of involvement in their healthcare. They may be more or less likely to engage in information processing. Under a high level of involvement, people exhibit greater information search behavior and higher information processing intensity (1998; PETTY *et al.* 1983). People tend to exert a greater cognitive effort to evaluate the relevant arguments and attitude changes occur through the central route of message processing. Some people by nature actively seek information and some do not (CACIOPPO and PETTY 1982). Cohen (1957) describes this need for cognition as "a need to structure relevant situations in meaningful, integrated ways and a need to understand and make reasonable the experiential world"(CACIOPPO and PETTY 1982). Attitude change via the central route is more likely when an individual has the motivation and ability to evaluate message arguments (HAUGTVEDT *et al.* 1992). We can infer that an individual with a high level of involvement and a higher need for cognition will be more likely to attend to the message in the DTC advertisement of a genetic test and process information more intensively than an individual with low involvement and lesser need for cognition. This might lead to greater information search and test inquiry intent in the higher involvement and higher need for cognition group.

3.2 Health Belief model

The Health Belief Model (see **Fig 33)** was developed by Rosenstock in the 1950’s and further developed by Becker later in the 80’s (Meei-shia chen, 1986). The model predicts health

behaviors based on four main components: 1) Perceived severity of disease 2) Perceived susceptibility to disease 3) perceived barriers and 4) Perceived benefits. The greater the perceived threat of the disease, the greater is the likelihood of patients taking recommended preventive action. Perceived threat is explained by perceived susceptibility and perceived severity of the disease. The greater one perceives the seriousness of the disease and his/her susceptibility to acquire it, the greater the likelihood of taking positive action. The greater the perceived benefits and lesser the perceived barriers, the greater is the possibility of desired health behavior by patients. Demographic factors such as age, gender, ethnicity, and cues to action such as media or advertisements and family history of disease could also impact health behavior by increasing perceived threat in the individual (Galvin 1992).

The genetic testing literature suggests that the best candidates for genetic tests are those with a long family history of the disease because the tests results are more relevant and accurate for that population (BERG and FRYER-EDWARDS 2008; LACOUR *et al.* 2008; LIU and PEARSON 2008). Some patients by nature tend to worry more about their health and susceptibility to a disease than others. Also, some might perceive the severity of a disease to be higher compared to others. The current study proposes to establish the relationship between these variables and intentions based on the theoretical framework of The Health Belief Model. Although the model has been tested on numerous occasions in the past, one of the criticisms of the model is that there are other factors substantially affecting health behavior that are not explained by the Health Belief Model (Galvin 1992). There are other beliefs and attitudes and not just health beliefs that predict health behavior. For example, talking about a genetic test with a physician can depend on the patient's perceptions of physician knowledge, privacy of genetic information, and concern about insurance discrimination. Considering this limitation, the current study also uses the

theoretical framework of Ajzen and Fishbein's Theory of Reasoned Action to explain beliefs that impact a consumer's intention to discuss with physicians about a genetic test.

3.3 Theory of Reasoned Action

The Theory of Reasoned Action was proposed by Fishbein and Azen (1975, 1980) to understand consumer behavior. The model has three components that either directly or indirectly determine behavior. **Figure 34** shows a representation of the model with the model components and causal flow.

According to Fishbein&Ajzen (1980), attitudes are determined by salient beliefs that the consumer has about the attitude object and the strength of each belief. An attitude is thus the salient belief whether the outcome of performing behavior would be positive or negative whereas the strength of the belief is the probability that performing the behavior would result in the belief being manifested. Subjective norm, as defined by Fishbein and Ajzen (1980), is the perception of relevant others about the outcomes of the subject performing the behavior and the motivation of the subject to comply with important others opinions. The theoretical framework of Theory of Reasoned action provides the explanation of the relationship between attitudes and consumers' intention to perform a behavior.

In the past, The Theory of Reasoned Action has provided a useful framework to understand decision making in general situations such as watching television, using the internet, and using coupons (LOKEN 1983; NJITE and PARSA 2005; SHIMP and KAVAS 1984). It has also proven useful in understanding decision making in the healthcare domain. The framework has been used to examine consumers' attitudes, beliefs, subjective norms and intentions for purchasing generic prescription drugs, adhering to treatment, and infection control among

healthcare workers (BRINBERG and CUMMINGS 1984; BURNETT *et al.* 1995; CREEDON 2006; ZIVIN and KALES 2008). The consumer behavior literature provides extensive support for the models contention about the influence of beliefs and subjective norms on one's intention to perform a behavior. Our study proposes to use this model to understand the influence of consumer beliefs on intentions to seek more information and to talk with the physician about a predictive genetic test after an advertisement exposure.

3.4 Study Hypotheses

On the basis of the Information Processing Theory, the Health Belief Model and Theory of Reasoned Action, the study variables can be represented by the following equation:

Test inquiry intention (TII) = f (Gender, FH, EDNL, Age, Race, Income, HS, NFC, INV, BEL_AD, BEL_TLK, SN, ATT_TLK, PT, ATT_GT, BEL_RX, ATT_RX)

Information search intent (ISI) = f (Gender, FH, EDNL, Age, Race, Income, HS, NFC, INV, BEL_AD, PT, ATT_GT)

Intentions to take the genetic test (ITT) = f (Gender, FH, EDNL, Age, Race, Income, HS, NFC, INV, BEL_AD, PT, ATT_GT)

FH is the family history of the consumer that assesses if any of their first-line or second-line blood relatives have had the disease. HS is the consumer's overall health status. EDNL is the

education level of the consumer. NFC (need for cognition) assesses the individual's nature to engage in and enjoy effortful cognitive work. INV is the involvement of consumers in their healthcare. BEL_AD is the consumer's beliefs about the advertising of genetic tests. BEL_TLK is the consumer's beliefs about talking to their doctor about the advertised genetic test. SN is the subjective norms or perceptions of important others opinion about a subject performing a behavior. ATT_TLK is the consumer's attitudes towards talking to their physician about the advertised genetic test. PT is the overall perceived threat of acquiring the disease in the future. PT is a product of perceived susceptibility to disease and perceived severity of the disease. ATT_GT is the attitudes toward genetic testing in general. BEL_RX is the beliefs of consumers' about requiring a prescription for the genetic test. ATT_RX is the attitudes of consumers about requiring a prescription for a genetic test. Intention to talk to their doctor about a genetic test that consumers' have seen advertised will be referred to as "test inquiry intent (TII)".

Test Inquiry Intention

Ho1: Consumer intentions to talk to the physician about the advertised genetic test will be a function of the consumers' beliefs about talking to the physician about the advertised test, attitudes about talking to the physician, subjective norms, perceived threat of advertised diseases, family history, involvement, need for cognition, attitudes about genetic testing, attitudes about requiring a prescription for the genetic test, health status and demographic characteristics.

Ho2: There is no significant difference in test inquiry intent between consumers who have positive beliefs about talking with their physician about the advertised predictive genetic test compared to those with negative beliefs.

Ho3: There is no significant difference in test inquiry intent between consumers who have positive attitudes about talking with their physician about the advertised predictive genetic test compared to those with negative attitudes.

Ho4: There is no significant difference in test inquiry intent between consumers who have higher subjective norm scores compared to those with lower scores.

Ho5: There is no significant difference in test inquiry intent between consumers who perceive greater threat of disease compared to lesser threat of disease.

Ho6: There is no significant difference in test inquiry intent between consumers who have a family history of the advertised disease compared to those without a family history.

Ho7: There is no significant difference in test inquiry intent between consumers who are highly involved in their healthcare compared to those who are less involved in their healthcare.

Ho8: There is no significant difference in test inquiry intent between consumers who have higher need of cognition scores compared to those with lower need for cognition scores.

Ho9: There is no significant difference in test inquiry intent between consumers who report better overall health compared to others.

Ho10: There is no significant difference in test inquiry intent between consumers who have positive attitudes about genetic testing in general compared to those who have negative attitudes.

Ho11: There is no significant difference in test inquiry intent among consumers who have positive beliefs about advertising of predictive genetic tests compared to those who have negative beliefs about advertising of predictive genetic tests.

Ho12: There is no significant difference in test inquiry intent between consumers who have positive beliefs about requiring a prescription for a genetic test compared to those with negative beliefs.

Ho13: There is no significant difference in test inquiry intent between consumers who have positive attitudes about requiring a prescription for a genetic test compared to those with negative attitudes.

Ho14: There is no significant difference in test inquiry intent between consumers based on their gender.

Ho15: There is no significant difference in test inquiry intent between consumers based on their level of education.

Ho16: There is no significant difference in test inquiry intent between consumers based on their age.

Ho17: There is no significant difference in test inquiry intent between consumers based on their race.

Ho18: There is no significant difference in test inquiry intent between consumers based on their income.

Information Search Intent

Ho19: Consumer intentions to look for information about the advertised genetic test will be a function of the consumers' perceived threat of advertised diseases, family history, involvement, need for cognition, attitudes about genetic testing, attitudes about requiring a prescription for the genetic test, health status and demographic characteristics.

Ho20: There is no significant difference in information search intent (ISI) between consumers who perceive greater threat of disease compared to lesser threat of disease.

Ho21: There is no significant difference in information search intent (ISI) between consumers who have a family history of the advertised disease compared to those without a family history.

Ho22: There is no significant difference in information search intent (ISI) between consumers who are highly involved in their healthcare compared to those who are less involved in their healthcare.

Ho23: There is no significant difference in information search intent (ISI) between consumers who have higher need of cognition scores compared to those with lower need for cognition scores.

Ho24: There is no significant difference in information search intent (ISI) between consumers who report better overall health compared to others.

Ho25: There is no significant difference in information search intent (ISI) between consumers who have positive attitudes about genetic testing in general compared to those who have negative attitudes.

Ho26: There is no significant difference in information search intent (ISI) among consumers who have positive beliefs about advertising of predictive genetic tests compared to those who have negative beliefs about advertising of predictive genetic tests.

Ho27: There is no significant difference in information search intent (ISI) between consumers based on their gender.

Ho28: There is no significant difference in information search intent (ISI) between consumers based on their level of education.

Ho29: There is no significant difference in information search intent (ISI) between consumers based on their age.

Ho30: There is no significant difference in information search intent (ISI) between consumers based on their race.

Ho31: There is no significant difference in information search intent (ISI) between consumers based on their income.

Intentions to take the genetic test

Ho32: Consumer intentions to take the advertised genetic test will be a function of the consumers' perceived threat of advertised diseases, family history, involvement, need for cognition, attitudes about genetic testing, attitudes about requiring a prescription for the genetic test, health status and demographic characteristics.

Ho33: There is no significant difference in intention to test (ITT) between consumers who perceive greater threat of disease compared to lesser threat of disease.

Ho34: There is no significant difference in intention to test (ITT) between consumers who have a family history of the advertised disease compared to those without a family history.

Ho35: There is no significant difference in intention to test (ITT) between consumers who are highly involved in their healthcare compared to those who are less involved in their healthcare.

Ho36: There is no significant difference in intention to test (ITT) between consumers who have higher need of cognition scores compared to those with lower need for cognition scores.

Ho37: There is no significant difference in intention to test (ITT) between consumers who report better overall health compared to others.

Ho38: There is no significant difference in intention to test (ITT) between consumers who have positive attitudes about genetic testing in general compared to those who have negative attitudes.

Ho39: There is no significant difference in intention to test (ITT) among consumers who have positive beliefs about advertising of predictive genetic tests compared to those who have negative beliefs about advertising of predictive genetic tests.

Ho40: There is no significant difference in intention to test (ITT) between consumers based on their gender.

Ho41: There is no significant difference in intention to test (ITT) between consumers based on their level of education.

Ho42: There is no significant difference in intention to test (ITT) between consumers based on their age.

Ho43: There is no significant difference in intention to test (ITT) between consumers based on their race.

Ho44: There is no significant difference in intention to test (ITT) between consumers based on their income.

Information Search Behavior

Ho45: There is no significant difference in information search behavior (ISB) between consumers who expressed greater information search intent compared to those who showed lesser intent for information search.

Experimental Study Hypotheses

Ho46: There is no significant difference between consumers' attitudes towards an advertisement based on whether the advertising company requires a prescription for the advertised genetic test.

Ho47: There is no significant difference between consumers' attitudes towards the advertised genetic test based on whether the advertising company requires a prescription for the genetic test.

Ho48: There is no significant difference between consumers' attitudes towards the company based on whether the advertising company requires a prescription for the genetic test.

Ho49: There is no significant difference between consumers' intention to take the genetic test based on whether the advertising company requires a prescription for the genetic test.

Chapter4

Research Methodology

The research design of this study reflects three main objectives. First, we attempt to assess the perceptions of consumers about advertising of genetic tests directly to them. Secondly, we assess if test inquiry intent and information search behavior differ based on the beliefs, health characteristics and personality of individuals. Finally, we attempt to measure if prescription requirement to take the genetic test has an impact on consumer attitudes and intentions.

This study integrates three different types of methods to measure the variables of interest. First, a series of qualitative focus groups will be conducted to assess beliefs of consumers about advertising of genetic tests, their beliefs about test inquiry intent and finally their beliefs about requiring a prescription for predictive genetic testing. The responses obtained from the qualitative focus groups will also be used for scale development for the main study. Secondly, a descriptive study analysis will be conducted, the goal of which would be to classify consumers more likely to seek more information and inquire about the test. The descriptive component of the study will test for model variables to better understand consumer information processing and decision making. Finally, the experimental component of this study will assess the impact of prescription requirement on consumers' test inquiry intent, attitude towards the ad (Aad), attitude towards the company marketing the test (Ac) and attitude towards the advertised genetic test (Ab).

4.1 Qualitative Focus Groups: Assessment of Consumers' Perceptions

Qualitative focus groups will be conducted to gain in-depth understanding of the beliefs of consumers about advertising of genetic tests, test inquiry intent and prescription requirement to take the genetic test. Further, consumer preferences will be obtained for type of information they would like to see in these advertisements.

4.1.1 Selection of DTC ad stimulus

A fictitious "RTF®" genetic test for multiple health conditions was chosen for this study. The purpose of choosing multiple health conditions was to have sufficient respondents with a family history of the disease. The health conditions selected were a mix of cancers and other health conditions namely rheumatoid arthritis, Alzheimers disease, lung cancer, pancreatic cancer and colon cancer. We selected health conditions for which individual genetic tests were available so that information obtained from the study could be applied to real market situation. A fictitious "gene" test was selected to avoid any pre-existing biases. Existing ads in the market were used as templates for this study. The same ad was used for the focus groups, descriptive study and experimental study.

4.1.2 Study Population

The study population included people who resembled closely to the final study and for whom the genetic test would provide useful information. Consumers age 21 and above were included in the study.

4.1.3 Study Method

Study participants were recruited using a convenience sample technique from the Athens Metropolitan area. An advertisement was emailed to consumers in local email listings. A snow-

balling sampling method was used to recruit study participants representing age spectrum, racial preferences and educational backgrounds.

Personal interviews and discussion were conducted at the University of Georgia, College of Pharmacy. The topic guide for these interviews was developed after discussion with faculty and staff members at the University of Georgia. The discussion groups were initiated following brief introductory remarks describing the study and the investigators, and introductions by participants themselves. Initially a free elicitation technique was used to elicit consumers' perceptions and beliefs followed by a more structured approach to elicit discussion of issues central to our study objectives. Hence, information such as consumers' perceptions about advertising of genetic tests, requirement of prescriptions for genetic tests and perceptions about talking with their doctor about an advertised genetic test were discussed. The group size ranged from six to seven participants in a group with a total of three to four groups. Each focus group lasted for about 90 minutes. At the end of the discussion, participants were given a $30 gift card as a token of appreciation.

After the end of each focus group, the discussion results were transcribed and an assessment was made of the issues that were subject to discussion. Key notes were identified that summarized consumers' opinions about the issues discussed in the focus groups. Focus groups were discontinued when group responses become redundant.

4.2 Quantitative Descriptive Study: Assessing Impact of Model Variables

Quantitative descriptive study was conducted to understand consumer information processing and to evaluate the impact of model variables on consumer decision making. This study utilized a randomized descriptive study design. Qualtrics online survey software was used

to create the survey. Subjects were recruited through Qualtrics consumer panel database. The subjects were exposed to the ad stimulus and responded to measurement scales on a self-administered questionnaire. The study constructs are operationally defined below.

4.2.1 Selection of DTC ad Stimulus and study population

The genetic test and DTC ad stimulus were same as that used for the focus groups. Similar to the focus groups, the study population consisted of individuals who were 21 years of age or older. Respondents were recruited from Qualtrics consumer panel database.

4.2.2 Study Construct Operationalization and Measurement

The constructs measured for the descriptive component of the study were test inquiry intent (TII), information search intent (ISI), intention to test (ITT), information search behavior (ISB), family history (FH), overall health status (HS), need for cognition (NFC), beliefs about advertising of genetic tests (BEL_AD), beliefs about talking to the physician about the advertised genetic test (BEL_TLK), attitudes about talking to the doctor about the advertised genetic test(ATT_TLK), perceived threat of disease (PT), attitude towards genetic testing in general (ATT_GT), beliefs about requiring a prescription for the genetic test(BEL_RX) and attitudes about requiring a prescription for the advertised genetic test (ATT_RX). Items employed on all measurement scales were adapted to the domain of genetic tests.

1) Test Inquiry Intent (TII)

For this study, test inquiry intent was operationally defined as the likelihood that the consumers will inquire about the advertised test during their next physician visit. Intention to test was measured using three items on a seven-point semantic differential scale adapted from the drug inquiry intention scale developed by Mackenzie and Lutz (MACKENZIE *et al.* 1986). The

scale has a good reliability with Cronbach's alpha > 0.8. The items to measure test inquiry intent are listed below.

Test Inquiry Intention Scale (TII)								
Likely	-------	-------	-------	-------	-------	-------	-------	Unlikely
Probable	-------	-------	-------	-------	-------	-------	-------	Improbable
Possible	-------	-------	-------	-------	-------	-------	-------	Impossible

2) Information search intent (ISI)

For this study, Information search intent was operationally defined as the likelihood that the consumer will search for more information about the advertised test during the next week. Information search intent was measured using three items on a seven-point semantic differential scale adapted from the drug inquiry intention scale developed by Mackenzie and Lutz (MACKENZIE *et al.* 1986). The scale has a good reliability with Cronbach's alpha > 0.8. The items to measure test inquiry intent are listed below.

Information search intent Scale (ISI)								
Likely	-------	-------	-------	-------	-------	-------	-------	Unlikely
Probable	-------	-------	-------	-------	-------	-------	-------	Improbable
Possible	-------	-------	-------	-------	-------	-------	-------	Impossible

3) Intention to take the genetic test (ITT)

For this study, intention to test was operationally defined as the likelihood that the consumer will take the test within the next three months. Intention to test was measured using three items on a seven-point semantic differential scale adapted from the drug inquiry intention

scale developed by Mackenzie and Lutz.(MACKENZIE *et al.* 1986). The scale has a good reliability with Cronbach's alpha > 0.8. The items to measure test inquiry intent are listed below.

Intention to test (ITT)								
Likely	-------	-------	-------	-------	-------	-------	-------	Unlikely
Probable	-------	-------	-------	-------	-------	-------	-------	Improbable
Possible	-------	-------	-------	-------	-------	-------	-------	Impossible

4) Information Search Behavior (ISB)

For this study, information search behavior was defined as the actual information search performed by the consumer. It was measured by a one-item discrete choice option. The question will ask the consumers to click on a yes or no option to look for more information about the advertised genetic test.

Information Search Behavior (ISB)
i) Do you want to learn more about the "RTF®" genetic test now?
Yes ----- No ------

5) Family History (FH)

For this study, a person was said to have a family history of the disease if any of the individual's first line or second line relatives have had the disease. Family history will be measured using a single item with three choices.

Family History			
Have any of your family members (father, mother, brother, sister, grandfather, grandmother, aunts and uncles) have had ……..			
	Yes	**No**	**Don't know**
Rheumatoid arthritis			
Alzheimer's disease			
Colon cancer			
Lung cancer			
Pancreatic cancer			

6) Health status (HS)

Health status is defined as the patient's perception of the severity of their current overall health status. The study will use a one-item seven-point Likert scale to measure general overall health status of the patient.

Health Status
In general, my overall health condition is ……..
BAD ------ ------ ------ ------ ------ ------ ------ GOOD

7) Need for Cognition (NFC)

Need for cognition is defined as "perception of one's desire to engage in effortful thinking" (CACIOPPO and PETTY 1982). The scale used to measure this construct was a modified short version of the scale adapted from Petty and Cacciopo's original need for cognition scale (CACIOPPO and PETTY 1982). Need for cognition scale is one-dimensional scale and earlier

research has shown that reducing the original 34 item scale to 16 items provided reliable estimates (PERRI and WOLFGANG 1988). The reliability for their scale was 0.88 which was comparable to the original scales reliability of 0.87. This could be done because all the items were measuring just one construct. So to reduce responder burden, we used the same procedure as Perri and Wolfgang to develop a five-item seven-point Likert scale based on the highest factor loadings obtained from the 16 item short NFC scale.

Need for Cognition Scale ((CACIOPPO and PETTY 1982)
i) I only think as hard as I have to. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
ii) I am an intellectual Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
iii) I really enjoy the task of coming up with new solution to problems Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
iv) I feel relief than satisfaction after completing a task that required a lot of mental effort Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
v) I would rather do something that requires little thought than something that is sure to challenge my thinking abilities Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree

8) Involvement (INV)

In this study involvement is defined as the "patients' perceptions of their overall involvement in their healthcare" (Perri 1984). The scale used to measure healthcare involvement is adapted from the scale used by Perri et al (1986) in their research in direct to consumer

prescription drug advertising. Their involvement scale is a four-item seven-point Likert type scale with Cronbach's alpha = 0.83 (PERRI 1986) but our study used the three items with highest factor loadings.

Involvement Scale (PERRI 1986)
In general, I consider myself to be very involved in my health care Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
I rarely look for information regarding healthcare issues Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
I generally pay attention to healthcare information that I am exposed to Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree

9) Beliefs about advertising of genetic tests

This construct will be measured using items adapted from Perri & Nelson's beliefs about advertising scale to determine consumer beliefs towards advertising of prescription drugs (PERRI and NELSON 1987).

Beliefs about advertising scale (BEL_AD)
Predictive genetic test information should only come from a doctor. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Predictive genetic tests should not be advertised to consumers. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
I think that consumer advertisements for predictive genetic tests would provide consumers with information they have the right to know Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Consumers want to know more about predictive genetic tests that are available Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Predictive genetic tests should not be advertised like other products Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Predictive genetic test advertisements can protect consumers from doctors who are not well informed. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
I would like to see more advertisements for genetic tests. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree

10) Beliefs about Test Inquiry Intent (BEL_TLK) &

11) Beliefs about requiring a prescription for a genetic test (BEL_RX)

These constructs represent the variables that have not been subjected to evaluations in prior research. We developed scales to measure these constructs. For this purpose, we created an item pool by conducting interviews with experts in the field of healthcare and advertising. The

generated items were then adapted for measuring consumers' beliefs about test inquiry intent and consumers' beliefs about requiring a prescription for a genetic test after an ad stimulus. Prior to using these scales in the main study, we pretested them in a convenience sample of 23 subjects to assess the psychometric properties of the scale and to ensure clarity and comprehensibility of the measurement scale.

Beliefs about Test Inquiry Intent (BEL_TLK)
Talking with my doctor about a genetic test that I saw advertised is a good idea Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Talking with my doctor about a genetic test that I saw advertised will provide useful information Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Talking with my doctor about a genetic test that I saw advertised will spoil my relationship with my physician Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Talking with my doctor about a genetic test that I saw advertised will help me decide if I should take the genetic test. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree

Beliefs about prescription requirement for a genetic test (BEL_RX)
My health insurance company could get the results. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
My employer could get the results. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
My test results won't be private anymore. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Doctors will decide if I need a test, and not me and this could be bad. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
I would not have the right to decide about my own body. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
I will no longer have access to information about my own body and it is a bad thing. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Doctors will need a lot more information on genetic tests to decide if the tests are right for me. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Doctors will need a lot more experience with genetic tests to decide if the tests are right for me Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
Doctors will need to learn more about genetic tests to decide if the tests are right for me. Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree

12) Attitudes about test inquiry (ATT_TLK)

Attitude about test inquiry was defined as the consumers' predisposition to respond in a favorable or unfavorable manner about talking with their doctor about the advertised genetic test.

Attitudes about test inquiry (ATT_TLK)								
Bad	-------	-------	-------	-------	-------	-------	-------	Good
Wise	-------	-------	-------	-------	-------	-------	-------	Foolish
Harmful	-------	-------	-------	-------	-------	-------	-------	Beneficial
Useful	-------	-------	-------	-------	-------	-------	-------	Useless

13) Attitudes about requiring a prescription for a genetic test (ATT_RX)

Attitudes about requiring a prescription was defined as the consumers' predisposition to respond in a favorable or unfavorable manner about requiring a prescription for a genetic test.

Attitudes about requiring a prescription (ATT_RX)								
Bad	-------	-------	-------	-------	-------	-------	-------	Good
Wise	-------	-------	-------	-------	-------	-------	-------	Foolish
Harmful	-------	-------	-------	-------	-------	-------	-------	Beneficial
Useful	-------	-------	-------	-------	-------	-------	-------	Useless

14) Subjective norms (SN)

Subjective norms is defined as "one's perception of important others opinion of the individual performing a particular behavior" (Fishbein 1980). Subjective norms were measured using three-item seven- point Likert type scale. The items are shown below.

Subjective norm Scale (SN)
People who are important to me would think that I should discuss with a physician about the advertised genetic test Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
People who are important to me would approve of me discussing about the advertised genetic test to a physician Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree
People who are important to me would feel very unhappy about me discussing the advertised genetic test with my physician Strongly Disagree ------ ------ ------ ------ ------ ------ ------ Strongly agree

15) Perceived threat (PT), Perceived susceptibility (PSu) & Perceived severity

In this study, perceived threat was measured as a product of perceived susceptibility of disease (PSu) and perceived severity of disease (PSe). For this study perceived susceptibility is defined as the individual's perceived risk of contracting a disease. Perceived severity is defined as the person's perception of the impact of contracting the disease. It was measured on a seven-point semantic differential scale using three items. The items in the scale were adapted from Everett's perceived risk scale and Manne's perceived susceptibility scale (EVERETT 1989; MANNE *et al.* 2003). Perceived severity and perceived susceptibility were measured for rheumatoid arthritis, Alzheimer's disease, colon cancer, lung cancer and pancreatic cancer.

Perceived Susceptibility scale (PSu)
i) What do you think is your risk of developing colon cancer compared to people of your age group? Very Low Risk ------- ------- ------- ------- ------- ------- ------- Very High Risk
ii) How afraid are you of developing colon cancer in the future Not at all afraid ------- ------- ------- ------- ------- ------- ------- Very Afraid
iii) How likely do you think you would be to develop colon cancer in the future? Not at all likely ------- ------- ------- ------- ------- ------- ------- Very Likely

Perceived Severity scale (PSe)
i) How severely do you think your developing colon cancer will disrupt your physical health? Not at all disruptive ------ ------ ------ ------ ------ ------ ------ highly disruptive
ii) How severely do you think your developing colon cancer will disrupt your emotional health? Not at all disruptive ------ ------ ------ ------ ------ ------ ------ highly disruptive
iii) How dangerous do you think colon cancer will be, if you contract it? Not at all dangerous ------ ------ ------ ------ ------ ------ ------ very dangerous

16) Attitudes towards genetic testing (ATT_GT)

In this study, attitudes towards genetic testing are defined as the consumers' predisposition to respond in a favorable or unfavorable manner to genetic testing in general (MUEHLING and LACZNIAK 1988). The scale developed by Muehling and Laczniak will be used

in this study to measure attitude towards genetic testing. The scale exhibits excellent internal consistency measured by Cronbach's alpha=0.95

Attitude towards Genetic testing scale (ATT_GT)								
Bad	-------	-------	-------	-------	-------	-------	-------	Good
Unpleasant	-------	-------	-------	-------	-------	-------	-------	Pleasant
Unfavorable	-------	-------	-------	-------	-------	-------	-------	Favorable

17) Covariates

Covariates such as demographics and variables related to past ad exposure were measured in this study. Consumers' age was measured using six categories (18-25 yrs, 26-35 yrs, 36-45 yrs, 46-55 yrs, 56-65 yrs and above 65 years). Race was measured using seven categories (American Indian or Alaska native, Asian, African American, Hispanic or Latino, Native Hawaiian or other Pacific Islander, White and others). Educational level was also categorically measured (Less than high school, High school graduate or equivalent, Associates/Technical/Vocational degree, Completed some part of college, College graduate and Graduate school or higher). Annual household income was measured using seven categories (less than $15000, $15000-$24999, $25,000-$34999, $35000-$49999, $50000-$74999, $75000-$99999, $100000 or more). Prior exposure to advertisements of genetic tests was a dichotomous measure. Consumers were asked to respond to categorical questions about where they saw an advertisement (Magazines, Newspaper, Internet, Doctors office, Television or other) for a genetic test and when they saw it (within last one month, 1-2 months, 2-3 months, 3-6 months, 6months-1 year, more than a year). Consumers who responded having seen an advertisement in the past were asked to recall the name of the genetic test or health condition for which the test

was used. Consumers' past behavior after exposure to DTC ads for genetic tests was measured using a dichotomous measure which indicated if they had ever talked to their doctor about a genetic test after having seen a DTC ad. Finally, consumers were asked if they would like to see any additional information in the advertisement that would help them make an informed decision.

4.2.3 Sample Size Estimation

Power tables developed by Cohen (1988) were used to determine the sample size for this study. Cohen describes that the power of a statistical test depends on the magnitude of the effect size (true differences in the population), significance criterion (Type I error rate) and the sample size. For an alpha level of 0.05, researchers recommend 80% power as adequate power for the study (SAWYER and BALL 1981). Since the variables in the study have not been studied before, a medium effect size was assumed to calculate the total sample size.

To address the study objectives, we proposed to determine if significant differences existed between consumer intentions when exposed to an advertisement of a genetic test with respect to their demographics, health status, family history, need for cognition, healthcare involvement, beliefs about advertising of genetic tests, beliefs about talking with their physician about the advertised genetic test, subjective norms, attitudes about genetic testing, perceived threat of advertised diseases and attitudes about requiring a prescription for a genetic test. For this purpose, we proposed to conduct t-tests and one way ANOVAs with intention to talk to the physician, intention to seek more information about the genetic test and intention to take the genetic test representing the dependent variables. For an alpha level of 0.025, 80% power and a medium effect size of 0.30, a total of 350 people were required for the study (Cohen 1988; table 2.4.1, pg 55) when using ANOVA for analysis. We also proposed to conduct multiple regression

analysis to determine the combined effect of the predictor variables on various intention measures. For a medium effect size of 0.10, 18 variables, R^2 0f 0.09,an alpha level of 0.05 and 80% power, a total of 203 subjects were required for this study (Cohen 1988; table 9.4.2p 454). Since the ANOVA required 350 subjects and the regression analysis required 325 subjects, we used the higher of these two desired samples as the effective sample size for our study. However, to account for attrition effects, the study attempted to get 400 responses.

4.2.4 Method of administration

The study was a cross-sectional study administered online through Qualtrics Inc. Study participants were randomly selected from Qualtrics 'consumer panel database. Study participants were selected after screening for inclusion criteria. Before the study was administered, approval was obtained from the Institutional review board (IRB) at The University of Georgia, Athens, GA (PROJECT NUMBER: 2010-10084-1). Data collection was through online interviews employing a structured questionnaire consisting primarily of closed ended questions. Prior to the main study, a pre-test was conducted to check for reliability, readability and clarity of items.

In the main study, consumers were exposed to the DTC ad stimulus. After reading the ad, consumers were asked to respond to measurement scales that assessed consumers' beliefs, attitudes, intentions and behavior related to genetic testing. The participants also responded to demographic questions and questions about prior exposure to DTC ads for genetic tests. Data that was collected online was imported into SPSS v 15.0 for further analysis.

4.2.5 Analyses

First, demographic variables were assessed to see how they compared with other variables in the study. A chi-square analysis, t-test or ANOVA was performed depending on whether the variable measure was categorical or continuous. The next step was to test the model

hypotheses. To test the model function and understand the combined effect of predictor variables, a regression analysis was carried out to determine if the predictor variables in the study were a function of consumer intentions. Univariate T-tests, ANOVA's and chi-square tests were also used to provide an in depth understanding of significant study variables.

4.3 Quantitative Experimental study: Assessing Impact of Prescription Requirement

A quantitative experimental study was conducted to evaluate the impact of prescription requirement on consumers' attitudes and intentions. The study was a randomized post-test only cross-sectional design. Data were collected online from Qualtrics' consumer panel database using Qualtrics software. After exposure to the experimental stimulus, subjects responded to measurement scales and demographic questions. The study variables are operationally defined below.

4.3.1 Selection of DTC ad Stimulus and study population

The genetic test and DTC ad stimulus were same as that used for the focus groups. Similar to the focus groups, the study population consisted of individuals who were 18 years of age or older. Respondents were recruited from Qualtrics consumer panel database.

4.3.2 Study Construct Operationalization and Measurement

The constructs measured for the experimental component of the study were attitude towards the ad (Aad), attitude towards the company marketing the test (Ac), attitude towards the genetic test (Ab) and test inquiry intent (TII). Items employed on all measurement scales were adapted to the domain of genetic tests.

1) Test Inquiry Intent (TII)

For this study, test inquiry intent was operationally defined as the likelihood that the consumers will inquire about the advertised test during their next physician visit. Intention to test was measured using three items on a seven-point semantic differential scale adapted from the drug inquiry intention scale developed by Mackenzie and Lutz(MACKENZIE *et al.* 1986). The scale has a good reliability with Cronbach's alpha > 0.8. The items to measure test inquiry intent are listed below.

Test Inquiry Intention Scale (TII)								
Likely	-------	-------	-------	-------	-------	-------	-------	Unlikely
Probable	-------	-------	-------	-------	-------	-------	-------	Improbable
Possible	-------	-------	-------	-------	-------	-------	-------	Impossible

2) Attitudes towards the advertisement (Aad)

Attitudes towards advertisement is defined as the consumers' predisposition to respond in a favorable or unfavorable manner to genetic test advertisement (MACKENZIE and LUTZ 1989). The scale developed by Mackenzie and Lutz will be used in this study to measure attitude towards advertisement. This scale exhibits excellent internal consistency measured by Cronbach's alpha=0.95.

Attitude towards advertisement scale (Aad)								
Bad	-------	-------	-------	-------	-------	-------	-------	Good
Unpleasant	-------	-------	-------	-------	-------	-------	-------	Pleasant
Unfavorable	-------	-------	-------	-------	-------	-------	-------	Favorable

3) Attitudes towards the marketing company (Ac)

Attitude towards the testing company is defined as the consumers' predisposition to respond in a favorable or unfavorable manner to company marketing the genetic test. The scale developed by Mackenzie and Lutz will be used in this study to measure attitude towards advertisement. The scale exhibits excellent internal consistency measured by Cronbach's alpha=0.95

Attitude towards Genetic testing company scale (Ac)								
Bad	-------	-------	-------	-------	-------	-------	-------	Good
Unpleasant	-------	-------	-------	-------	-------	-------	-------	Pleasant
Unfavorable	-------	-------	-------	-------	-------	-------	-------	Favorable

4) Attitudes towards the genetic test (Ab)

Attitude towards the genetic test is defined as the consumers' predisposition to respond in a favorable or unfavorable manner to the genetic test that was advertised. The scale developed by Mackenzie and Lutz will be used in this study to measure attitude towards advertisement. The scale exhibits excellent internal consistency measured by Cronbach's alpha=0.95

Attitude towards the genetic test (Ab)								
Bad	-------	-------	-------	-------	-------	-------	-------	Good
Unpleasant	-------	-------	-------	-------	-------	-------	-------	Pleasant
Unfavorable	-------	-------	-------	-------	-------	-------	-------	Favorable

4.3.3 Sample Size Estimation

Power tables developed by Cohen (1988) were used to determine the sample size for this study. Cohen describes that the power of a statistical test depends on the magnitude of the effect size (true differences in the population), significance criterion (Type I error rate) and the sample size. For an alpha level of 0.05, researchers recommend 80% power as adequate power for the study (SAWYER and BALL 1981). Since the variables in the study have not been studied before, a medium effect size was assumed to calculate the total sample size.

To address the study objectives, we proposed to determine if significant differences existed between consumer attitudes and intentions with respect to requiring a prescription for a genetic test after exposure to an advertisement. For this purpose, we proposed to conduct t-tests with intention to talk to the physician, attitudes towards the advertisement, attitudes towards the genetic test and attitudes towards the company marketing the test as dependent variables and prescription requirement for a genetic test as the experimental variable. For an alpha level of 0.025, 80% power and a medium effect size of 0.40, a total of 198 subjects were required for the study with 99 subjects in each group (Cohen 1988; table 2.4.1, pg 55).

4.3.4 Method of Administration

A single factor between subjects design was used for this study with prescription requirement as the experimental variable. Data were collected from people randomly assigned to two different groups. Both groups saw the same ad that differed only on the information stating prescription requirement.

The study was a cross-sectional study administered online through Qualtrics. Study participants were randomly assigned to the two experimental groups from the Qualtrics sample panel database. Study participants were selected after screening for inclusion criteria. Before the

study was administered approval was obtained from the Institutional review board (IRB) at The University of Georgia, Athens, GA (PROJECT NUMBER: 2010-10084-1). Data collection was through online interviews employing a structured questionnaire consisting primarily of closed ended questions. Prior to the main study, a pre-test was conducted to check for reliability, readability and clarity of items.

In the main study, consumers in the different experimental groups were exposed to the DTC ad stimulus. After reading the ad, consumers were asked to respond to measurement scales that assessed consumers' attitudes and intentions related to advertising of genetic tests. The participants also responded to demographic questions and questions about prior exposure to DTC ads for genetic tests. Data that was collected online was imported into SPSS v 15.0 for further analysis.

4.3.5 Analysis Plan

We planned to use t-tests to determine which ad outcome measures differed across the two experimental manipulations. To account for the inflation of alpha that may occur because of the several t-tests run to test this objective, we applied the Bonferroni adjustment while interpreting p-values (HAIR JOSEPH R.E 1998)

Chapter 5

Results

5.1 Qualitative study

The qualitative component of this research involved focus group interviews with subjects who were representative of the target population. Accordingly, three such interviews were designed and implemented with 18 consumers above 18 years of age, with each interview comprising 5-7 participants. A summary of the focus group discussions is provided below.

5.1.1 Consumers' opinions about direct to consumer advertising of genetic test

All participants reported having seen some kind of a DTC advertisement in the past. Although only few participants reported having seen an advertisement for predictive genetic tests, many of them believed that it was just a marketing strategy employed by companies with an explicitly financial motive. The general thought was that advertising of genetic tests was not appropriate. One participant said:

> *"Advertising is manipulative and plays on people's emotions, especially the pictures, they are so cheesy sometimes".*

Nevertheless, there was a general consensus towards the opinion that advertisements may be useful in increasing awareness and providing information about healthcare options. Still, overall participants thought that advertising was a marketing gimmick employed by companies to just make more dollars. For example, a participant mentioned:

> *"Companies that are doing the advertising would give you some level of information but their job in the end is that of a sales person".*

A common theme during the discussion of advertising of PGTs revolved around the effects of advertising. Participants expressed concerns that genetic test advertising may create a need for tests that may not be essential. Perhaps, the ads are so compelling as to convince people who do not have a family history or are not appropriate candidates to test to believe that there isn't any risk in getting tested. For example, one participant said:

> *"Sometimes I think, advertisers make people think that maybe I need this test when actually they don't. My mom for example is 66 years old and she thinks that everything is wrong with her and when she sees any ad she thinks that she needs to talk with the doctor about the condition or drug or test that is advertised".*

Although consumers agreed that advertisements provided some useful information, they thought that this information may be biased and also not adequate for them to make an informed decision. In regard to this, a participant remarked:

> "*The danger of advertising is for people who do not think critically because they would be led to believe that the test is the best and they have to take it, without adequate information to make a good decision*".

A general consensus among the group was that people should not rely completely on advertisements for their source of information but they should obtain information from neutral sources such as their physicians, pharmacists and even neutral websites. For example, a participant said:

> *"I think that the ads are informative…hmmm. But I would still do research from a neutral source before arriving at a decision. I do not trust these companies you know".*

Despite all these concerns, consumers were encouraged by the statements in the DTC ads exhorting only consumers with a family history to take the test or even talk to their doctor about the test. Regarding the advantages, participants reported that advertising may draw consumers to seek advice from their healthcare provider, especially when they have a family history of the disease or have been adopted and do not know their family history. In such cases, benefits justify the time and money spent on advertising. In this regard, one participant remarked:

> *"My mother and grandmother have had breast cancer. I think I would talk to my physician, maybe I would even take the test for the peace of my mind and probably I can take some steps to prevent it"*

However, participants reported that advertisers need to provide more information for consumers to be able to make an informed decision, especially with the amount of psychological risks associated with a positive test result. One participant said:

> *"What the…, There is nothing in here about the risks of this test. Now, I know that the test is not risky as such. They mention it is a painless swab but what about the next step? What if I have a high risk for breast cancer and I decide to have a mastectomy".*
>
> *"You might try to cure something that may or may not happen".*

When the discussion on this issue reached the core, consumers were also concerned about the risks associated with a negative result on these tests. Many were alarmed by the emotional consequences that could result from false positives and the false security that could be perceived by consumers who tested negative for a particular risk. A participant remarked:

> *"What if people decide that they do not need to exercise or eat in a healthy way since they do not have a high risk for many diseases?"*

"What if I find out that I do not have a gene for lung cancer? Can I continue to smoke then"?

There was a unanimous agreement among participants that advertising companies should, not only provide information about the accuracy of the test but also information on preventive measures that consumers with positive result could take to reduce their risks. It was observed that study participants were reluctant to take the test when there were no preventive or treatment possibilities. In regard to this, one participant said:

"If there is no preventive or treatment option then I don't want to know about it".

Surprisingly, as the discussion progressed and people started processing the information in the ad, some participants were not even sure why somebody with a family history would even need the test. Their argument was that people with a family history were already at high risk. Hence, what was the point in testing? One participant said:

"if somebody finds out that they have a family history of lung disease then they know they should not smoke or if they have a family history of breast cancer, then you know that you are at high risk and take preventative measures. So why take a genetic test. It would make more sense if these tests are advertised for people without a family history".

This reflects a lack of knowledge in consumers about the limitations of a genetic test. Advertisements need to be clearer about the association of family history with genetic testing. They should explain that a family history is important to make meaningful interpretations from a genetic test. This could reduce utilization of genetic tests in non-risk populations thereby curtailing any adverse psychological risks that can result from inappropriate use of this modern technology.

During the discussion on the issue of advertising of genetic tests directly to consumers, participants identified several problematic issues related to information provided in the advertisements. This group discussion revealed that consumers need the following information to make an informed decision. Hence, if advertising's goal is to really motivate positive health behavior then companies should:

- Provide information about the accuracy of the test
- Provide information on what consumers can do if they test positive or,
- Explain what consumers should do if they test negative
- Provide evidence from a neutral source about research establishing association of the gene with the health risk and the strength of this association. This could be a link on their website or a link on their print advertisement.
- Make consumers aware that there could be emotional risks associated with the test results and they should probably consult an expert before deciding to test and,
- Mention why the test is appropriate for only those with a family history.

5.1.2 Beliefs about talking to their physician about the advertised test

Those participants who responded positively to the advertisement and the genetic test at the beginning of the discussion seemed to have changed their opinion at this point. In this regard, a few participants remarked:

"I was thinking of testing for breast cancer after I saw their advertisement. But, after all this talk, I would rather talk to my doctor about it".

"I trust my physician to tell me what would be the best option".

Realization of the risks and limitations of the tests during the discussion may have prompted this switch of feelings about the advertised genetic test. Consumers were now motivated to seek

expert advice before testing. This implies that further processing of limitation and risk information in the ads during the discussion led to a behavior that could safeguard the consumers from inappropriate use of this genetic test.

However, some consumers thought that doctors may not have adequate information about genetic tests as they were not trained in genetic testing. Nevertheless, the group agreed that doctors would definitely know more about genetic tests compared to them. Also, the doctor was seen as a neutral provider of reliable information. A participant said:

"I am not sure if my doctor would know about this test but I think I will speak with him. At the least, he knows more than me"

A participant reported that talking to his doctor would probably help him make an informed decision.

"I trust my physician to tell me what would be the best option and why. I would then be well educated before I do anything".

Consumers who were interested in the genetic test did not express urgency in talking with their doctor about the advertised test. Consumers indicated that they would not make an appointment to discuss the test with their physician. However, they clearly saw an advantage of talking to their physician about the test during their next visit. In this regard, a participant said:

"If we had a history of the disease from some relative then probably the next time I was having my physical, going in for my regular exams or whatever, then I might mention it but I wouldn't hang up the phone with my aunt and say…Oh my god, she has breast cancer and then call up my doctor and say I really need to have this genetic test done".

This implies that even when consumers are interested to take the test or talk to the doctor about the test, there may be a time lag between intentions and behavior after exposure to advertisement.

Although some participants reported that talking with their doctor about an advertised genetic test was a good thing and may provide them with valuable information, others indicated that they would never speak with their doctor about the test. These consumers were either not interested to learn about their future risks or they were averse to take a genetic test for a heath condition for which there was no treatment or preventive measure possible. For these consumers, unless there was evidence or research that something could be done differently after learning the result of the test, they would not speak with the doctor nor take the test. One participant said:

> *"if there was evidence that for people who carried this gene, we could do something different then probably I would think about it".*

It was observed that participants' relationship with their physician also factored into their decision of talking to their doctor about the advertised test. A participant said:

> *"I do not trust doctors sometimes; they don't give me the time of the day. If the doctor spent time with me and really listened to me then I might…Otherwise I think he is just going to say the same thing that I got off the internet".*

An interesting observation was participants' concerns about insurance discrimination that inhibited participants from seeking advice or taking the test. These participants reported that even if their physician recommends the test, they would not feel comfortable talking about the results with them. Hence, it would not be sensible to talk to the doctor in the first place. In this regard, a participant mentioned:

"What if the insurance company gets access to the results? I am not even sure if there are any laws to protect me from being dropped".

"Then one has the results and cannot discuss with the physician, then what is the point really in talking before testing".

This implies that participants who may benefit from these tests may not seek medical advice due to risk of dropped coverage. These are serious issues that need to be addressed.

Another interesting observation was based on the personality characteristics of the participants. It was seen that those who were less involved with their health or were less concerned about their future health, did not express any desire to speak with their physician about the genetic test. One participant said:

"If it is immediately life threatening then I might take some measures but I could be taking all the steps to prevent this and later die in a car accident. I am going when I am going. I don't want to know too much. I am not the type who worries about their health much".

To summarize, we believe that consumers who were interested in the test would generally talk with their doctor about the test. However, this decision to talk and learn more about the genetic test depended on their relationship with their physician, their fear of contracting the disease and the possibility of preventive and treatment measures being available for the tested health condition. Worries about insurance discrimination were also seen as a potential inhibitor of seeking medical advice about genetic testing. Based on this discussion we developed the following items to measure consumers' beliefs about talking to their physician about the advertised genetic test.

Beliefs about Talking to the Physician
Advertisements of genetic tests should not be discussed with the physician
Talking with my physician about the genetic test that I saw advertised will spoil my relationship with my physician
Talking with my physician about the genetic test that I saw advertised will spoil my relationship with my physician
Talking with my physician about the genetic test that I saw advertised will help me make a better decision if should take the test.

5.1.3 Beliefs about requiring a prescription for a genetic test

Despite criticizing advertisements for genetic tests and supporting the view that consumers ought to consult an expert before taking the genetic test, consumers were unanimous in voicing their opposition to requiring a prescription. Consumers thought that talking to their doctor would be beneficial but requiring a prescription diminishes their freedom to choose what is best for them. A participant said:

"I think you should seek someone's opinion but I don't think it should be mandated. It is my life and it is my decision. Unless it is something illegal I don't want somebody to tell me what I can do or cannot".

Some participants thought that genetic tests were similar to other body tests so prescription should not be necessary. In this regard, one participant said:

"If you have the money and want to do it, then you should be able to do it. It is just like a full body scan and you don't need a doctor's prescription for that".

Consumers felt that genetic tests were not invasive and hence safe. Therefore, they thought that requiring a prescription was unnecessary. They agreed that seeking a doctor's opinion was good, but they were very critical about prescription requirement.

"There is no side effects from the test like a drug hence prescription should not be mandatory"

A major concern among the participants was fear of insurance discrimination that could result from a prescription requirement. They were scared that if companies required a prescription, then their test results might be entered and saved for medical records. Hence, their insurance companies could drop coverage. Even when they were told about HIPAA and GINA guidelines that protect against insurance discrimination, participants were not reassured. They were concerned about the privacy of their results from the doctor, the insurance companies, their employers and also the government.

"My insurance is from my employer. What if the insurance company knows or worse my employer knows that I am a high risk for this disease. What if I lose my job?"

"They are not stupid to tell you that they are laying you off for health reasons".

However, consumers who trusted their doctors to be highly knowledgeable about genetic tests believed that requiring a prescription would safeguard the consumers from companies and tests that are not genuine. In this regard a participant said:

"I trust my doctor knows a lot and I would want him to make the decision".

"I would get referred to as the company might take advantage of me if they did not require a physician approval. I would not trust them"

To summarize, we found that there were three main factors that determined how consumers react to prescription requirement for genetic tests: 1) consumers' perceptions about their right to decide what is best for them 2) Worry about insurance and employer discrimination 3) consumers' perceptions of their doctor's knowledge about genetic tests. Hence to measure consumers' beliefs on requiring a prescription we created a questionnaire that would determine consumers' responses on the above three dimensions.

Beliefs about requiring a prescription
Predictive genetic tests should be available only by prescription
Getting a prescription for a predictive genetic test means insurance companies might know about it and I don't think it is a good thing.
It is my right and not the doctors to decide if a predictive genetic test is suitable for me.
Doctors do not know enough about predictive genetic tests to decide if a genetic test is right for me.
A doctor is the best person to decide if I should take the predictive genetic test to determine my disease risks.

5.2 Quantitative descriptive study

The quantitative component of the study involved administering the ad stimuli (same ad copy as the focus groups) and conducting online interviews with consumers who were representative of the target population for PGT products (consumers 18 years and above). These consumers were first exposed to the ad stimulus and asked to respond to a structured closed-ended questionnaire consisting of rating scales measuring the constructs of interest.

5.2.1 Pretests

A pretest of the survey questionnaire was conducted in order to ensure the measures used were reliable, and that the questionnaire was understandable and clear to the respondents. A total of three pretests were conducted online using Qualtrics sample panel. The first pretest was conducted on 10 consumers and the next two pretests were conducted on 30 consumers. Internal consistency reliability measures were computed for the rating scales that were used in the study. According to Nunnally (1978), the minimum acceptable standard for demonstrating internal consistency reliability using Cronbach's alpha is 0.70.The results of the first pretests revealed that all scales except need for cognition, beliefs about talking with the physician and beliefs about requiring a prescription for the genetic test had excellent internal consistency reliabilities. Hence items for the above three scales were modified and final pretest was conducted. Need for cognition was now also assessed using just one item. Perris et al (1988) showed in their research that need for cognition was one-dimensional. Hence, it was decided that a single item would be sufficient to measure the construct. The final pretest revealed that all our study scales now had excellent reliabilities ranging from (0.70 to 0.97) (**Table1**). Further examination also revealed excellent inter-item and item to total correlations for all the scales. Moreover, removal of any single item from any of the scales, did not lead to a substantial increase in the internal consistency.

Anecdotal evidence showed that respondents did not face any issues in understanding the instructions in the questionnaire or in providing answers to any of the rating scales. On average, respondents took about 25 minutes to complete the entire survey. Since no major issues emerged during the pretests, no significant modifications were made to the instrument, study design and method of recruitment of study participants.

5.2.2 Main Study

The data was collected in March 2010 using the Qualtrics online tool. For this particular study stratification tools were used to balance the sample so the incoming survey starts would mirror the latest census figures. After the stratification was selected, the sampling tool pulled random respondents from the Authentic Response panelist pool, and deployed sample when needed. The survey was sent to a total of 2800 survey participants.410 completes were recorded within five hours. On average, each interview took approximately 25 minutes to complete.

Sample characteristics

A total of 410 complete questionnaires were obtained in accordance with maintaining adequate statistical power (80%). The demographics of the sample are summarized in **Table 2**. About twice the respondents were female. The majority of the respondents were Caucasian (76.3). Approximately 32 % were African American, while 24% were Hispanic and 21% were Asian. At least 70% of the participants in this study had completed a four year college degree.

We also measured consumers past experiences with advertisements for genetic tests. These are summarized in **Table 3.**Only 11.2 percent of the respondents claimed to have seen an advertisement for a genetic test in the past. Most consumers reported having seen these advertisements either on television (26) or internet (22). A total of 21 people also reported having seen advertisements in magazines. This was expected as most companies advertise genetic tests primarily on the internet, magazines and television. However, many people have not seen these advertisements suggesting a low level of awareness among the general public about predictive genetic tests.

After comparison with the US census data it was evident that age, race and income breakdown of the participants was representative of the US population. However, the current

study participant's education level was much higher than the general US population. According to the US Census Bureau 2000 figures, only 24% of the US population had completed a four year college degree compared to 42% in our study. Our study also had two times more females than males. Thus, it can be concluded that overall the study sample was representative of the US population in some respects. However, one should be aware of these demographic discrepancies between the survey respondents and the national population while generalizing the results.

Age

Study participants were above 18 years of age. The age groups were fairly representative of the US population (US census 2000) (see **Table 2)**. We found that age had a significant impact on most of the independent variables in the study. First we evaluated consumer involvement in healthcare by age using analysis of variance. ANOVA-test results revealed that a statistically significant difference was observed ($p < 0.000$) **(Table 4)**. Scheffe's post hoc analysis revealed that consumers who were above 46 years of age were more involved in their healthcare compared to consumers 18-25 years of age. This was expected because younger people tend to be healthier and hence may not feel the need to be more concerned about their healthcare.

Next we evaluated consumer's age and attitudes about advertising of genetic tests (see **Table 5)**. ANOVA-test results revealed that a statistically significant difference was observed ($p < 0.001$). In our study sample, consumers 46-55 and above 65 years of age had positive attitudes about advertising of genetic tests compared to those between the age groups 18-25. Advertising studies have shown that consumers who are highly involved, process information differently than those who are less involved and hence exhibit stronger attitudes towards advertisements(LACZNIAK and MUEHLING 1993). Our finding suggests that consumers who are

middle aged were more involved and hence might have had more positive attitudes about advertising of genetic tests compared to the younger individuals.

The relationship between age and consumer's attitude about genetic testing in general is evaluated in **Table 6.** ANOVA-test results revealed that a statistically significant difference was observed ($p < 0.000$). Results showed that consumers between the age groups 18-25 had significantly lower attitudes about genetic testing compared to people in other age groups. This could possibly be due to lower concerns about health in younger consumers. Hence, younger consumers were not interested to learn their risks of future diseases when compared to people in other age groups.

Next we evaluated relationship between age and perceived threat of Alzheimer's disease (**Table 7)**. As expected, consumers who were between the age groups 36-55 perceived greater threat of Alzheimer compared to younger consumers. ANOVA-test results revealed that a statistically significant difference was observed ($p < 0.002$). Age had a significant impact on whether consumers perceived greater threat of Alzheimer's disease.

Finally, we also evaluated relationship between age and overall health status **(Table 8)**. We assumed that elderly consumers would report poorer health. Although a visual comparison of the means supported our assumption, the difference was not statistically significant. Similarly, the relationships between age and other study variables were not significant.

Gender, Income, Race and Education level

Our study sample comprised 35% males and 65% females (see **Table 2).** We found that sex of an individual did not have a significant impact on any of the independent study variables when tested against a conservative alpha level of 0.003. However, study results showed that women expressed positive beliefs about talking their physician about the advertised genetic test

at higher levels than men ($p<0.006$). Although, these differences did not attain statistical significance, a visual evaluation indicated strong differences (see **Tables 9)**. Similarly, we found that income and race did not have any significant impact on the study variables as well. We assumed that education level would affect consumers need for cognition. However, study results did not indicate a significant difference (see **Table 10).** Study results indicated a significant difference was not obtained when compared at a conservative alpha level of 0.003. Education level did not have any significant impact on other independent study variables.

Post-hoc reliabilities of outcome measures

Internal consistency reliabilities were computed for all scales prior to conducting the univariate and multivariate analysis. All scales demonstrated good internal consistency (0.71to 0.94) (**Table 11)**. Removing any items did not result in a significant increase in the internal consistency of the scales **(Table 12 – 32)**.

Descriptive statistics for outcome measures

Descriptive statistics for the outcome measures are reported in **Table 33.** Results indicate that consumers had favorable perceptions about genetic testing and advertising of genetic tests. This was evidenced by their high scores on the rating scales measuring beliefs about advertising of genetic tests (Mean = 4.54, SD = 0.91) and attitudes about genetic testing (Mean = 5.24, SD = 1.23). Study results also showed that consumers perceived high benefits from talking with their physician about the advertised genetic tests. This was shown by their high scores on the rating scales measuring their attitudes towards talking with their physician about the advertised genetic test (Mean = 5.59, SD = 1.24) and consumers' beliefs about talking with their physician about the advertised genetic tests (Mean = 5.35, SD = 0.98). Although consumers exhibited high intentions to talk with their physician in their next visit (Mean = 4.63, SD = 1.70) and look for

more information about the advertised genetic test (Mean = 4.32, SD = 1.85), they were slightly less inclined to actually take the genetic test within the next three months (Mean = 3.57, SD = 1.85). Further, participants also had slightly favorable perceptions (Mean = 4.36, SD = 1.18) and attitudes about requiring a prescription for a genetic test (Mean = 4.50, SD = 1.62). On average, participants also exhibited high need for cognition (Mean = 5.45, SD = 1.09) and perceived themselves to be highly involved in their healthcare (Mean = 5.33, SD = 1.09). Results also indicated that participants perceived lesser susceptibility to arthritis ($Mean_{arthritis}$ = 3.40, SD = 1.53), Alzheimer's disease ($Mean_{alzheimers}$ = 3.54, SD = 1.46), lung cancer ($Mean_{lung\ cancer}$ = 3.47, SD = 1.59), pancreatic cancer ($Mean_{pancreatic\ cancer}$ = 3.31, SD = 1.41) and colon cancer ($Mean_{colon\ cancer}$ = 3.52, SD = 1.47). However, they perceived a high level of severity for all the above health conditions ($Mean_{arthritis}$ = 4.89, SD = 1.28) ($Mean_{alzheimers}$ = 5.61, SD = 1.41) ($Mean_{lung\ cancer}$ = 5.79, SD = 1.36) ($Mean_{pancreatic\ cancer}$ = 5.75, SD = 1.40) ($Mean_{colon\ cancer}$ = 5.75, SD = 1.35) respectively.

T-tests were conducted to check if the respondent scores on the study constructs differed significantly from the midpoint (4) of the scale. All t-test results were interpreted at alpha = 0.0027 (0.05/18) (**Table 34).** Results showed that all study constructs significantly differed from the midpoint value of (4) of the scale. Since respondents were categorized into high and low groups for the independent variables in the study, t-tests were also conducted to see if these groups were significantly different from each other. The results of these t-tests **(see Table 35 – Table 48)** indicate that the categorized groups for all independent variables were significantly different from each other.

Confirmatory Factor Analysis

A confirmatory factor analysis was performed for all the study constructs. A CFA was needed to ascertain that the measurement items were indeed measuring only the construct of interest. Measurement items were fixed to load only on the constructs they were measuring and then goodness of fit indices were calculated for the data using MPLUS.

Kline (2005) recommends using CFI, TLI, SRMR and RMSEA to determine goodness of fit for models(KLINE 2005). A general rule of thumb for goodness of fit indices is that Comparative Fit Index (CFI) and Tucker- Lewis Index (TLI) values greater than 0.90 are considered acceptable. SRMR values lower than 0.10 and RMSEA values smaller than 0.08 also suggest acceptable model fit (LANCE 2002). However, Bollen (1989) observes that these cut-offs are arbitrary. A more salient criterion may be simply to compare the fit of one's model to the fit of other, prior models of the same phenomenon (BOLLEN 1989). For example, a TLI of .80 may represent progress in a field where the best prior model had a fit of 0.70. Results provided in **Table 49** show that the study model produced a good fit considering that there were no prior models to compare with the study model.

Additionally, as expected, the confirmatory factor analysis indicated three dimensions for beliefs about requiring a prescription. All other constructs were one-dimensional as expected. Further these results also demonstrate evidence for convergent and discriminant validity as all items loaded on their factors as expected. Since all the measurement items appear to reflect their underlying construct, there was some evidence for construct validity.

Test of assumptions for ANOVA, T-tests and Regression analysis

The assumptions that underlie appropriate application of ANOVA's, T- tests and Regression include independence of cases, multivariate normality, equality of variances between

groups, linear relationship between dependent and independent variables, high reliability of scales (variables measured with minimum error), equality of variances across all levels of the independent variables.

Independence of cases

Survey administration procedures ensured that cases were independent of each other. This was made sure by randomly selecting participants for the survey. Durbin Watson tests for autocorrelations were also performed to confirm independence of cases. A rule of the thumb is that a value close to '2' indicates independence of cases whereas values close to '0' and '4' indicates positive or negative correlations respectively. Results in **Table 50** indicate that cases in the study were independent of each other.

Normality

According to this assumption, all the variables should be normally distributed. The normality of the study constructs was assessed by an examination of skewness and QQ-plots. A test of skewness indicates how much the variable departs from normality assumption. If the skewness values are within -2 to +2 range, then the distribution can be said to be normal. Skewness and Kurtosis indices shown in **Table 33** indicate that all the values were in the acceptable range.

Additional tests like the Shapiro-Wilk test and the Normal Probability plots were used to evaluate univariate normality of all study variables. Results of the Shapiro Wilk's test are shown in **Table 51.** The results indicate that the distribution of the study variables deviate from the normality assumption. However, Stevens (2002) suggests that the Shapiro-Wilk tests are extremely sensitive to even minor deviations from normality. Visual examination of the QQ Plots for all the study variables showed that the distribution of the variables did not significantly

deviate from a normal distribution as most of the data points fell on the diagonal line **(See Figures 2 to 19).** Thus, based on the results of the normality tests, it was assumed that all study variables were normally distributed.

Equality of Variances between groups

Equality of variances between the groups was tested using the Levene's test. Whenever the Levene's tests indicated unequal variances, an adjusted statistic was used to determine statistical significance of the tests. Levene's test for the study variables are shown in **Tables 56-63, 65- 72 & 75.**

Linear relationship between dependent and independent variables &

Homoscedasticity

A linear regression model assumes that there is a linear relationship between the dependent and independent variables. This assumption is a necessary assumption to make valid conclusions from the data. The presence of a linear relationship was verified by visual examination of the residual plots (see **Figures 20 to 22).** The residual plots confirmed that the linear relationship assumption was not violated indicating that a regression model was an appropriate choice for data analysis. The standardized residual values in **Table 52 -54** indicate that at least one prediction was either below or above three standard deviations of the mean residual. However, since the centered leverage values for the cases were less than 0.2, we can confidently say that these cases do not have a significant influence in the model. The Cook's distance calculated in the model also confirmed that removing these outliers would not significantly change the beta coefficients. The residual plots also provided evidence for assumption of homoscedasticity (equal error variances across all levels of the independent variables).

Reliability of scales

An important assumption for linear regression analysis is that all variables should be measured without error. Results of the Cronbach's alpha (test for reliability) indicate that all study variables were reliably measured**.** Results show that all scales demonstrated good internal consistency (0.71to 0.94) (**Table 11)**. Removing any items did not result in a significant increase in the internal consistency of the scales **(Table 12 – 32)**.

Tests of study Hypothesis

Forty-nine hypotheses were generated to understand the impact of the study variables on test inquiry intent, information search intent and intention to test. A stepwise regression analysis was conducted was conducted to test the study hypothesis. To obtain a better understanding of certain variables, univariate ANOVA's or T-tests were conducted whenever appropriate. If the predictor variable had multiple levels then post hoc analysis was performed using the conservative Scheffe's test. A Bonferoni adjustment was applied to reduce the family wise error rate of the study whenever T-tests or ANOVA's were used. The level at which the significance of the tests were interpreted was $\alpha = 0.05$.

Test Inquiry Intent (TII)

H1: Consumer intentions to talk to the physician about the advertised genetic test will be a function of the consumers' beliefs about talking to the physician about the advertised test, attitudes about talking to the physician, subjective norms about test inquiry intent, perceived threat of advertised diseases, family history, involvement, need for cognition, attitudes about genetic testing, attitudes about requiring a prescription for the genetic test, health status and demographic characteristics.

The null (Ho1) of this hypothesis states that consumer intentions to talk to their physician about the advertised genetic test will not be predictable based on consumer characteristics.

Regression analysis:

The appropriate null hypothesis for a regression analysis is that all regression coefficients are equal to zero.

Ho47: All b = 0

Ha47: Atleast one b ≠ 0

A stepwise regression analysis was conducted which included only significant predictors of the dependent variable. All insignificant relationships were removed. This model explained approximately 50% of the variance. The overall regression model was significant at alpha = 0.05; (F statistic = 64.04, $p < 0.0001$). The two tailed significance test revealed that attitudes towards talking to the physician about the advertised genetic test, subjective norms, general attitudes about genetic testing, perceived threat of diseases, gender and race were significant predictors of intentions to talk to the physician about the advertised genetic test (see **Table 55)**. Residual plots in **figure 20** showed that a linear model was good predictor of the relationships between the independent and dependent variables. Power analysis was conducted to evaluate the extent that the set of the regression coefficients selected for the analysis are correlated with the dependent variable. This was derived by examining the effect size, sample size and the non centrality parameter. The appropriate null hypothesis for this analysis is that the proportion of explained variance is zero. The parameter λ was calculated to be 379.17. Based on the power tables, the power of the test is 99%. The regression results were also tested for significant interactions. However, no significant interactions were observed.

1) Beliefs about test inquiry intent

Ho2: The second hypothesis stated that there is no significant difference in test inquiry intent between consumers who have positive beliefs about talking with their physician about the advertised predictive genetic test compared to those with negative beliefs. The multiple regression model failed to yield a statistically significant relationship between beliefs about talking to the physician and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that beliefs about talking to the physician was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

2) Attitudes about test inquiry intent

Ho3: The third hypothesis stated that there is no significant difference in test inquiry intent between consumers who have positive attitudes about talking with their physician about the advertised predictive genetic test compared to those with negative attitudes. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0001$) (**Table 55)**. Regression results showed that for every unit increase in attitudes towards talking to the physician, intentions to talk would increase by 0.516 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed ($p < 0.000$) (**Table 56)**. Consumers with positive attitudes about talking to their physician about the advertised genetic test exhibited higher test inquiry intent compared to those with negative attitudes about talking with their physician ($Mean_{+att} = 5.54$, $SD_{+att} = 1.44$ versus $Mean_{-att} = 3.65$, $SD_{-att} = 1.38$). Therefore the null hypothesis was rejected indicating that attitudes about talking with their doctor about the advertised genetic test had an impact on consumers' intentions to talk with their doctor about the advertised genetic test.

3) Subjective Norms

Ho4: The fourth hypothesis stated that there is no significant difference in test inquiry intent between consumers who have higher subjective norm scores towards test inquiry compared to those with lower scores. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0001$) (**Table 55)**. Regression results showed that for every unit increase in subjective norm scores, intentions to talk would increase by 0.337 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed ($p < 0.000$) **(Table 57)**. Consumers with higher subjective norm scores exhibited higher test inquiry intent compared to those with lower scores ($Mean_{high}$ = 5.37, SD_{high} = 1.43 versus $Mean_{low}$ = 3.83, SD_{low} = 1.60). Therefore the null hypothesis was rejected indicating that when family members and friends were more supportive about consumers talking with their doctors, consumers had higher intentions to talk with their doctor about the advertised genetic test.

4) Perceived Threat of advertised disease

Ho5: The fifth hypothesis stated that there is no significant difference in test inquiry intent between consumers who perceive greater threat of advertised disease compared to those who perceived lesser threat of advertised disease. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.019$) (**Table 55)**. Regression results showed that for every unit increase in perceived threat scores, intentions to talk would increase by 0.017 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed for perceived threat for all the advertised health conditions ($p_{arthritis} < 0.000$, $p_{lung\ cancer} < 0.000$, $p_{pancreatic\ cancer} < 0.000$, $p_{colon\ cancer} < 0.000$) except Alzheimer's disease which failed significance test at the adjusted alpha value of 0.003($p = 0.007$)

(Table 58-62). Consumers who perceived greater threat of advertised health condition exhibited higher test inquiry intent compared to those who perceived lower threat of disease ($Mean_{high\_arthritis}$ = 5.02, $SD_{high\_arthritis}$ = 1.72 versus $Mean_{low\_arthritis}$ = 4.34, $SD_{low\_arthritis}$ = 1.63) ($Mean_{high\_alzheimer}$ = 4.86, $SD_{high\_alzheimer}$ = 1.78 versus $Mean_{low\_alzheimer}$ = 4.41, $SD_{low\_alzheimer}$ = 1.59) ($Mean_{high\_lung}$ = 5.07, SD_{high_lung} = 1.72 versus $Mean_{low\_lung}$ = 4.28, SD_{low_lung} = 1.60) ($Mean_{high\_pancreatic}$ = 4.99, $SD_{high\_pancreatic}$ = 1.67 versus $Mean_{low\_pancreatic}$ = 4.34, $SD_{low\_pancreatic}$ = 1.67) ($Mean_{high\_colon}$ = 5.04, SD_{high_colon} = 1.62 versus $Mean_{low\_colon}$ = 4.23, SD_{low_colon} = 1.68). Therefore the null hypothesis was rejected indicating that perceived threat was a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

5) Family History

Ho6: The sixth hypothesis stated that there is no significant difference in test inquiry intent between consumers who have a family history of the disease compared to those without a family history. The multiple regression model failed to yield a statistically significant relationship between family history and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that family history was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

6) Involvement

Ho7: The seventh hypothesis stated that there is no significant difference in test inquiry intent between consumers who are highly involved in their healthcare compared to those who are less involved in their healthcare. The multiple regression model failed to yield a statistically significant relationship between involvement and test inquiry intent. Therefore the null

hypothesis failed to be rejected indicating that involvement was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

7) Need for Cognition

Ho8: The eighth hypothesis stated that there is no significant difference in test inquiry intent between consumers who have higher need of cognition scores compared to those with lower need for cognition scores. The multiple regression model failed to yield a statistically significant relationship between need for cognition and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that need for cognition was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

8) Overall Health Status

Ho9: This hypothesis stated that there is no significant difference in test inquiry intent between consumers who report better overall health compared to others. The multiple regression model failed to yield a statistically significant relationship between overall health status and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that overall health status was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

9) Attitudes about Genetic testing

Ho10: The tenth hypothesis stated that there is no significant difference in test inquiry intent between consumers who have positive attitudes about genetic testing in general compared to those who have negative attitudes. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0001$) (**Table 55)**. Regression results

showed that for every unit increase in attitudes towards genetic testing scores, intentions to talk would increase by 0.516 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed ($p < 0.000$) **(Table 63)**. Consumers with positive attitudes about genetic testing in general exhibited higher test inquiry intent compared to those with negative attitudes ($Mean_{+attitude} = 5.42$, $SD_{+attitude} = 1.57$ versus $Mean_{-attitude} = 3.83$, $SD_{-attitude} = 1.44$). Therefore the null hypothesis was rejected indicating that consumers who had positive feelings about genetic testing had higher intentions to talk with their doctor about the advertised genetic test.

10) Beliefs about advertising of genetic tests

Ho11: This hypothesis stated that there is no significant difference in test inquiry intent among consumers who have positive beliefs about advertising of predictive genetic tests compared to those who have negative beliefs about advertising of predictive genetic tests. The multiple regression model failed to yield a statistically significant relationship between beliefs about advertising of genetic tests and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that beliefs about advertising was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

11) Beliefs about requiring a prescription for a genetic test

Ho12: The twelfth hypothesis stated that there is no significant difference in test inquiry intent between consumers who have positive beliefs about requiring a prescription for a genetic test compared to those with negative beliefs. The multiple regression model failed to yield a statistically significant relationship between beliefs about requiring a prescription for genetic tests and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that

beliefs about requiring a prescription was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

12) Attitudes about requiring a prescription for a genetic test

Ho13: The thirteenth hypothesis stated that there is no significant difference in test inquiry intent between consumers who have positive attitudes about requiring a prescription for a genetic test compared to those with negative attitudes. The multiple regression model failed to yield a statistically significant relationship between attitudes about requiring a prescription for genetic tests and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that attitudes about requiring a prescription was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

13) Gender

Ho14: The fourteenth hypothesis stated that there is no significant difference in test inquiry intent between consumers based on their gender. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0057$) (**Table 55)**. Regression results showed that females were more interested to talk to their doctors about an advertised genetic test compared to males assuming all other variables do not change. Therefore the null hypothesis was rejected indicating that gender was a significant predictor of intentions to talk with the doctor about the advertised genetic test.

14) Education level

Ho15: The fifteenth hypothesis stated that there is no significant difference in test inquiry intent between consumers based on their level of education. The multiple regression model failed to yield a statistically significant relationship between education level and test inquiry intent.

Therefore the null hypothesis failed to be rejected indicating that education level was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

15) Age

Ho16: The sixteenth hypothesis stated that there is no difference in test inquiry intent between consumers based on their age differences. The multiple regression model failed to yield a statistically significant relationship between age and test inquiry intent. Therefore the null hypothesis failed to be rejected indicating that age was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

16) Race

Ho17: The seventeenth hypothesis stated that there difference in test inquiry intent between consumers based on their race. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0018$) (**Table 55)**. Regression results showed that African Americans were more interested to talk to their doctors about an advertised genetic test compared to Caucasians assuming all other variables do not change. Therefore the null hypothesis was rejected indicating that race was a significant predictor of intentions to talk with the doctor about the advertised genetic test.

17) Income

Ho18: The eighteenth hypothesis stated that there is no significant difference in test inquiry intent between consumers based on their income. The multiple regression model failed to yield a statistically significant relationship between income and test inquiry intent. Therefore the null

hypothesis failed to be rejected indicating that income was not a significant factor influencing consumers' intentions to talk with their physician about the advertised genetic test.

Information Search Intent (ISI)

Ho19: Consumer intentions to look for information about the advertised genetic test will be a function of the consumers' perceived threat of advertised diseases, family history, involvement, need for cognition, attitudes about genetic testing, health status and demographic characteristics. The null (Ho48) of this hypothesis states that consumer intentions to look for information about the advertised genetic test will not be predictable based on consumer characteristics.

Regression analysis:

The appropriate null hypothesis for a regression analysis is that all regression coefficients are equal to zero.

Ho48: All $b = 0$

Ha48: Atleast one $b \neq 0$

A stepwise regression analysis was conducted which included only significant predictors of the dependent variable. All insignificant relationships were removed. This model explained approximately 24% of the variance. The overall regression model was significant at alpha = 0.05; (F statistic = 32.64, $p < 0.0001$). The two tailed significance test at $p < 0.05$ revealed that general attitudes about genetic testing, perceived threat of diseases, beliefs about advertising of genetic tests and need for cognition were significant predictors of intentions to look for more information about the advertised genetic test (see **Table 64)**. Residual plots in **figure 21** showed that a linear model was good predictor of the relationships between the independent and dependent variables. Power analysis was conducted to evaluate the extent that the set of the regression coefficients selected for the analysis are correlated with the dependent variable. This was derived by

examining the effect size, sample size and the non centrality parameter. The appropriate null hypothesis for this analysis is that the proportion of explained variance is zero. The parameter λ was calculated to be 146.2. Based on the power tables, the power of the test is 99%. The regression results were also tested for significant interactions. However, no significant interactions were observed.

1) Perceived Threat of advertised diseases

Ho20: The hypothesis stated that there is no significant difference in information search intent between consumers who perceive greater threat of advertised disease compared to those who perceived lesser threat of advertised disease. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0015$) (**Table 64)**. Regression results showed that for every unit increase in perceived threat scores, intentions to look for information would increase by 0.03096 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed for perceived threat for all the advertised health conditions ($p_{arthritis} < 0.000$, $p_{lung\ cancer} < 0.000$, $p_{pancreatic\ cancer} < 0.000$, $p_{colon\ cancer} < 0.000$) except Alzheimer's disease which failed significance test at the adjusted alpha value of 0.003($p_{alzheimer} = 0.004$) **(Table 65-69)**. Consumers who perceived greater threat of advertised health condition exhibited higher information search intent compared to those who perceived lower threat of disease ($Mean_{high\_arthritis} = 4.69$, $SD_{high\_arthritis} = 1.80$ versus $Mean_{low\_arthritis} = 4.03$, $SD_{low\_arthritis} = 1.84$) ($Mean_{high\_alzheimer} = 4.86$, $SD_{high\_alzheimer} = 1.78$ versus $Mean_{low\_alzheimer} = 4.41$, $SD_{low\_alzheimer} = 1.59$) ($Mean_{high\_lung} = 4.80$, $SD_{high\_lung} = 1.80$ versus $Mean_{low\_lung} = 3.92$, $SD_{low\_lung} = 1.80$) ($Mean_{high\_pancreatic} = 4.77$, $SD_{high\_pancreatic} = 1.75$ versus $Mean_{low\_pancreatic} = 3.93$, $SD_{low\_pancreatic} = 1.85$) ($Mean_{high\_colon} = 4.76$, $SD_{high\_colon} = 1.75$ versus $Mean_{low\_colon} = 3.88$, $SD_{low\_colon} = 1.85$). Therefore the null hypothesis was rejected

indicating that perceived threat was a significant factor influencing consumers' intentions to look for more information about the advertised genetic test.

2) Family History

Ho21: The hypothesis stated that there is no significant difference in information search intent between consumers who have a family history of the disease compared to those without a family history. The multiple regression model failed to yield a statistically significant relationship between family history and information search intent. Therefore the null hypothesis failed to be rejected indicating that family history was not a significant factor influencing consumers' intentions to look for information about the advertised genetic test.

3) Involvement

Ho22: The hypothesis stated that there is no significant difference in information search intent between consumers who are highly involved in their healthcare compared to those who are less involved in their healthcare. The multiple regression model failed to yield a statistically significant relationship between involvement and information search intent. Therefore the null hypothesis failed to be rejected indicating that involvement was not a significant factor influencing consumers' intentions to look for information about the advertised genetic test.

4) Need for Cognition

Ho23: The hypothesis stated that there is no significant difference in information search intent between consumers who have higher need of cognition scores compared to those with lower need for cognition scores. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0025$) (**Table 64)**. Regression results showed that for every unit increase in need for cognition scores, intentions to look for

information would increase by 0.24364 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed ($p<0.000$) **(Table 70)**. Consumers with higher levels of need for cognition exhibited higher information search intent compared to those with lower need for cognition ($Mean_{high} = 4.70$, $SD_{high} = 1.85$ versus $Mean_{low} = 3.89$, $SD_{low} = 1.76$). Therefore the null hypothesis was rejected indicating that consumers who had greater desires to engage in effortful thinking or due to their nature had a greater need to understand things, had higher intentions to look for more information about the advertised genetic test.

5) Overall health status

Ho24: This hypothesis stated that there is no significant difference in information search intent between consumers who report better overall health compared to others. The multiple regression model failed to yield a statistically significant relationship between overall health status and information search intent. Therefore the null hypothesis failed to be rejected indicating that health status was not a significant factor influencing consumers' intentions to look for information about the advertised genetic test.

6) Attitudes about genetic testing in general

Ho25: The hypothesis stated that there is no significant difference in information search intent between consumers who have positive attitudes about genetic testing in general compared to those who have negative attitudes. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0001$) (**Table 64)**. Regression results showed that for every unit increase in attitude towards genetic testing scores, intentions to look for information would increase by 0.49396 units assuming all other variables do not change.

Univariate T-test results revealed that a statistically significant difference was observed ($p<0.000$) **(Table 71)**. Consumers with positive attitudes about genetic testing in general exhibited higher information search intent compared to those with negative attitudes ($Mean_{+attitude}$ = 4.99, $SD_{+attitude}$ = 1.84 versus $Mean_{-attitude}$ = 3.62, $SD_{-attitude}$ = 1.59). Therefore the null hypothesis was rejected indicating that consumers who had positive feelings about genetic testing had higher intentions to look for more information about the advertised genetic test.

7) Beliefs about advertising of genetic tests

Ho26: This hypothesis stated that there is no significant difference in information search intent among consumers who have positive beliefs about advertising of predictive genetic tests compared to those who have negative beliefs about advertising of predictive genetic tests. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0091$) (**Table 64)**. Regression results showed that for every unit increase in beliefs about advertising scores, intentions to look for information would increase by 0.2650 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed ($p<0.000$) **(Table 72)**. Consumers with positive beliefs about advertising of genetic tests exhibited higher information search intent compared to those with negative beliefs ($Mean_{+beliefs}$ = 4.82, $SD_{+beliefs}$ = 1.86 versus $Mean_{-beliefs}$ = 3.83, $SD_{-beliefs}$ = 1.71). Therefore the null hypothesis was rejected indicating that consumers who had positive beliefs about advertising of genetic tests had higher intentions to look for more information about the advertised genetic test.

8) Gender

Ho27: The hypothesis stated that there is no significant difference in information search intent between consumers based on their gender. The multiple regression model failed to yield a

statistically significant relationship between gender and information search intent. Therefore the null hypothesis failed to be rejected indicating that gender was not a significant factor influencing consumers' intentions to look for more information about the advertised genetic test.

9) Education level

Ho28: The hypothesis stated that there is no significant difference in information search intent between consumers based on their level of education. The multiple regression model failed to yield a statistically significant relationship between education level and information search intent. Therefore the null hypothesis failed to be rejected indicating that education level was not a significant factor influencing consumers' intentions to look for more information about the advertised genetic test.

10) Age

Ho29: The hypothesis stated that there is no significant difference in information search intent between consumers based on age. The multiple regression model failed to yield a statistically significant relationship between age and information search intent. Therefore the null hypothesis failed to be rejected indicating that age was not a significant factor influencing consumers' intentions to look for more information about the advertised genetic test.

11) Race

Ho30: The hypothesis stated that there difference in information search intent between consumers based on their race. The multiple regression model failed to yield a statistically significant relationship between race and information search intent. Therefore, the null hypothesis failed to be rejected indicating that race was not a significant factor influencing consumers' intentions to look for more information about the advertised genetic test.

12) Income

Ho31: The hypothesis stated that there is no significant difference in information search intent between consumers based on their income. The multiple regression model failed to yield a statistically significant relationship between income and information search intent. Therefore, the null hypothesis failed to be rejected indicating that income was not a significant factor influencing consumers' intentions look for more information about the advertised genetic test.

Intentions to test

Ho32: Consumer intentions to take the advertised genetic test will be a function of the consumers' perceived threat of advertised diseases, family history, involvement, need for cognition, attitudes about genetic testing, health status and demographic characteristics.

Regression analysis:

The appropriate null hypothesis for a regression analysis is that all regression coefficients are equal to zero.

Ho49: All $b = 0$

Ha49: Atleast one $b \neq 0$

A stepwise regression analysis was conducted which included only significant predictors of the dependent variable. All insignificant relationships were removed. This model explained approximately 23.7% of the variance. The overall regression model was significant at alpha = 0.05; (F statistic = 31.47, $p < 0.0001$). The two tailed significance test at $p < 0.05$ revealed that gender, age, general attitudes about genetic testing and overall health were significant predictors of intentions to take the advertised genetic test (see **Table 73)**. Residual plots in **figure 22** showed that a linear model was good predictor of the relationships between the independent and dependent variables. Power analysis was conducted to evaluate the extent that the set of the

regression coefficients selected for the analysis are correlated with the dependent variable. This was derived by examining the effect size, sample size and the non centrality parameter. The appropriate null hypothesis for this analysis is that the proportion of explained variance is zero. The parameter λ was calculated to be 146.2. Based on the power tables, the power of the test is 99%. The regression results were also tested for significant interactions. However, no significant interactions were observed.

1) Perceived Threat of advertised diseases

Ho33: The hypothesis stated that there is no significant difference in intentions to test between consumers who perceive greater threat of advertised disease compared to those who perceived lower threat of advertised disease. The multiple regression model failed to yield a statistically significant relationship between perceived threat of disease and intention to test. Therefore, the null hypothesis failed to be rejected indicating that perceived threat was not a significant factor influencing consumers' intentions to take the advertised genetic test.

2) Family History

Ho34: The hypothesis stated that there is no significant difference in intentions to test between consumers who have a family history of the disease compared to those without a family history. The multiple regression model failed to yield a statistically significant relationship between family history of disease and intention to test. Therefore, the null hypothesis failed to be rejected indicating that family history was not a significant factor influencing consumers' intentions to take the advertised genetic test.

3) Involvement

Ho35: The hypothesis stated that there is no significant difference in intentions to test between consumers who are highly involved in their healthcare compared to those who are less involved in their healthcare. The multiple regression model failed to yield a statistically significant relationship between involvement and intention to test. Therefore, the null hypothesis failed to be rejected indicating that involvement was not a significant factor influencing consumers' intentions to take the advertised genetic test.

4) Need for Cognition

Ho36: The hypothesis stated that there is no significant difference in intentions to test between consumers who have higher need of cognition scores compared to those with lower need for cognition scores. The multiple regression model failed to yield a statistically significant relationship between need for cognition and intention to test. Therefore, the null hypothesis failed to be rejected indicating that need for cognition was not a significant factor influencing consumers' intentions to take the advertised genetic test.

5) Overall health status

Ho37: This hypothesis stated that there is no significant difference in intentions to test between consumers who report better overall health compared to others. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0309$) (**Table 73)**. Regression results showed that for every unit increase in overall health status, intentions to take the test would decrease by 0.1525 units assuming all other variables do not change. Therefore the null hypothesis was rejected indicating that overall health status was a significant factor influencing consumers' intentions to take the advertised genetic test.

6) Attitudes about genetic testing in general

Ho38: The hypothesis stated that there is no significant difference in intentions to test between consumers who have positive attitudes about genetic testing in general compared to those who have negative attitudes. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0001$) (**Table 73)**. Regression results showed that for every unit increase in attitudes about genetic testing scores, intentions to take the genetic test would increase by 0.7293 units assuming all other variables do not change. Univariate T-test results revealed that a statistically significant difference was observed (0.000) **(Table 74)**. Consumers with positive attitudes about genetic testing in general exhibited higher intentions to test compared to those with negative attitudes ($Mean_{+attitude} = 4.28$, $SD_{+attitude} = 1.94$ versus $Mean_{-attitude} = 2.84$, $SD_{-attitude} = 1.43$). Therefore the null hypothesis was rejected indicating that consumers who had positive feelings about genetic testing had higher intentions to take the advertised genetic test.

7) Beliefs about advertising of genetic tests

Ho39: This hypothesis stated that there is no significant difference in intentions to test among consumers who have positive beliefs about advertising of predictive genetic tests compared to those who have negative beliefs about advertising of predictive genetic tests. The multiple regression model failed to yield a statistically significant relationship between beliefs about advertising and intention to test. Therefore, the null hypothesis failed to be rejected indicating that beliefs about advertising was not a significant factor influencing consumers' intentions to take the advertised genetic test.

8) Gender

Ho42: The hypothesis stated that there is no significant difference in intentions to test between consumers based on their gender. The stepwise multiple regression model revealed that

a statistically significant difference was observed ($p < 0.0001$) (**Table 73)**. Regression results showed that females were more interested to take the advertised genetic test compared to males assuming all other variables do not change. Therefore the null hypothesis was rejected indicating that gender was a significant predictor of intentions to take the advertised genetic test.

9) Education level

Ho43: The hypothesis stated that there is no significant difference in intentions to test between consumers based on their level of education. The multiple regression model failed to yield a statistically significant relationship between education level and intention to test. Therefore the null hypothesis failed to be rejected indicating that education level was not a significant factor influencing consumers' intentions to take the advertised genetic test.

10) Age

Ho44: The hypothesis stated that there is no significant difference in intentions to test between consumers based on age. The stepwise multiple regression model revealed that a statistically significant difference was observed ($p < 0.0099$) (**Table 73)**. Regression results showed that consumers aged 55 -65years were less interested to take the advertised genetic test compared to consumers aged 35-45 years assuming all other variables do not change. Therefore the null hypothesis was rejected indicating that age was a significant predictor of intentions to take the advertised genetic test.

11) Race

Ho45: The hypothesis stated that there difference in intentions to test between consumers based on their race. The multiple regression model failed to yield a statistically significant relationship between race and intention to test. Hence, the null hypothesis failed to be rejected

indicating that race was not a significant factor influencing consumers' intentions to take the advertised genetic test

12) Income

Ho46: The hypothesis stated that there is no significant difference in intentions to test between consumers based on their income. The multiple regression model failed to yield a statistically significant relationship between income and intention to test. Therefore, the null hypothesis failed to be rejected indicating that income was not a significant factor influencing consumers' intentions to take the genetic test.

Information Search Behavior

Ho47: This hypothesis stated that there is no significant difference in information search behavior (ISB) between consumers who expressed greater information search intent compared to those who showed lesser intent for information search. T-test results revealed that a statistically significant difference was observed ($p<0.000$) **(Table 75)**. Consumers with higher intentions to search for information exhibited positive behavior compared to those with lower intentions ($Mean_{+yes} = 4.66$, $SD_{+yes} = 1.56$ versus $Mean_{-no} = 3.40$, $SD_{-intention} = 1.84$). Since, only 55 respondents actually performed the information search behavior, there was a large inequality between group sizes in the T-test. Hence, chi-square analysis was performed (see **Table 76)**. Chi –Square results revealed a statistically significant difference ($p<0.000$). Therefore the null hypothesis was rejected indicating that consumers who had higher information search intentions actually looked for information about the advertised genetic test more than those with lower information search intentions.

Multicollinearity

Multicollinearity is sometimes an issue in ordinary least square regression models. Although it does not bias the OLS assumptions and the parameter estimates, it increases the standard errors. This is usually a problem because coefficients will have to be larger in order to be statistically significant. This means that it will be harder to reject the null when multicollinearity is present. The best way to check for multicollinearity is to calculate the Variance Inflation Factor (VIF) and the Tolerance. Usually the rule of the thumb is that VIF lesser than 15 and tolerances greater than 0.10 are indicative of non-multicollinearity. In our regression analysis for intentions to talk to the physician, intentions to look for more information and intentions to take the advertised genetic test, VIF values were lesser than 1.6 and tolerances were greater than 0.6 which is very well within the standards for these values (see **Tables 55, 64, 73)**.

Outlier Analysis

Case wise analysis was conducted to study if outliers could significantly influence the analysis. Centered leverage value was calculated to identify influential outliers. A rule of the thumb is that centered leverage values greater than 0.20 indicate strong influences of outlier cases.

1) Intention to talk to the physician about the advertised genetic test

Residual analysis showed that there were five outliers outside three standard deviations from the mean for intentions to talk. However, the centered leverage value of 0.012 did not indicate any concerns (see **Table 52)**. Cook's distance was also calculated to confirm that removing the outliers would not affect the parameter estimates. Results indicated that removing the outlier cases would change the parameter estimates by only 0.003 for intentions to talk to the physician about the advertised genetic test.

2) Intentions to look for more information about the advertised genetic test

Residual analysis for intention to look for information about the advertised genetic test showed that there was just one outlier outside three standard deviations from the mean. However, the centered leverage value of 0.015 did not indicate any concerns (see **Table 53)**. Cook's distance also confirmed that removing the outliers would not affect the parameter estimates. Results indicated that removing the outlier cases would change the parameter estimates by only 0.003 for intentions to look for more information about the advertised genetic test.

3) Intentions to take the advertised genetic test

Residual analysis for intention to take the advertised genetic test showed that there was just one outlier outside three standard deviations from the mean. However, the centered leverage value of 0.012 did not indicate any concerns (see **Table 54)**. Cook's distance also confirmed that removing the outliers would not affect the parameter estimates. Results indicated that removing the outlier cases would change the parameter estimates by only 0.003 for intentions to take the advertised genetic test.

5.3 Quantitative experimental study

The experimental component of the study involved administering the ad stimuli (same ad copy as the focus groups) and conducting online interviews with consumers who were representative of the target population for genetic testing products (consumers 18 and above). Before the interviews, consumers were randomly assigned to two groups. One of the groups was informed that the company administering the genetic test did not require a doctor's prescription for the advertised genetic test. However, the second group was told that the company administering the genetic test required a doctor's prescription before one could take the test.

Both groups were informed that the government did not require these companies to provide tests only with a prescription and it was the choice of the companies to do so. These consumers were first exposed to the ad stimulus and asked to respond to a structured closed-ended questionnaire consisting of rating scales measuring the constructs of interest.

5.3.1 Pretests

A pretest of the survey questionnaire was conducted in order to ensure the measures that we used were reliable, and that the questionnaire was understandable and clear to the respondents. A convenience sample of 30 participants was used for the pretests. Internal consistency reliability measures were computed for the rating scales that were used in the study. According to Nunnally (1978), the minimum acceptable standard for demonstrating internal consistency reliability using Cronbach's alpha is 0.70.The results of the pretests revealed that all scales had excellent internal consistency reliabilities ranging from (0.80 to 0.87) (**Table77**). Further examination also revealed excellent inter-item and item to total correlations for all the scales. Moreover, removal of any single item from any of the scales, did not lead to a substantial increase in the internal consistency.

Anecdotal evidence showed that respondents did not face any issues in understanding the instructions in the questionnaire or in providing answers to any of the rating scales. On average, respondents took about 10 minutes to complete the entire survey. Since no major issues emerged during the pretests, no significant modifications were made to the instrument, study design and method of recruitment of study participants.

5.3.2 Main Study

The data was collected in March 2010 using the Qualtrics online tool. For this particular study stratification tools were used to balance the sample so the incoming survey starts would

mirror the latest census figures. After the stratification was selected, the sampling tool pulled random respondents from the Authentic Response panelist pool, and deployed sample when needed. The survey was sent to a total of 600 survey participants randomly selected by the Qualtrics software.206 completes were recorded within five hours with 106 completes for group that required a prescription for the genetic test and 100 completes for the group that did not require a prescription for the genetic test. On average, each interview took approximately 10 minutes to complete.

Sample characteristics

A total of 206 complete questionnaires were obtained in accordance with maintaining adequate statistical power (80%). The demographics of the sample are summarized in **Table 78**. About twice the respondents were female. Majority of the respondents were Caucasian (76.7). Approximately 9.7 % were African American, while 4.4% were Hispanic and 3.1% were Asian. At least 43% of the participants in this study had completed a four year college degree.

We also measured consumers past experiences with advertisements for genetic tests. These are summarized in **Table 79.**Only 8.3 percent of the respondents claimed to have seen an advertisement for a genetic test in the past. Most consumers reported having seen these advertisements either on television (9) or internet (9). 7 people also reported having seen advertisements in magazines. This was expected as most companies advertise genetic tests mostly on the internet, magazines and television. However, many people had not seen these advertisements, suggesting a low level of awareness among the general public about predictive genetic tests.

After comparison with the US census data, it was evident that age, race and income breakdown of the participants was representative of the US population. However, the current

study participant's education level was much higher than the general US population. According to the US Census Bureau 2000 figures, only 24% of the US population had completed a four year college degree compared to 43% in our study. Our study also had two times more females than males. Thus, it can be concluded that overall the study sample was representative of the US population. However, one should be aware of these demographic discrepancies between the survey respondents and the national population while generalizing the results.

Descriptive statistics for outcome measures

Descriptive statistics for the outcome measures are reported in **Table 80.** Results indicate that consumers had favorable attitudes about the advertisement, genetic test and the company providing the test. This was evidenced by their high scores on the rating scales measuring attitudes about advertisement (Mean = 5.35, SD = 1.26), attitudes about genetic test (Mean = 4.95, SD = 1.11) and attitudes about the advertising company (Mean = 4.81, SD = 1.07). However consumers had only moderate intentions to talk to the physician about the advertised test (Mean = 4.12, SD = 1.89) and lower intentions to take the genetic test (Mean = 3.00, SD = 1.86).

T-tests were conducted to check if the respondent scores on the study constructs differed significantly from the midpoint (4) of the scale. All t-test results were interpreted at alpha = 0.0125 (0.05/4) (**Table 81).** Results showed that all study constructs significantly differed from the midpoint value of (4) of the scale.

Confirmatory Factor Analysis

A confirmatory factor analysis was performed for all the study constructs. A CFA was needed to ascertain that the measurement items were indeed measuring only the construct of

interest. Measurement items were fixed to load only on the constructs they were measuring and then goodness of fit indices were calculated for the data using MPLUS.

Results provided in **Table 82** show that the study model produced a good fit considering that there were no prior models to compare with the study model. Additionally, as expected, the confirmatory factor analysis indicated three dimensions for beliefs about requiring a prescription. All other constructs were one-dimensional as expected. Further these results also demonstrate evidence for convergent and discriminant validity as all items loaded on their factors as expected. Since all the measurement items appear to reflect their underlying construct, there was some evidence for construct validity.

Equivalence of treatment groups

To ensure validity of random assignment, chi-square tests were conducted (KERLINGER 1986). The purpose of these tests were to verify if the experimental groups differed significantly from each other based on the demographic characteristics and prior exposure to advertisements of genetic tests. A Bonferroni correction was applied to the pre-specified alpha level of 0.05 since multiple chi-square tests were used (HARRIS 2001). All chi- squares were evaluated at a stringent alpha level of 0.0062 (0.05/8). Results of the analysis showed that there were no statistically significant differences in the demographic characteristics of the participants between the two experimental groups (see **Tables 83)**. Further analysis also showed that there were no statistically significant differences between experimental groups with respect to prior exposure to advertisements of genetic tests (**Table 84)**. The results of the analysis confirm that random assignment of the treatment groups was successful and the groups were statistically equivalent.

Post-hoc reliabilities of outcome measures

Internal consistency reliabilities were computed for all scales prior to conducting the univariate and multivariate analysis. All scales demonstrated good internal consistency (0.69 to 0.96) (**Table 85)**. Removing any items did not result in a significant increase in the internal consistency of the scales **(Table 86 – 94)**.

Test of assumptions for T-tests

The assumptions that underlie appropriate application of T- tests independence of cases, multivariate normality and equality of variances between groups

Independence of cases

Survey administration procedures ensured that cases were independent of each other. This was made sure by randomly selecting participants for the survey.

Normality

According to this assumption, all the variables should be normally distributed. The normality of the study constructs was assessed by an examination of skewness and QQ-plots. A test of skewness indicates how much the variable departs from normality assumption. If the skewness values are within -2 to +2 range, then the distribution can be said to be normal. Skewness and Kurtosis indices shown in **Table 80** indicate that all the values were in the acceptable range.

Additional tests like the Shapiro-Wilk test and the Normal Probability plots were used to evaluate univariate normality of all study variables. Results of the Shapiro Wilk's test are shown in **Table 95.** The results indicate that the distribution of the study variables deviate from the normality assumption. However, Stevens (2002) suggests that the Shapiro-Wilk tests are extremely sensitive to even minor deviations from normality. Visual examination of the QQ

Plots for all the study variables showed that the distribution of the variables did not significantly deviate from a normal distribution as most of the data points fell on the diagonal line **(See Figures 23 to 31).** Thus, based on the results of the normality tests, it was assumed that all study variables were normally distributed.

Equality of Variances between groups

Equality of variances between the groups was tested using the Levene's test. Whenever the Levene's tests indicated unequal variances, an adjusted statistic was used to determine statistical significance of the tests. Levene's test for the study variables are shown in **Tables 96-99.**

Experimental Study Hypothesis

Attitudes towards the ad, test, company and intentions to test were the dependent variables that were tested by four hypotheses. T-tests were conducted to test these hypotheses. Since 4 different T-tests were conducted, a Bonferoni adjustment was applied to reduce the family wise error rate of the study. Accordingly, the level at which the significance of the tests were interpreted was reduced from $\alpha = 0.05$ to $\alpha = 0.0125$.

Attitudes towards the advertisement (AAD)

Ho50: This hypothesis stated that there is no significant difference between consumers' attitudes towards an advertisement based on whether the advertising company requires a prescription for the advertised genetic test. The p-value of the T-test evaluating differences in treatment groups with respect to evaluation of attitude towards the ad was 0.048, which is non-significant when a conservative alpha level of 0.0125 is used for the test **(Table 96)**. Therefore the null hypothesis failed to be rejected indicating that requiring a prescription or not, did not affect consumers attitude towards the advertisement. However, a visual comparison of the means

revealed that requiring a prescription ($Mean_{ad\_rx}$ = 5.52, SD_{ad_rx} = 1.15) generated more positive attitudes about the advertisement compared to when a prescription was not required ($Mean_{ad\_norx}$ = 5.17, SD_{ad_norx} = 1.35).

Ho51: The hypothesis stated that there is no significant difference between consumers' attitudes towards the advertised genetic test based on whether the advertising company requires a prescription for the genetic test. The p-value of the T-test evaluating differences in treatment groups with respect to evaluation of attitude towards the RTF® genetic test was 0.019, which is non-significant when a conservative alpha level of 0.0125 is used for the test **(Table 97)**. Therefore the null hypothesis failed to be rejected indicating that requiring a prescription or not, did not affect consumers attitude towards the test. However, a visual comparison of the means revealed that requiring a prescription ($Mean_{ad\_rx}$ = 5.1, SD_{ad_rx} = 1.01) generated more positive attitudes about the test compared to when a prescription was not required ($Mean_{ad\_norx}$ = 4.7, SD_{ad_norx} = 1.19).

Ho52: This hypothesis stated that there is no significant difference between consumers' attitudes towards the company based on whether the advertising company requires a prescription for the genetic test. The p-value of the T-test evaluating differences in treatment groups with respect to evaluation of attitude towards the company providing the test was 0.135, which is non-significant when a conservative alpha level of 0.0125 is used for the test **(Table 98)**. Therefore the null hypothesis failed to be rejected indicating that requiring a prescription or not, did not affect consumers attitude towards the company.

Ho53: This hypothesis stated that there is no significant difference between consumers' intention to take the genetic test based on whether the advertising company requires a prescription for the genetic test. The p-value of the T-test evaluating differences in treatment

groups with respect to evaluation of intentions to take the genetic test was 0.662, which is non-significant when a conservative alpha level of 0.0125 is used for the test **(Table 99)**. Therefore the null hypothesis failed to be rejected indicating that requiring a prescription or not, did not affect consumers intentions to take the test.

Chapter 6

Discussion& Implications

The primary purpose of this study was to understand how consumers might respond to advertising of genetic tests. Consequently our aim was to gain a better understanding consumers' perceptions about DTC advertising of genetic tests and factors that might influence consumers' attitudes, intentions and behaviors related to talking to their physician about the advertised genetic test, looking for more information and taking the advertised genetic test.

Our study incorporated qualitative focus groups to figure out consumers' perceptions about: 1) advertising of genetic tests, 2) talking to their doctor about the advertised genetic test and 3) requiring a prescription for a genetic test. In addition, the quantitative descriptive study assessed how consumers process information in these advertisements to make healthcare decisions. Finally, the quantitative experimental study involved assessing whether requiring a prescription for a genetic test would impact ad outcome measures like attitudes towards the advertisement, attitudes towards the genetic test and attitudes towards the company offering the genetic test. This chapter summarizes the conclusions drawn from both the qualitative and quantitative analysis.

6.1 Consumer Response to Advertising of Genetic Tests

The findings from the focus groups indicate that consumers generally are wary about advertising of genetic tests and companies that advertise these tests. However, we observed that most consumers had positive opinions about advertising of genetic tests and welcomed the idea of more advertising in the future. There were two main factors that led to this positive belief about advertising of genetic tests in consumers. First, consumers expected advertisements to

provide useful information so that they can lead a healthy lifestyle by preventing diseases before they start. Secondly, they thought that it was unfair of regulators to deny them of their right to learn about their body and be involved in their healthcare. These results also find support in the quantitative study where consumers indicated that they were supportive of advertisements of genetic test and wanted to know more about available tests. This was evidenced by 66.4% of the consumers reporting positive beliefs about advertising of genetic tests (value higher than 4 on the scale).

Another interesting finding was that most consumers who had positive beliefs about advertising of genetic tests had significantly positive beliefs and attitudes about genetic testing in general. This indicates that consumers' preconceived notions and feelings about genetic testing greatly influence how consumers might perceive the benefits of advertising of genetic tests. Further analysis also showed that consumers beliefs about advertising was were a significant predictor of consumers intentions to talk to their physician about the test, look for more information about the test and take the test in the future. Although, consumers expressed low intentions overall to actually take the advertised genetic test (Mean = 3.6, SD= 1.8), opponents' fear that advertising might motivate increased utilization of genetic tests was supported in our research. However, a multivariate analysis showed that other factors like attitudes about genetic testing, subjective norms, beliefs and attitudes about talking to the physician about the advertised test diminished the effect of beliefs about the advertisement on consumer intentions to take the genetic test or talk to the physician about the genetic test.

Theory of Reasoned Action- intentions to talk with their doctor

The focus groups revealed that consumers' intention to talk with their doctor about the advertised genetic test depended on their beliefs and attitudes about the advantages of speaking

with their physician. Those consumers who reported that they would consult with their doctor about the test expressed greater trust and better relationships with their doctor. It was observed that consumers would only talk to their doctors because they thought that doctors were a reliable source of information compared to industry and that talking with their doctor will help them make the right decision about taking the test. Our quantitative research confirmed this finding. Consumer's who had positive beliefs and attitudes about talking to their physician about the advertised predictive genetic test, expressed significantly greater intentions to talk to their doctor. Our research indicates that with more genetic tests becoming available in the future, consumers will seek information from their doctors to help them decide whether they should take the tests. However, other studies have found that physicians are not yet ready for this challenge. Studies show that physicians have no formal education in genetics and hence are less confident about discussing genetic tests with their patients (ACTON *et al.* 2000; FREEDMAN *et al.* 2003). Our study demonstrates that consumers expect physicians to inform and guide them on issues related to genetic tests. Hence, it is absolutely essential for medical practitioners to develop guidelines for discussing and helping patients make informed decisions. It is also necessary for the medical body to incorporate genetics as a part of their formal education and practice. This would make physicians more confident when they discuss the benefits and risks of genetic tests with their patients thus helping to protect consumers from genetic tests that lack clinical and analytical validity.

The theory of reasoned action also postulates that subjective norms (what significant others think about consumer performing a behavior) is a significant predictor of consumers' intentions to perform that behavior. Our study showed that consumers who thought their family members, friends or relatives would be supportive of them talking to a physician about the

advertised genetic test had significantly greater intentions to talk to their physician about the test. This implies that important healthcare decisions related to genetic testing not only depend on consumers' attitudes about predictive genetic tests, but also on the level of support that they receive from their family and friends about their decision.

Information Processing- Involvement and Need for Cognition

Another interesting finding was how need for cognition and involvement in healthcare influences consumers' intentions about the advertised genetic test. Some people actively seek information and some do not. Some people are by nature more involved in their health compared to others. Our study found that consumer's who by nature seek more information exhibited greater intentions to look for more information about the advertised genetic test. Cacioppo and Petty (1982) have shown that attitude change via central route of information processing happens when an individual has the motivation and ability to evaluate message arguments. Hence we infer from our study results that consumers who expressed greater need for cognition processed information more intensely than consumers with low need for cognition. Thus, these consumers had greater intentions to look for more information about the advertised genetic test. However, this study demonstrated that need for cognition was not sufficient for consumers to actually want to take the advertised test or even talk to the doctor about it. This implies that consumers who had higher need for cognition were interested to learn more about the test before they can decide whether they would actually take it or talk to the doctor about it. Also our survey question on intention specifically asked for consumers' intentions to take the test within the next three months or talk to the doctor in their next visit. Maybe, this was a short time period for these consumers to get sufficient information to enable them to make a decision about genetic testing to determine their disease risks due to the sensitive nature of genetic tests and lesser knowledge

in consumers about genetic testing. More research is needed to understand about consumers' knowledge about genetic tests and its influence on attitudes, intentions and behavior.

Past pharmaceutical research has shown that involvement in healthcare has a significant impact on consumers' intentions to talk to the doctor about the advertised drug. Hence, we believed that consumers who were highly involved in their health would be more attentive to advertisements, process information from these advertisements and decide to act through a central route of information processing and decision making. However, in the case of predictive genetic tests, this may not be true. Our study did not support the hypothesis that involvement in one's healthcare impacted consumer intentions. Our focus groups revealed that consumers' are very sensitive and worry a lot about the consequences of genetic testing. Hence, the opinions and attitudes they have about genetic testing have a great impact on their intentions and overshadow the influence of involvement in one's health on intentions. For example, a consumer may be highly involved in their health but may not want to talk to their doctor or take the test because of their negative attitudes about genetic testing in general. Maybe, involvement measure was good to predict how much attention people give to advertisements of genetic tests but was not reflective of intentions and behavior related to genetic tests.

Health Belief Model- Perceived Threat, Health Status, Family History and Demographics

An interesting finding in this study is based on the theory of The Health Belief Model. According to this model, consumers who perceive a greater threat from the advertised disease would exhibit greater intentions. Some patients by nature tend to worry more about their health and susceptibility to a disease than others. Also, some might perceive the severity of a disease to be higher compared to others. Our study results demonstrate that consumers who perceived

greater threat (perceived susceptibility X perceived severity) of the advertised diseases expressed higher intentions to talk to their doctor about the genetic test and looked for more information about the test when compared to others. However, perceived threat did not have an impact on consumers' intentions to take the test. The results indicate that even when consumers perceive greater threat of the diseases, their first line of action is to look for more information about the genetic test and talk to their doctor about it. These consumers were interested in the test. Hence, they wanted to learn more about it to know if they really need to take it. Unlike medicines, genetic tests cannot cure the disease. Hence, consumers who perceived more threat may not have seen a direct benefit of taking a genetic test. However, they would talk to their doctor and look for additional information to help them decide if taking the test would help them improve their health.

Another interesting finding that deviated from our expectations was that consumers who did not have a family history of the advertised health conditions were equally interested in talking to their physicians, looking for more information and taking the test when compared to those with a family history of the disease. A visual observation of the means revealed that although consumers with a family history expressed greater intentions, these differences were not significantly different. Thus, an increased willingness of people without a family history of a disease to take a genetic test is potentially problematic because results of genetic tests make sense only when consumers have a family history of the disease. Despite clear indications in our advertisements that the RTF® genetic test was only for people with a family history of the disease, results showed that many consumers who expressed interests in talking with their doctors or look for more information about the test or even take the test never had a family history of any of the advertised health conditions. Of all the consumers who expressed greater

intentions to talk to their physician about the advertised genetic test, 32% never had a family history of any of the advertised health conditions. Of all the consumers who expressed greater intentions to look for more information about the genetic test, 33% never had a family history of any of the advertised diseases. Similarly, of all the people who wanted to take the advertised genetic test 36% never had a family history of the advertised health condition. Opponents of DTC advertising of genetic test have expressed fears about this nature of advertisements of genetic tests to motivate people without a family history to take the test. Opponents believe that unwarranted use of genetic tests in consumers without a prior history could present greater risks than benefits. For example, consumers may misinterpret a positive result and take drastic steps like mastectomy for breast cancer, when in reality these results do not have any meaning when the consumers did not have a family history of breast cancer. Our study results support this concern of criticizers of DTC advertising of genetic tests. Our study demonstrates that advertising can lead to increased utilization of genetic tests among individuals for whom critics believe that these genetic tests may not be appropriate. However, study results show that most consumers (without family history) expressed high intentions to look for more information and high intentions to talk to their doctor about the advertised test. Hence, it is likely that their doctor might explain the lack of validity of most genetic tests when family history is absent and thus prevent inappropriate use of predictive genetic tests. However, there is also a possibility that some consumers without a family history would not consult their doctors before testing, thereby subjecting them to potential emotional harm from results that were not really meaningful in their case.

In regards to demographic characteristics, gender was a significant predictor of intentions to talk to the doctor about the advertised genetic test and intentions to take the genetic test. Prior

research has shown that females utilize healthcare services more often than men because they are generally more concerned about their health (DREW and SENIER 2007; SHALEV *et al.* 2005). Thus, it can be said based on this data that women seek more information from doctor about genetic tests and express greater intentions to take the genetic test after exposure to an advertising stimulus. Age was another variable that produced significant differences in intentions to talk with the doctor about the advertised predictive genetic test. Results showed that middle age consumers between the ages of 35-55 expressed greater intentions to talk with their doctors about the advertised genetic test compared to consumers greater than 55 years. This is expected as consumers might not see a benefit of determining their risks after certain age and hence do not consider talking with their doctor about the test. For consumers greater than 55 years, knowing about the future at that point of time in their life may not really be as meaningful to them. Although age produced significant differences in intentions to talk to the doctor, it was not significant for intentions to look for information and intentions to take the genetic test. This indicates that middle aged consumers would probably talk to their doctor about issues regarding genetic tests before deciding whether they need to take the test.

In accordance with the Health Belief Model, our data indicated that consumers who perceived better overall health expressed lesser intentions to take the genetic test. This could be due to higher perceived threat of the disease among those who had poor health. This was evidenced in our analysis (see **Table 100).** Education level and income did not produce any significant difference in intentions to talk, look for information or take a genetic test.

Beliefs about requiring a prescription for a genetic test

Our focus groups indicated that consumers appreciated the idea of talking with their doctors about the advertised genetic test but unanimously rejected prescription requirement for

genetic tests. Our focus groups revealed that there might be three different factors that impact consumers' beliefs about requiring a prescription. The quantitative descriptive study affirmed that beliefs about requiring a prescription depended on consumers' perceptions of their doctor's knowledge about genetic tests, their perception of their right to decide about their own body and consumers' concerns about insurance. The results in **Table 102** indicate that 56% of the respondents felt that requiring a prescription could lead to health insurance discrimination. Consumers expressed concerns that requiring a prescription would lead to entry of genetic test results into the health records allowing access to health insurance companies. Our focus groups also revealed that consumers might be unaware of laws such as GINA and HIPAA protecting them from insurance discrimination. It is beneficial that consumers are educated about the laws protecting them so that they can be confident about seeking help from doctors about their results to achieve better health outcomes. Secondly, 45% of the consumers thought that it was bad that doctors will decide who should take the test whereas 25% thought that doctors' making this decision for them was a good thing. This might depend on the level of trust and the type of relationship one has with their physician or physicians in general. About 60-65% of consumers also doubted their doctors' knowledge about genetic tests. Hence, they were against prescription requirement for genetic tests. Although there were mixed opinions about requiring a prescription for a genetic test, consumers attitudes and beliefs about prescription requirement did not have an impact on their intentions to talk to the physician about the advertised genetic test. Consumers' opinions about requiring a prescription for a genetic test were in contrast to expert opinions about requiring a prescription for testing. Experts feel that requiring a prescription may lead to appropriate utilization of these tests. Hence, if a prescription is required for a genetic test in the future, one has to be aware that many consumers for whom these genetic tests could be useful

may never approach their doctors or take the test owing to insurance concerns. Evidence from our study also suggests that many consumers are likely to get the consultation even when a prescription is not required. Future studies need to evaluate the benefits and risks of prescription requirement before deciding on implementing such a policy.

As for biotech companies selling genetic tests, our quantitative experimental research shows that requiring a prescription or not, did not significantly impact consumer attitudes towards the advertisement, attitudes towards the genetic test and attitudes towards the advertising company when tested at a conservative alpha level of 0.0125. However, visual comparisons of the means revealed that consumers had better attitudes towards advertising and attitudes about the advertised genetic test when companies required a prescription. Our results provide evidence that consumer attitudes towards ads and company is not affected by prescription requirement as they do not perceive it as a legal requirement.

6.2 Conclusion & Practical Implications

The primary goal of our research was to understand how consumers might respond to advertising of genetic tests. The objective was to determine if a DTC advertisement of a genetic test could stimulate the patients to discuss the advertised test with their doctor or look for information elsewhere.

Since intentions are reflective of actual behavior, our research evaluated consumer intentions to seek information and talk about the advertised genetic test to their doctor. Subjects completed an advertising survey that measured consumers' beliefs about advertising, attitudes about talking to their physician, subjective norms, perceived threat, family history, prescription requirement beliefs and attitudes, need for cognition, involvement in healthcare and

demographics. Effects of independent variables were analyzed by using regression analysis, T-tests, chi-square contingency tables and ANOVA.

The results revealed that 57% of the consumers expressed interest in discussing with their doctors about the advertised genetic test. Almost 50% were interested to look for more information about the advertised genetic test. However, only 11.2% consumers actually performed the information search behavior even when intention was highly correlated with behavior. The consumer characteristics that were found to correlate with intentions to talk with the physician were attitudes about talking to the physician, subjective norms, attitudes about genetic testing, perceived threat, gender and race. These were significant in explaining 50% of the variance observed in the dependent variable. As for information seeking behavior, 24% of the variance noted in information seeking intent was explained by need for cognition, beliefs about advertisements of genetic tests, perceived threat of advertised health condition and attitudes about genetic testing.

Attitude towards genetic testing was a strong predictor for all intention scores. Attitudes toward talking to the physician and perceptions of support for such talk from family and friends were the strongest predictors of intentions to talk to the physician about the advertised genetic test. Although family history was expected to correlate with intentions, it was observed that perceived threat was significantly associated with intentions rather than family history. Need for cognition, a measure of consumers' propensity to engage in thinking and information processing was significant only for intentions to seek information but was not significantly associated with intentions to talk to the doctor about the advertised test. Beliefs about advertisements were found to be very favorable and consumers' expressed a great desire to see advertisements for genetic tests in the future.

The findings from our quantitative descriptive and experimental study are unique in empirically revealing the nature and extent of consumers' information processing, attitudes, intentions and behavior after exposure to a DTC advertisement of a predictive genetic test. The premise that consumers will process information in ads after exposure and exhibit intentions and behavior is reflected in this study. Additionally, the qualitative component of this study provides substantial information about consumers' perceptions about risks and benefits of these advertisements and their preferences for information that they would like to see in these ads in the future. Such information can be very useful for marketers to create advertisements catered to consumer preferences.

This is the first known research to our knowledge to investigate consumer perceptions on several issues that are current and relevant to the area of predictive genetic tests. The unique aspect of this study is that it delivers to its audience, pertinent and valuable insights about consumer perceptions on issues such as advertising of genetic tests, prescription requirement for predictive genetic tests and barriers to performing positive health behaviors. The findings reported here will provide information that would be of interest to federal regulators, doctors, consumer advocates, biotech companies and academic researchers. DTC advertisements of genetic tests are at a stage similar to DTC advertisements of prescription drugs during the 80's. The regulations are fragmented, there are several unresolved ethical dilemmas and there is lack of understanding about the impact of these ads on consumers. The findings from this data suggest how utilization of genetic tests is affected by advertisements. The results also provide insights on consumer intentions to seek help or perform behaviors that may affect health outcomes for consumers. This information is very critical for regulators and policy makers. We

believe that the results from our study could shape future policies in the area of advertising of genetic tests.

Marketers claim that advertisements provide information to patients, who then perform positive health behavior by making informed decisions (ACMG 2004a; LIU and PEARSON 2008). Out data suggests that this information is only partly true. Consumers expressed greater intentions to seek information and talk to their doctor about the advertised genetic tests after exposure to an advertisement. However, consumers in our qualitative analysis perceive information in ads of genetic tests inadequate to make informed decisions. There are several complaints that focus group participants reported with the existing advertisements of predictive genetic tests. The information uncovered through our data will allow the FDA to develop new standards in the future. This information may also help marketers to develop ads that would help consumers make an informed choice.

Our research confirms that there is definitely an incentive for biotech companies to market such tests to consumers. For biotech companies interested in DTC advertising of genetic tests, this seems to be a tool that is effective in motivating consumers to seek information from doctors and other sources, thereby leading them to take the tests. Our results revealed that consumers will most often talk to their doctors about the advertised test even when a prescription is not required. Hence, it is essential that marketers also reach out to physicians to inform them about the ads directed to consumers. For companies that do not require a prescription for a genetic test, our study reveals that consumers might have slightly negative attitudes about their ads and products. However, this did not affect their intentions to talk with their physician about the advertised genetic test. As for prescription requirement, our finding shows that consumers are against requiring a prescription for genetic tests. If regulators adhere to advocates of prescription

requirement, there is a possibility that many consumers who may benefit from these tests may be discouraged to take it due to fear of insurance discrimination and loss of privacy of information.

6.3 Limitations and Future Research

Although this study is unique in investigating the influence of DTC advertisements of genetic tests on consumer attitudes, intentions and behavior, there are some limitations which necessitate cautious interpretation of study results. Some of the limitations of this study are as follows:

This study used a forced exposure to the ad stimulus. Hence, the ecological validity of the study findings should be interpreted in light of the fact that experimental settings deviated from natural and could have influenced consumers to respond differently than usual. Further, it should be noted that attitude formation may take several ad exposures. Furthermore, this study implemented a cross-sectional study design whereas attitudes, intentions and behavior are known to evolve with time. In future, researchers should use longitudinal studies to understand the nature and extent of influence of study variables on consumer intentions and behavior.

This study has limited generalizability because of limited representativeness that is endemic to any convenience sample. Moreover, this study was conducted using an online tool using Qualtrics sample panels. Prior experience of this sample with surveys and monetary incentives could also plague the generalizability of study results. The testing environment was thus different from a typical ad exposure environment and could introduce bias.

One major limitation is due to the fact that DTC advertisements of genetic tests are new and consumers are not exposed to many ads for genetic tests via traditional media. Processing this information may be new to consumers. However, we believe that consumers do have

experiences with DTC advertising of drug products and may be able to relate to advertising of genetic tests.

Although we measured consumer information seeking behavior, this measurement was made just based on one binary response question. In the future researchers should direct consumers to websites that provide information and use modern tracking methods to provide increased validity to conclusions about behavior.

In light of the limitations of this study, future studies should examine effect of study variables in a more natural setting. Future studies should also explore healthcare professionals' perceptions of DTC advertising of genetic tests. Recently, it has been observed that some companies have appointed their own doctors to resolve queries of patients about the company's genetic tests and answer any other concerns of patients. It would be interesting to know if consumers would trust these doctors to be a reliable source of information and seek information from them. It would also be interesting to understand if this new strategy employed by biotech companies would impact consumer attitudes and utilization of genetic tests. Based on the conclusions of this research, further investigations can be made to assess if consumer attitudes and intentions improved after incorporating additional information regarding risks and limitations in advertisements as recommended by this research.

During the focus groups consumers indicated that they believe that these tests and advertisements are regulated by FDA and were shocked to learn otherwise. A well designed research in the future could address if consumers perceptions about FDA control of genetic tests would significantly impact attitudes, intentions and behavior regarding utilizations of genetic tests.

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Tables

Table 1: Scale Reliabilities- Pretest3

Scales	α	Scales	α
Involvement	0.78	Perceived susceptibility of Colon cancer	0.83
Attitudes about advertising	0.70	Perceived severity of rheumatoid arthritis	0.76
Beliefs about talking to physician	0.70	Perceived severity of Alzheimer's disease	0.83
Subjective Norms	0.75	Perceived severity of Lung cancer	0.81
Attitudes about talking to physician	0.93	Perceived severity of Pancreatic cancer	0.83
Intention to talk to the physician	0.97	Perceived severity of Colon cancer	0.85
Intention to look for more information	0.97	Attitudes about genetic testing in general	0.92
Intention to test	0.95	Beliefs about requiring a prescription	0.86
Perceived threat of rheumatoid arthritis	0.86	Attitudes about requiring a prescription	0.85
Perceived susceptibility of Alzheimer's disease	0.87	Perceived susceptibility of Pancreatic cancer	0.81

Table 2: Sample Descriptives- Demographics

Variable	Categories	Frequency	Percent
Gender	Male	141	34.4
	Female	266	64.9
	Prefer not to answer	3	0.7
Education Level	Less than high school	4	1
	High school graduate or equivalent	98	23.9
	Associates/technical/vocational degree	45	11
	Completed some part of college but no degree	88	21.5
	College graduate	116	28.3
	Graduate school or higher	56	13.7
	Prefer not to answer	3	0.7
Race	American Indian or Alaska native	2	0.5
	Asian	21	5.1
	African American	32	7.8
	Hispanic or Latino	24	5.9
	Native Hawaiian or other pacific islander	1	0.2
	White	313	76.3
	Mixed	4	1
	Other	10	2.4
	Prefer not to answer	3	0.7
Age	18-25	55	13.4
	26-35	86	21
	36-45	53	12.9
	46-55	103	25.1
	56-65	81	19.8
	Above 65 years	31	7.6
	Prefer not to answer	1	0.2
Annual Income	<$15K	31	7.6
	$15K-$24999	51	12.4
	$25K-$34,999	45	11
	$35K-$49,999	74	18
	$50K-$74,999	95	23.2
	$75K-$99,999	48	11.7
	$100K or more	59	14.4
	Prefer not to answer	7	1.7

Table 3: Sample Descriptives – Past experiences with genetic test advertisements

Variables	Categories	Frequency	Percent
Have you ever seen an advertisement for genetic test	Yes	46	11.2
	No	312	76.2
	Do not remember	52	12.7
*Media where the advertisement was seen	Magazines	20	
	Newspaper	12	
	Internet	22	
	Doctor's office	10	
	Television	26	
	Other	1	
Time when the advertisement was seen	Within last one month	14	3.4
	1-2 months	9	2.2
	2-3 months	9	2.2
	3-6 months	6	1.5
	6months-1 year	3	0.7
	>1year	5	1.2
Have you ever talked to your doctor about a genetic test that you have seen advertised	Yes	26	6.3
	No	384	93.7

*Percentages were not calculated because of membership in multiple categories

Table 4: Sample Descriptives: Involvement by Age

Age	N	Mean	Std. Deviation	Std. Error
18-25	55	4.7394	1.02978	.13886
26-35	86	5.1202	1.17814	.12704
36-45	53	5.2956	1.07747	.14800
46-55	103	5.3786	1.10065	.10845
56-65	81	5.7449	.87761	.09751
Above 65 years	31	5.8925	.83616	.15018
Total	409	5.3390	1.09451	.05412

ANOVA

	Levene's test			ANOVA			
	df	**F**	**Sig**	**Sum of Squares**	**df**	**F**	**Sig (2tailed)**
Between groups	5	3.038	0.011	46.993	5	8.574	0.000
Within groups	403			441.771	403		
Total				488.764	408		

Scheffe's Multiple Comparisons

Age 18-25 versus	Mean Difference	Std. Error	Sig.
26-35	-.38076	.18077	.489
36-45	-.55620	.20153	.181
46-55	-.63925*	.17485	.022
56-65	-1.00546*	.18293	.000
Above 65 years	-1.15308*	.23514	.000

*****Significantly different groups

After applying Bonferroni correction, the level of significance tested is 0.05/18= 0.003

Table 5: Sample Descriptives: Beliefs about advertising of genetic tests by Age

Age	N	Mean	Std. Deviation	Std. Error
18-25	55	4.1018	.78869	.10635
26-35	86	4.4767	.96390	.10394
36-45	53	4.6038	.85799	.11785
46-55	103	4.7282	.92709	.09135
56-65	81	4.5728	.87507	.09723
Above 65 years	31	4.7806	.93002	.16704
Total	409	4.5482	.91601	.04529

ANOVA

	Levene's test			ANOVA			
	df	F	Sig	Sum of Squares	df	F	Sig (2tailed)
Between groups	5	1.374	0.233	16.622	5	4.113	.001
Within groups	403			325.720	403		
Total				342.341	408		

Scheffe's Multiple Comparisons

Age 18-25 versus	Mean Difference	Std. Error	Sig.
26-35	-.37493	.15522	.325
36-45	-.50196	.17305	.138
46-55	-.62634*	.15014	.004
56-65	-.47102	.15708	.112
Above 65 years	-.67883*	.20191	.048

*Significantly different groups

After applying Bonferroni correction, the level of significance tested is 0.05/18= 0.003

Table 6: Sample Descriptives: Attitudes about genetic testing by Age

Age	N	Mean	Std. Deviation	Std. Error
18-25	55	4.5939	1.18581	.15989
26-35	86	5.0116	1.21046	.13053
36-45	53	5.6478	1.12359	.15434
46-55	103	5.2880	1.28002	.12612
56-65	81	5.4074	1.14018	.12669
Above 65 years	31	5.7634	1.02630	.18433
Total	409	5.2429	1.22884	.06076

ANOVA

	Levene's test			ANOVA			
	df	**F**	**Sig**	**Sum of Squares**	**df**	**F**	**Sig (2tailed)**
Between groups	5	0.601	0.699	47.254	5	6.695	.000
Within groups	403			568.844	403		
Total				616.097	408		

Scheffe's Multiple Comparisons

Age 18-25 versus	Mean Difference	Std. Error	Sig.
26-35	-.41769	.20513	.529
36-45	-1.05386*	.22868	.001
46-55	-.69409*	.19841	.033
56-65	-.81347*	.20758	.010
Above 65 years	-1.16950*	.26683	.002

*Significantly different groups

After applying Bonferroni correction, the level of significance tested is 0.05/18= 0.003

Table 7: Sample Descriptives: Perceived threat of Alzheimer's by Age

Age	N	Mean	Std. Deviation	Std. Error
18-25	55	15.4303	8.54997	1.15288
26-35	86	20.3824	11.24550	1.21263
36-45	53	21.7945	10.91986	1.49996
46-55	103	22.6980	10.54472	1.03900
56-65	81	21.6228	11.30978	1.25664
Above 65 years	31	18.8495	9.64120	1.73161
Total	409	20.6121	10.78340	.53320

ANOVA

	Levene's test			ANOVA			
	df	F	Sig	Sum of Squares	df	F	Sig (2tailed)
Between groups	5	1.746	0.123	2182.627	5	3.887	.002
Within groups	403			45260.314	403		
Total				47442.941	408		

Scheffe's Multiple Comparisons

Age 18-25 versus	Mean Difference	Std. Error	Sig.
26-35	-4.95213	1.82972	.200
36-45	-6.36425	2.03985	.086
46-55	-7.26765*	1.76984	.005
56-65	-6.19247*	1.85162	.050
Above 65 years	-3.41916	2.38009	.840

*Significantly different groups

After applying Bonferroni correction, the level of significance tested is 0.05/18= 0.003

Table 8: Sample Descriptives: Overall health status by Age

Age	N	Mean	Std. Deviation	Std. Error
18-25	55	4.95	.951	.128
26-35	86	4.97	1.011	.109
36-45	53	4.75	.998	.137
46-55	103	4.71	1.296	.128
56-65	81	4.59	1.311	.146
Above 65 years	31	4.58	1.409	.253
Total	409	4.77	1.177	.058

ANOVA

	Levene's test			ANOVA			
	df	**F**	**Sig**	**Sum of Squares**	**df**	**F**	**Sig (2tailed)**
Between groups	5	4.981	0.000	9.025	5	1.308	.259
Within groups	403			555.909	403		
Total				564.934	408		

Table 9: Sample Descriptives: Beliefs about talking to physician about advertised genetic test by Gender

Group Statistics

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	141	5.1844	.89375	.07527
Female	266	5.4624	.99953	.06128

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.924	.337	-2.768	405	.006
Equal variances not assumed			-2.864	314.206	.004

*After applying Bonferroni correction, the level of significance tested is 0.05/18= 0.003

Table 10: Sample Descriptives: Need for cognition by Education level

Age	N	Mean	Std. Deviation	Std. Error
Less than high school	4	5.50	1.732	.866
High school graduate or equivalent	98	5.26	1.124	.114
Associates/technical/vocational degree	45	5.51	1.036	.154
Completed some part of college but no degree	88	5.49	1.203	.128
College Graduate	116	5.48	.928	.086
Graduate school or higher	56	5.70	1.159	.155
Total	407	5.46	1.093	.054

ANOVA

	Levene's test			ANOVA			
	df	F	Sig	Sum of Squares	df	F	Sig (2tailed)
Between groups	5	1.370	0.235	7.499	5	1.259	.281
Within groups	401			477.660	401		
Total				485.160	406		

Table 11: Post-hoc Scale Reliabilities

Scales	Reliability (Cronbach's α)
Involvement	0.71
Attitudes about advertising	0.71
Beliefs about talking to physician	0.71
Subjective Norms	0.91
Attitudes about talking to physician	0.89
Intention to talk to the physician	0.91
Intention to look for more information	0.93
Intention to test	0.93
Perceived susceptibility of rheumatoid arthritis	0.86
Perceived susceptibility of Alzheimer's disease	0.85
Perceived susceptibility of Lung cancer	0.87
Perceived susceptibility of Pancreatic cancer	0.82
Perceived susceptibility of Colon cancer	0.84
Perceived severity of rheumatoid arthritis	0.76
Perceived severity of Alzheimer's disease	0.84
Perceived severity of Lung cancer	0.86
Perceived severity of Pancreatic cancer	0.85
Perceived severity of Colon cancer	0.84
Attitudes about genetic testing in general	0.83
Beliefs about requiring a prescription	0.88
Attitudes about requiring a prescription	0.94

Table 12: Reliability of Involvement Scale

N = 410
Number of items = 3
Cronbach's alpha = 0.71

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
In general, I consider myself to be very involved in my healthcare.	10.44	5.724	.539	.539
I rarely look for information regarding healthcare issues.	11.11	4.765	.440	.713
I generally pay attention to healthcare information that I am exposed to.	10.45	6.263	.560	.541

Table 13: Reliability of Beliefs about Advertisement Scale

N = 410
Number of items = 7
Cronbach's alpha = 0.71

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Predictive genetic test information should only come from a doctor.	28.45	30.497	.130	.738
Predictive genetic tests should not be advertised to consumers.	27.07	24.264	.546	.621
I think that consumer advertisements for predictive genetic tests would provide consumers with information they have a right to know.	26.26	28.111	.477	.651
Consumers want to know more about predictive genetic tests.	26.48	27.707	.483	.648
Predictive genetic tests should not be advertised like other products.	27.48	24.901	.466	.646
Predictive genetic test advertisements can protect consumers from doctors who are not well informed.	27.20	30.032	.219	.708
I would like to see more advertisements for genetic tests.	27.24	24.240	.610	.605

Table 14: Beliefs about talking to physician scale

N = 410
Number of items = 4
Cronbach's alpha = 0.71

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Talking with my doctor about the genetic test I saw advertised is a good idea.	16.17	8.807	.651	.566
Talking with my doctor about a genetic test I saw advertised will provide useful information.	16.07	8.841	.723	.533
Talking with my doctor about a genetic test I saw advertised will spoil my relationship with my physician.	16.04	11.180	.157	.888
Talking with my doctor about a genetic test I saw advertised will help me decide if I should take the test.	15.96	9.172	.652	.573

Table 15: Subjective Norms about Talking to the Doctor

N = 410
Number of items = 3
Cronbach's alpha = 0.91

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
People who are important to me would think that I should talk to my doctor about the advertised RTF® genetic test.	9.96	6.849	.772	.907
People who are important to me would approve of me talking to my doctor about the advertised RTF® genetic test.	9.47	7.521	.802	.877
People who are important to me would be glad I talked to my doctor about the RTF® genetic test.	9.59	6.991	.876	.814

Table 16: Attitude towards talking to the physician

N = 410
Number of items = 4
Cronbach's alpha = 0.89

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Bad:Good	16.62	15.742	.718	.869
Wise:Foolish	16.90	13.484	.778	.846
Harmful:Beneficial	16.69	14.991	.787	.845
Useful:Useless	16.89	13.604	.750	.858

Table 17: Intention to talk to the physician

N = 410
Number of items = 3
Cronbach's alpha = 0.91

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Likely:Unlikeky	9.51	10.901	.856	.840
Improbable:Probable	9.34	11.433	.842	.851
Possible:Impossible	8.97	14.011	.779	.909

Table 18: Intention to look for in formation

N = 410
Number of items = 3
Cronbach's alpha = 0.93

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Likely:Unlikely	8.82	12.928	.889	.885
Improbable:Probable	8.73	13.869	.875	.893
Possible:Impossible	8.37	15.969	.839	.927

Table 19: Intention to test

N = 410
Number of items = 3
Cronbach's alpha = 0.93

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Likely:Unlikely	7.40	13.115	.900	.858
Improbable:Probable	7.22	13.818	.864	.887
Possible:Impossible	6.83	15.904	.805	.935

Table 20: Perceived Susceptibility of Rheumatoid Arthritis

N = 410
Number of items = 3
Cronbach's alpha = 0.86

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) What do you think is your risk of developing the Rheumatoid Arthritis in the future	6.86	9.779	.775	.765
B) How afraid are you of developing Rheumatoid Arthritis in the future	6.75	10.828	.658	.873
C) How likely do you think you would be to develop Rheumatoid arthritis in the future	6.82	9.747	.775	.765

Table 21: Perceived Susceptibility of Alzheimer's disease

N = 410
Number of items = 3
Cronbach's alpha = 0.85

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) What do you think is your risk of developing the Alzheimer's in the future	7.34	9.688	.736	.768
B) How afraid are you of developing Alzheimer's in the future	6.61	8.653	.647	.869
C) How likely do you think you would be to develop Alzheimer's in the future	7.34	9.515	.782	.729

Table 22: Perceived Susceptibility of Lung Cancer

N = 410
Number of items = 3
Cronbach's alpha = 0.87

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) What do you think is your risk of developing the lung cancer in the future	7.20	11.136	.766	.816
B) How afraid are you of developing lung cancer in the future	6.54	10.410	.700	.885
C) How likely do you think you would be to develop lung cancer in the future	7.10	11.097	.823	.770

Table 23: Perceived Susceptibility of Pancreatic Cancer

N = 410
Number of items = 3
Cronbach's alpha = 0.82

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) What do you think is your risk of developing the pancreatic cancer in the future	6.90	9.624	.663	.762
B) How afraid are you of developing pancreatic cancer in the future	6.12	7.851	.615	.835
C) How likely do you think you would be to develop pancreatic cancer in the future	6.87	8.889	.770	.660

Table 24: Perceived Susceptibility of Colon Cancer

N = 410
Number of items = 3
Cronbach's alpha = 0.84

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) What do you think is your risk of developing the colon cancer in the future	7.31	10.166	.710	.775
B) How afraid are you of developing colon cancer in the future	6.60	8.720	.626	.877
C) How likely do you think you would be to develop colon cancer in the future	7.25	9.401	.804	.686

Table 25: Perceived Severity of Rheumatoid Arthritis

N = 410
Number of items = 3
Cronbach's alpha = 0.76

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) How severely do you think your developing Rheumatoid Arthritis will disrupt your physical health	9.51	7.546	.579	.698
B) How severely do you think your developing Rheumatoid Arthritis will disrupt your emotional health	9.65	6.140	.733	.507
C) How dangerous do you think Rheumatoid Arthritis will be, if you contract it?	10.20	8.602	.487	.792

Table 26: Perceived Severity of Alzheimer's disease

N = 410
Number of items = 3
Cronbach's alpha = 0.84

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) How severely do you think your developing Alzheimer's will disrupt your physical health	11.25	7.725	.731	.749
B) How severely do you think your developing Alzheimer's will disrupt your emotional health	11.05	7.986	.768	.707
C) How dangerous do you think Alzheimer's will be, if you contract it?	11.38	10.198	.623	.849

Table 27: Perceived Severity of Lung Cancer

N = 410
Number of items = 3
Cronbach's alpha = 0.86

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) How severely do you think your developing lung cancer will disrupt your physical health	11.71	7.171	.770	.763
B) How severely do you think your developing lung cancer will disrupt your emotional health	11.69	7.183	.806	.724
C) How dangerous do you think lung cancer will be, if you contract it?	11.37	9.642	.637	.883

Table 28: Perceived Severity of Pancreatic Cancer

N = 410
Number of items = 3
Cronbach's alpha = 0.85

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) How severely do you think your developing pancreatic cancer will disrupt your physical health	11.66	7.721	.742	.774
B) How severely do you think your developing pancreatic cancer will disrupt your emotional health	11.57	7.787	.790	.722
C) How dangerous do you think pancreatic cancer will be, if you contract it?	11.26	10.113	.649	.859

Table 29: Perceived Severity of Colon Cancer

N = 410
Number of items = 3
Cronbach's alpha = 0.84

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A) How severely do you think your developing colon cancer will disrupt your physical health	11.64	7.032	.735	.740
B) How severely do you think your developing colon cancer will disrupt your emotional health	11.57	7.205	.770	.699
C) How dangerous do you think colon cancer will be, if you contract it?	11.27	9.671	.616	.853

Table 30: Attitudes towards genetic testing

N = 410
Number of items = 3
Cronbach's alpha = 0.83

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BAD:GOOD	10.11	6.561	.729	.726
PLEASANT:UNPLEASANT	10.95	7.093	.556	.898
UNFAVORABLE:FAVORABLE	10.36	6.225	.799	.655

Table 31: Beliefs about requiring a prescription

N = 410
Number of items = 9
Cronbach's alpha = 0.88

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
My health insurance company could get the results.	34.58	92.958	.526	.871
My employer could get the results.	35.62	91.380	.529	.872
My test results won't be private anymore.	35.05	89.374	.600	.865
Doctors will decide if I need a test, and not me and this could be bad.	34.94	89.410	.699	.856
I would not have the right to decide about my own body.	35.22	88.421	.662	.859
I will no longer have access to information about my own body and it is a bad thing.	35.47	89.403	.627	.862
Doctors will need a lot more information on genetic tests to decide if the tests are right for me.	34.55	92.615	.661	.860
Doctors will need a lot more experience with genetic tests to decide if the tests are right for me.	34.48	92.470	.660	.860
Doctors will need to learn more about genetic tests to decide if the tests are right for me.	34.34	93.340	.638	.862

Table 32: Attitudes about requiring a prescription

N = 410
Number of items = 4
Cronbach's alpha = 0.94

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Bad:Good	13.55	23.749	.847	.930
Wise:Foolish	13.54	24.131	.882	.918
Harmful:Beneficial	13.43	24.676	.873	.921
Useful:Useless	13.54	24.386	.847	.929

Table 33: Sample Descriptives – Study Constructs

	N	Minimum	Maximum	Mean		Std. Deviation	Skewness	Kurtosis
				Statistic	Std. Error			
NFC	410	2.20	7.00	5.4500	0.0540	1.09000	-.031	-.530
INV	410	2.33	7.00	5.3341	.05421	1.09765	-.353	-.555
BEL_AD	410	2.20	7.00	4.5478	.04518	.91492	.172	-.212
BEL_TLK	410	1.75	7.00	5.3530	.04850	.98206	-.410	.236
SN	410	1.00	7.00	4.8366	.06441	1.30413	-.407	.212
ATT_TLK	410	1.00	7.00	5.5921	.06144	1.24414	-.566	-.285
INT_TLK	410	1.00	7.00	4.6366	.08407	1.70220	-.282	-.737
INT_INF	410	1.00	7.00	4.3203	.09172	1.85712	-.146	-1.001
INT_TST	410	1.00	7.00	3.5748	.09168	1.85642	.283	-.893
PSU_ART	410	1.00	7.00	3.4049	.07593	1.53746	.136	-.769
PSU_ALZ	410	1.00	7.00	3.5488	.07251	1.46828	-.027	-.644
PSU_LNG	410	1.00	7.00	3.4748	.07900	1.59973	.199	-.781
PSU_PAN	410	1.00	7.00	3.3146	.07008	1.41898	.189	-.447
PSU_COL	410	1.00	7.00	3.5268	.07295	1.47715	.086	-.525
PSE_ART	410	1.00	7.00	4.8927	.06364	1.28852	-.725	.396
PSE_ALZ	410	1.00	7.00	5.6138	.06980	1.41332	-1.245	1.161
PSE_LNG	410	1.00	7.00	5.7943	.06746	1.36603	-1.372	1.661
PSE_PAN	410	1.00	7.00	5.7472	.06961	1.40951	-1.262	1.197
PSE_COL	410	1.00	7.00	5.7472	.06702	1.35707	-1.273	1.324
PT_ART	410	1.00	49.00	17.3000	.50132	10.15092	.692	-.027
PT_ALZ	410	1.00	49.00	20.6493	.53321	10.79660	.280	-.609
PT_LNG	410	1.00	49.00	20.6504	.56462	11.43268	.520	-.415
PT_PAN	410	1.00	49.00	19.4520	.49832	10.09020	.493	-.086
PT_COL	410	1.00	49.00	20.7759	.51762	10.48109	.369	-.211
ATT_GT	410	1.00	7.00	5.2358	.06103	1.23572	-.446	.304
BEL_RX	410	1.00	7.00	4.3645	.05845	1.18357	-.205	.241
ATT_RX	410	1.00	7.00	4.5055	.08027	1.62540	-.178	-.553
OVR_HLTH	410	1.00	6.00	4.77	.058	1.176	-.969	.456

NFC- Need for cognition, INV- Involvement, BEL_TLK- Beliefs about test inquiry, BEL_AD- Beliefs about advertisement, SN- Subjective norms about test inquiry, ATT_TLK- attitudes about test inquiry, INT_TLK- Intentions about test inquiry, INT_INF- Intentions to seek information, INT_TST- Intention to take the predictive genetic test, PSU_ART- Perceived susceptibility for arthritis, PSU_ALZ- Perceived susceptibility for Alzheimer, PSU_LNG- Perceived susceptibility for lung cancer, PSU_PAN- Perceived susceptibility for pancreatic cancer, PSU_COL- Perceived susceptibility for colon cancer, PSE_ART- Perceived severity for arthritis, PSE_ALZ- Perceived severity for Alzheimer, PSE_LNG- Perceived severity for lung cancer, PSE_PAN- Perceived severity for pancreatic cancer, PSE_COL- Perceived severity for colon cancer, PT_ALZ- Perceived threat of Alzheimer, PT_ART- Perceived threat of Arthritis, PT_LNG- Perceived threat of lung cancer, PT_PAN- Perceived threat of pancreatic cancer, PT_COL- perceived threat of colon cancer, ATT_GT- Attitudes towards genetic testing, BEL_RX- Beliefs about requiring a prescription, ATT_RX- Attitudes about requiring a prescription

Table 34: T-tests for Study Constructs

	Test Value = 4					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
NFC_F	26.751	409	.000	1.45100	1.34	1.56
INV_F	24.611	409	.000	1.33415	1.2276	1.4407
BEL_AD_F	12.124	409	.000	.54780	.4590	.6366
BEL_TLK_F	27.898	409	.000	1.35305	1.2577	1.4484
SN_F	12.989	409	.000	.83659	.7100	.9632
ATT_TLK_F	25.911	409	.000	1.59207	1.4713	1.7129
INT_TLK_F	7.572	409	.000	.63659	.4713	.8018
INT_INF_F	3.493	409	.001	.32033	.1400	.5006
INT_TST_F	-4.638	409	.000	-.42520	-.6054	-.2450
PSU_ART	-7.838	409	.000	-.59512	-.7444	-.4459
PSU_ALZ	-6.223	409	.000	-.45122	-.5938	-.3087
PSU_LNG	-6.648	409	.000	-.52520	-.6805	-.3699
PSU_PAN	-9.780	409	.000	-.68537	-.8231	-.5476
PSU_COL	-6.486	409	.000	-.47317	-.6166	-.3298
PSE_ART	14.028	409	.000	.89268	.7676	1.0178
PSE_ALZ	23.121	409	.000	1.61382	1.4766	1.7510
PSE_LNG	26.597	409	.000	1.79431	1.6617	1.9269
PSE_PAN	25.099	409	.000	1.74715	1.6103	1.8840
PSE_COL	26.069	409	.000	1.74715	1.6154	1.8789
ATT_GT_F	20.249	409	.000	1.23577	1.1158	1.3557
BEL_RX_F	6.236	409	.000	.36450	.2496	.4794
ATT_RX_F	6.297	409	.000	.50549	.3477	.6633
OVR_HLTH	13.188	409	.000	.766	.65	.88

NFC- Need for cognition, INV- Involvement, BEL_TLK- Beliefs about test inquiry, BEL_AD- Beliefs about advertisement, SN- Subjective norms about test inquiry, ATT_TLK- attitudes about test inquiry, INT_TLK- Intentions about test inquiry, INT_INF- Intentions to seek information, INT_TST- Intention to take the predictive genetic test, PSU_ART- Perceived susceptibility for arthritis, PSU_ALZ- Perceived susceptibility for Alzheimer, PSU_LNG- Perceived susceptibility for lung cancer, PSU_PAN- Perceived susceptibility for pancreatic cancer, PSU_COL- Perceived susceptibility for colon cancer, PSE_ART- Perceived severity for arthritis, PSE_ALZ- Perceived severity for Alzheimer, PSE_LNG- Perceived severity for lung cancer, PSE_PAN- Perceived severity for pancreatic cancer, PSE_COL- Perceived severity for colon cancer, PT_ALZ- Perceived threat of Alzheimer, PT_ART- Perceived threat of Arthritis, PT_LNG- Perceived threat of lung cancer, PT_PAN- Perceived threat of pancreatic cancer, PT_COL- perceived threat of colon cancer, ATT_GT- Attitudes towards genetic testing, BEL_RX- Beliefs about requiring a prescription, ATT_RX- Attitudes about requiring a prescription

Table 35- Need for Cognition

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Need for cognition	Low	194	4.51	.784	.056
	High	216	6.30	.460	.031

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Need for cognition	Equal variances assumed	45.146	.000	-28.641	408	.000
	Equal variances not assumed			-27.899	304.649	.000

Table 36- Involvement

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Involvement	Low	181	4.2891	.64061	.04762
	High	229	6.1601	.53401	.03529

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Involvement	Equal variances assumed	2.201	.139	-32.243	408	.000
	Equal variances not assumed			-31.569	348.925	.000

Table 37- Beliefs about advertising of genetic tests

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Beliefs about advertising	Low	208	3.8154	.48847	.03387
	High	202	5.3020	.57519	.04047

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Beliefs about advertising	Equal variances assumed	5.498	.020	-28.237	408	.000
	Equal variances not assumed			-28.170	393.651	.000

Table 38- Beliefs about Talking with the physician about the advertised genetic test

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Beliefs about talking With physician	Low	202	4.5520	.65346	.04598
	High	208	6.1310	.50656	.03512

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Beliefs about talking with physician	Equal variances assumed	4.540	.034	-27.391	408	.000
	Equal variances not assumed			-27.291	378.793	.000

Table 39- Attitudes about talking with the physician about the advertised genetic test

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
attitudes about talking with physician	Low	197	4.4937	.80553	.05739
	High	213	6.6080	.47777	.03274

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Attitudes about talking with physician	Equal variances assumed	31.479	.000	-32.607	408	.000
	Equal variances not assumed			-32.001	313.596	.000

Table 40- Subjective Norms

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Subjective norms	Low	195	3.7419	.86224	.06175
	High	215	5.8295	.70295	.04794

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Subjective norms	Equal variances assumed	.591	.442	-26.969	408	.000
	Equal variances not assumed			-26.705	374.893	.000

Table 41- Perceived threat of Arthritis

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Perceived threat- Arthritis	Low	231	9.9788	4.33089	.28495
	High	179	26.7480	7.29399	.54518

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Perceived threat- Arthritis	Equal variances assumed	41.798	.000	-28.973	408	.000
	Equal variances not assumed			-27.260	272.784	.000

Table 42- Perceived threat of Alzheimer's

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Perceived threat-Alzheimer	Low	207	11.7397	5.13393	.35683
	High	203	29.7345	6.69648	.47000

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Perceived threat-Alzheimer	Equal variances assumed	13.130	.000	-30.572	408	.000
	Equal variances not assumed			-30.494	378.628	.000

Table 43- Perceived threat of lung Cancer

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Perceived threat- Lung cancer	Low	225	12.0711	5.07985	.33866
	High	185	31.0847	7.72344	.56784

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Perceived threat- Lung cancer	Equal variances assumed	34.659	.000	-29.895	408	.000
	Equal variances not assumed			-28.758	306.337	.000

Table 44- Perceived threat of Pancreatic Cancer

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Perceived threat- Pancreatic cancer	Low	222	11.8659	4.83570	.32455
	High	188	28.4102	6.78570	.49490

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Perceived threat- Pancreatic cancer	Equal variances assumed	11.521	.001	-28.724	408	.000
	Equal variances not assumed			-27.955	330.679	.000

Table 45- Perceived threat of Colon Cancer

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Perceived threat- Colon cancer	Low	207	12.4015	5.24916	.36484
	High	203	29.3153	7.01271	.49220

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Perceived threat- Colon cancer	Equal variances assumed	9.833	.002	-27.683	408	.000
	Equal variances not assumed			-27.607	374.190	.000

Table 46- Attitudes about genetic testing

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Attitudes about genetic testing	Low	202	4.2063	.78250	.05506
	High	208	6.2356	.61956	.04296

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Attitudes about genetic testing	Equal variances assumed	.007	.932	-29.157	408	.000
	Equal variances not assumed			-29.060	382.558	.000

Table 47- Beliefs about requiring a prescription for genetic testing

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Beliefs about requiring prescription	Low	211	3.4750	.79416	.05467
	High	199	5.3076	.69825	.04950

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Beliefs about requiring prescription	Equal variances assumed	1.852	.174	24.756	408	.000
	Equal variances not assumed			24.850	406.026	.000

Table 48- Attitudes about requiring a prescription for genetic testing

Group statistics

Variable	High vs Low	N	Mean	Std. Deviation	Std. Error Mean
Attitudes about requiring prescription	Low	229	3.3199	1.00630	.06650
	High	181	6.0055	.81818	.06081

T-test

Variable		Levene's test for equality of variances		t-test for equality of variances		
		F	Sig.	t	df	Sig (2 tailed)
Attitudes about requiring prescription	Equal variances assumed	6.955	.009	-29.098	408	.000
	Equal variances not assumed			-29.803	407.663	.000

Table 49: Goodness of Fit Statistics

Goodness of Fit Index	Value
Chi-Square (df = 1326 , p – value = 0.00)	17061
Root Mean Square Error of Approximation (RMSEA)	0.062
Standardized Root Mean Square Residual (SRMR)	0.055
Comparative Fit Index (CFI)	0.89
Tucker- Lewis Index (TLI)	0.87

Table 50: Residual Analysis – Durbin Watson test for autocorrelation

Variable	Durbin Watson statistic
Intention to talk to physician	2.020
Intention to look for more information	1.766
Intention to take the genetic test	1.853

Table 51: Sample Descriptives – Tests of Normality - Shapiro- Wilk test

Variables	Shapiro-Wilk test		
	Statistic	df	Sig.
Intention to talk to doctor	.946	410	.000
Intention to look for information	.943	410	.000
Intention to test	.937	410	.000
Involvement in healthcare	.962	410	.000
Beliefs about advertisement	.988	410	.002
Beliefs about talking to doctor	.971	410	.000
Subjective Norms	.962	410	.000
Attitudes about talking to doctor	.909	410	.000
Perceived Threat of Arthritis	.957	410	.000
Perceived Threat of Alzheimer's	.981	410	.000
Perceived Threat of Lung cancer	.965	410	.000
Perceived Threat of Pancreatic cancer	.976	410	.000
Perceived Threat of Colon cancer	.983	410	.000
Attitudes towards genetic testing	.943	410	.000
Beliefs about requiring a prescription	.986	410	.001
Attitudes about requiring a prescription	.951	410	.000
Need for Cognition	.893	410	.000
Overall health	.851	410	.000

Table 52: Residual Analysis – Intention to talk to doctor about genetic test

	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	.0336	7.1691	4.6413	1.18767
Std. Predicted Value	-3.880	2.128	.000	1.000
Standard Error of Predicted Value	.076	.335	.144	.040
Adjusted Predicted Value	-.0132	7.1758	4.6400	1.18891
Residual	-5.11711	4.03475	.00000	1.22536
Std. Residual	-4.150	3.272	.000	.994
Stud. Residual	-4.169	3.372	.001	1.003
Deleted Residual	-5.16250	4.28383	.00132	1.24733
Stud. Deleted Residual	-4.257	3.416	.000	1.007
Mahal. Distance	.536	29.042	4.988	3.852
Cook's Distance	.000	.117	.003	.009
Centered Leverage Value	.001	.072	.012	.009

Outliers

Case Number	Std. Residual	INT_TLK_F	Predicted Value	Residual
174	-3.390	2.00	6.1800	-4.18003
203	-3.045	1.00	4.7541	-3.75408
333	3.272	7.00	2.9653	4.03475
338	-4.150	1.00	6.1171	-5.11711
347	-3.730	2.00	6.5991	-4.59908

Table 53: Residual Analysis – Intention to look for information

	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	.8701	6.8160	4.3210	.97465
Std. Predicted Value	-3.541	2.560	.000	1.000
Standard Error of Predicted Value	.096	.444	.201	.061
Adjusted Predicted Value	.8614	6.8113	4.3199	.97578
Residual	-5.07200	3.95210	.00000	1.58722
Std. Residual	-3.172	2.471	.000	.993
Stud. Residual	-3.195	2.500	.000	1.003
Deleted Residual	-5.14740	4.04298	.00120	1.62013
Stud. Deleted Residual	-3.233	2.516	.000	1.005
Mahal. Distance	.480	30.248	5.985	4.512
Cook's Distance	.000	.069	.003	.006
Centered Leverage Value	.001	.075	.015	.011

Outliers

Case Number	Std. Residual	INT_TLK_F	Predicted Value	Residual
338	-3.172	1.00	6.0720	-5.07200

Table 54: Residual Analysis – Intention to take the genetic test

	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	.3239	6.2592	3.5758	.92456
Std. Predicted Value	-3.517	2.902	.000	1.000
Standard Error of Predicted Value	.105	.377	.191	.052
Adjusted Predicted Value	.2857	6.2275	3.5737	.92649
Residual	-4.46701	5.70001	.00000	1.61727
Std. Residual	-2.745	3.503	.000	.994
Stud. Residual	-2.789	3.591	.001	1.002
Deleted Residual	-4.61223	5.99068	.00203	1.64502
Stud. Deleted Residual	-2.813	3.646	.001	1.005
Mahal. Distance	.700	20.750	4.988	3.423
Cook's Distance	.000	.110	.003	.007
Centered Leverage Value	.002	.051	.012	.008

Outliers

Case Number	Std. Residual	INT_TLK_F	Predicted Value	Residual
259	3.503	7.00	1.3000	5.70001

Table 55: Regression analysis – Intentions to talk to the doctor about the advertised genetic test

Analysis of Variance

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	6	555.70456	92.61743	64.04	< 0.0001
Error	369	533.67529	1.44627		
Corrected Model	375	1089.37985			

R-Square	0.5101
Adj R- Square	0.5021

Parameter Estimates

Variable	df	Parameter estimate	Std. Error	t-value	Pr > t	Tolerance	Variance Inflation
Intercept	1	-1.74203	0.34491	-5.05	<0.0001		0
Nsex	1	0.36225	0.13025	2.78	0.0057	0.98851	1.01162
Dum_race3	1	0.72173	0.22996	3.14	0.0018	0.99065	1.00944
SN	1	0.33690	0.06079	5.54	<0.0001	0.65235	1.53291
Attitudes about talking to doctor	1	0.51626	0.06601	7.82	<0.0001	0.58645	1.70518
Perceived threat	1	0.01722	0.00729	2.36	0.0187	0.91732	1.09013
Attitude about genetic testing	1	0.25326	0.06432	3.94	<0.0001	0.64281	1.55566

Table 56: Tests for Hypothesis for Test inquiry intent – Attitudes about talking to physician

Group Statistics

Attitudes about talking to doctor	N	Mean	Std. Deviation	Std. Error Mean
Negative attitudes	197	3.6548	1.38193	.09846
Positive attitudes	213	5.5446	1.44925	.09930

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	1.288	.257	-13.489	408	.000
Equal variances not assumed			-13.514	407.615	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 57: Tests for Hypothesis for Test inquiry intent – Subjective Norms

Group Statistics

Subjective Norms	N	Mean	Std. Deviation	Std. Error Mean
Low	195	3.8274	1.60766	.11513
High	215	5.3705	1.43414	.09781

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	1.053	.305	-10.272	408	.000
Equal variances not assumed			-10.215	390.629	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 58: Tests for Hypothesis for Test inquiry intent – Perceived Threat of Arthritis

Group Statistics

PT_Arthritis	N	Mean	Std. Deviation	Std. Error Mean
Low	231	4.3405	1.62898	.10718
High	179	5.0186	1.72292	.12878

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	1.288	.257	-4.076	408	.000
Equal variances not assumed			-4.047	371.905	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 59: Tests for Hypothesis for Test inquiry intent – Perceived Threat of Alzheimer's disease

Group Statistics

PT_Alzheimer's	N	Mean	Std. Deviation	Std. Error Mean
Low	207	4.4138	1.59150	.11062
High	203	4.8637	1.78354	.12518

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	4.042	.045	-2.696	408	.007
Equal variances not assumed			-2.693	400.923	.007

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 60: Tests for Hypothesis for Test inquiry intent – Perceived Threat of Lung cancer

Group Statistics

PT_Lung Cancer	N	Mean	Std. Deviation	Std. Error Mean
Low	225	4.2785	1.60278	.10685
High	185	5.0721	1.72215	.12661

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	3.577	.059	-4.823	408	.000
Equal variances not assumed			-4.790	380.770	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 61: Tests for Hypothesis for Test inquiry intent – Perceived Threat of Pancreatic cancer

Group Statistics

PT_Pancreatic Cancer	N	Mean	Std. Deviation	Std. Error Mean
Low	222	4.3393	1.67373	.11233
High	188	4.9876	1.67267	.12199

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.014	.906	-3.909	408	.000
Equal variances not assumed			-3.909	397.032	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 62: Tests for Hypothesis for Test inquiry intent – Perceived Threat of Colon cancer

Group Statistics

PT_Colon Cancer	N	Mean	Std. Deviation	Std. Error Mean
Low	207	4.2383	1.68120	.11685
High	203	5.0427	1.62973	.11438

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.154	.695	-4.918	408	.000
Equal variances not assumed			-4.919	407.946	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 63: Tests for Hypothesis for Test inquiry intent – Attitudes about genetic testing in general

Group Statistics

Attitudes about genetic testing	N	Mean	Std. Deviation	Std. Error Mean
Negative	202	3.8317	1.44103	.10139
Positive	208	5.4183	1.56921	.10881

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	3.620	.058	-10.655	408	.000
Equal variances not assumed			-10.668	406.735	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/17= 0.003

Table 64: Regression analysis – Intentions to look for more information about the advertised genetic test

Analysis of Variance

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	4	345.27632	86.31908	32.64	< 0.0001
Error	388	1026.11868	2.64464		
Corrected Model	392	1371.39500			

R-Square	0.2518
Adj R- Square	0.2441

Parameter Estimates

Variable	df	Parameter estimate	Std. Error	t-value	Pr > t	Tolerance	Variance Inflation
Intercept	1	-1.42528	0.57765	-2.47	< 0.0140		0
Need for cognition	1	0.24364	0.07999	3.05	0.0025	0.95692	1.04502
Beliefs about ad	1	0.26505	0.10103	2.62	0.0091	0.78404	1.27545
Perceived Threat	1	0.03096	0.00967	3.20	0.0015	0.92096	1.08583
Attitudes about genetic testing	1	0.49396	0.07846	6.30	<0.0001	0.76048	1.31495

Table 65: Tests for Hypothesis for Information Search intent – Perceived Threat of Arthritis

Group Statistics

PT_Arthritis	N	Mean	Std. Deviation	Std. Error Mean
Low	231	4.0303	1.84536	.12142
High	179	4.6946	1.80956	.13525

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.001	.972	-3.646	408	.000
Equal variances not assumed			-3.655	386.321	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 66: Tests for Hypothesis for Information Search intent – Perceived Threat of Alzheimer's disease

Group Statistics

PT_Alzheimer's	N	Mean	Std. Deviation	Std. Error Mean
Low	207	4.0596	1.81037	.12583
High	203	4.5862	1.87085	.13131

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	1.434	.232	-2.897	408	.004
Equal variances not assumed			-2.896	406.883	.004

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 67: Tests for Hypothesis for Information Search intent – Perceived Threat of Lung cancer

Group Statistics

PT_Lung Cancer	N	Mean	Std. Deviation	Std. Error Mean
Low	225	3.9215	1.80422	.12028
High	185	4.8054	1.80895	.13300

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.505	.478	-4.931	408	.000
Equal variances not assumed			-4.929	392.435	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 68: Tests for Hypothesis for Information Search intent – Perceived Threat of Pancreatic cancer

Group Statistics

PT_Pancreatic Cancer	N	Mean	Std. Deviation	Std. Error Mean
Low	222	3.9339	1.85352	.12440
High	188	4.7766	1.75971	.12834

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.198	.656	-4.694	408	.000
Equal variances not assumed			-4.715	402.683	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 69: Tests for Hypothesis for Information Search intent – Perceived Threat of Colon cancer

Group Statistics

PT_Colon Cancer	N	Mean	Std. Deviation	Std. Error Mean
Low	207	3.8857	1.85892	.12920
High	203	4.7635	1.75161	.12294

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.311	.578	-4.919	408	.000
Equal variances not assumed			-4.922	407.353	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 70: Tests for Hypothesis for Information Search intent – Need for Cognition

Group Statistics

Need for cognition	N	Mean	Std. Deviation	Std. Error Mean
Low	194	3.8969	1.76961	.12705
High	216	4.7006	1.85547	.12625

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	1.323	.251	-4.476	408	.000
Equal variances not assumed			-4.487	406.520	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 71: Tests for Hypothesis for Information Search intent – Attitudes about genetic testing in general

Group Statistics

Attitudes about genetic testing	N	Mean	Std. Deviation	Std. Error Mean
Negative	202	3.6238	1.59127	.11196
Positive	208	4.9968	1.84998	.12827

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	7.697	.006	-8.047	408	.000
Equal variances not assumed			-8.064	402.162	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 72: Tests for Hypothesis for Information Search intent –Beliefs about advertising of genetic tests

Group Statistics

Beliefs about advertising	N	Mean	Std. Deviation	Std. Error Mean
Negative	208	3.8301	1.71288	.11877
Positive	202	4.8251	1.86859	.13147

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	4.529	.034	-5.623	408	.000
Equal variances not assumed			-5.616	402.582	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 73: Regression analysis – Intentions to take the advertised genetic test

Analysis of Variance

Source	df	Sum of Squares	Mean Square	F value	Pr > F
Model	4	336.60036	84.15009	31.47	< 0.0001
Error	388	1037.42465	2.67377		
Corrected Model	392	1374.02500			

R-Square	0.2450
Adj R- Square	0.2372

Parameter Estimates

Variable	df	Parameter estimate	Std. Error	t-value	Pr > t	Tolerance	Variance Inflation
Intercept	1	0.31852	0.49347	0.65	0.5190		0
Nsex	1	0.69366	0.17327	4.00	<0.0001	0.98817	1.01198
Dum_Age5	1	-0.53292	0.20556	-2.59	0.0099	0.98397	1.01629
Overall Health	1	-0.15248	0.07039	-2.17	<0.0309	0.98911	1.01101
Attitudes towards genetic testing	1	0.72933	0.06927	10.53	<0.0001	0.98623	1.01396

Table 74: Tests for Hypothesis for Intentions to test – Attitudes about genetic testing in general

Group Statistics

Attitudes about genetic testing	N	Mean	Std. Deviation	Std. Error Mean
Negative	202	2.8432	1.43253	.10079
Positive	208	4.2853	1.94609	.13494

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	21.786	.000	-8.525	408	.000
Equal variances not assumed			-8.562	380.457	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 75: Tests for Hypothesis for Information search behavior & Information search intent- T-test

Group Statistics

Information search behavior	N	Mean	Std. Deviation	Std. Error Mean
Yes	55	4.6606	1.56806	.21144
No	355	3.4066	1.84259	.09779

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	4.542	.034	4.785	408	.000
Equal variances not assumed			5.383	79.024	.000

*After applying Bonferroni correction, the level of significance tested is 0.05/15= 0.003

Table 76: Tests for Hypothesis for Information search behavior & Information search intent- Chi-Square test.

Behavior	Counts	Intention to look for information		Total
		1.00	2.00	
Yes	Count	12	43	55
	Expected Count	27.6	27.4	55.0
No	Count	194	161	355
	Expected Count	178.4	176.6	355.0
Total	Count	206	204	410
	Expected Count	206.0	204.0	410.0

Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.531[a]	1	.000		
Continuity Correction[b]	19.239	1	.000		
Likelihood Ratio	21.603	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.481	1	.000		
N of Valid Cases	410				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 27.37.

b. Computed only for a 2x2 table

Table 77: Pretest Scale Reliabilities

Scales	Reliability (Cronbach's α)
Attitudes about advertisement	0.87
Attitudes about RTF® genetic test	0.80
Attitudes about the testing company(Genesis)	0.84
Intention to take the genetic test	0.84
Beliefs about requiring a prescription for a genetic test	0.84
Involvement	0.83
Attitude towards requiring a prescription	0.88
Intention to talk to the physician about the advertised genetic test	0.83
Intention to search for information about advertised genetic test	0.86

Table 78: Demographic characteristics (experimental)

Variable	Categories	Frequency	Percent
Gender	Male	57	27.7
	Female	148	71.8
	Prefer not to answer	1	0.5
Education Level	Less than high school	2	1
	High school graduate or equivalent	42	20.4
	Associates/technical/vocational degree	18	8.7
	Completed some part of college but no degree	55	26.7
	College graduate	55	26.7
	Graduate school or higher	34	16.5
	Prefer not to answer		
Race	American Indian or Alaska native	1	0.5
	Asian	7	3.4
	African American	20	9.7
	Hispanic or Latino	9	4.4
	Native Hawaiian or other pacific islander	0	0
	White	158	76.7
	Mixed	9	4.4
	Other	2	1
	Prefer not to answer		
Age	18-25	30	14.6
	26-35	39	18.9
	36-45	25	12.1
	46-55	53	25.7
	56-65	47	22.8
	Above 65 years	12	5.8
	Prefer not to answer		
Annual Income	<$15K	19	9.2
	$15K-$24999	15	7.3
	$25K-$34,999	25	12.1
	$35K-$49,999	38	18.4
	$50K-$74,999	54	26.2
	$75K-$99,999	19	9.2
	$100K or more	30	14.6
	Prefer not to answer	6	2.9

Table 79: Prior exposure to advertisements for genetic tests (experiment)

Have you ever seen an advertisement for genetic test	Yes	17	8.3
	No	165	80.1
	Do not remember	24	11.7
Media where the advertisement was seen	Magazines	7	
	Newspaper	2	
	Internet	9	
	Doctor's office	7	
	Television	6	
	Other	1	
Time when the advertisement was seen	Within last one month	2	1
	1-2 months	4	1.9
	2-3 months	5	2.4
	3-6 months	3	1.5
	6months-1 year	2	1
	>1year	1	0.5
Have you ever talked to your doctor about a genetic test that you have seen advertised	Yes	10	4.9
	No	196	95.1

Table 80: Sample Descriptives-Study Constructs (experiment)

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Attitude_ad	206	1.00	7.00	5.3495	1.26652	-.502	.097
Attitude_test	206	1.33	6.33	4.9515	1.11837	-.664	.354
Attitude_company	206	1.33	6.33	4.8155	1.07621	-.342	.146
Intention_talk	206	1.00	7.00	4.1489	1.89921	-.065	-1.139
Intention to look for information	206	1.00	7.00	4.1796	2.03907	-.120	-1.296
Intention_test	206	1.00	7.00	3.0049	1.86000	.679	-.654
Involvement	206	1.00	7.00	5.4385	1.05576	-.711	.870
Belief_rx	206	1.56	7.00	4.2940	1.09449	.042	-.279
Attitude_rx	206	1.00	7.00	4.5789	1.62418	-.359	-.437
Valid N (listwise)	206						

Table81: Study Constructs-T tests (experiment)

Variables	Test Value = 4					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Attitude_ad	15.293	205	.000	1.34951	1.1755	1.5235
Attitude_test	12.211	205	.000	.95146	.7978	1.1051
Attitude_company	10.876	205	.000	.81553	.6677	.9634
Intention_talk	1.125	205	.262	.14887	-.1120	.4098
Intention to look for information	1.264	205	.208	.17961	-.1005	.4597
Intention_test	-7.679	205	.000	-.99515	-1.2507	-.7396
Involvement	19.556	205	.000	1.43851	1.2935	1.5835
Belief_rx	3.855	205	.000	.29396	.1436	.4443
Attitude_rx	5.116	205	.000	.57888	.3558	.8020

Table 82: Goodness of Fit Statistics (experiment)

Goodness of Fit Index	Value
Chi-Square (df = 472 , p – value = 0.00)	1010
Root Mean Square Error of Approximation (RMSEA)	0.074
Standardized Root Mean Square Residual (SRMR)	0.051
Comparative Fit Index (CFI)	0.91
Tucker- Lewis Index (TLI)	0.89

Table 83: Equivalence of treatment groups by demographics

Variables	**Chi-Square/Fischer's exact test/Likelihood Ratio**	**df**	**p-value**
Gender*			0.535
Education level#	5.118	5	0.402
Race#	5.409	6	0.492
Age	10.150	5	0.071
Annual household income	4.192	7	0.757

*Fischer's Exact test was used for a 2×2 contingency table

Likelihood Ratio Chi-Square was used as the expected count for some cells was less than 5

After applying Bonferroni correction, the level of significance tested is 0.05/8= 0.0062

Table 84: **Equivalence of treatment groups by prior exposure to genetic test ads**

Variables	Chi-Square/Fischer's Exact test/ Likelihood Ratio	df	p-value
Ever seen an advertisement of predictive genetic tests	1.319	2	0.517
When did you see the advertisement[#]	2.442	5	0.785
Have you ever talked to your doctor about a genetic test that you had seen or heard advertised*			0.053

*Fischer's Exact test was used for a 2×2 contingency table
Likelihood Ratio Chi-Square was used as the expected count for some cells was less than 5
After applying Bonferroni correction, the level of significance tested is 0.05/8= 0.0062

Table 85: Post-hoc Scale Reliabilities

Scales	Reliability (Cronbach's α)
Attitudes about advertisement	0.87
Attitudes about RTF® genetic test	0.89
Attitudes about the testing company(Genesis)	0.92
Intention to take the genetic test	0.95
Beliefs about requiring a prescription for a genetic test	0.84
Involvement	0.69
Attitude towards requiring a prescription	0.93
Intention to talk to the physician about the advertised genetic test	0.93
Intention to search for information about advertised genetic test	0.96

Table 86: Reliability of Attitude towards the advertisement Scale

N = 206
Number of items = 3
Cronbach's alpha = 0.87

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I feel that the ad is…..BAD: GOOD	10.54	6.913	.769	.794
I feel that the ad is…Pleasant: Unpleasant	10.70	6.670	.782	.781
I feel that the ad is….. Unfavorable: Favorable	10.86	6.941	.693	.864

Table 87: Reliability of Attitude towards the genetic test Scale

N = 206
Number of items = 3
Cronbach's alpha = 0.89

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I feel that the RTF test is…..BAD: GOOD	10.05	5.183	.817	.814
I feel that the RTF test is…Pleasant: Unpleasant	10.20	5.155	.839	.796
I feel that the RTF test is….. Unfavorable: Favorable	9.46	5.498	.702	.915

Table 88: Reliability of Attitude towards the testing company (Genesis) Scale

N = 206
Number of items = 3
Cronbach's alpha = 0.92

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I feel that the genesis is…..BAD: GOOD	9.83	4.760	.877	.847
I feel that genesis is…Pleasant: Unpleasant	9.88	4.796	.861	.860
I feel that genesis is….. Unfavorable: Favorable	9.18	4.912	.769	.937

Table 89: Reliability of Intention to take the genetic test Scale

N = 206
Number of items = 3
Cronbach's alpha = 0.95

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I feel that the genesis is…..BAD: GOOD	6.16	13.599	.922	.896
I feel that genesis is…Pleasant: Unpleasant	5.68	14.724	.862	.942
I feel that genesis is….. Unfavorable: Favorable	6.18	14.298	.883	.927

Table 90: Reliability of beliefs about requiring a prescription scale

N = 206
Number of items = 9
Cronbach's alpha = 0.84

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
My health insurance company could get the results.	33.89	80.519	.443	.833
My employer could get the results.	35.00	76.093	.539	.823
My test results won't be private anymore.	34.71	72.303	.649	.809
Doctors will decide if I need a test, and not me and this could be bad.	34.40	78.016	.536	.823
I would not have the right to decide about my own body.	34.68	73.915	.631	.811
I will no longer have access to information about my own body and it is a bad thing.	35.11	78.295	.523	.824
Doctors will need a lot more information on genetic tests to decide if the tests are right for me.	33.89	81.784	.536	.823
Doctors will need a lot more experience with genetic tests to decide if the tests are right for me.	33.87	80.101	.579	.819
Doctors will need to learn more about genetic tests to decide if the tests are right for me.	33.61	82.942	.536	.824

Table 91: Reliability of Involvement Scale

N = 206
Number of items = 3
Cronbach's alpha = 0.69

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
In general, I consider myself to be very involved in my healthcare.	11.31	4.379	.399	.724
I rarely look for information regarding healthcare issues.	10.63	5.414	.542	.478
I generally pay attention to healthcare information that I am exposed to.	10.69	5.872	.525	.517

Table 92: Attitudes about requiring a prescription

N = 206
Number of items = 3
Cronbach's alpha = 0.93

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Bad:Good	13.74	24.019	.862	.906
Wise:Foolish	13.74	24.438	.824	.918
Harmful:Beneficial	13.90	23.454	.826	.919
Useful:Useless	13.57	25.183	.863	.907

Table 93: Intention to talk to the physician

N = 206
Number of items = 3
Cronbach's alpha = 0.93

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Likely:Unlikeky	9.51	10.901	.856	.840
Improbable:Probable	9.34	11.433	.842	.851
Possible:Impossible	8.97	14.011	.779	.909

Table 94: Intention to look for in formation

N = 206
Number of items = 3
Cronbach's alpha = 0.96

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Likely:Unlikely	8.82	12.928	.889	.885
Improbable:Probable	8.73	13.869	.875	.893
Possible:Impossible	8.37	15.969	.839	.927

Table 95: Shapiro-Wilk Test

Variables	Shapiro Wilk Test		
	Statistic	df	Sig.
Attitudes about advertisement	.935	206	.000
Attitudes about RTF® genetic test	.925	206	.000
Attitudes about the testing company	.936	206	.000
Intention to talk to the physician about the advertised genetic test	.942	206	.000
Intention to search for information about advertised genetic test	.920	206	.000
Intention to take the genetic test	.890	206	.000
Involvement	.954	206	.000
Beliefs about requiring a prescription for a genetic test	.992	206	.312
Attitude towards requiring a prescription	.957	206	.000

Table 96: Tests for Hypothesis for Experimental study-Attitudes towards the ad
Group Statistics

Attitudes_advertising	N	Mean	Std. Deviation	Std. Error Mean
Prescription	106	5.5189	1.15752	.11243
No_prescription	100	5.1700	1.35545	.13555

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	1.420	.235	1.990	204	.048
Equal variances not assumed			1.981	195.039	.049

Table 97: Tests for Hypothesis for Experimental study-Attitudes towards the Genetic test
Group Statistics

Attitudes_test	N	Mean	Std. Deviation	Std. Error Mean
Prescription	106	5.1289	1.01686	.09877
No_prescription	100	4.7633	1.19322	.11932

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	2.139	.145	2.371	204	.019
Equal variances not assumed			2.360	194.878	.019

Table 98: Tests for Hypothesis for Experimental study-Attitudes towards the testing company

Group Statistics

Attitudes_company	N	Mean	Std. Deviation	Std. Error Mean
Prescription	106	4.9245	.98913	.09607
No_prescription	100	4.7000	1.15519	.11552

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.968	.326	1.501	204	.135
Equal variances not assumed			1.494	195.244	.137

99: Tests for Hypothesis for Experimental study-Intentions to take the test

Group Statistics

Intentions to test	N	Mean	Std. Deviation	Std. Error Mean
Prescription	106	2.9497	1.90948	.18547
No_prescription	100	3.0633	1.81384	.18138

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.103	.749	-.437	204	.662
Equal variances not assumed			-.438	203.990	.662

Table 100: Perceived Threat and Overall Health Status

Group Statistics

Perceived Threat	N	Mean	Std. Deviation	Std. Error Mean
Low Health	133	22.9945	8.80870	.76381
High Health	277	18.2152	8.43708	.50693

T-test

	Levene's test		**T-test**		
	F	**Sig**	**t**	**df**	**Sig (2tailed)**
Equal variances assumed	.143	.706	5.293	408	.000
Equal variances not assumed			5.213	250.641	.000

Table 101: Beliefs about Advertising of Genetic Tests

Items	Agree	Disagree	Neither Agree nor Disagree	Mean
Predictive genetic test information should only come from a doctor.	58.5	30	11.5	3.25(1.5)
Predictive genetic tests should not be advertised to consumers.	23.2	56	20.8	4.63(1.5)
I think that consumer advertisements for predictive genetic tests would provide consumers with information they have a right to know.	72.6	13.4	14	5.43(1.13)
Consumers want to know more about predictive genetic tests.	72	4.8	23.2	5.22(1.18)
Predictive genetic tests should not be advertised like other products.	32.7	41.3	26	4.21(1.62)
Predictive genetic test advertisements can protect consumers from doctors who are not well informed.	46.6	18	35.4	4.5(1.35)
I would like to see more advertisements for genetic tests.	23.3	20.7	56	4.46(1.45)

Table 102: Beliefs about requiring a prescription for a genetic test

Items	% Agree	% Disagree
My health insurance company could get the results	56.6	21.3
My employer could get the results	33.7	43.6
My test results won't be private anymore	45.8	33.9
Doctors will decide if I need the test, and not me and this could be bad	45.4	27.1
I would not have the right to decide about my own body	39.9	35.2
I will no longer have access to information about my own body and it is a bad thing	34.1	41.8
Doctors will need a lot more information on genetic tests to decide if the tests are right for me	58.1	16.1
Doctors will need a lot more experience with genetic tests to decide if the tests are right for me	62.4	14.9
Doctors will need to learn a lot more about genetic tests to decide if the tests are right for me	66.5	12.9

1= strongly disagree, 7= strongly agree.

FIGURES

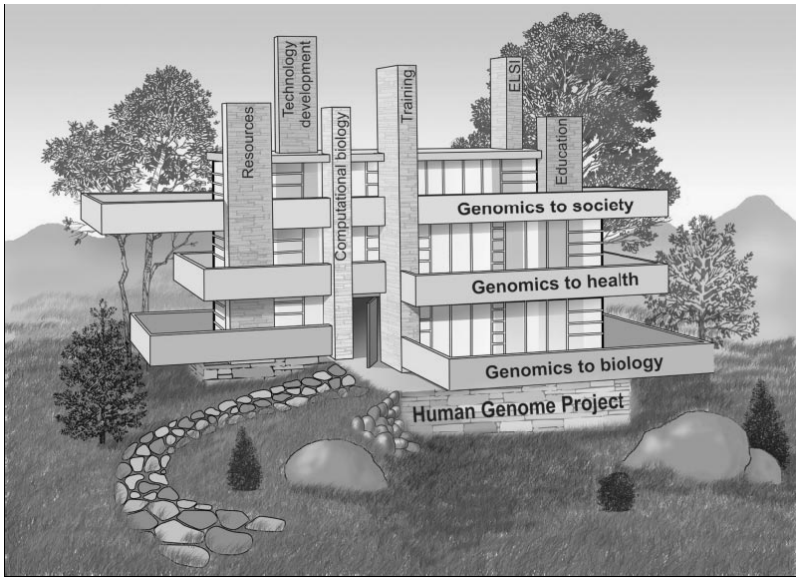


Figure 1: Future Vision of the Human Genome Project researchers

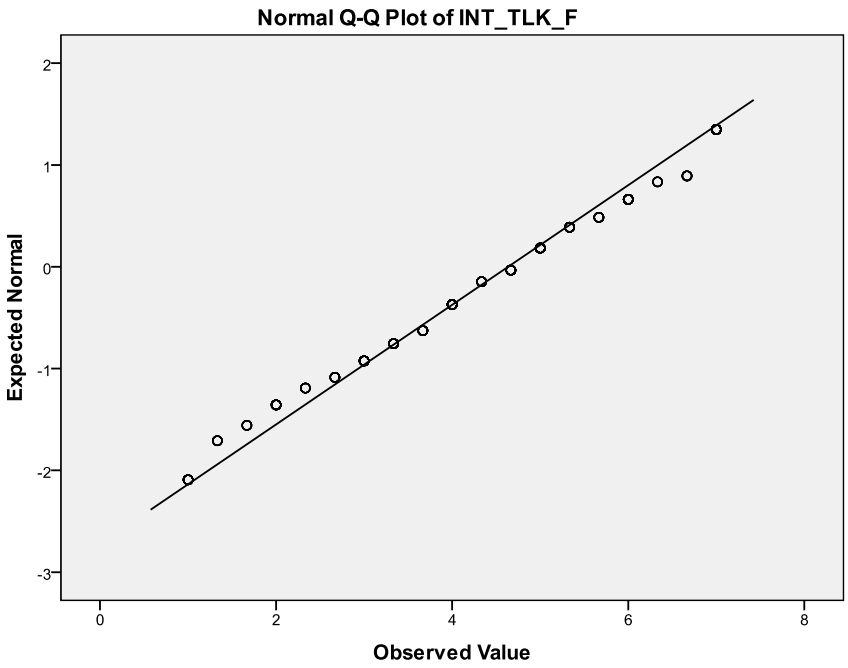


Figure 2: Normal probability plot – Intention to talk to doctor

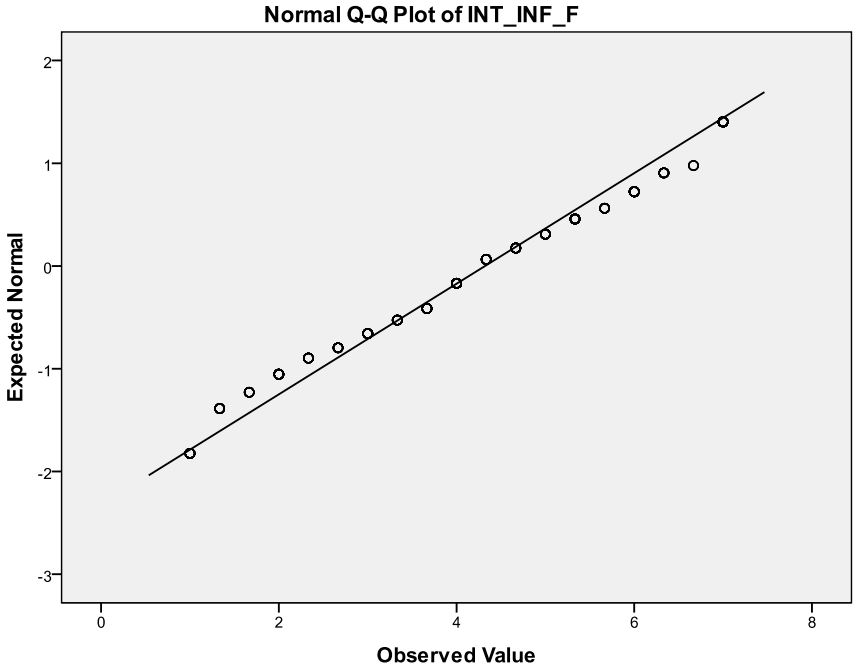


Figure 3: Normal probability plot – Intention to look for information about genetic test

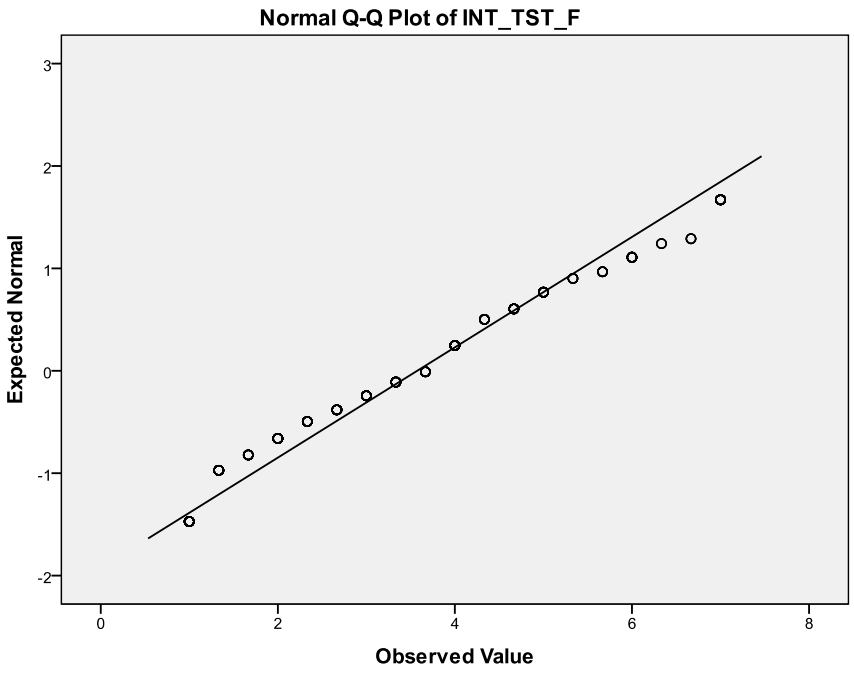


Figure 4: Normal probability plot – Intention to take the genetic test

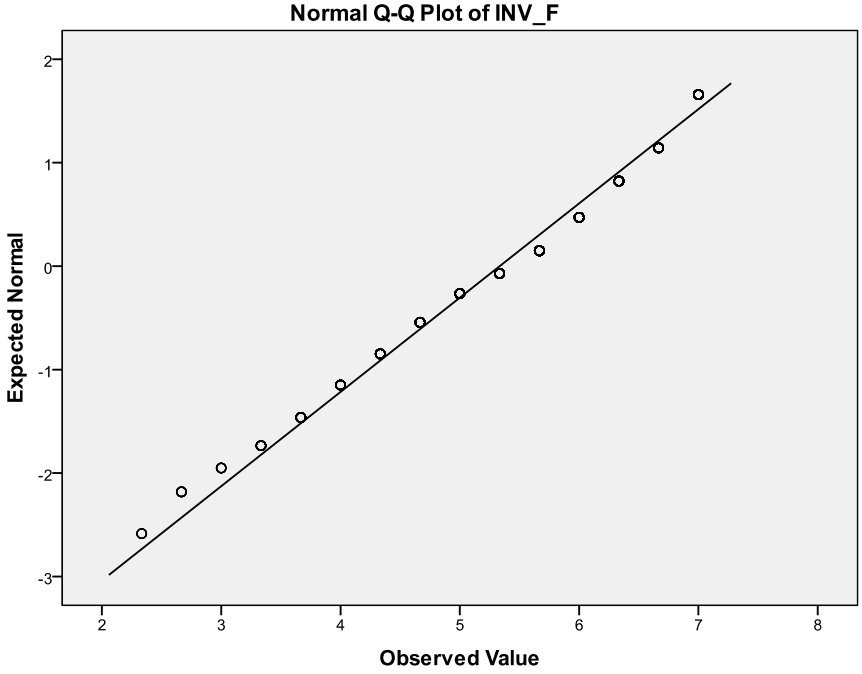


Figure 5: Normal probability plot – Involvement in healthcare

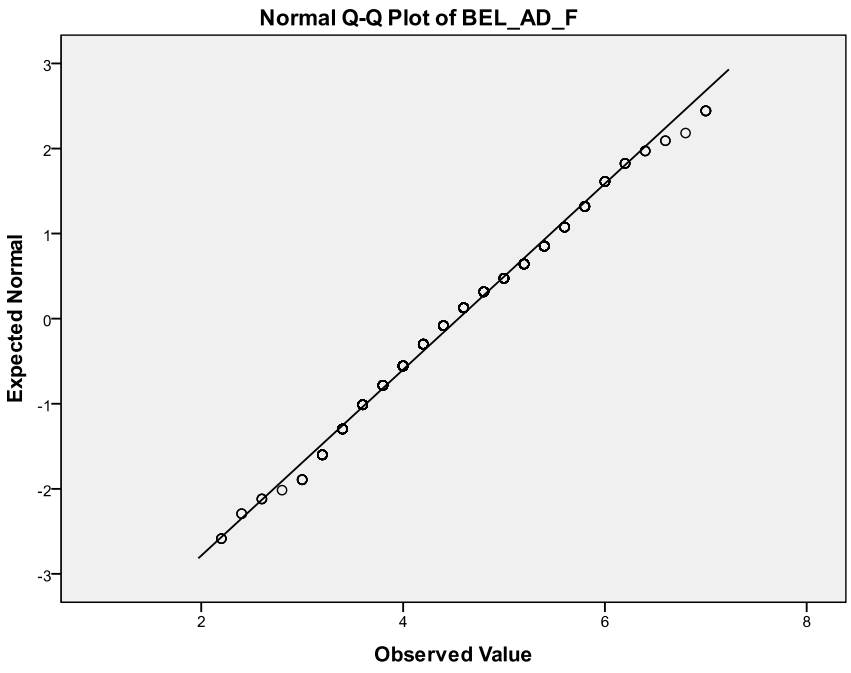


Figure 6: Normal probability plot – Beliefs about advertising of genetic tests

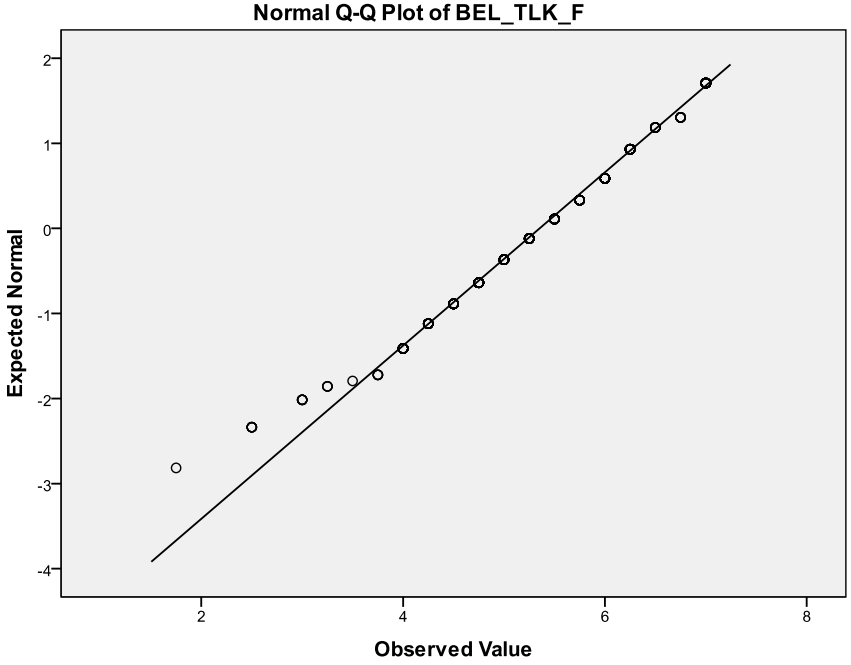


Figure 7: Normal probability plot – Beliefs about talking to physician about advertised genetic test

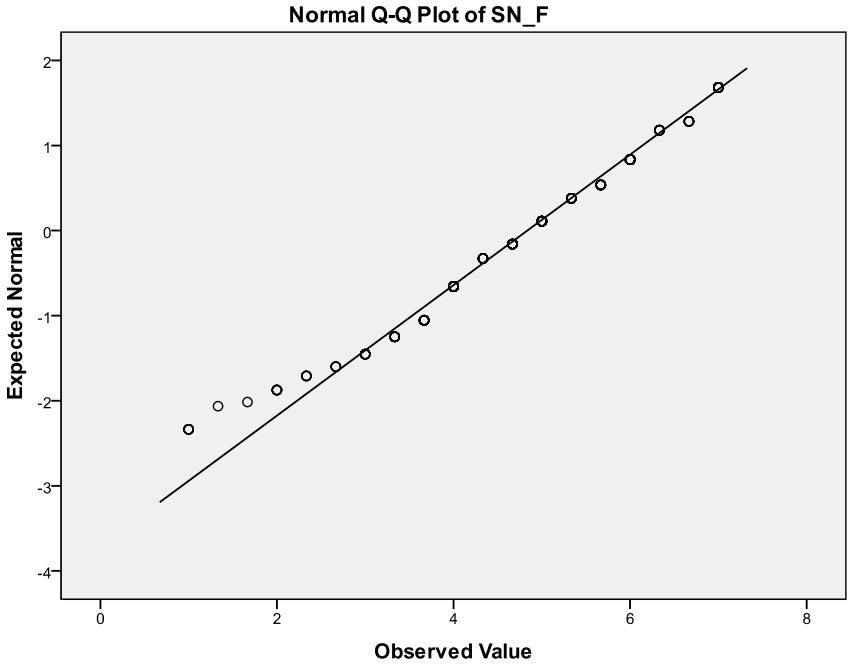


Figure 8: Normal probability plot – Subjective Norms

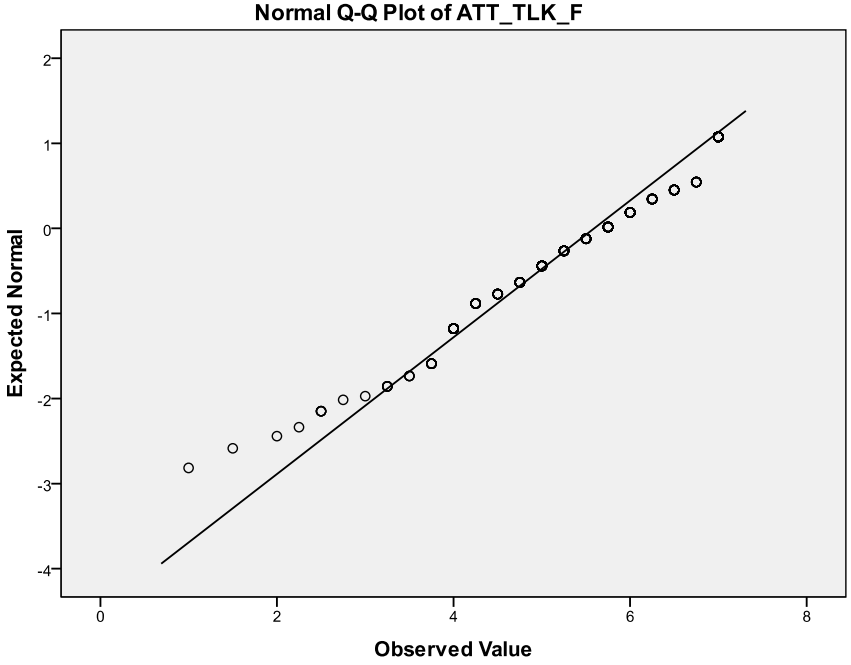


Figure 9: Normal probability plot – Attitudes towards talking to physician about genetic test

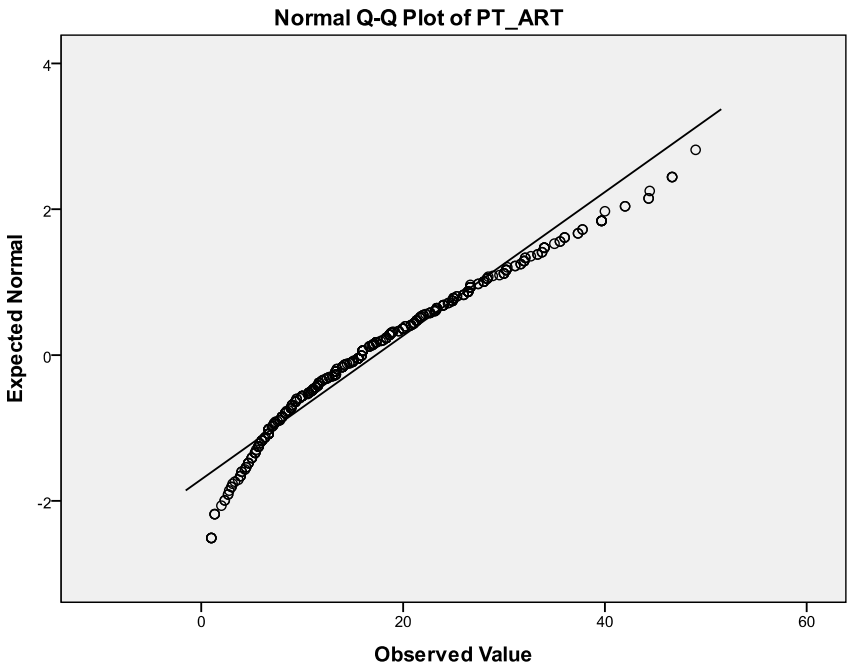


Figure 10: Normal probability plot – Perceived threat of arthritis

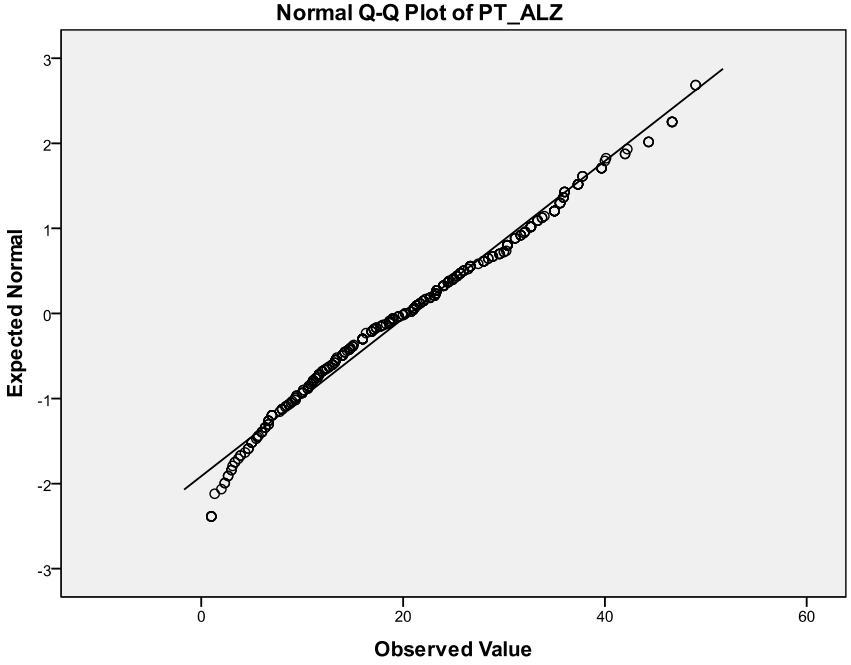


Figure 11: Normal probability plot – Perceived threat of Alzheimer's disease

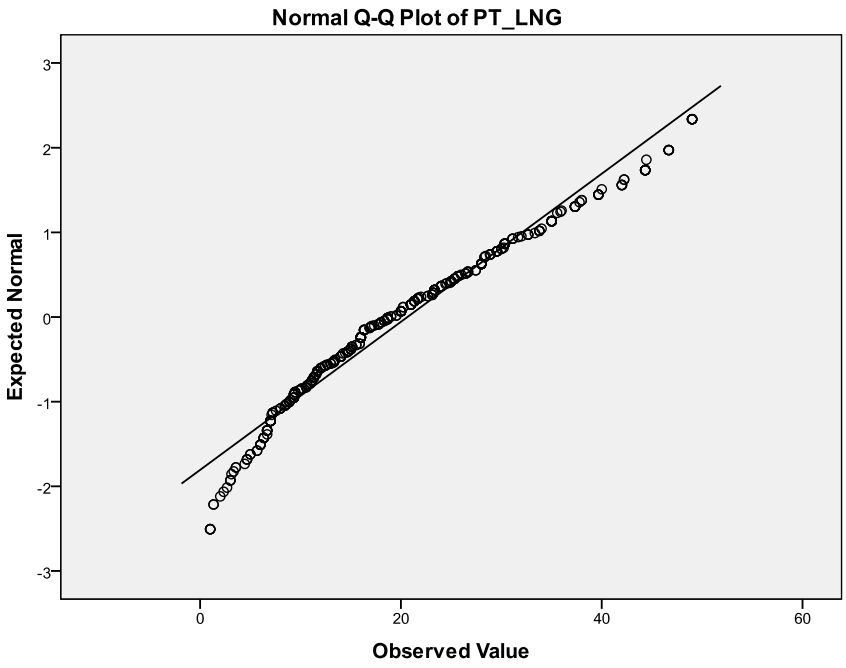


Figure 12: Normal probability plot – Perceived threat of lung cancer

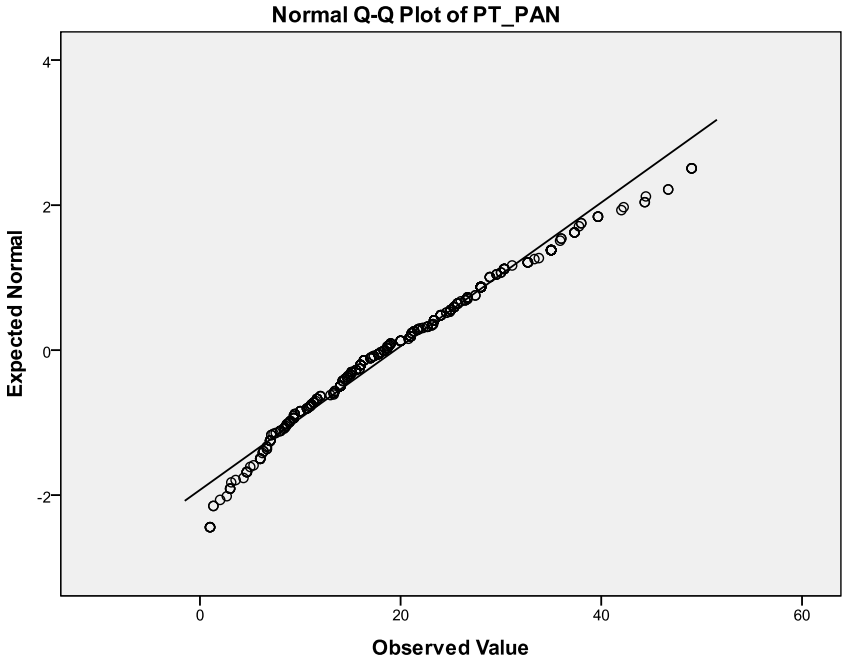


Figure 13: Normal probability plot – Perceived threat of pancreatic cancer

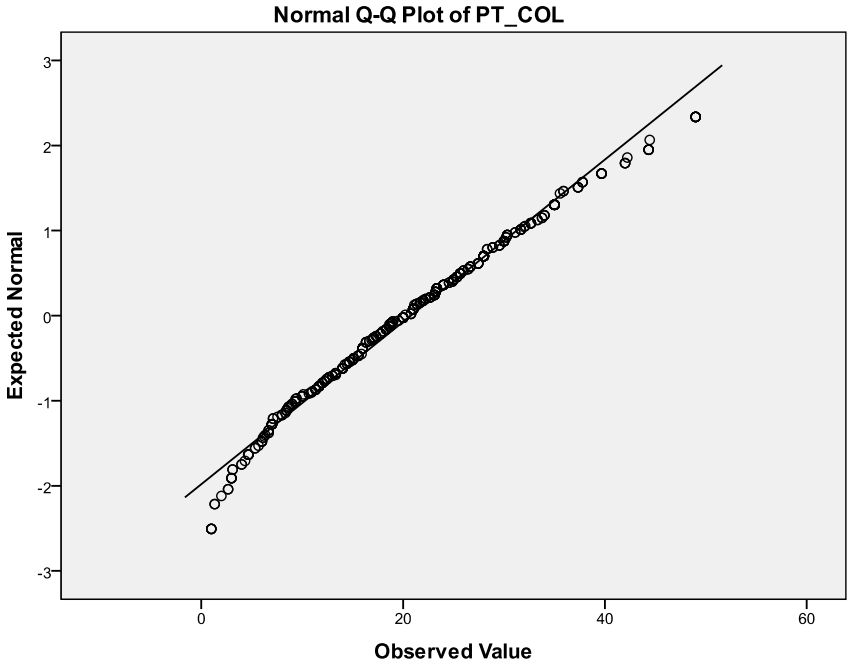


Figure 14: Normal probability plot – Perceived threat of colon cancer

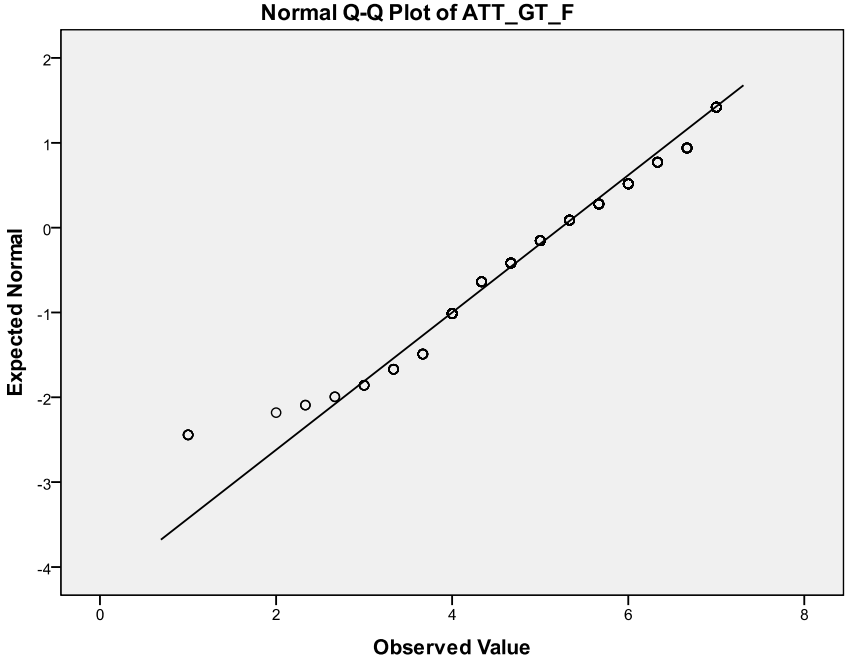


Figure 15: Normal probability plot – Attitudes towards genetic testing

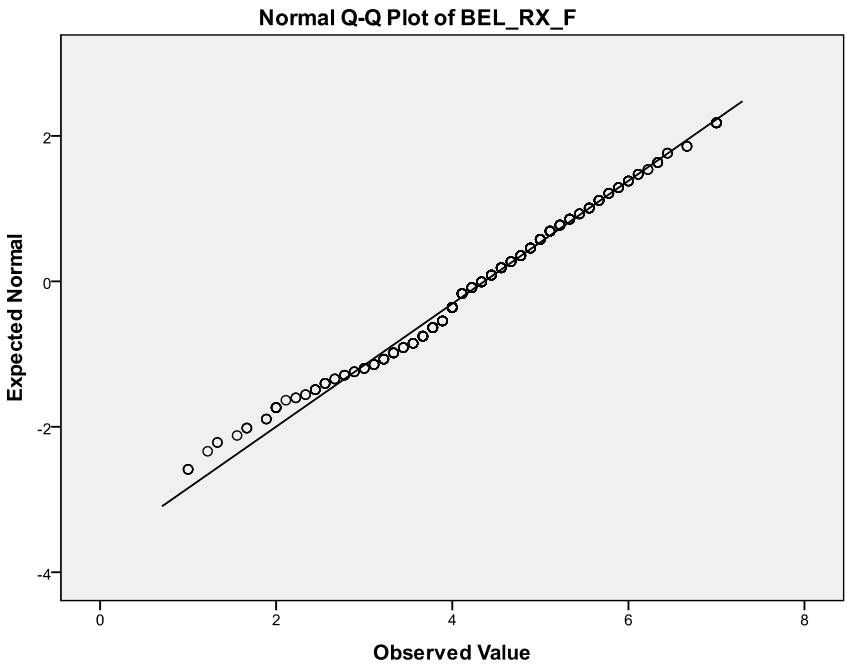


Figure 16: Normal probability plot – Beliefs about requiring a prescription for genetic test

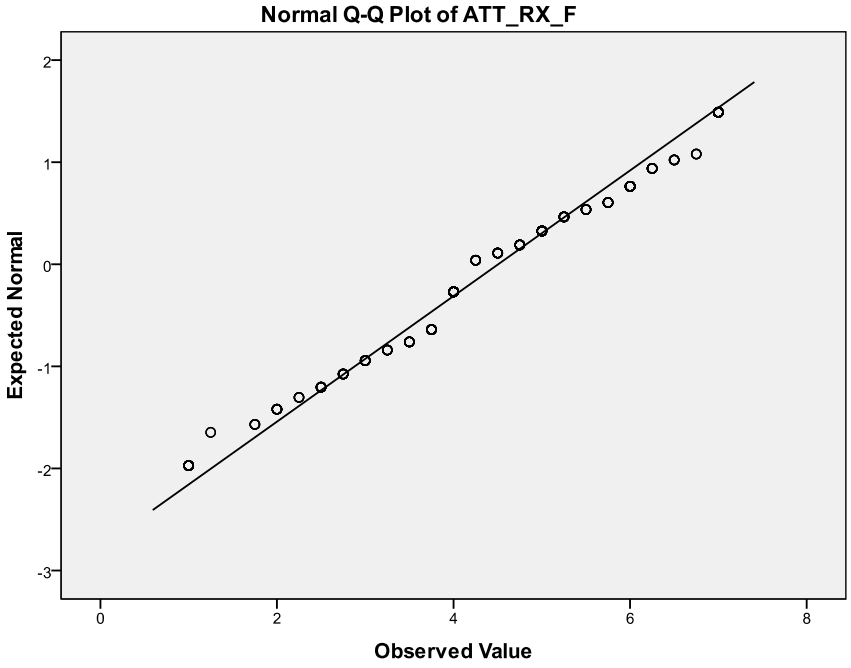


Figure 17: Normal probability plot – Attitudes towards genetic testing

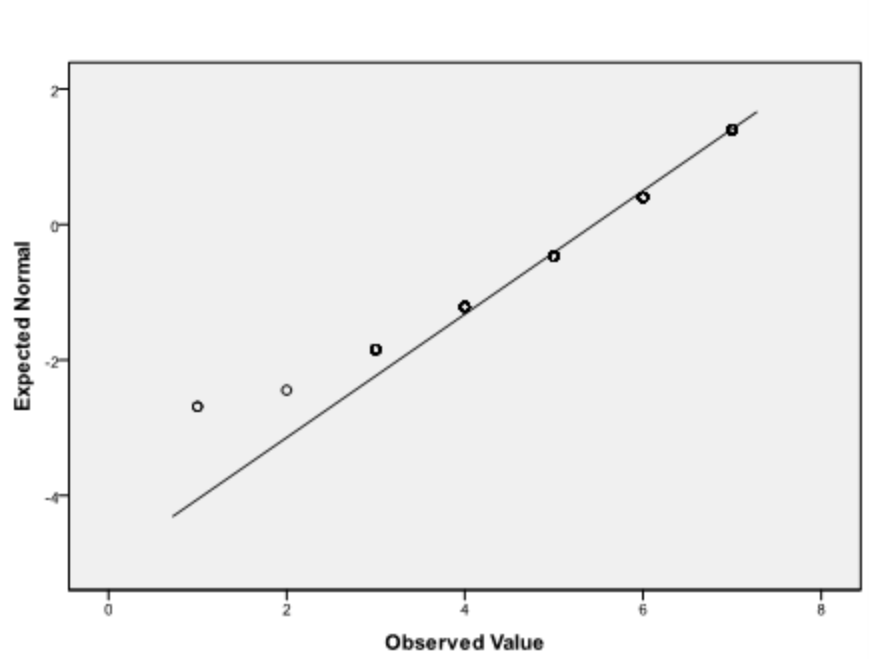


Figure 18: Normal probability plot – Need for Cognition

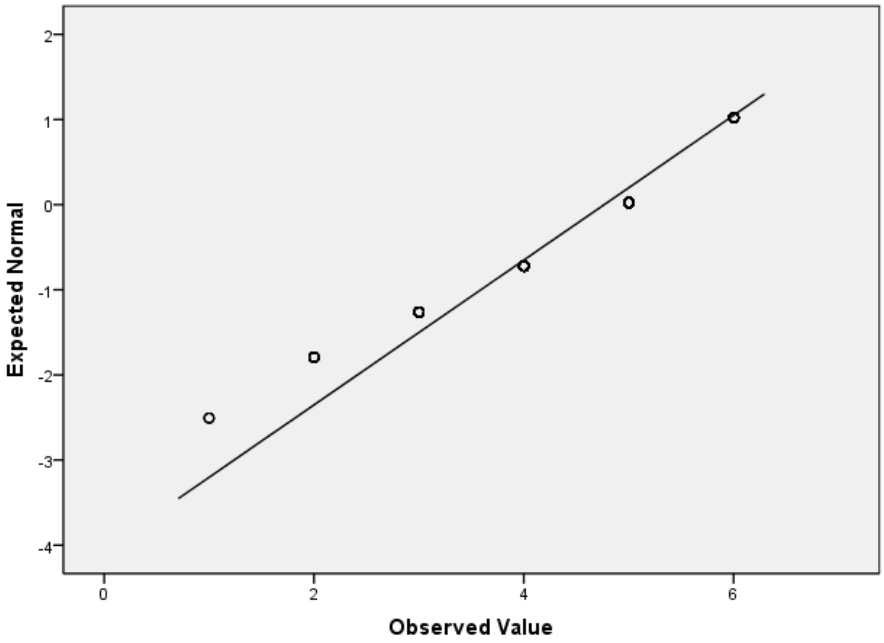


Figure 19: Normal probability plot – overall health

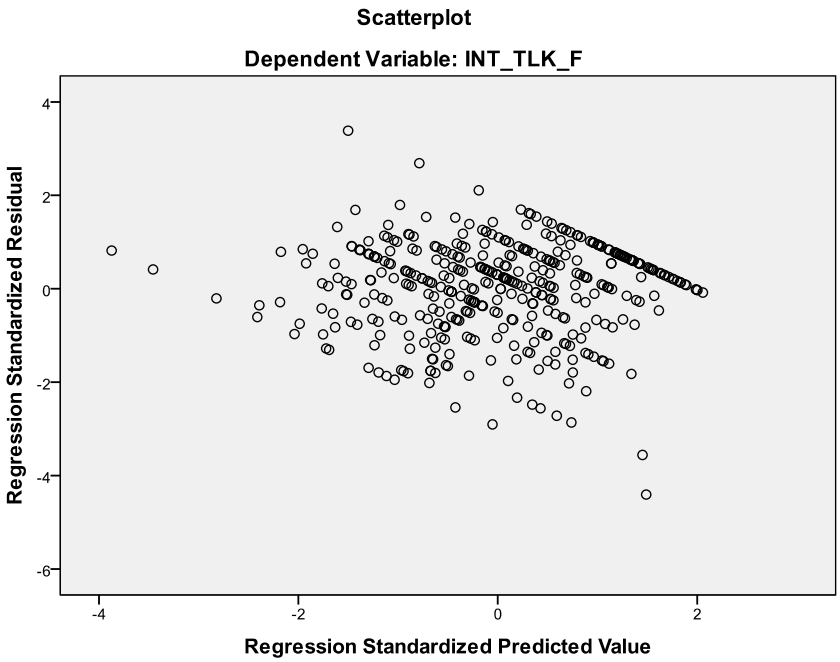


Figure 20: Residual plot – Intention to talk to the physician

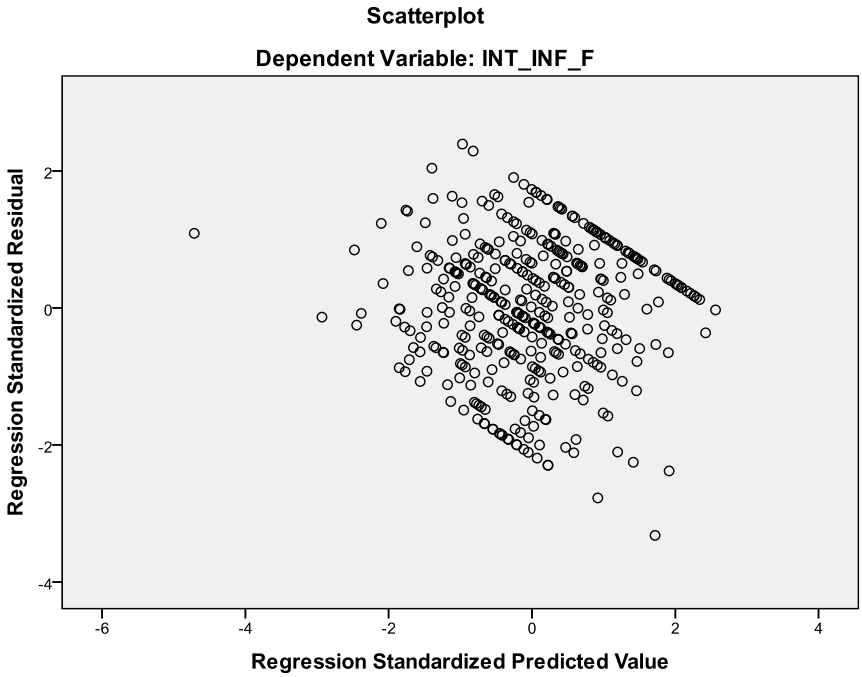


Figure 21: Residual plot – Intention to look for information

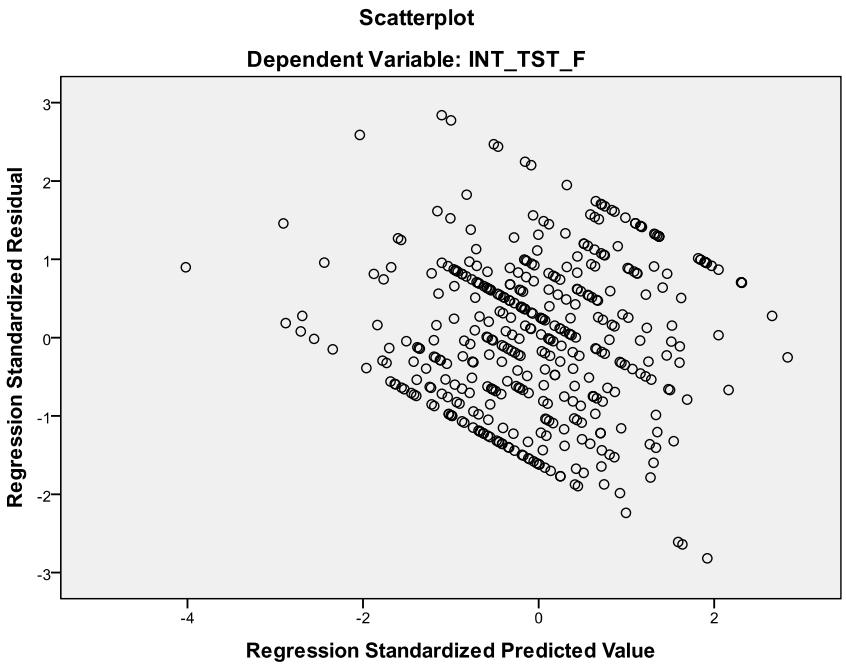


Figure 22: Residual plot – Intention to test

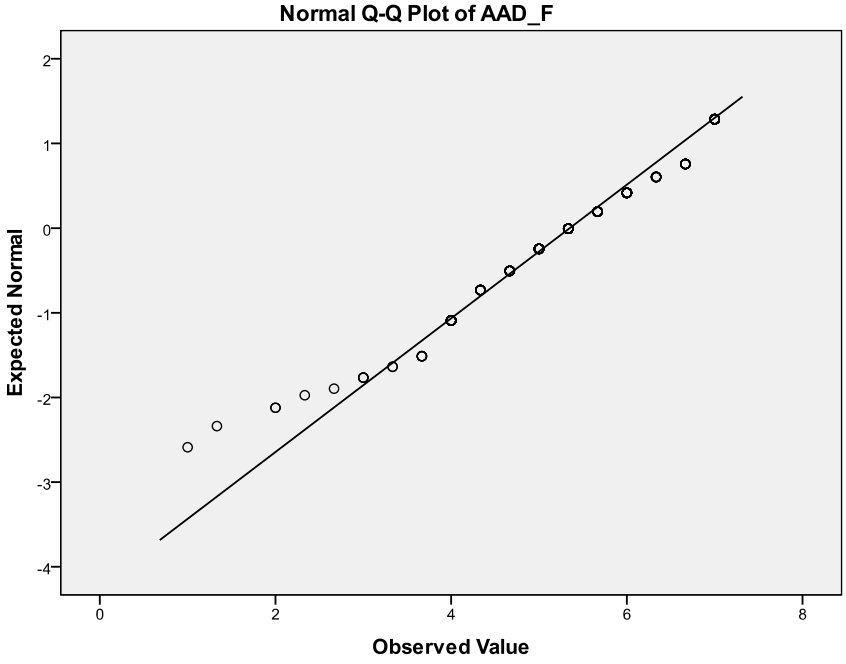


Figure 23: Normal QQ plot (Experimental) – Attitude towards the advertisement

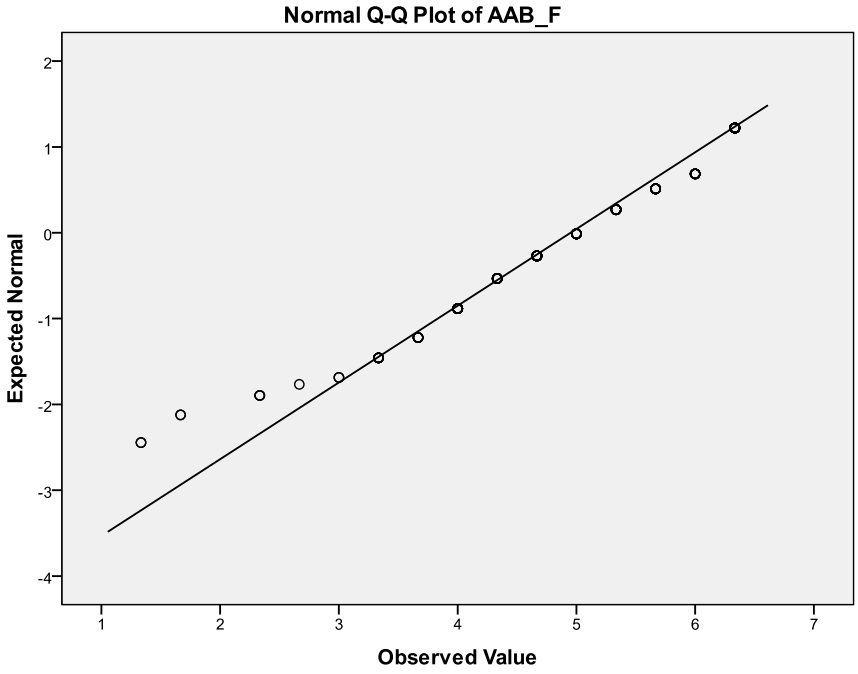


Figure 24: Normal QQ plot (Experimental) – Attitude towards the genetic test

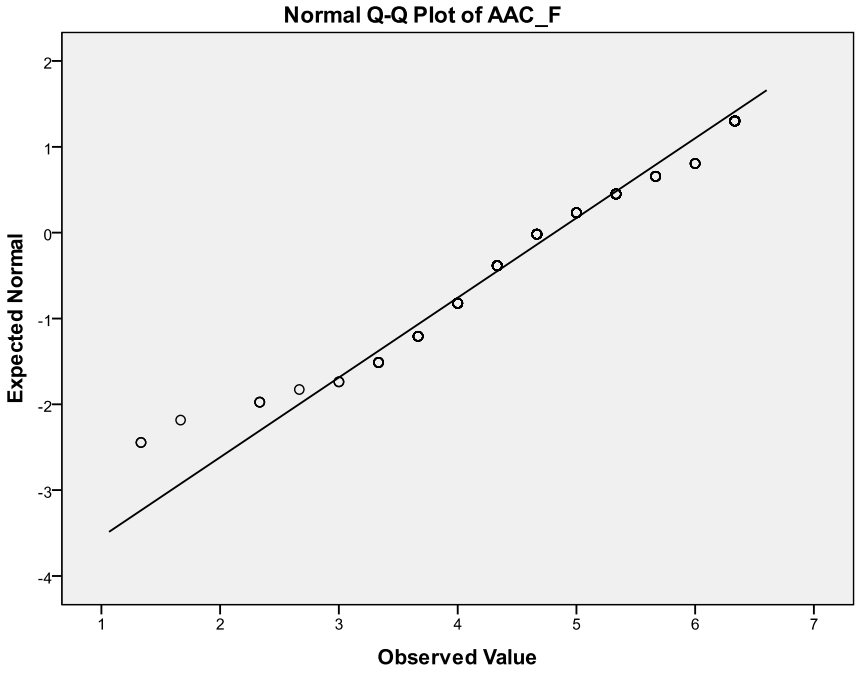


Figure 25: Normal QQ plot (Experimental) – Attitude towards the company providing the test

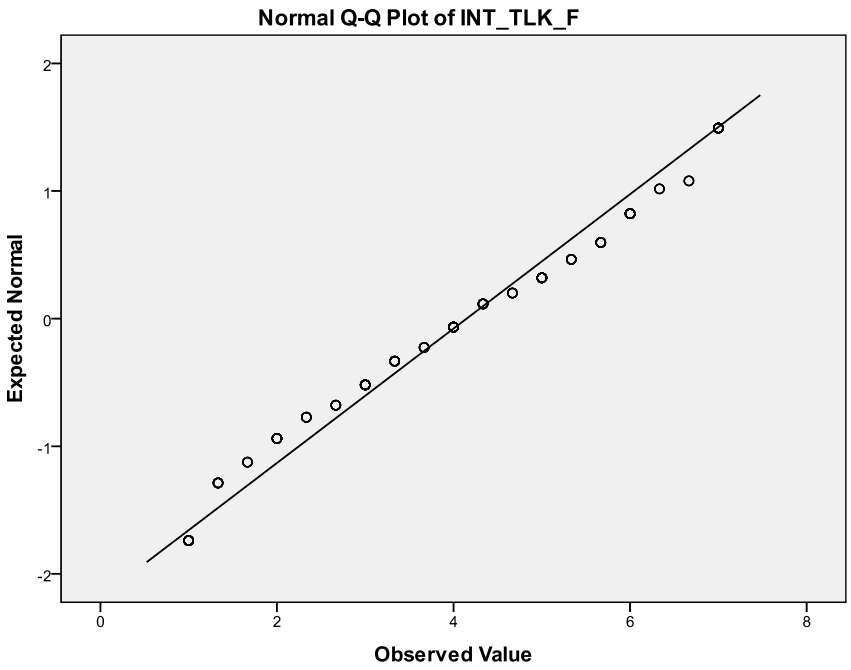


Figure 26: Normal QQ plot (Experimental) – Intention to talk to the physician about the advertised test.

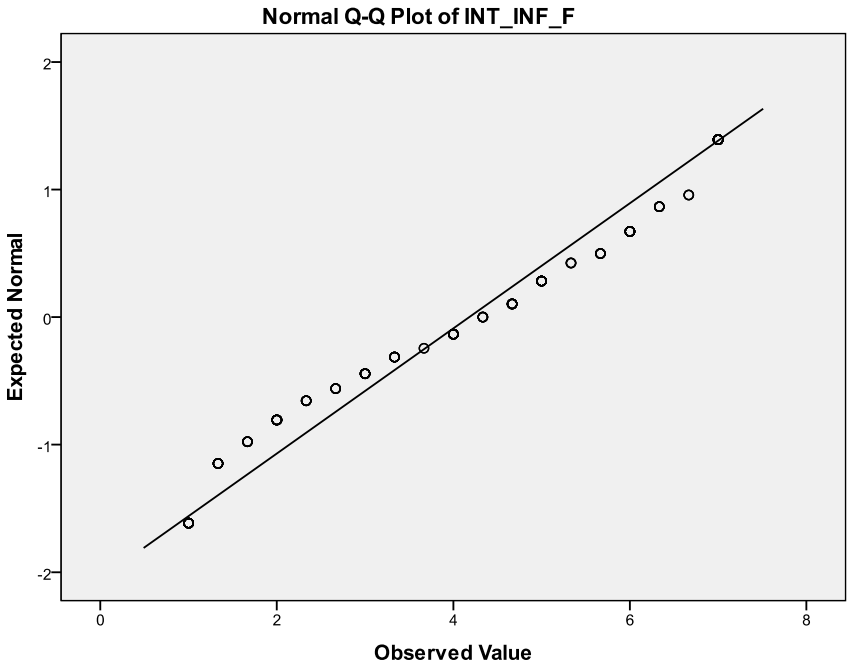


Figure 27: Normal QQ plot (Experimental) – Intention to look for information about the advertised test.

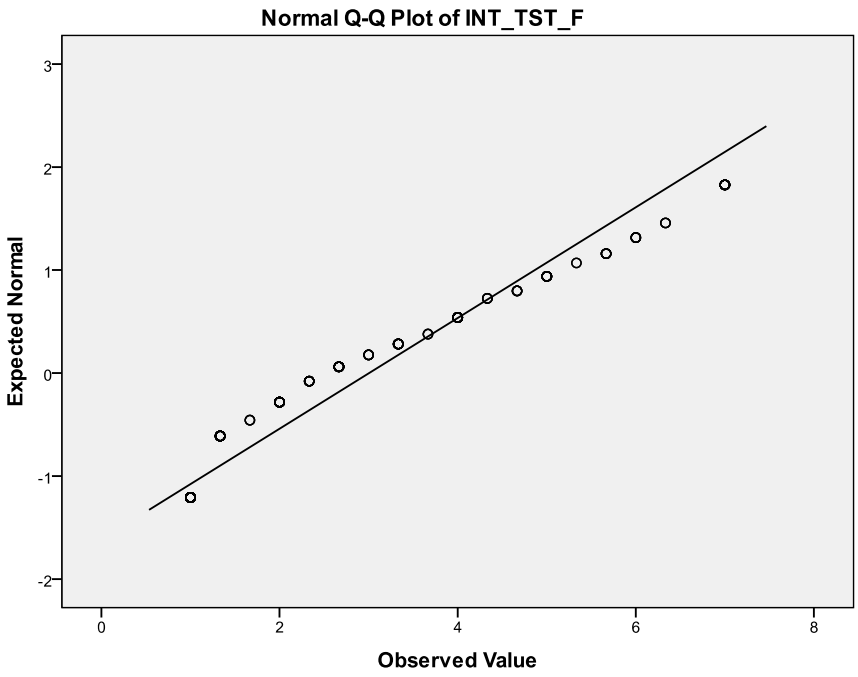


Figure 28: Normal QQ plot (Experimental) – Intention to take the advertised genetic test

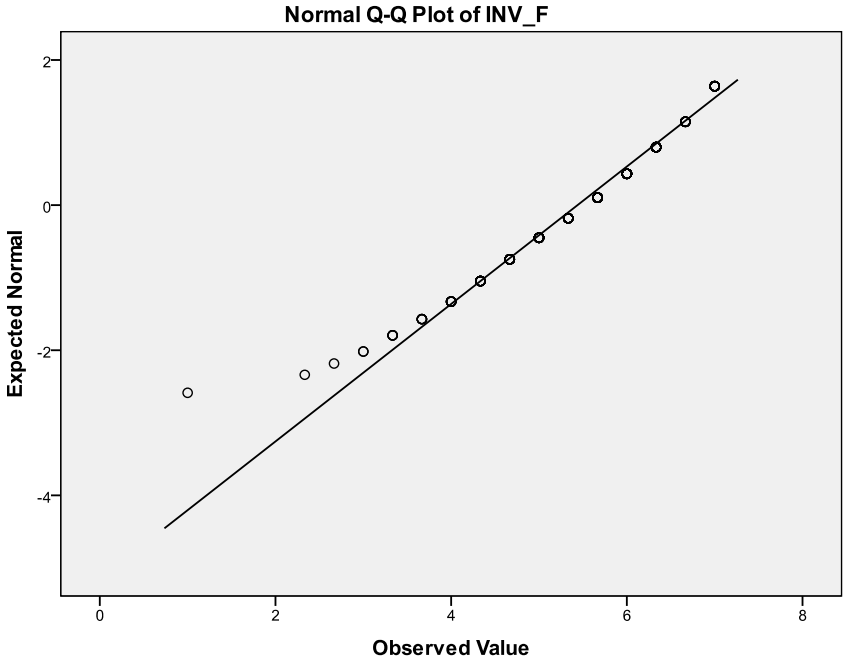


Figure 29: Normal QQ plot (Experimental) – Involvement

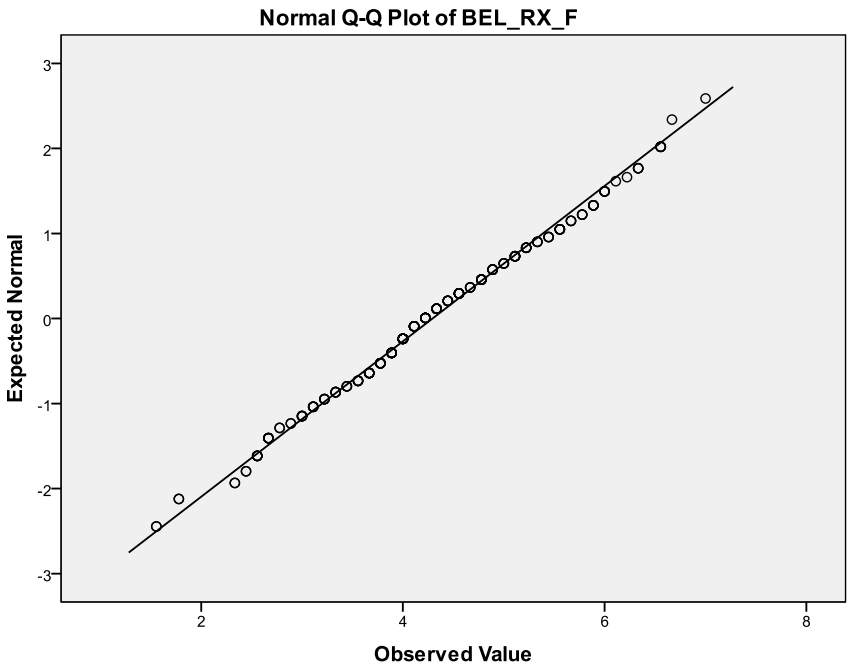


Figure 30: Normal QQ plot (Experimental) – Beliefs about requiring a prescription

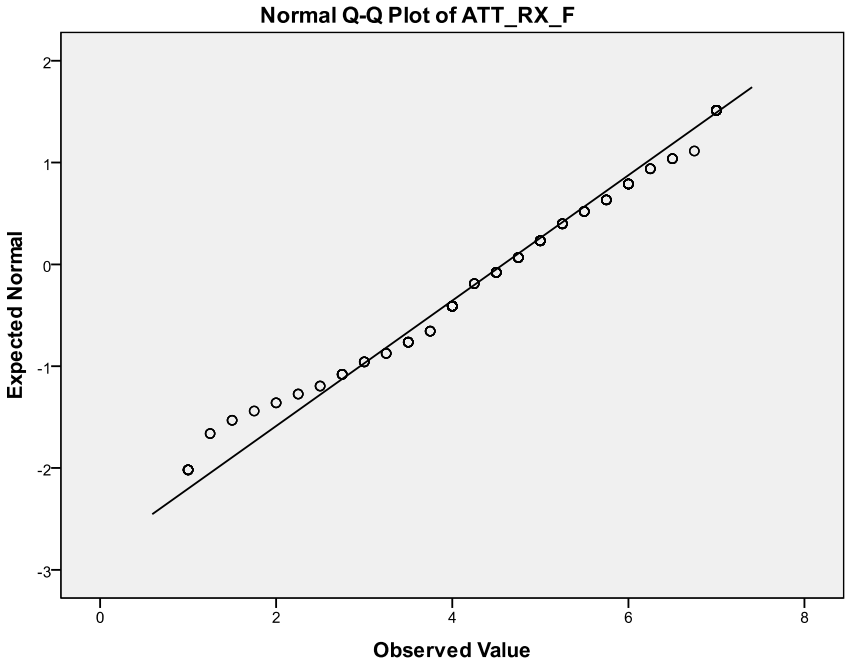


Figure 31: Normal QQ plot (Experimental) – Attitudes about requiring a prescription

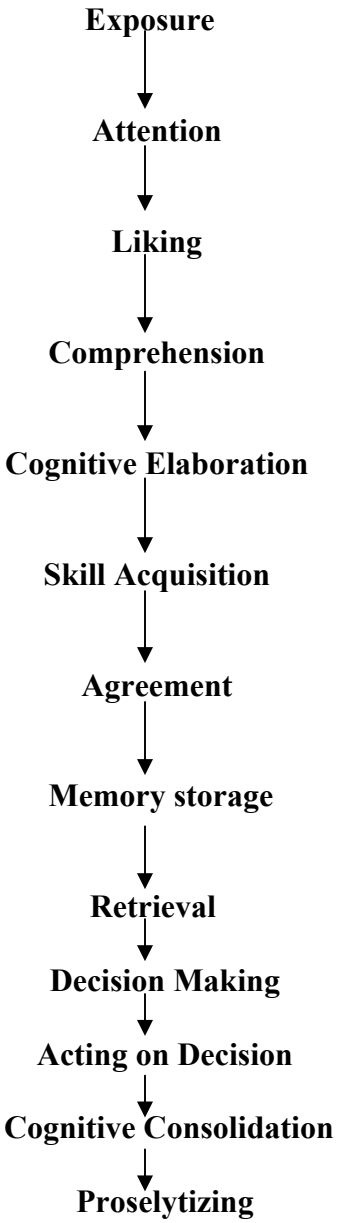


Figure 32: Information Processing Model

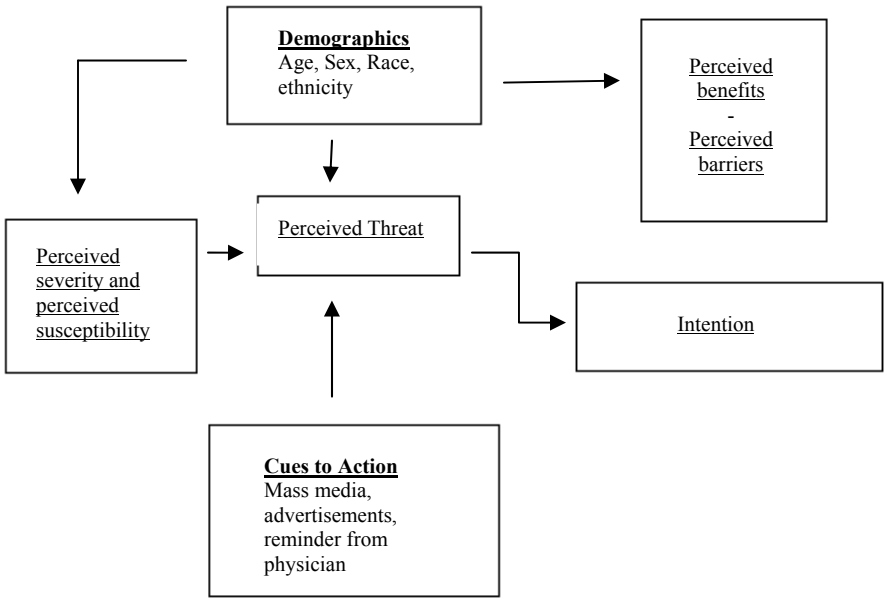


Fig 33: Health Belief Model

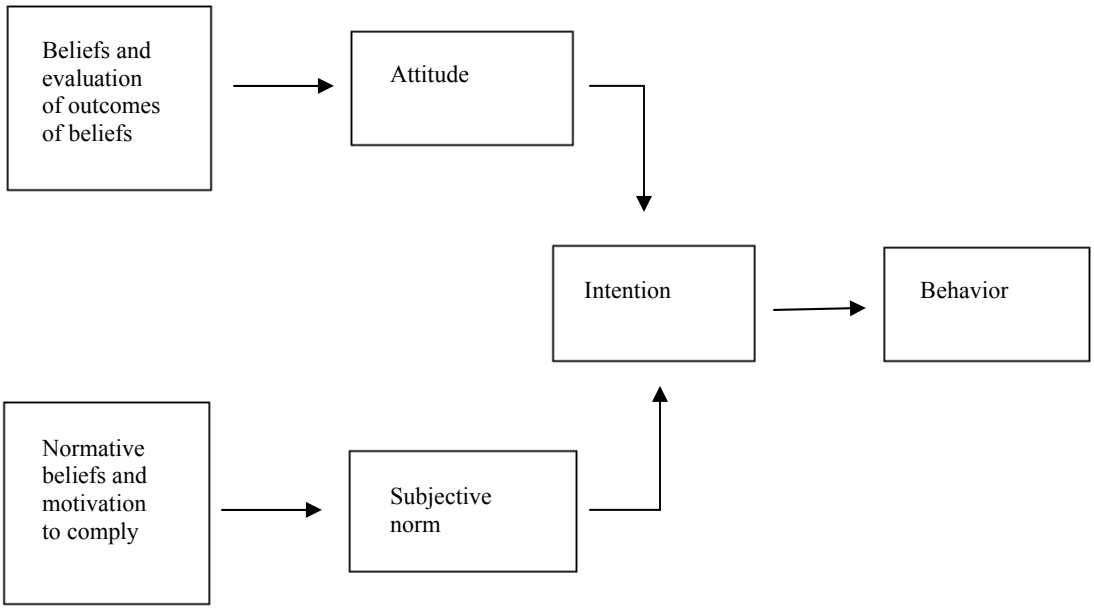


Fig 34: Theory of Reasoned Action

Appendix

Appendix A: Survey Instrument for Descriptive Study

I live closest to the following metropolitan area.

- Philadelphia, PA
- New York, NY
- Hartford, CT
- Providence, RI
- Boston, MA
- Other

In what state do you currently reside?

What is your gender

- Male
- Female
- Do not want to answer

Default Question Block

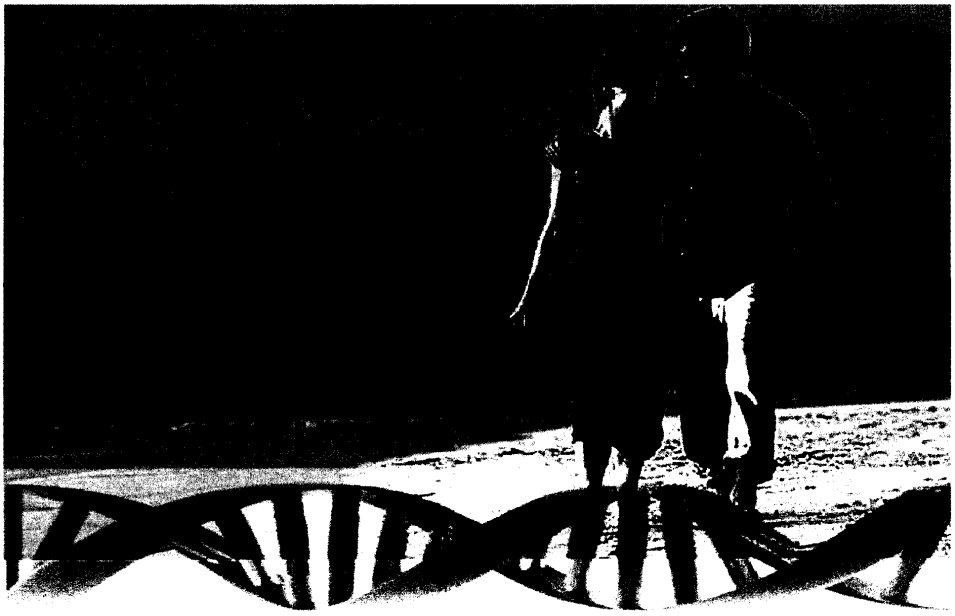
THE UNIVERSITY OF GEORGIA

A study to understand consumers opinions about advertising of genetic tests

04/12/2010

Survey Conducted by:
The Department of Clinical and Administrative Pharmacy
R.C Wilson College of Pharmacy
University of Georgia, Athens, GA

Please take a few minutes and review the following advertisement for the RTF® genetic test. You might have seen this advertisement in some magazines. After you review the ad, we have a few questions we'd like to ask you about it.



Are You Ready To Fight Disease Before It Starts?

If any of your family members have had:

- *Alzheimer's Disease*
- *Rheumatoid Arthritis*
- *Cancer (Breast Cancer, Colon Cancer, Lung Cancer, Pancreatic Cancer)*

then you may be at increased risk too.

Medical science has shown that we inherit many diseases from our ancestors. If someone in your family has been diagnosed with one of the above hereditary medical conditions, you too may be at increased risk. Early detection, along with proactive medical care, is proven to help reduce risk and save lives.

Ask your doctor about RTF® genetic testing because understanding your risk is the first step to reducing it. RTF® analysis - a test that uses a simple painless cotton swab from your cheek - can help you understand your personal risk for developing any of these serious medical conditions. Proper risk assessment, along with a discussion of testing and medical options, is your chance to begin fighting a serious disease before it starts. After RTF® analysis, you and your doctor can discuss effective choices and steps you can take to ensure your own health.

Are You Ready To Fight Disease Before It Starts?
Talk to your doctor or call today for a free educational brochure.
www.RTF.com
1.800RTFGene(toll free)
RTF®Analysis

GENESIS®
Genesis Laboratories
New York, NY 10071

This survey has two different types of questions. Please read the following examples carefully. You do not have to click on any answer for the example questions.

Example 1: In the following example, the questions has three statements. For such questions, make sure that you select an option for all the three statements as shown below.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
It is very pretty outside today.	○	○	○	○	◉	○	○
Eating a healthy diet is good for me.	○	○	○	○	○	○	◉
Cars are the main cause of pollution.	○	○	◉	○	○	○	○

Example 2: The following question is slightly different from the previous example. This question has one statement followed by three descriptive words. For such questions, make sure to select an option for all the three words as shown below.

I feel that the weather today is.....

Good	○	○	○	○	○	○	◉	Bad
Unpleasant	○	◉	○	○	○	○	○	Pleasant
Favorable	○	○	○	○	◉	○	○	Unfavorable

Instructions:

- The Questions in this survey are intended to obtain your general thoughts, opinions and reactions to the advertisement for **"R genetic test"** that you just saw. The entire survey would take approximately 25-30 minutes. **Your input is very valuable an have a great impact on how genetic tests are provided in the future.**
- RTF® genetic test is a predictive Genetic test which means that the test can determine your risk of developing a disease in t future.
- This test uses a cotton swab from the inside of your cheeks to determine your risk for developing genetic diseases such as Arthritis, Alzheimer's disease and Cancers.
- Please try to answer all questions based on your impression of the advertisement and to the best of your ability. There is no r or wrong answer.

Section 1: This section will help us determine if there are differences in the way you think about certain issues. Please indicate yo opinion by clicking the appropriate box.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str Ag
I only think as hard as i have to.	○	○	○	○	○	○	
I am an intellectual	○	○	○	○	○	○	
I really enjoy a task that involves coming up with new solution to problems	○	○	○	○	○	○	
I feel relief rather than satisfaction after completing a task that required a lot of mental effort.	○	○	○	○	○	○	
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities	○	○	○	○	○	○	
Please select "agree" to continue with the survey	○	○	○	○	○	○	

Section 2: The purpose of this section is to find out how involved you are in your healthcare. Please indicate your opinion by clickir appropriate box that describes how you feel about taking care of your health.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
In general, I consider myself to be very involved in my healthcare.	○	○	○	○	○	○	
I rarely look for information regarding healthcare issues.	○	○	○	○	○	○	
I generally pay attention to healthcare information that I am exposed to.	○	○	○	○	○	○	

Section 3: Next we would like to find out what you think about advertising of predictive genetic tests. Please indicate your opinion b clicking the appropriate box that describes what you think about advertising of predictive genetic tests (predictive genetic tests dete your risk of developing a disease in the future).click here if you want to see the ad again

I think that.....

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
Predictive genetic test information should only come from a doctor.	○	○	○	○	○	○	
Predictive genetic tests should not be advertised to consumers.	○	○	○	○	○	○	
I think that consumer advertisements for predictive genetic tests would provide consumers with information they have a right to know.	○	○	○	○	○	○	
Consumers want to know more about predictive genetic tests.	○	○	○	○	○	○	
Predictive genetic tests should not be advertised like other products.	○	○	○	○	○	○	
Predictive genetic test advertisements can protect consumers from doctors who are not well informed.	○	○	○	○	○	○	
I would like to see more advertisements for genetic tests.	○	○	○	○	○	○	

Section 4: The purpose of this section is to find out what you think about talking to your doctor about the RTF® genetic test that yo advertised.click here if you want to see the ad again

I think that.....

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
Talking with my doctor about the genetic test I saw advertised is a good idea.	○	○	○	○	○	○	
Talking with my doctor about a genetic test I saw advertised will provide useful information.	○	○	○	○	○	○	
Talking with my doctor about a genetic test I saw advertised will spoil my relationship with my physician.	○	○	○	○	○	○	
Talking with my doctor about a genetic test I saw advertised will help me decide if i should take the test.	○	○	○	○	○	○	

Section 5: The next few questions ask what other people would think about you talking to your doctor about the RTF® genetic test t you saw in an advertisement.click here if you want to see the ad again

I think that .....

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
People who are important to me would think that I should talk to my doctor about the advertised RTF® genetic test.	○	○	○	○	○	○	
People who are important to me would approve of me talking to my doctor about the advertised RTF® genetic test.	○	○	○	○	○	○	
People who are important to me would be glad I talked to my doctor about the RTF® genetic test.	○	○	○	○	○	○	

Section 6: Below you will find a list of descriptions that represents different feelings about the advertisement that you just read. Ple indicate your opinion by clicking the appropriate box that best describes how you feel about talking to your doctor about the RTF® genetic test that you saw advertised.click here if you want to see the ad again

Talking to my physician about the RTF® test that i saw advertised would be.....

Bad	○	○	○	○	○	○	○	Good
Wise	○	○	○	○	○	○	○	Foolish
Harmful	○	○	○	○	○	○	○	Beneficial
Useful	○	○	○	○	○	○	○	Useless

Section 7: Based on your assessment of the RTF® test, please indicate your opinion by clicking the appropriate box that best desc how likely you are to talk to your doctor about RTF® genetic test during your next office visit . click here if you want to see the ad a

Likely	○	○	○	○	○	○	○	Unlikeky
Improbable	○	○	○	○	○	○	○	Probable
Possible	○	○	○	○	○	○	○	Impossible

Section 8: Based on your assessment of the RTF® test, please indicate your opinion by clicking the appropriate box that best desc how likely you are to look for more information about RTF® genetic test within the next couple of weeks.click here if you want to see ad again

Likely	○	○	○	○	○	○	○	Unlikely
Improbable	○	○	○	○	○	○	○	Probable
Possible	○	○	○	○	○	○	○	Impossible

Section 9: Based on your assessment of the RTF® test, please indicate your opinion by clicking the appropriate box that best desc how likely you are to take the RTF® genetic test within the next 3 months. click here if you want to see the ad again

Likely	○	○	○	○	○	○	○	Unlikely
Improbable	○	○	○	○	○	○	○	Probable
Possible	○	○	○	○	○	○	○	Impossible

Section 10: The next few questions ask about your feelings about the disease conditions mentioned in the advertisement

A) What do you think is your risk of developing the following diseases in the future?

	Very low risk	Low risk	Somewhat low risk	Neither high nor low risk	Somewhat high risk	high risk	Very Ri
Rheumatoid Arthritis	○	○	○	○	○	○	(
Alzheimer's disease	○	○	○	○	○	○	(
Lung cancer	○	○	○	○	○	○	(

	Very low risk	Low risk	Somewhat low risk	Neither high nor low risk	Somewhat high risk	high risk	Very Ri
Pancreatic cancer	○	○	○	○	○	○	○
Colon cancer	○	○	○	○	○	○	○

B) How afraid are you of developing the following diseases in the future?

	Not at all afraid	less afraid	Somewhat less afraid	Neither more nor less afraid	Somewhat more afraid	More afraid	Very /
Rheumatoid Arthritis	○	○	○	○	○	○	○
Alzheimer's disease	○	○	○	○	○	○	○
Lung cancer	○	○	○	○	○	○	○
Pancreatic cancer	○	○	○	○	○	○	○
Colon cancer	○	○	○	○	○	○	○

C) How likely do you think you would be to develop the following diseases in the future?

	Not at all likely	Less likely	Somewhat less likely	neither less nor more likely	Somewhat more likely	More likely	Very
Rheumatoid Arthritis	○	○	○	○	○	○	○
Alzheimer's disease	○	○	○	○	○	○	○
Lung cancer	○	○	○	○	○	○	○
Pancreatic cancer	○	○	○	○	○	○	○
Colon cancer	○	○	○	○	○	○	○

D) How severely do you think your developing the following diseases will disrupt your physical health?

	Not at all disruptive	less disruptive	Somewhat less disruptive	Neither less nor more disruptive	somewhat more disruptive	More disruptive	Hig disru
Rheumatoid Arthritis	○	○	○	○	○	○	○
Alzheimer's disease	○	○	○	○	○	○	○
Lung cancer	○	○	○	○	○	○	○
Pancreatic cancer	○	○	○	○	○	○	○
Colon cancer	○	○	○	○	○	○	○

E) How severely do you think your developing the following diseases will disrupt your emotional health?

	Not at all disruptive	less disruptive	Somewhat less disruptive	Neither less nor more disruptive	somewhat more disruptive	More disruptive	Hig disru
Rheumatoid Arthritis	○	○	○	○	○	○	○
Alzheimer's disease	○	○	○	○	○	○	○
Lung cancer	○	○	○	○	○	○	○
Pancreatic cancer	○	○	○	○	○	○	○
Colon cancer	○	○	○	○	○	○	○

F) How dangerous do you think the following disease will be, if you contract it?

	Not at all dangerous	less dangerous	Somewhat less dangerous	Neither less nor more dangerous	somewhat more dangerous	More dangerous	Hig dange
Rheumatoid Arthritis	○	○	○	○	○	○	(
Alzheimer's disease	○	○	○	○	○	○	(
Lung cancer	○	○	○	○	○	○	(
Pancreatic cancer	○	○	○	○	○	○	(
Colon cancer	○	○	○	○	○	○	(

Section 11: How well informed do you consider yourself about.....

	Not at all informed	less informed	Somewhat less informed	Neither more or less informed	somewhat well informed	Well informed	Very infor
Rheumatoid Arthritis	○	○	○	○	○	○	(
Alzheimer's disease	○	○	○	○	○	○	(
Colon cancer	○	○	○	○	○	○	(
Lung cancer	○	○	○	○	○	○	(
Pancreatic cancer	○	○	○	○	○	○	(

Section 12: Below you will find a list of descriptions that represents different feelings about genetic testing in general. Please indica your opinion by clicking the appropriate box that best describes how you feel in general about predictive genetic tests that determin disease risks.

Generally, I feel that predictive genetic tests are.....

BAD	○	○	○	○	○	○	○	GOOD
PLEASANT	○	○	○	○	○	○	○	UNPLEASANT
UNFAVORABLE	○	○	○	○	○	○	○	FAVORABLE

Section 13:

The purpose of this section is to find out what you think about requiring a prescription for genetic tests in general. Please indicate y opinion by clicking the appropriate box that best describes, what you think about a prescription requirement for genetic tests.

I think that needing a prescription for a genetic test means:

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
My health insurance company could get the results.	○	○	○	○	○	○	
My employer could get the results.	○	○	○	○	○	○	
My test results won't be private anymore.	○	○	○	○	○	○	
Doctors will decide if I need a test, and not me and this could be bad.	○	○	○	○	○	○	
I would not have the right to decide about my own body .	○	○	○	○	○	○	
I will no longer have access to information about my own body and it is a bad thing.	○	○	○	○	○	○	

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
Doctors will need a lot more information on genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Doctors will need a lot more experience with genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Doctors will need to learn more about genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	

Section 14: Below you will find a list of descriptions that represents different feelings about requiring a prescription for a genetic tes
Please indicate your opinion by clicking the appropriate box that best describes how you feel about requiring a prescription for the RTF® genetic test that you saw advertised.click here if you want to see the ad again

Requiring a prescription for the RTF® test that i saw advertised would be.....

Bad	○	○	○	○	○	○	○	Good
Wise	○	○	○	○	○	○	○	Foolish
Harmful	○	○	○	○	○	○	○	Beneficial
Useful	○	○	○	○	○	○	○	Useless

Section 15: Please answer the following question about your health.

My overall health condition is.....

Bad	○	○	○	○	○	○	Good

Section 16: Please answer the following questions about the health of your family members.

Have any of your family members(father, mother, grandparents, brothers, sisters,aunts and uncles) have had.....

	Yes	No	don't know
Rheumatoid Arthritis	○	○	○
Alzheimer's disease	○	○	○
Colon cancer	○	○	○
Lung cancer	○	○	○
Pancreatic cancer	○	○	○

Section 17: In this section we would like to know about your past experiences with advertisements of genetic tests.

Have you ever seen advertisements for predictive genetic tests?

- ○ Yes
- ○ No
- ○ I do not remember

Where did you see the advertisement ?(you can click on more than 1 option)

- ☐ Magazines
- ☐ Newspaper
- ☐ Internet

Doctor's office

- [ ] Television
- [ ] Other

When did you see the advertisement?

- ○ within last 1 month
- ○ 1-2 months
- ○ 2- 3 months
- ○ 3- 6 months
- ○ 6months- 1 year
- ○ more than 1 year

If you remember, could you please write the name of the genetic test or the health condition for which the test was used?

Have you ever talked to your doctor about a genetic test you had seen or heard advertised?

- ○ Yes
- ○ No

Have you ever taken a predictive genetic test before?

- ○ Yes
- ○ No

Section 18:

Please answer the following questions about yourself

What is the highest level of education you have completed?

- ○ Less than high school
- ○ High school graduate or equivalent
- ○ Associates/technical/vocational degree
- ○ Completed some part of college but no degree
- ○ College Graduate
- ○ Graduate school or higher
- ○ Do not want to answer

How do you describe yourself? (Please indicate mixed racial heritage by checking more than one option)

- [ ] American Indian or Alaska native
- [ ] Asian
- [ ] African American
- [ ] Hispanic or Latino
- [ ] Native Hawaiian or Other Pacific Islander

White

☐ Other

☐ Do not want to answer

Which of the following categories describes your age?

○ 18-25

○ 26-35

○ 36-45

○ 46-55

○ 56-65

○ Above 65 years

○ Do not want to answer

Which occupational category best describes your employment? (U.S. Census 40 Categories)

What is your annual household income?

○ Less than $ 15000

○ $15,000 to $ 24,999

○ $ 25,000 to $ 34,999

○ $ 35,000 to $49,999

○ $ 50,000 to $ 74,999

○ $ 75,000 to $ $ 99,999

○ $ 100,000 or more

○ Do not want to answer

Please tell us if you would like to see any other information in the advertisement of RTF® test to make an informed decision. click here if you want to see the ad again

Section 19:

Do you want to learn more about "RTF®" gene test now? Clicking on yes will take you to a link that will provide you more informatior about the RTF® Genetic test before the end of the survey. You may also click on "no" to end the survey without being directed to th link.

○ Yes

○ No

Debriefing Statement

Dear Study Participant,

The advertisement for the genetic test used in this study is not for a real genetic test. Both the advertisement and the genetic test a fictitious. The advertisement for the genetic test was designed by the researchers. However, the presentation format of the

advertisements was similar to advertisements of real genetic tests. The intention of this study was to determine how consumers res to advertisements of genetic tests and determine if these types of advertisements can have a positive or negative influence on respondent's attitudes and behavioral intentions.

Please click on the next button to submit your responses

Appendix B: Survey Instrument for genetic tests that do not require a prescription

Block 1

I live closest to the following metropolitan area.

- ○ Philadelphia, PA
- ○ New York, NY
- ○ Hartford, CT
- ○ Providence, RI
- ○ Boston, MA
- ○ Other

In what state do you currently reside?

What is your gender?

- ○ Male
- ○ Female
- ○ Do not want to answer

Default Question Block

THE UNIVERSITY OF GEORGIA

A study to understand consumers opinions about advertising of genetic tests

04/12/2010

Survey Conducted by:
The Department of Clinical and Administrative Pharmacy
R.C Wilson College of Pharmacy
University of Georgia, Athens, GA

Please take a few minutes and review the following advertisement for the RTF® genetic test. You might have seen this advertisement in some magazines. After you review the ad, we have a few questions we'd like to ask you about it.

Are You Ready To Fight Disease Before It Starts?

If any of your family members have had:

- *Alzheimer's Disease*
- *Rheumatoid Arthritis*
- *Cancer (Breast Cancer, Colon Cancer, Lung Cancer, Pancreatic Cancer)*

then you may be at increased risk too.

Medical science has shown that we inherit many diseases from our ancestors. If someone in your family has been diagnosed with one of the above hereditary medical conditions, you too may be at increased risk. Early detection, along with proactive medical care, is proven to help reduce risk and save lives.

Ask your doctor about RTF® genetic testing because understanding your risk is the first step to reducing it. RTF® analysis - a test that uses a simple painless cotton swab from your cheek - can help you understand your personal risk for developing any of these serious medical conditions. Proper risk assessment, along with a discussion of testing and medical options, is your chance to begin fighting a serious disease before it starts. After RTF® analysis, you and your doctor can discuss effective choices and steps you can take to ensure your own health.

Are You Ready To Fight Disease Before It Starts?

Talk to your doctor or call today for a free educational brochure.
www.RTF.com
1.800RTFGene(toll free)
RTF®Analysis

GENESIS®
Genesis Laboratories
New York, NY 10071

This survey has two different types of questions. Please read the following examples carefully. You do not have to click on any answer for the example questions.

Example 1: In the following example, the questions has three statements. For such questions, make sure that you select an option for all the three statements as shown below.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
It is very pretty outside today.	○	○	○	○	◉	○	○
Eating a healthy diet is good for me.	○	○	○	○	○	○	◉
Cars are the main cause of pollution.	○	○	◉	○	○	○	○

Example 2: The following question is slightly different from the previous example. This question has one statement followed by three descriptive words. For such questions,make sure to select an option for all the three words as shown below.

I feel that the weather today is.....

Good	○	○	○	○	○	○	◉	Bad
Unpleasant	○	◉	○	○	○	○	○	Pleasant
Favorable	○	○	○	○	◉	○	○	Unfavorable

Instructions:

- The questions in this survey are intended to obtain your general thoughts, opinions and reactions to the advertisement of **"RT genetic test"** that you just saw. The entire survey would take approximately 15 minutes. **Your input is very valuable and w have a great impact on how genetic tests are provided in the future.**
- RTF® genetic test is a Predictive Genetic test, which means that the test can detect your risk of developing a certain disease the future.
- This test uses a cotton swab from the inside of your cheeks to determine your risk for developing genetic diseases such as Arthritis, Alzheimer's disease and Cancers.
- **Genesis®, the company that provides the RTF® test does not require a doctor's prescription for you to take the test you information, companies are not required by law to require a prescription.**
- Please try to answer all questions based on your impression of the advertisement to the best of your ability. There is no right wrong answer.

Section 1

Knowing that a doctors prescription is not required by the company(Genesis), how do you feel about the advertisement? (click her you want to see the ad again)

I feel that the advertisement is.....

BAD	○	○	○	○	○	○	○	GOOD
PLEASANT	○	○	○	○	○	○	○	UNPLEASANT
UNFAVORABLE	○	○	○	○	○	○	○	FAVORABLE

Section 2:

Knowing that a doctors prescription is not required by the company(Genesis), how do you feel about RTF® genetic test? (click here you want to see the ad again)

I feel that the RTF® genetic test is.....

BAD	○	○	○	○	○	○	GOOD
PLEASANT	○	○	○	○	○	○	UNPLEASANT
UNFAVORABLE	○	○	○	○	○	○	FAVORABLE

Section 3:

Knowing that a doctors prescription is not required by the company (Genesis) , How do you feel about the company (Genesis) that o the RTF® test?

I feel that the company(Genesis) that offers the RTF® test is.....

BAD	○	○	○	○	○	○	GOOD
PLEASANT	○	○	○	○	○	○	UNPLEASANT
UNFAVORABLE	○	○	○	○	○	○	FAVORABLE

Section 4:

Assuming that you interested in the RTF® test and knowing that you do not require a doctor's prescription for this test.....

How likely are you to talk to your doctor about RTF® genetic test during your next visit?

LIKELY	○	○	○	○	○	○	○	UNLIKELY
IMPROBABLE	○	○	○	○	○	○	○	PROBABLE
POSSIBLE	○	○	○	○	○	○	○	IMPOSSIBLE

Section 5:

Assuming that you are interested in the RTF® test and knowing that you do not require a doctor's prescription for this test.....

How likely are you to look for more information about the RTF® genetic test within the next couple of weeks?

LIKELY	○	○	○	○	○	○	○	UNLIKELY
IMPROBABLE	○	○	○	○	○	○	○	PROBABLE
POSSIBLE	○	○	○	○	○	○	○	IMPOSSIBLE

Section 6:

Based on your overall assessment of the RTF® genetic test.....
(click here if you want to see the ad again)

How likely is it that you will take the RTF® genetic test within the next 3 months?

LIKELY	○	○	○	○	○	○	○	UNLIKELY
IMPROBABLE	○	○	○	○	○	○	○	PROBABLE
POSSIBLE	○	○	○	○	○	○	○	IMPOSSIBLE

Section 7: The purpose of this section is to find out how interested you are in your healthcare in general. Please indicate your opin by clicking the appropriate box that describes how you feel about taking care of your health.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
In general, I consider myself to be very involved in my healthcare.	○	○	○	○	○	○	
I rarely look for information regarding healthcare issues.	○	○	○	○	○	○	
I generally pay attention to healthcare information that I am exposed to.	○	○	○	○	○	○	

Section 8:

The purpose of this section is to find out what you think about requiring a prescription for genetic tests in general. Please indicate y opinion by clicking the appropriate box that best describes, what you think about a prescription requirement for genetic tests.

I think that needing a prescription for a genetic test means:

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
My health insurance company could get the results.	○	○	○	○	○	○	
My employer could get the results.	○	○	○	○	○	○	
My test results won't be private anymore.	○	○	○	○	○	○	
Doctors will decide if I need a test, and not me and this could be bad.	○	○	○	○	○	○	
I would not have the right to decide about my own body .	○	○	○	○	○	○	
I will no longer have access to information about my own body and it is a bad thing.	○	○	○	○	○	○	
Doctors will need a lot more information on genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Doctors will need a lot more experience with genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Doctors will need to learn more about genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Please select "Agree" to the right.	○	○	○	○	○	○	

Section 9: Below you will find a list of descriptions that represents different feelings about requiring a prescription to take a genetic Please indicate your opinion by clicking the appropriate box that best describes how you feel about requiring a prescription for the RTF® genetic test that you saw advertised.click here if you want to see the ad again

Requiring a prescription for the RTF® test that I saw advertised would be.....

Bad	○	○	○	○	○	○	○	good

wise	○	○	○	○	○	○	○	foolish
harmful	○	○	○	○	○	○	○	beneficial
useful	○	○	○	○	○	○	○	useless

Section 10: In this section we would like to know about your past experiences with advertisements of genetic tests.

Have you ever seen advertisements for predictive genetic tests?

- ○ Yes
- ○ No
- ○ I do not remember

Where did you see the advertisement ?**(you can click on more than 1 option)**

- ☐ Magazines
- ☐ Newspaper
- ☐ Internet
- ☐ Doctor's office
- ☐ Television
- ☐ Other

When did you see the advertisement?

- ○ within last 1 month
- ○ 1-2 months
- ○ 2- 3 months
- ○ 3- 6 months
- ○ 6months- 1 year
- ○ more than 1 year

If you remember, please write the name of the genetic test or the health condition for which the test was used.

Have you ever talked to your doctor about a genetic test you had seen or heard advertised?

- ○ Yes
- ○ No

Have you ever taken a predictive genetic test before?

- ○ Yes
- ○ No

Section 11:

Please answer the following questions about yourself

What is the highest level of education you have completed?

- ○ Less than high school
- ○ High school graduate or equivalent
- ○ Associates/technical/vocational degree
- ○ Completed some part of college but no degree
- ○ College Graduate
- ○ Graduate school or higher
- ○ Do not want to answer

How do you describe yourself? (Please indicate mixed racial heritage by checking more than one option)

- ☐ American Indian or Alaska native
- ☐ Asian
- ☐ African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Other
- ☐ Do not want to answer

Which of the following categories describes your age?

- ○ 18-25
- ○ 26-35
- ○ 36-45
- ○ 46-55
- ○ 56-65
- ○ Above 65 years
- ○ Do not want to answer

Which occupational category best describes your employment? (U.S. Census 40 Categories)

What is your annual household income?

- ○ Less than $ 15000
- ○ $15,000 to $ 24,999
- ○ $ 25,000 to $ 34,999
- ○ $ 35,000 to $49,999
- ○ $ 50,000 to $ 74,999
- ○ $ 75,000 to $ $ 99,999
- ○ $ 100,000 or more
- ○ Do not want to answer

Section 12:

Do you want to learn more about "RTF®" gene test now? Clicking on yes will take you to a link that will provide you more informatio about the RTF® Genetic test before the end of the survey. You may also click on "no" to end the survey without being directed to th link.

- ○ Yes
- ○ No

Debriefing Statement

Dear Study Participant,

The advertisement for the genetic test used in this study is not for a real genetic test. Both the advertisement and the genetic test a fictitious. The advertisement for the genetic test was designed by the researchers. However, the presentation format of the advertisements was similar to advertisements of real genetic tests. The intention of this study was to determine how consumers res to advertisements of genetic tests and determine if these types of advertisements can have a positive or negative influence on respondent's attitudes and behavioral intentions.

Appendix C: Survey Instrument for genetic tests that require a prescription

Block 1

I live closest to the following metropolitan area.

- ○ Philadelphia, PA
- ○ New York, NY
- ○ Hartford, CT
- ○ Providence, RI
- ○ Boston, MA
- ○ Other

In what state do you currently reside?

What is your Gender?

- ○ Male
- ○ Female
- ○ Do not want to answer

Default Question Block

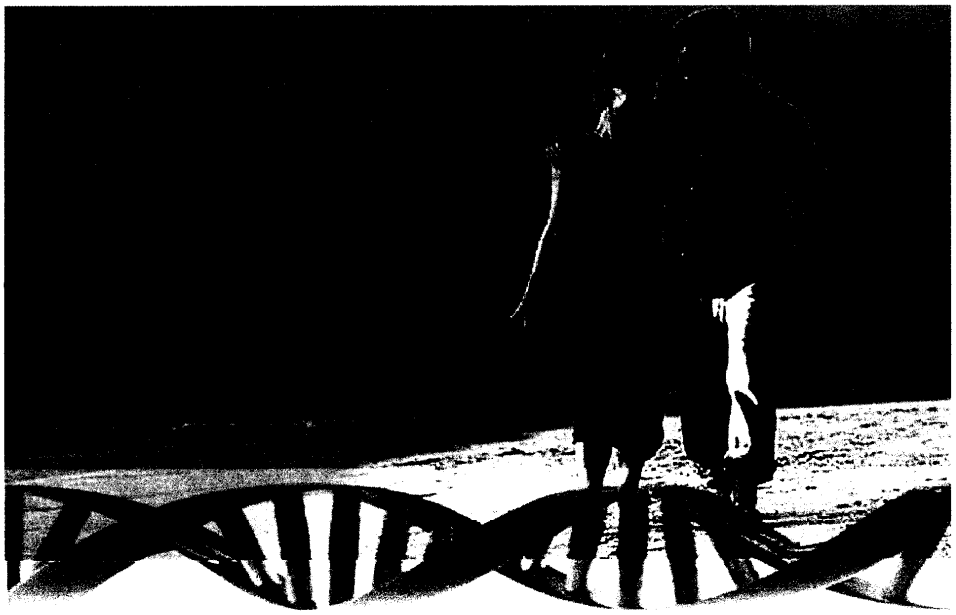
THE UNIVERSITY OF GEORGIA

A study to understand consumers opinions about advertising of genetic tests

04/12/2010

Survey Conducted by:
The Department of Clinical and Administrative Pharmacy
R.C Wilson College of Pharmacy
University of Georgia, Athens, GA

Please take a few minutes and review the following advertisement for the RTF® genetic test. You might have seen this advertisement in some magazines. After you review the ad, we have a few questions we'd like to ask you about it.



Are You Ready To Fight Disease Before It Starts?

If any of your family members have had:

- *Alzheimer's Disease*
- *Rheumatoid Arthritis*
- *Cancer (Breast Cancer, Colon Cancer, Lung Cancer, Pancreatic Cancer)*

then you may be at increased risk too.

Medical science has shown that we inherit many diseases from our ancestors. If someone in your family has been diagnosed with one of the above hereditary medical conditions, you too may be at increased risk. Early detection, along with proactive medical care, is proven to help reduce risk and save lives.

Ask your doctor about RTF® genetic testing because understanding your risk is the first step to reducing it. RTF® analysis - a test that uses a simple painless cotton swab from your cheek - can help you understand your personal risk for developing any of these serious medical conditions. Proper risk assessment, along with a discussion of testing and medical options, is your chance to begin fighting a serious disease before it starts. After RTF® analysis, you and your doctor can discuss effective choices and steps you can take to ensure your own health.

Are You Ready To Fight Disease Before It Starts?

Talk to your doctor or call today for a free educational brochure.
www.RTF.com
1.800RTFGene(toll free)
RTF®Analysis

GENESIS®
Genesis Laboratories
New York, NY 10071

This survey has two different types of questions. Please read the following examples carefully. You do not have to click on any answer for the example questions.

Example 1: In the following example, the questions has three statements. For such questions, make sure that you select an option for all the three statements as shown below.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
It is very pretty outside today.	○	○	○	○	◉	○	○
Eating a healthy diet is good for me.	○	○	○	○	○	○	◉
Cars are the main cause of pollution.	○	○	◉	○	○	○	○

Example 2: The following question is slightly different from the previous example. This question has one statement followed by three descriptive words. For such questions,make sure to select an option for all the three words as shown below.

I feel that the weather today is.....

Good	○	○	○	○	○	○	◉	Bad
Unpleasant	○	◉	○	○	○	○	○	Pleasant
Favorable	○	○	○	○	◉	○	○	Unfavorable

Instructions:

- The questions in this survey are intended to obtain your general thoughts, opinions and reactions to the advertisement of **"RT genetic test"** that you just saw. The entire survey would take approximately 15 minutes.**Your input is very valuable and wi have a great impact on how genetic tests are provided in the future.**
- RTF® genetic test is a Predictive Genetic test, which means that the test can detect your risk of developing a certain disease the future.
- This test uses a cotton swab from the inside of your cheeks to determine your risk for developing genetic diseases such as Arthritis, Alzheimer's disease and Cancers.
- **Although it is not a legal requirement by the US govt,Genesis®, the company that provides the RTF® test requires a doctor's prescription for you to take the test.**
- Please try to answer all questions based on your impression of the advertisement to the best of your ability. There is no right wrong answer.

Section 1

Knowing that a doctors prescription is required by the company(Genesis), how do you feel about the advertisement? (click here if want to see the ad again)

I feel that the advertisement is.....

BAD	○	○	○	○	○	○	○	GOOD
PLEASANT	○	○	○	○	○	○	○	UNPLEASANT
UNFAVORABLE	○	○	○	○	○	○	○	FAVORABLE

Section 2:

Knowing that a doctors prescription is required by the company(Genesis), how do you feel about RTF® genetic test? (click here if y want to see the ad again)

I feel that the RTF® genetic test is.....

BAD	○	○	○	○	○	○	GOOD
PLEASANT	○	○	○	○	○	○	UNPLEASANT
UNFAVORABLE	○	○	○	○	○	○	FAVORABLE

Section 3:

Knowing that a doctors prescription is required by the company (Genesis) , How do you feel about the company (Genesis) that offe RTF® test?

I feel that the company(Genesis) that offers the RTF® test is.....

BAD	○	○	○	○	○	○	GOOD
PLEASANT	○	○	○	○	○	○	UNPLEASANT
UNFAVORABLE	○	○	○	○	○	○	FAVORABLE

Section 4:

Assuming that you interested in the RTF® test and knowing that you require a doctor's prescription for this test.....

How likely are you to talk to your doctor about RTF® genetic test during your next visit?

LIKELY	○	○	○	○	○	○	○	UNLIKELY
IMPROBABLE	○	○	○	○	○	○	○	PROBABLE
POSSIBLE	○	○	○	○	○	○	○	IMPOSSIBLE

Section 5:

Assuming that you are interested in the RTF® test and knowing that you require a doctor's prescription for this test.....

How likely are you to look for more information about the RTF® genetic test within the next couple of weeks?

LIKELY	○	○	○	○	○	○	○	UNLIKELY
IMPROBABLE	○	○	○	○	○	○	○	PROBABLE
POSSIBLE	○	○	○	○	○	○	○	IMPOSSIBLE

Section 6:

Based on your overall assessment of the RTF® genetic test.....
(click here if you want to see the ad again)

How likely is it that you will take the RTF® genetic test within the next 3 months?

LIKELY	○	○	○	○	○	○	○	UNLIKELY
IMPROBABLE	○	○	○	○	○	○	○	PROBABLE
POSSIBLE	○	○	○	○	○	○	○	IMPOSSIBLE

Section 7: The purpose of this section is to find out how interested you are in your healthcare in general. Please indicate your opin by clicking the appropriate box that describes how you feel about taking care of your health.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
In general, I consider myself to be very involved in my healthcare.	○	○	○	○	○	○	
I rarely look for information regarding healthcare issues.	○	○	○	○	○	○	
I generally pay attention to healthcare information that I am exposed to.	○	○	○	○	○	○	

Section 8:

The purpose of this section is to find out what you think about requiring a prescription for genetic tests in general. Please indicate y opinion by clicking the appropriate box that best describes, what you think about a prescription requirement for genetic tests.

I think that needing a prescription for a genetic test means:

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Str A
My health insurance company could get the results.	○	○	○	○	○	○	
My employer could get the results.	○	○	○	○	○	○	
My test results won't be private anymore.	○	○	○	○	○	○	
Doctors will decide if I need a test, and not me and this could be bad.	○	○	○	○	○	○	
I would not have the right to decide about my own body .	○	○	○	○	○	○	
I will no longer have access to information about my own body and it is a bad thing.	○	○	○	○	○	○	
Doctors will need a lot more information on genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Doctors will need a lot more experience with genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Doctors will need to learn more about genetic tests to decide if the tests are right for me.	○	○	○	○	○	○	
Please select "Agree" to the right.	○	○	○	○	○	○	

Section 9: Below you will find a list of descriptions that represents different feelings about requiring a prescription to take a genetic Please indicate your opinion by clicking the appropriate box that best describes how you feel about requiring a prescription for the RTF® genetic test that you saw advertised.click here if you want to see the ad again

Requiring a prescription for the RTF® test that i saw advertised would be.....

Bad	○	○	○	○	○	○	○	good

wise	○	○	○	○	○	○	○	foolish
harmful	○	○	○	○	○	○	○	beneficial
useful	○	○	○	○	○	○	○	useless

Section 10: In this section we would like to know about your past experiences with advertisements of genetic tests.

Have you ever seen advertisements for predictive genetic tests?

- ○ Yes
- ○ No
- ○ I do not remember

Where did you see the advertisement ?**(you can click on more than 1 option)**

- ☐ Magazines
- ☐ Newspaper
- ☐ Internet
- ☐ Doctor's office
- ☐ Television
- ☐ Other

When did you see the advertisement?

- ○ within last 1 month
- ○ 1-2 months
- ○ 2- 3 months
- ○ 3- 6 months
- ○ 6months- 1 year
- ○ more than 1 year

If you remember, please write the name of the genetic test or the health condition for which the test was used.

Have you ever talked to your doctor about a genetic test you had seen or heard advertised?

- ○ Yes
- ○ No

Have you ever taken a predictive genetic test before?

- ○ Yes
- ○ No

Section 11:

Please answer the following questions about yourself

What is the highest level of education you have completed?

- ○ Less than high school
- ○ High school graduate or equivalent
- ○ Associates/technical/vocational degree
- ○ Completed some part of college but no degree
- ○ College Graduate
- ○ Graduate school or higher
- ○ Do not want to answer

How do you describe yourself? (Please indicate mixed racial heritage by checking more than one option)

- ☐ American Indian or Alaska native
- ☐ Asian
- ☐ African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Other
- ☐ Do not want to answer

Which of the following categories describes your age?

- ○ 18-25
- ○ 26-35
- ○ 36-45
- ○ 46-55
- ○ 56-65
- ○ Above 65 years
- ○ Do not want to answer

Which occupational category best describes your employment? (U.S. Census 40 Categories)

What is your annual household income?

- ○ Less than $ 15000
- ○ $15,000 to $ 24,999
- ○ $ 25,000 to $ 34,999
- ○ $ 35,000 to $49,999
- ○ $ 50,000 to $ 74,999
- ○ $ 75,000 to $ $ 99,999
- ○ $ 100,000 or more
- ○ Do not want to answer

Section 12:

Do you want to learn more about "RTF®" gene test now? Clicking on yes will take you to a link that will provide you more informatio about the RTF® Genetic test before the end of the survey. You may also click on "no" to end the survey without being directed to th link.

- ○ Yes
- ○ No

Debriefing Statement

Dear Study Participant,

The advertisement for the genetic test used in this study is not for a real genetic test. Both the advertisement and the genetic test a fictitious. The advertisement for the genetic test was designed by the researchers. However, the presentation format of the advertisements was similar to advertisements of real genetic tests. The intention of this study was to determine how consumers res to advertisements of genetic tests and determine if these types of advertisements can have a positive or negative influence on respondent's attitudes and behavioral intentions.

Appendix D: Informed Consent Form for Focus Groups

Informed Consent Form

I, ----------, agree to participate in a research study titled " Direct-to-Consumer Advertisement of Genetic Tests: Influence on Consumer Intentions and Behaviors" conducted by Sharavanan Ramakrishnan, investigator from the Department of Clinical and Administrative Pharmacy at the University of Georgia (706-202-4008) under the direction of Dr Matthew Perri III, Department of Clinical and Administrative Pharmacy, University of Georgia (706-542-5365). I understand that my participation is voluntary. I can refuse to participate or stop taking part at anytime without giving any reason, and without penalty or loss of benefits to which I am otherwise entitled. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The purpose of this study is to evaluate how genetic tests and their advertisements impact health attitudes and health behaviors. If I volunteer to take part in this study, I will be asked to do the following things:

1) Take part in a discussion with 5-7 other participants about my opinions on Genetic testing and their advertisements. This discussion will last for one and half hours at the Wilson College of Pharmacy conference rooms.

2) Answer questions about my health and the health of my family members

3) The discussion in which I participate will be recorded on two audio tapes which will be used only for research purposes. The content of the audio tapes will be highly confidential and will be used only by the researchers of this study. However, the audiotapes will be analyzed by the researchers and used to develop questions for other surveys. This analyzed content may be used in publications and presentations that result from this project. However, all identifiable information in the tapes will be replaced by participant numbers and the tapes will NOT be publicly disseminated.

4) The principal investigator is responsible for maintaining all protocol record for at least 3 years after the completion of the study. Completion of the study is indicated when the principal investigator notifies the Human Subjects Office that the research project is complete. My personally identifiable information will be kept with the researchers for a period of 3 years after completion of the study. All audio tapes will be erased and destroyed at the completion of the study.

The benefits that I may expect from this study are that the participation in this study may help me understand and evaluate promotional strategies used by companies better than before. I may become more aware about genetic tests and their advertisements and may understand if it is important to consult a health care professional before testing myself in the future.

No physical discomforts or legal, social and economic stresses are expected in this study.

No risks are expected in this study. Since this research study is a group discussion, I should be careful not to reveal any personal information that I do not want the other participants to know.

In order to make this study a valid one, some information about my participation will be withheld until after the study.

I will receive a $30 gift certificate for participating in the group discussion at the end of this study.

No individually identifiable information about me, or provided by me during the research, will be shared with others without my written permission. The group discussion will be recorded in two audio tapes. All identifiable information in audio tapes will be replaced by participant numbers. The tapes will not be publicly disseminated but analyzed content may be used in research presentations, publications and development of questionnaires.

In order to process the payment for my participation, the researcher(s) need to collect my name, mailing address, and social security number on a separate payment form. This completed form will be sent to the Department of Clinical and Administrative Pharmacy at the College of Pharmacy's business office and then to the UGA Business Office. The researcher(s) have been informed that these offices will keep my information private, but may have to release my name and the amount of compensation paid to you to the IRS, if ever asked. The researcher(s) connected with this study will protect my private information and will keep this confidential by storing in a secured location. However, the researcher is not responsible once my name, social security number, and mailing address leave their office/laboratory for processing of my payment.

The investigator will now answer any further questions about the research, now or during the course of the project.

I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

_____ _____ _____ _____

Signature Date

Sharavanan Ramakrishnan, B.S, PhD. Candidate
Telephone: 706-202-4008
Email: ramakris@rx.uga.edu

Matthew Perri III, PhD, R.Ph
Telephone: 706-542-5365
Email: mperri@rx.uga.edu

_____ _____ _____

Name of Participant Signature Date

Please sign both the copies, keep one and return one to the researcher.

Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

Appendix E: Debriefing Statement for Focus Group and Main Study

Debriefing Statement

Dear Study Participant,

The advertisement for the genetic test used in this study is not for a real genetic test. Both the advertisement and the genetic test are fictitious. The advertisement for the genetic test was designed by the researchers. However, the presentation format of the advertisements was similar to advertisements of real genetic tests. The intention of this study was to determine how consumers respond to advertisements of genetic tests and determine if these types of advertisements can have a positive or negative influence on respondent's attitudes and behavioral intentions.

Now that you are aware that the ad and genetic test was fictitious, if you feel differently about participating in this study and would like to withdraw, please let the researcher know. If you wish to withdraw from the study, your information in the tapes will not be transcribed for further analysis. The information that you provided will be erased as soon as the transcription for other participants is complete.

Thank you for your valuable time and participation in this study.

_____ _____	_____ _____
Signature Date	Signature Date
Sharavanan Ramakrishnan B.S., PhD candidate	Matthew PerriIII, RPh, PhD.
Telephone: 706-202-4008	Telephone: 706-542-5365
Email: ramakris@rx.uga.edu	Email: mperri@rx.uga.edu

Appendix F: DTC Ad Stimuli

Are You Ready To Fight Disease Before It Starts?

If any of your family members have had:

- *Alzheimer's Disease*
- *Rheumatoid Arthritis*
- *Cancer (Breast Cancer, Colon Cancer, Lung Cancer, Pancreatic Cancer)*

then you may be at increased risk too.

Medical science has shown that we inherit many diseases from our ancestors. If someone in your family has been diagnosed with one of the above hereditary medical conditions, you too may be at increased risk. ***Early detection, along with proactive medical care, is proven to help reduce risk and save lives.***

Ask your doctor about RTF® genetic testing because understanding your risk is the first step to reducing it. RTF® analysis - a test that uses a simple painless cotton swab from your cheek - can help you understand your personal risk for developing any of these serious medical conditions. ***Proper risk assessment, along with a discussion of testing and medical options, is your chance to begin fighting a serious disease before it starts.*** *After RTF® analysis, you and your doctor can discuss effective choices and steps you can take to ensure your own health.*

Are You Ready To Fight Disease Before It Starts?

Talk to your doctor or call today for a free educational brochure.
www.RTF.com
1.800RTFGene(toll free)
RTF®Analysis

GENESIS®
Genesis Laboratories
New York, NY 10071

Appendix G: Focus Group Topic Guide

INTRODUCTION

Hello everyone. My name is Sharavanan Ramakrishnan and I am a graduate student at the College of Pharmacy .Welcome and thank you for participating in this study entitled "Direct-to-Consumer Advertisement of Genetic Tests: Influence on Consumer Intentions and Behaviors". This study is a part of my doctoral dissertation research. The session will take approximately 90 minutes. You will be compensated for your time with a $30 Wal-Mart gift certificate. During the session, the conversation will be audio-taped; however the content of the tapes will be completely confidential. No one except the researchers working on this project will have access to these tapes. Before we begin, I want to give you a brief description of the study and I need you to sign an informed consent of your participation in the study.

Direct-to-Consumer ads or DTC ads are advertisements of drugs, medical devices or genetic tests. You may have seen them on TV or in magazines. These ads promote drugs, genetic tests and medical devices directly to consumers. We are interested in getting your thoughts and opinions on the information that is conveyed in these ads. For the purpose of this study we will be examining an ad for a Genetic test that determines your risk of developing four deadly diseases 1) Rheumatoid Arthritis 2) Alzheimer disease, 3) Pancreatic Cancer 4) Lung Cancer and 5) Colon cancer in the future.

Since this research study is a group discussion, you should be careful not to reveal any personal information that you do not want the other participants to know.

Discussion Questions:

1) Opening Questions- Tell us your name, what you do and what you most enjoy when you are not working
2) When you hear the word advertising, what comes to your mind?

Key Questions

1) What do you think about Direct to consumer advertising of drugs or medical devices that you have seen on television and magazines?
2) What do you think or how do you feel about the advertising of genetic tests directly to you?

Now, please read the ad completely, as if this were a genetic test you are interested in taking. As we talk about several issues in this discussion group, please focus on the ad that you have in front of you.

1) As you look at the advertisement of the Genetic test, what are the initial thoughts on your mind?
2) How do you feel when you look at this ad?
   Probe: Overwhelmed? Informed? Fearful? Educated?
3) After looking at the ad, how likely are you to talk to your doctor about the advertised genetic test?

Could you please provide some reasons why you would or would not talk to your doctor about the advertised genetic test?

4) Do you think this ad was enough to get you to consider taking one of these genetic tests?
   Probe: Why or Why not?
   If not, what will make you change your mind to take the genetic test in the future?
5) Do you think that the amount of information provided in the advertisement is sufficient for you to make an informed decision?
   Probe: If not, what more information do you think needs to be provided?
6) Was the information in the ad useful?
7) Do you think that the information in the ad, is information that everyone should know about or has the right to know about?
8) If this Genetic test in the ad required a prescription to take the test, would you be more or less likely to take the test?
   Probe: why or Why not?
   Will you change your mind if prescription was not required? Why or Why not?
9) Please tell me more about how you feel about doctors making this decision for you. Should it be a prescription only test? Or should people have access to tests without a doctor's prescription?

Appendix H: Recruitment Flyer for Focus Groups

Participants 18-64 Years Required For an Advertising Study

EARN $30 AND HELP A PhD STUDENT

IF YOU ARE

- **18-64 Years of Age**
- **Interested in Sharing Your Opinion About Genetic Tests**

I Need Your Help!!
Please Call Today and Participate In My Study

Contact Person: Sharavanan Ramakrishnan (SHRA)
Phone#: 706-202-4008
Email:ramakris@rx.uga.edu

Contact: SHRA
Phone#: 706-202-4008
Email:ramakris@rx.uga.edu

Contact: SHRA
Phone#: 706-202-4008
Email:ramakris@rx.uga.edu

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