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FACTORS AFFECTING INTENT TO USE CONSUMER GENETIC TESTS: A REVISED TECHNOLOGY ACCEPTANCE MODEL

Richard Johnson

29603332

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

10 November 2010

Abstract

Genetic testing offers disease diagnosis and other information based on genetic material provided by an individual. Direct to consumer genetic tests bypass clinician-administered tests in favour of direct sales and usage by consumers. The relative newness of consumer genetic testing to the South African market provides an opportunity for understanding the factors that would drive adoption of these products. An established technology acceptance model was enriched with factors important to clinical genetic testing and individual innovativeness. The model was tested through an online questionnaire with a nonprobability sample of 109 individuals. Factors including performance expectancy, social influence and discrimination concerns, were found to exhibit significant influence on consumers' behavioural intention to use consumer genetic tests. These findings provide a theoretical framework of individuals' attributes of importance for marketing and sales of consumer genetic tests.

Keywords

genetic test, consumer behavior, TAM, UTAUT, innovation diffusion

Declaration

I declare that this research project is my own work. It is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorization and consent to carry out this research.

Richard Johnson

10 November 2010

Acknowledgements

My thanks to Nicola Kleyn for her guidance and enthusiasm on my topic, my methods and my conclusions.

To Judy Coetsee, my thanks for her assistance with the statistics and my repeated requests for more information.

This paper is dedicated to my partner Christopher for his enduring patience and support.

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Explanatory Note

In consultation with Nicola Kleyn and on permission being obtained from GIBS it was decided that my research report should be submitted in the form of a paper for submission to the South African Journal of Economic and Management Sciences (SAJEMS). In addition to the report, an introduction and literature review were to be provided in full.

A table of contents is provided on the following page for ease of reference and dividers are included. All material required for examination is to be found in this document in the following sections. The Introduction and Literature Review contains an introduction to the research and an evaluation of the relevant literature, including references in the GIBS format; this is equivalent to Chapters 1 and 2 of the standard GIBS research report. The SAJEMS guidelines to authors is then provided for reference when evaluating the research report. The research report is then provided. Finally, a technical report containing all relevant statistical investigations is included.

The research report is written in the style required by SAJEMS, including a front page and an anonymous manuscript. Before writing up the journal submission, a number of SAJEMS articles were reviewed and the style of those articles has been followed. SAJEMS style does not require a restatement of the research objectives before discussing findings; conclusions and recommendations are generally reported together. Hypotheses are generally not explicitly stated; listing the hypotheses would dramatically inflate the length of the paper. The referencing style of SAJEMS differs from the GIBS standard and has been followed in the manuscript.

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Introduction and Literature Review

(Chapters 1 & 2)

10 November 2010

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1. INTRODUCTION TO THE RESEARCH PROBLEM

Direct to Consumer genetic testing describes a range of genetic tests that have been available online directly to the public since at least 2002 (Gollust, Wilfond, & Hull, 2003). The available tests cover a wide range of services including parentage testing, ancestry delineation, prediction of phenotypical traits and probabilistic prediction of clinical disorders (Hall & Gartner, 2009). Historically, *clinical* genetic testing required the involvement of physicians in prescribing and interpreting tests for patients. Direct to Consumer (DTC) testing can bypass the healthcare system as healthcare providers are not necessarily involved in ordering or interpreting the results from the test. Consumers are These tests have therefore become a consumer product (Roche & Annas, 2006).

A recent investigation of social networkers' attitudes towards DTC products (McGuire, Diaz, Wang, & Hilsenbeck, 2009) points to a lack of formal research into the factors driving consumer adoption of these products. The investigation utilised a questionnaire that was composed of questions of interest to the researchers. The questionnaire was created without a theoretical model to guide the selection of questions and was therefore of limited use in building a framework for understanding consumer behaviour towards DTC products. The investigation did highlight some important factors relevant for adoption (including privacy concerns and curiosity about one's own genetic make-up) but did not utilise any previously-identified adoption theories or theoretical constructs to substantiate the methodology followed or the results achieved.

Understanding adoption factors can assist businesses in tailoring products, services and marketing techniques to increase adoption (Frenzel & Grupp, 2009). Several theoretical frameworks have been used to understand consumer adoption factors of novel products and technologies, including Rogers' Innovation Diffusion Theory (Rogers, 2003) and the Unified Theory of the Adoption and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003); however no specific model for DTC genetic testing products has been published.

This research seeks to identify, enrich and test an applicable model that could be used to guide future decision making on DTC product marketing by businesses in the industry. Companies wishing to offer genetic tests or companies that currently offer related diagnostics (such as pathologists) require an understanding of the factors driving adoption in order to understand consumer behaviour and respond with the appropriate business positioning. Understanding the consumer behaviour factors that drive adoption may also assist in forming public policy.

1.1. THE GROWING IMPORTANCE OF CONSUMER GENETIC TESTS

Recent publications in high-profile sources such as the New York Times (Pinker, 2009) and The Economist (Taking your genes in hand, 2007) have sensitised the public to the availability of DTC tests. A growing number of companies offer DTC testing (Hogarth, Javitt, & Melzer, 2008) including 23andMe, Navigenics and Pathway Genomics. In addition to the basic tests, many of these companies also offer explanatory information for the results and online access to test records. Their products have received much attention in the popular press, including the award of Time magazine's "Best Invention of 2008" to the test kit of 23andMe (Hamilton, 2008)

As the tests reduce in cost due to economies of scale and scope they will become accessible to many more people. Some researchers have suggested that DTC companies will in the future be preferred to clinicians as the primary providers of genetic information (Foster & Sharp, 2008).

1.2. CURRENT DEBATE

The clinical validity of DTC tests, correct interpretation of the results and the usefulness of the data have all been questioned (Hall & Gartner, 2009). Certain results obtained from three different providers for the same test have been shown to vary widely; it is clear that the products themselves are immature and there is a lack of formal regulation of the tests (Waters, 2010).

The future of DTC products is currently a subject of much debate in the United States. In July 2010, both Congress and the Government Accountability Office (GAO) held hearings into consumer genetic testing (What lies within, 2010). The federal Food and Drug Administration (FDA) believes that several of the genetics companies are marketing their products as medical tests, making them subject to FDA control. None of the DTC testing companies have, however, submitted their tests to the FDA for approval, with most providers claiming that the information they provide is for entertainment value only and is not to be used as a medical diagnosis (Timmer, 2010).

Possible outcomes of the current debate include more strict regulation of the sale and use of genetic tests or the banning of DTC products altogether (requiring that a medical practitioner be involved in the ordering and interpretation of any genetic tests). It is likely that testing for frivolous reasons (such as ancestry) will not be regulated but that tests with claimed medical significance will require FDA approval. Several commentators have argued that overly-strict regulation may stifle innovation in the sector (What lies within, 2010).

The Economist (2010) highlights the fact that the consumer genetic testing business is still young and that most firms are struggling to make money. One estimate places the total number of people who have participated in DTC testing at a mere 100,000. As prices for whole genome sequencing (the most productive of all tests) reduce, it is likely that more people will participate. The cost of whole genome sequencing a decade ago was over one billion US dollars; it is estimated that by 2015 the price will be below one thousand dollars. The Economist believes that the genetic testing industry will survive the current debates and will grow rapidly in the coming years.

1.3. THE SOUTH AFRICAN CONTEXT

Consumer genetic testing is already available in South Africa from websites such as www.genediagnostics.co.za, www.easydna.co.za and www.dnatest.co.za. The available tests include paternity testing, ancestry tests and disease tests. No published statistics exist as to the success of these companies in the South African market.

A specific profession, that of the genetic counselor, has been created to provide counseling at all stages of an individual's life, especially before and after taking a genetic test (Bennett, Hampel, Mandell, & Marks, 2003). Genetic counselling is intended to assist individuals in understanding, coping with and choosing the correct response to information about their genets. Genetic counselling is established in South Africa and is partly overseen by the Southern African Society for Human Genetics (*Southern African Society for Human Genetics,* 2010).

In line with several countries, South Africa appears to have chosen to enforce the involvement of medical practitioners in genetic testing. A publication in the Government Gazette of 22 May 2009, made in terms of the Health Professions Act, 1974, appears to restrict the practice of genetic testing and results evaluation to registered health professionals (Department of Health, 2009). An argument for the involvement of medical practitioners is that the interpretation of some of the medical information resulting from the tests is difficult even for physicians (Timmer, 2010). The required involvement of a healthcare professional does not necessarily prevent direct sales of DTC tests – some international companies circumvent the law by simply involving a doctor in writing an automatic prescription for each test ordered online.

1.4. ADOPTION FACTORS

As DTC tests are recently available for direct purchase by the consumer, the adoption of genetic tests may follow patterns similar to other novel consumer products. The adoption of innovations has been extensively studied since the 1950s (see Meade &Islam (2006) for a review) and several diffusion models have been identified, each listing a set of factors and processes that help to drive adoption. The Innovation Diffusion model and the attributes of both the innovation itself and the adopter that have an impact on the rate of diffusion are discussed in Section 2.2.

The mechanisms behind consumer behaviour and consumer choice have been examined using derived social psychology models such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991). The TPB has been extended, incorporating elements of innovation diffusion theory, and applied specifically to the adoption of new technologies through the Technology Adoption Model and its revised version the Unified Theory of the Acceptance and Use of Technology (Venkatesh et al., 2003). Factors such as Performance Expectancy and Social Influence have been determined to influence the intention to use a specific technology, which is itself the best predictor of actual use.

A variety of studies and anecdotal evidence have provided a broad list of possible factors driving adoption of clinical genetic tests (those tests ordered by or on the instruction of a physician as part of a diagnostic process). Factors affecting the adoption of these tests include concerns on the usefulness of the information, the privacy of that information and potential psychological impacts of discovering unwelcome information (Frost, Myers, & Newman, 2001). A recent New York Times article discussed anecdotal stories of perceived discrimination risks affecting the choices consumers made on taking or not taking clinical genetic tests (Harmon, 2008). The article determined that many potential users were avoiding genetic tests out of fear that they would be discriminated against by their health insurers, despite the fact that the genetic tests themselves are becoming more accurate and more useful in understanding and preventing the onset of disease. Consumers appear to be willing to forego the benefits of testing based on their fear of genetic discrimination.

It is possible that clinical testing adoption factors, innovation diffusion theory and the models describing the adoption of new technologies may also apply to DTC testing.

1.5. RESEARCH OBJECTIVES

This research aims to construct and statistically verify a model that combines and explains adoption drivers for DTC genetic tests. By understanding the factors driving adoption and the relative importance of each factor, marketers can adjust the messages they use in advertising DTC tests. The mix of messages will likely include addressing privacy concerns, explaining the functional utility of the test and explaining how easy the test is to use. An understanding of the demographics and customer traits that affect adoption (e.g. innovativeness) will provide additional information related to whom the messages should target. The DTC genetic testing industry is poised for growth; a model of customer adoption will help marketers to drive this growth.

2. LITERATURE REVIEW

2.1. INTRODUCTION

To understand the factors driving the uptake of direct to consumer genetic tests, models from multiple disciplines need to be understood.

Several theoretical models have been created to explain the spread, acceptance and use of innovations and novel technologies. One of the models most frequently utilised to understand the spread of new technologies is the Innovation Diffusion model (ID) (Rogers, 2003). This theory is investigated to understand its relevance to DTC testing.

As summarised in Faiers (2007) several theories have been suggested that attempt to explain different aspects of consumer behaviour. One model frequently used to understand the buying process is the Theory of Planned Behaviour (TPB), a model that has been extensively adopted and widely tested (Sheppard, Jon Hartwick, & Warshaw, 1988). TPB has been applied to novel technology adoption through the Technology Acceptance Model (TAM) (Davis, 1989). The Unified Theory of the Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) combines several theories (including TPB and ID) into a single model that attempts to explain usage of new technologies. UTAUT is investigated in detail as it forms the basis of this research.

Research investigating genetic testing has used TPB (Frost et al., 2001) and ID theory (Armstrong, Weiner, Weber, & Asch, 2003) to explain the uptake of clinical genetic testing. This and other research (Balmaña, Stoffel, Emmons, Garber, & Syngal, 2004; Hadley et al., 2003; Jacobsen, Valdimarsdottier, Brown, & Offit, 1997; Lerman, Tercyak, Croyle, & Hamann, 2002) introduced several additional considerations specific to genetic testing. The relevant research is reviewed to build a comprehensive understanding of the factors involved.

2.2. INNOVATION DIFFUSION MODEL

Developed initially in the agricultural sector, the ID model has been used extensively across industries and discipline to describe and understand the spread of various innovations within populations (Meade & Islam, 2006). Rogers (2003) defines an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, section 667). Objective newness is not necessary, only the perceived newness for the unit of adoption, which determines their reaction to it. DTC genetic testing is not prevalent in South Africa and its adoption is likely to follow the same patterns of innovation diffusion.

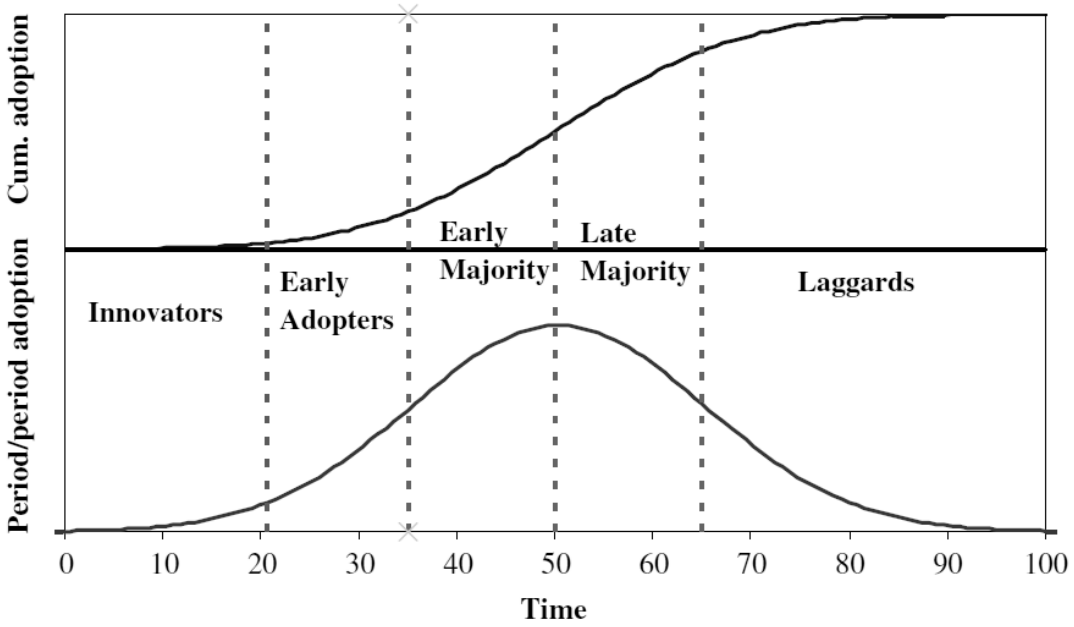
Diffusion takes place through communications among members of a social system, over time, through certain channels. Cumulative adoption within a system, when plotted, defines as an s-curve with time on the X-axis and Y as the number of individuals that have implemented the innovation (Figure 1). The slope of the s-curve describes the rate of adoption of the innovation.

Rogers' ID model describes five attributes of an innovation that together explain the adoption rate of the innovation; these are relative advantage (is the innovation better than current practice, does it confer prestige, does it offer satisfaction?), complexity (ease of understanding and use), trialability (degree to which an innovation can be experimented with on a limited basis), observability (visibility of adoption and results to others) and compatibility (with existing needs, values and experiences of potential adopters) (Rogers, 2003). Relative advantage, complexity and compatibility define the benefits and disadvantages of an innovation, while increasing observability and trialability decrease the risks to adoption.

The decision to adopt the innovation can be described as a process, moving from knowledge (awareness of the innovation and partial understanding) through persuasion (development of an attitude toward the innovation), decision (choosing to adopt or reject), implementation (utilising the innovation) and confirmation (either reinforcement within the group of the use of the innovation or reversion to past practice) (Rogers, 2003, section 963).

Diffusion is primarily a social process as it takes place through communication (Rogers, 2003, section 765). As such it relies on the attributes of individuals to drive innovation. Using the number of individuals adopting an innovation and the time at which they adopt as a classification mechanism, Rogers divided the adopters into categories, plotted against the adoption s-curve as per Figure 1. Adopters in each category share a number of traits. The categories and their traits are the following: innovators (willing to take risks, high social class, well educated, young), early adopters (high degree of opinion leadership in the population, young, well educated and socially forward), early majority (above average social status, contact with early adopters), late majority (sceptical about the innovation, below average social status, fewer financial skills) and laggards (lowest social status, lowest financial fluidity, limited social circles) (Rogers, 2003, section 1108).

Figure 1: Diffusion of Innovation Adoption Curve



(Meade & Islam, 2006)

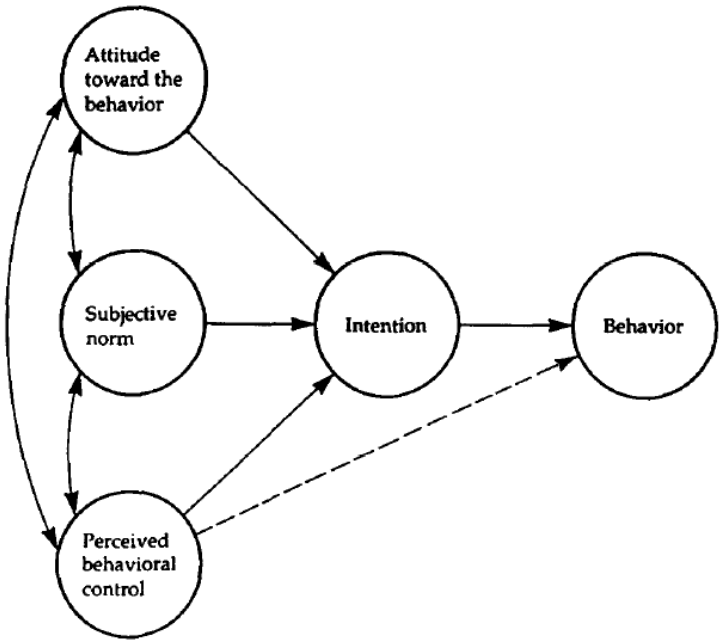
ID has been criticised as being useful as a theoretical underpinning but not as a predictive theory (Straub, 2009). Its principles have however informed the development of other models, including the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) and the Unified Theory of the Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) discussed below. A survey instrument to measure users' perceptions of adopting a technology innovation has also been developed based on the Innovation Diffusion (Moore & Benbasat, 1991).

2.3. THEORIES OF REASONED ACTION AND PLANNED BEHAVIOUR

The Theory of Reasoned Action is a frequently-used model for predicting behaviour. As quoted in Chang (1998) TRA posits that Behavioural Intention is the most accurate predictor of actual behaviour. Behavioural Intention, the theory's major dependent variable, captures "the motivational factors that influence a behaviour" and "are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behaviour" (Ajzen, 1991, p. 181). There is an express link between the strength of the intention and the likelihood of the behaviour being performed. Behavioural Intention is a function of Attitude toward the behaviour and Subjective Norm, where Attitude captures feelings of favourableness or unfavourableness for the action and Subjective Norm describes the individual's perceptions that people important to the individual think that the individual should/should not perform the action (Chang, 1998).

The Theory of Reasoned Action is valid only if the behaviour is under volitional control. TRA was elaborated on and developed into the Theory of Planned Behaviour (TPB) (Ajzen, 1991) through the addition of a measure of Perceived Behavioural Control, which allows for situations in which the performance of the action is not entirely voluntary, where the individual is concerned about how well they can execute a course of action and where there are "potential constraints on action as perceived by the actor" (Armitage & Conner, 2001, p. 472) The constructs of TPB and their relationships are depicted in Figure 2.

Figure 2: Theory of Planned Behaviour



Adapted from (Ajzen, 1991)

TRA and TPB are only useful in predicting the intention of an individual to perform the action, not the performance of the action itself as ability to perform the action may be constrained by external circumstances such as a lack of money or unwillingness of others to participate in the action (Sheppard et al., 1988). The relationship between intention and performance is therefore mediated by a number of factors. The model also provides only for intention to perform a single action, not the choice between multiple actions.

TRA and TPB have been shown to be useful across a wide range of fields (Sheppard et al., 1988). The theories provide theoretical levers for manipulating behaviour: if changing Behavioural Intention is required, the constructs that influence it must be change, i.e. the Attitude toward the behaviour should be changed, the individual's applicable normative beliefs should be changed or the individual's perceptions of their Behavioural Control over the action should be improved.

2.4. EXTENSIONS TO THE TRA AND TPB

Several researchers have suggested extensions to the Theory of Reasoned Action and the Theory of Planned Behaviour. In a review of 185 studies of TPB, Armitage and Conner (2001) found that 27% of the variance in behaviour and 39% of the variance in behavioural intention was successfully predicted by the TPB. There is room for improvement through the addition of variables that may increase the explanation of variation. Several variables have been suggested by many authors. In a meta-analysis of TPB research, Conner & Armitage (1998), six additional variables were reviewed: Past Behaviour/Habit, Self-Identity, Perceived Behavioural Control versus Self-Efficacy, Belief Salience, Moral Norms and Affective Beliefs.

The findings of Conner & Armitage (1998) and their relevance to this study are discussed as follows. Past Behaviour has been shown to be the strongest predictor of future behaviour; this is however not necessarily useful in DTC testing given that the products are new and consumers have not had previous opportunities to engage with the products. Past medical behaviours (such as frequency of visits to doctors) might have some influence but these medical behaviours may reflect other psychological factors that are the underlying causes of any variance in behaviour that Past Behaviour might appear to predict. Moral Norms capture the perceptions of an individual as to the correctness or incorrectness of performing a specific behaviour. This is distinguished from Subjective Norm (a construct of the TPB) which reflects the social/peer-group pressures that influence intention. Moral norms were shown to have a 3% to 6% influence on intention where moral factors were involved in the choice of behaviour. This construct been left out of the research model for reasons of parsimony. Self-Identity has a range of definitions and is used to capture the extent to which an individual sees themselves as fulfilling a particular set of criteria for a societal role (such as being a person who cares about climate change). Self-Identity predicts only 1% of behaviour variance and has been left out of the research model for reasons of parsimony. Perceived Behavioural Control (PBC) in most studies has been equated with Self Efficacy. It has been argued that Self-Efficacy is distinct from PBC. For the purposes of this study, Self Efficacy and PBC are captured in Effort Expectancy from the UTAUT; as DTC tests are sold directly to the consumer, taking the test is under complete volitional control. In TPB, beliefs are thought to influence the Attitude Toward the Behaviour, a TPB construct. Belief Salience captures the subset of beliefs that are important to a particular decision, and is thought to bring more precision to the Attitude Toward the Behaviour construct. Salient Beliefs are usually elicited through a frequency-of-elicitation method, incompatible with the methods in this research.

Affective Beliefs capture the emotional reactions to the performance or non-performance of a behaviour. One frequently studied aspect of affect is Anticipated Regret, applicable especially in situations where the consequence of a particular behaviour is potentially unpleasant or would lead to emotional discomfort. Anticipated Regret is discussed below.

2.4.1. ANTICIPATED REGRET

Regret-theory states that when people make decisions, they compare the outcome of that decision with other possible outcomes had a different decision been made (Sheeran & Orbell, 1999). As a consequence of this comparison, people either feel satisfaction if the outcome is favourable or regret if the outcome of their choice is worse than the non-chosen option. The theory also states that people take this anticipated regret into account when making decisions. The impact of Anticipated Regret (AR) on motivation has been widely studied outside of the TRA/TPB, including its effect on condom usage, junk food consumption and the drinking of alcohol (Sheeran & Orbell, 1999). The emotion of Anticipated Regret has been found to be a powerful motivator of actions.

Studies that have used Anticipated Regret have focused on risk-averse behaviours (such as condom usage and drug usage) but have not comprehensively addressed risk-seeking behaviour (such as gambling or the taking of a test that might reveal negative information). A recent study (Sandberg & Conner, 2008) performed a meta-analysis of the use of Anticipated Regret. Anticipated Regret was shown to be distinct from Attitudes (a construct of TPB) and was shown to have a direct and significant impact on behavioural intention, increasing the amount of variance explained by 7%. As genetic tests may reveal information of an unpleasant nature, the AR construct will be included in the research model.

2.5. TECHNOLOGY ACCEPTANCE MODEL

The Technology Acceptance Model (TAM), proposed by Davis (1989), is an implementation of the Theory of Planned Behaviour used to understand the factors determining intention to adopt novel technologies.

As with the TRA, the TAM postulates Behavioural Intention (use of information technology) as the major determinant of actual action (system use). The TAM utilises two constructs, Perceived Usefulness and Perceived Ease of Use as the factors which influence Attitude Toward Using, which in turn determines Behavioural Intention. Perceived Usefulness in the TAM context is defined as the individual's perception that using a system will increase the user's job performance. Perceived Ease of Use refers

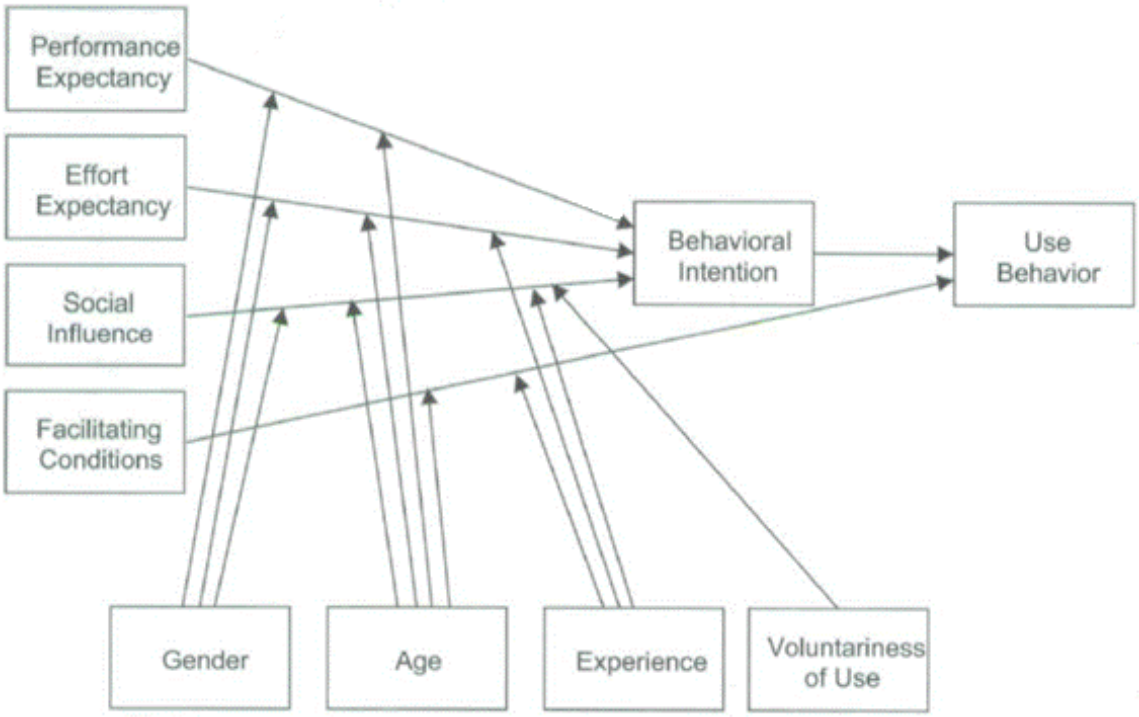
to “to the degree to which the prospective user expects the target system to be free of effort” (Davis et al., 1989, p. 985). Davis further explains that Perceived Usefulness and Perceived Ease of Use are similar to other variables linked to attitude and usage in other models. This is confirmed by Moore and Benebast (1991) who point out the conceptual closeness of Perceived Usefulness and Perceived Ease of Use to Rogers’ (Rogers, 2003) Innovation Diffusion theory – the factors of Relative Advantage and Complexity respectively. TAM also excludes TRA’s Subjective Norm component due to its “uncertain theoretical and psychometric status” (Davis et al., 1989, p. 986).

TAM was originally used to examine adoption of end user computing devices in organisations (Davis et al., 1989). Since its publication, the TAM has been used and extended by several authors to investigate the adoption of a wide range of technologies including internet banking (Lee, 2009), contactless credit cards (Wang, 2008) and radio frequency identity tags (Cazier, Jensen, & Dave, 2008). TAM was developed within the business environment where technology changes are pushed to workers by management. In consumer products, the consumer initiates the adoption (pull). Revisions of the model have included affect components to incorporate pull-related factors into the TAM (Kulviwat, Bruner, Kumar, Nasco, & Clark, 2007).

2.6. Unified Theory of Acceptance and Use of Technology

ID, TRA, TAM and five other models were investigated and combined into a unified theory of acceptance and use of technology (UTAUT) by Venkatesh et al (2003). The UTAUT model forms the basis of this research. UTAUT specifies a set of constructs, created through combining conceptually and experimentally similar constructs from the eight models, which directly affect or moderate the Behavioural Intention to use a novel technology (Figure 3) where Behavioural Intention is defined as per the TRA/TPB and TAM. Each of the constructs is explained below.

Figure 3: UTAUT Model



(Venkatesh et al., 2003)

2.6.1. Performance Expectancy

This construct is found to be the strongest predictor of intention. Defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447), the definitions from other models outside of information technology that were used to define the construct include "achieving valued outcomes that are distinct from the activity itself" (Venkatesh et al., 2003, p. 448), ID theory's Relative Advantage construct and the TAM's Perceived Usefulness.

2.6.2. Effort Expectancy

Defined in UTAUT as "the degree of ease associated with the use of the system" (Venkatesh et al., 2003, p. 450); this definition was partly derived from a broader definition of "an innovation is perceived as being difficult to use" in Moore and Benbasat (1991). It captures elements of complexity and ease of use.

2.6.3. Social Influence

Derived primarily from the Subjective Norm construct of TPB (Ajzen, 1991), this construct captures the "degree to which an individual perceives that important others

believe he or she should use the new system" (Venkatesh et al., 2003, p. 451) and includes Moore and Benbasat's (1991) definition of an innovation as perceived to enhance an individuals' image or social status.

2.6.4. Facilitating Conditions

This construct is broadly defined and contains a range of elements that define the "degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003, p. 453). It combines Perceived Behavioural Control from TPB (including self-efficacy) and Compatibility derived from IDT (the innovation is consistent with existing values and experiences). While Venkatesh et al provide statistical evidence that the range of elements in Facilitating Conditions are related, the construct as stated is broad and may lack resolution outside of the context for which UTAUT was developed. In UTAUT the presence of both Performance Expectancy and Effort Expectancy constructs renders the impact of Facilitating Conditions on Behavioural Intention insignificant. The UTAUT therefore postulates that the impact of Facilitating Conditions on Behavioural Intention is not significant but that Facilitating Conditions is a direct antecedent of usage (Venkatesh et al., 2003) in the Information Technology context.

2.6.5. Moderating Factors

Gender, Age, Experience and Voluntariness of Use were identified as moderating factors with various effects specific to the Information Technology domain e.g. the influence of Performance Expectancy on Behavioural Intention is strongest for young males (Venkatesh et al., 2003).

2.6.6. Constructs Removed from UTAUT

The constructs of Self Efficacy and Anxiety were investigated in the fomulation of the UTAUT (Venkatesh et al., 2003). These factors were found to be fully mediated by Perceived Ease of Use. Anxiety is defined from Social Cognitive Theory and is defined as "evoking anxious or emotional reactions when it comes to performing a behaviour" (Venkatesh et al., 2003, p. 432). Within the context of Information Technology this may align to Perceived Ease of Use where the use of an IT system is without significant risk but within other settings that evoke strong emotional responses this construct might directly influence Behavioural Intention. In this study, the emotional cue of Anxiety is aligned to Anticipated Regret, anticipated to be a distinct adoption factor.

2.7. CRITICISM OF TPB

The Theory of Planned Behaviour, on which UTAUT is based, has been criticised for its lack of emotional (affective) constructs – consumer behaviour is frequently not in line with purely rational expectations (Faiers et al., 2007).

TPB is a "deliberative processing model" and as such implies that "individuals make behavioral decisions based on careful consideration of available information" (Conner & Armitage, 1998, p. 1430). It assumes that "people are logical and rational in their decision making" (Sandberg & Conner, 2008, p. 590). A recent trend in consumer behaviour is the recognition of the irrationality of consumers in purchasing decisions. This class of research has been called behavioural economics and describes the instinctual, habitual and subconscious drivers of consumption decisions, primarily related to impulse-buying of and brand responses to consumer products such as cigarettes and soft drinks (Lindstrom, 2008). The purchase of a genetic test is likely to require a substantial amount of thought and deliberation; the TPB and related models are anticipated to be applicable.

2.8. CLINICAL GENETIC TESTING MOTIVATIONAL FACTORS

Extensive research has been conducted on the clinical uses and adoption of genetic tests (Balmaña et al., 2004; Cappelli et al., 2001; Hadley et al., 2003; Hallowell et al., 2005; Riedijk et al., 2005). This research is predominantly in the context of doctor-administered single-disease tests but has uncovered several common factors that either promote or inhibit patients' use of these tests.

Factors promoting adoption include perceived susceptibility to a genetic disease, perceived benefits from taking the test and motivation to engage in healthy behaviour (constructs derived from the Health Belief Model quoted in Cappelli (2001)). Factors considered to reduce adoption include doubts about the reliability of the test, perceived discomfort of testing and perceived inability to cope emotionally with the outcomes of the test.

Research published in 1997 (Jacobsen et al.) used "decisional balance" to understand the choice of women to undertake BRCA1/2 testing (testing for two well-proven breast cancer-causing genetic mutations). This approach assumes that individuals carefully consider the pros and cons of a decision to take a genetic test and will take the test only if the pros outweigh the cons. Data collection was performed using a questionnaire. Factors in the questionnaire used to assess adoption readiness were drawn from interviews the author undertook with women and genetic counsellors. The

questionnaire used a Likert scale (strongly disagree to strongly agree). Reasons for not taking the test included concerns about test accuracy and emotional response while reasons for taking the test include reassurance and taking "better care of oneself" (Jacobsen et al., 1997, p. 460). Demographic information indicated that older women and those who perceived their risk to be greater than average were most likely to undergo testing.

Innovation Diffusion Theory has also been used to understand and explain the adoption of the same BRCA1/2 genetic testing (Armstrong et al., 2003). Individuals who had undergone genetic counselling and subsequent testing for BRCA1/2 mutations were asked to complete a survey. The survey measured each individual's score on metrics associated with IDT including innovativeness, relative advantage and complexity. The study found that innovativeness of the individual and perceived compatibility with their needs rated highly; it was found that complexity and relative advantage were not important considerations for adopters. It was argued that the relative advantages of preventive innovations are difficult for individuals to perceive as the benefits are delayed in time and the expected unwanted consequences are only probabilistically predictable (Armstrong et al., 2003).

The Theory of Planned Behaviour has been applied to genetic tests for Alzheimer's disease (Frost et al., 2001). Part of the research design investigated the fact that test providers may overstate the accuracy and certainty that a genetic test can provide. The research found that subjective norm was the strongest predictor of adoption where individuals were told that a positive results on the test provided 90% certainty they would develop Alzheimer's, whereas positive belief (e.g. ability to cope with the results) was the strongest predictor where the group was told that positive results on the test provided only 50% certainty.

While several models have been proposed or modified to understand genetic testing factors, there does not appear to be a single well accepted model of adoption behaviour. The above studies frequently introduce additional factors/constructs for their specific studies and utilise different scales, making direct comparisons of the studies difficult. Typical of this is research on the adoption of genetic testing for hereditary melanoma (Riedijk et al., 2005). The study utilised a wide range of measures including the authors' own perceptions of attitude, family dynamics, an existing anxiety scale and a list of "non-participation" factors drawn from the literature. No overarching theoretical framework was used. Without a unifying framework, direct comparisons of studies and their findings is not possible.

2.9. CONCERNS ABOUT GENETIC TESTING

2.9.1. GENETIC DISCRIMINATION

Consumers are concerned that genetic testing results will be used against them by their health insurers and employers. A study of consumers (Lapham, Kozma, & Weiss, 1996) indicated that they are concerned that health insurers may choose not to insure them or increase the premiums for people who have specific genetic markers. These consumers also believed that genetic information will lead to impacts on their jobs, including possible dismissal. While actual instances of genetic information being used in this way are scarce, the study found that nine percent of subjects refused to be tested for genetic conditions based on their fear of discrimination. Being able to take the test at home may reduce the fear of discrimination and increase adoption as there will be no official records of the outcomes - consumers will have increased privacy of their information.

A large-scale 2008 study in Australia (Taylor, Treloar, Barlow-Stewart, Stranger, & Otlowski, 2008) found that ten percent of subjects that had tested positively for a genetic condition but were asymptomatic had experienced discrimination. The self-reported discrimination experienced by this subset of the subjects was primarily by life insurers (42%) and employers (5%) but also included discrimination by the subjects' family members (22%) and general social discrimination (11%). It is therefore believed that fear of discrimination will impact the propensity to take genetic tests.

Legislation may impact the perceptions of the risk of discrimination. In the United States, the Genetic Information Non-Discrimination Act (GINA), passed in 2008, prevents health insurers from raising premiums or denying access to benefits based on genetic information (Hyun-Myung Tan, 2009). GINA also provides protection against workplace discrimination, preventing employers from using genetic information in hiring, promotion, job assignment or firing decisions. The law also prevents employers from requesting genetic testing or genetic information from their employees, either as a condition of employment or for health insurance reasons.

2.9.2. ANTICIPATED REGRET

The phenomenon of Anticipated Regret has been shown to impact the intention to take a clinical genetic test for Alzheimer's disease (Frost et al., 2001). The study investigated several factors that potentially impact the intention to take the test. Variables from the Theory of Planned Behaviour were investigated, as were additional

factors including Anticipated Regret. Taken collectively, the tested variables predicted greater than 50% of variance in intention. While Anticipated Regret was found to be a significant predictor, it accounted for only a small percentage of the variance.

2.10. Consumer Genetic Tests

Clinical genetic tests for specific health-related mutations have been available since at least the 1980s (Lerman et al., 2002). These tests are generally prescribed by physicians, administered in a clinical environment and interpreted through a physician. Tests usually include a component of genetic counselling to explain the impact of these tests (Hadley et al., 2003).

Clinical genetic tests frequently require drawing blood samples (which requires specialised training and equipment). This barrier to consumer adoption has lowered substantially due to improvements in testing techniques. Conducting current DTC tests is often as simple as spitting into a test tube or swabbing a cheek, then posting the sample to the service provider (*Using your personal DNA test,* 2010). DTC testing differs from existing clinical tests as DTC test providers offer a wide range of products that are not only diagnostic for individual disease (as has been the case in clinical testing) but also informative and fun, including tests for ancestry determination. DTC testing has received much attention in the popular press; writers have listed motivations for adoption that include a personal quest for self-understanding (Pinker, 2009).

Purported benefits of DTC tests include taking a proactive role on personal health and as a supplement to information held by doctors (Genetic Alliance, 2010). Risks involved in DTC tests include possible loss of privacy and the possible misunderstanding or overestimation of disease risk leading to improper responses by individuals (Hall & Gartner, 2009).

Recent research into the attitudes of social network users toward consumer genetic testing (McGuire et al., 2009) highlighted a lack of research into the attitudes of testing adopters. The scales used in the research were not based on a specific behavioural model, acting instead as a broad survey on attitudes. Further, more rigorous study is needed to provide a conceptual framework in which behaviours towards consumer genetic testing can be investigated.

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JOURNAL SUBMISSION

FACTORS AFFECTING INTENT TO USE CONSUMER GENETIC TESTS: A REVISED TECHNOLOGY ACCEPTANCE MODEL

Richard D Johnson

Gordon Institute of Business Science, University of Pretoria

Nicola Kleyn

Gordon Institute of Business Science, University of Pretoria

Abstract: Genetic testing offers disease diagnosis and other information based on genetic material provided by an individual. Direct to consumer genetic tests bypass clinician-administered tests in favour of direct sales and usage by consumers. The relative newness of consumer genetic testing to the South African market provides an opportunity for understanding the factors that would drive adoption of these products. An established technology acceptance model was enriched with factors important to clinical genetic testing and individual innovativeness. The model was tested through an online questionnaire with a nonprobability sample of 109 individuals. Factors including performance expectancy, social influence and discrimination concerns, were found to exhibit significant influence on consumers' behavioural intention to use consumer genetic tests. These findings provide a theoretical framework of individuals' attributes of importance for marketing and sales of consumer genetic tests.

JEL D11, M31

Corresponding Author Contact Details: Nicola Kleyn | klenynn@gibs.co.za | 083 326 3227

Justification for Submission: SAJEMS' stated aim is the publication of manuscripts related to "economic and management science research of an interdisciplinary nature". This research falls within the ambit of SAJEMS as it combines several disciplines (marketing, genetics and health, technology) to produce management insights on the factors of importance in consumer behaviour related to a novel class of products (consumer genetic tests) and the marketing messages that are of relevance to potential early adopters in South Africa.

Word Count (excluding tables): 6896

1
Introduction

Direct to consumer genetic testing describes a range of genetic tests that have been available online directly to the public in the USA since at least 2002 (Gollust, Wilfond, & Hull, 2003: 332). The available tests cover a wide range of services including parentage testing, ancestry delineation, prediction of phenotypical traits and probabilistic prediction of clinical disorders (Hall & Gartner, 2009: 54). Historically, clinical genetic testing required the involvement of physicians in prescribing and interpreting tests for patients. Direct to consumer (DTC) testing can bypass the healthcare system as healthcare providers are not necessarily involved in ordering or interpreting the results from the test. These tests have therefore become a consumer product (Roche & Annas, 2006: 545). Some researchers have suggested that DTC companies will in the future be preferred to clinicians as the primary providers of genetic information (Foster & Sharp, 2008: 419).

Consumer genetic tests are a novel product in the South African market. Understanding adoption factors can assist businesses in tailoring products, services and marketing techniques to increase adoption of novel products (Frenzel & Grupp, 2009: 39). Several theoretical frameworks have been developed to understand the factors determining adoption of novel products and technologies, including Rogers' Innovation Diffusion Theory (Rogers, 2003: location 689) and the Unified Theory of the Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003: 425); however no specific model for DTC genetic testing products has been published.

This research seeks to identify, enrich and test an applicable model that could be used to guide future decision making on DTC product marketing. Companies wishing to offer genetic tests or companies that currently offer related diagnostics require an understanding of the factors driving adoption in order to understand consumer behaviour and respond with the appropriate marketing messages.

2
Literature Background

2.1. Innovation Diffusion

Developed initially in the agricultural sector, the Innovation Diffusion (ID) thery has been used extensively across industries and disciplines to describe and understand the spread of various innovations within populations (Meade & Islam, 2006: 519). Rogers defines an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003: location 667). Objective newness is not necessary, only the perceived newness for the unit of adoption, which determines their reaction to it. DTC genetic testing is not prevalent in South Africa and its adoption is likely to follow the same patterns of Innovation Diffusion.

Rogers' ID theory describes five attributes of an innovation that together explain the adoption rate of the innovation; these are relative advantage, complexity, trialability, observability and compatibility (Rogers, 2003: location 969). Relative advantage, complexity and compatibility define the benefits and disadvantages of an innovation, while increasing observability and trialability decrease the risks to adoption.

Diffusion is primarily a social process as it takes place through communication among members of a social system, over time, through certain channels (Rogers, 2003: location 784). As such it relies on the attributes of individuals to drive innovation. Rogers divided adopters into categories, where each category shares a number of traits. The categories and their traits are the following: innovators (willing to take risks, high social class, well educated, young), early adopters (high degree of opinion leadership in the

population, young, well educated and socially forward), early majority (above average social status, contact with early adopters), late majority (sceptical about the innovation, below average social status, fewer financial skills) and laggards (lowest social status, lowest financial fluidity, limited social circles) (Rogers, 2003: location 1108).

2.2. Theories of Reasoned Action and Planned Behaviour

The Theory of Reasoned Action is a frequently-used model for predicting behaviour. As quoted in Chang (1998: 1825) TRA posits that behavioural intention is the most accurate predictor of actual behaviour. behavioural intention, the theory's major dependent variable, captures "the motivational factors that influence a behaviour" and "are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behaviour" (Ajzen, 1991: 181). There is an express link between the strength of the intention and the likelihood of the behaviour being performed. Behavioural intention is a function of attitude toward the behaviour and subjective norm, where attitude captures feelings of favourableness or unfavourableness for the action and subjective norm describes the individual's perceptions that people important to the individual think that the individual should/should not perform the action (Chang, 1998: 1825).

The Theory of Reasoned Action is valid only if the behaviour is under volitional control. TRA was elaborated on and developed into the Theory of Planned Behaviour (TPB) (Ajzen, 1991: 181) through the addition of a measure of perceived behavioural control, which allows for situations in which the performance of the action is not entirely voluntary (Armitage & Conner, 2001: 472).

TRA and TPB are only useful in predicting the intention of an individual to perform the action, not the performance of the action itself as ability to perform the action may be constrained by external circumstances such as a lack of money or unwillingness of others to participate in the action (Sheppard, Hartwick, & Warshaw, 1988: 325). The relationship between intention and performance is therefore mediated by a number of factors. The model also provides only for intention to perform a single action, not the choice between multiple actions.

TRA and TPB have been shown to be useful across a wide range of fields (Sheppard, Hartwick, & Warshaw, 1988: 325). The theories provide theoretical levers for manipulating behaviour: if changing Behavioural Intention is required, the constructs that influence it must be changed, i.e. the attitude toward the behaviour should be changed, the individual's applicable normative beliefs should be changed or the individual's perceptions of their behavioural control over the action should be modified.

Several researchers have suggested extensions to the Theory of Reasoned Action and the Theory of Planned Behaviour. In a review of 185 studies of TPB, Armitage and Conner (2001: 471) found that an average of 27% of the variance in behaviour and 39% of the variance in behavioural intention was successfully predicted by the TPB. There is room for improvement through the addition of variables that may increase the explanation of variation (Conner & Armitage, 1998: 1429). One such variable is anticipated regret (AR). Regret-theory states that when people make decisions, they compare the outcome of that decision with other possible outcomes had a different decision been made (Sheeran & Orbell, 1999: 2107). As a consequence of this comparison, people either feel satisfaction if the outcome is favourable or regret if the outcome of their choice is worse than the non-chosen option. The theory also states that people take this anticipated regret into account when making decisions. The impact of anticipated regret on motivation has been widely studied outside of the TRA/TPB, including its effect on condom usage, junk food consumption and the drinking of alcohol (Sheeran & Orbell, 1999: 2107). Anticipated regret has also been studied as an extension of TPB as an affective addition to the model (Sandberg & Conner, 2008: 589) and has been found to be a significant addition to the prediction of intention.

2.3. Technology Acceptance

2.3.1. Technology Acceptance Model

The TPB has been implemented and extended, incorporating elements of Innovation Diffusion theory, to understand the factors determining intention to adopt novel technologies as the Technology Acceptance Model (TAM) (Davis, 1989: 319).

As with the TRA, the TAM postulates behavioural intention (intent to use information technology) as the major determinant of actual action (system use). The TAM utilises two constructs, perceived usefulness and perceived ease of use as the factors which influence attitude towards using, which in turn determines behavioural intention. Perceived usefulness in the TAM context is defined as the individual's perception that using a system will increase the user's job performance (Davis, 1989: 320). Perceived ease of use refers to "to the degree to which the prospective user expects the target system to be free of effort" (Davis, Bagozzi, & Warshaw, 1989: 985).

Davis further explains that perceived usefulness and perceived ease of use are similar to other variables linked to attitude and usage in other models. This is confirmed by Moore and Benebast (1991: 192) who point out the conceptual closeness of perceived usefulness and perceived ease of use to Rogers' (Rogers, 2003: location 689) Innovation Diffusion theory – the factors of relative advantage and complexity respectively. TAM also excludes TRA's subjective norm component due to its "uncertain theoretical and psychometric status" (Davis, Bagozzi, & Warshaw, 1989: 986).

TAM was originally used to examine adoption of end user computing devices in organisations (Davis, Bagozzi, & Warshaw, 1989: 982). Since its publication, the TAM has been used and extended by several authors to investigate the adoption of a wide range of consumer technologies including internet banking (Lee, 2009: 130), contactless credit cards (Wang, 2008: 687) and radio frequency identity tags (Cazier, Jensen, & Dave, 2008: 235).

2.3.2. Unified Theory of the Acceptance and Use of Technology

ID, TRA, TAM and five other models were investigated and combined into a unified theory of acceptance and use of technology (UTAUT) by Venkatesh et al (2003: 425). UTAUT specifies a set of constructs, created through combining conceptually and experimentally similar constructs from the eight models, which directly affect or moderate the behavioural intention to use a novel technology where behavioural intention is defined as per the TRA/TPB and TAM.

The UTAUT construct performance expectancy is found to be the strongest predictor of intention. Defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh, Morris, Davis, & Davis, 2003: 447), the definitions from other models outside of information technology that were used to define the construct include "achieving valued outcomes that are distinct from the activity itself" (Venkatesh, Morris, Davis, & Davis, 2003: 449), ID theory's relative advantage construct and the TAM's perceived usefulness.

"Effort expectancy" is defined in UTAUT as "the degree of ease associated with the use of the system" (Venkatesh, Morris, Davis, & Davis, 2003: 450); this definition was partly derived from a broader definition of "an innovation is perceived as being difficult to use" in Moore and Benbasat (1991: 192). It captures elements of complexity and ease of use.

"Social influence" is derived primarily from the subjective norm construct of TPB (Ajzen, 1991: 179); this construct captures the "degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh, Morris, Davis, & Davis, 2003: 451, p. 451) and includes

Moore and Benbasat's (1991: 192) definition of an innovation as perceived to enhance an individuals' image or social status.

"Facilitating conditions" is broadly defined and contains a range of elements that define the "degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh, Morris, Davis, & Davis, 2003: 453). It combines perceived behavioural control from TPB (including self-efficacy) and compatibility derived from ID theory (the innovation is consistent with existing values and experiences). In UTAUT the presence of both performance expectancy and effort expectancy constructs renders the impact of facilitating conditions on behavioural intention insignificant. The UTAUT therefore postulates that the impact of facilitating conditions on behavioural intention is not significant but that facilitating conditions is a direct antecedent of usage (Venkatesh, Morris, Davis, & Davis, 2003: 454) in the information technology context.

Gender, age, experience and voluntariness of use were identified as moderating factors with various effects specific to the information technology domain e.g. the influence of performance expectancy on behavioural intention is strongest for young males (Venkatesh, Morris, Davis, & Davis, 2003: 450).

2.4. Clinical Genetic Testing

Clinical genetic tests for specific health-related mutations have been available since at least the 1980s (Lerman, Tercyak, Croyle, & Hamann, 2002: 784). These tests are generally prescribed by physicians, administered in a clinical environment and interpreted through a physician. Tests usually include a component of genetic counselling to explain the impact of these tests (Hadley, Jenkins, Dimond, Nakahara, Grogan, Liewehr, Steinberg, & Kirsch, 2003: 573).

Research investigating genetic testing has used TPB (Frost, Myers, & Newman, 2001: 101) and ID theory (Armstrong, Weiner, Weber, & Asch, 2003: 92) to explain the uptake of clinical genetic testing. This and other research (Lerman, Tercyak, Croyle, & Hamann, 2002: 784; Hadley, Jenkins, Dimond, Nakahara, Grogan, Liewehr, Steinberg, & Kirsch, 2003: 573; Balmaña, Stoffel, Emmons, Garber, & Syngal, 2004: e44; Jacobsen, Valdimarsdottier, Brown, & Offit, 1997: 459; Cappelli, Surh, Walker, Korneluk, Humphreys, Verma, Hunter, Allanson, & Logan, 2001: 321; Hallowell, Ardern-Jones, Eeles, Foster, Lucassen, Moynihan, & Watson, 2005: 492; Riedijk, de Snoo, van Dijk, Bergman, van Haeringen, Silberg, van Elderen, T. M. T., & Tibben, 2005: 738) introduced several additional usage considerations specific to genetic testing. This research is predominantly in the context of doctor-administered single-disease tests but has uncovered several common factors that either promote or inhibit patients' use of genetic tests.

Common factors affecting use of clinical genetic tests include concerns on the usefulness of the information, the privacy of that information and potential psychological impacts of discovering unwelcome information (Frost, Myers, & Newman, 2001: 101). Factors promoting use include perceived susceptibility to a genetic disease (perceived risk), perceived benefits from taking the test and motivation to engage in healthy behaviour (constructs derived from the Health Belief Model quoted in Cappelli (2001: 321)). Factors considered to reduce adoption include doubts about the reliability of the test, perceived discomfort of testing and perceived inability to cope emotionally with the outcomes of the test.

Innovation Diffusion theory has been used to understand and explain the adoption of BRCA1/2 genetic testing (testing for two well-proven breast cancer-causing genetic mutations) (Armstrong, Weiner, Weber, & Asch, 2003: 92). Individuals who had undergone genetic counselling and subsequent testing for BRCA1/2 mutations were asked to complete a survey. The survey measured each individual's score on metrics associated with innovation diffusion including innovativeness, relative advantage and complexity. The study found that innovativeness of the individual and perceived compatibility with their needs rated

highly; it was found that complexity and relative advantage were not important considerations for adopters. Research published in 1997 (Jacobsen, Valdimarsdottier, Brown, & Offit, 459) investigating reasons for not taking the BRCA1/2 test included concerns about test accuracy and emotional response while reasons for taking the test include reassurance and taking "better care of oneself" (Jacobsen, Valdimarsdottier, Brown, & Offit, 1997: 460, p. 460). Demographic information indicated that older women and those who perceived their risk to be greater than average were most likely to undergo testing.

The phenomenon of anticipated regret has been shown to impact the intention to take a clinical genetic test for Alzheimer's disease (Frost, Myers, & Newman, 2001: 107). The study investigated several factors that potentially impact the intention to take the test. Variables from the Theory of Planned Behaviour were investigated, as were additional factors including anticipated regret. Taken collectively, the tested variables predicted greater than 50% of variance in intention. While anticipated regret was found to be a significant predictor, it accounted for only a small percentage of the variance.

Consumers are concerned that clinical genetic testing results will be used against them. A study of consumers (Lapham, Kozma, & Weiss, 1996: 621) indicated that they are concerned that health insurers may choose not to insure them or increase premiums for people who have specific genetic markers. These consumers also believed that genetic information will lead to impacts on their jobs, including possible dismissal. While actual instances of genetic information being used in this way are scarce, the study found that discrimination concerns led nine percent of subjects to refuse testing for genetic conditions.

2.5. Consumer Genetic Testing

Clinical genetic tests frequently require drawing blood samples which requires specialised training and equipment. This barrier to consumer adoption has lowered substantially due to improvements in testing techniques. Conducting current DTC tests is often as simple as swabbing a cheek and posting the sample to the service provider (Gollust, Wilfond, & Hull, 2003: 333). DTC testing differs from existing clinical tests as DTC test providers offer a wide range of products that are not only diagnostic for individual disease (as has been the case in clinical testing) but also informative and fun, including tests for ancestry determination. DTC testing has received much attention in the popular press; writers have listed various motivations for use that include a personal quest for self-understanding (Pinker, 2009: MM24).

Purported benefits of DTC tests include taking a proactive role on personal health and as a supplement to information held by doctors (Genetic Alliance, 2010: 1). Risks involved in DTC tests include possible loss of privacy and the possible misunderstanding or overestimation of disease risk leading to improper responses by individuals (Hall & Gartner, 2009: 54).

3 Problem statement and objectives

Further, more rigorous study is needed to provide a conceptual framework in which attitudes towards using consumer genetic testing can be investigated. As genetic testing moves out of the realm of clinical prescription and is presented directly to consumers, it is hypothesised that factors responsible for the uptake of other novel consumer-facing technologies (such as information technology) will be applicable in addition to factors identified as important in the adoption of clinical genetic testing.

This research seeks to investigate the attitude of consumers toward the use of consumer genetic tests based on the influence of several theory-based factors and to construct a parsimonious model that explains adoption drivers for DTC genetic tests within the South African context. By understanding the factors driving adoption and the relative importance of each factor, marketers can adjust the messages and approaches used in marketing DTC genetic tests.

4
Method

4.1. Research Model

The UTAUT (Venkatesh, Morris, Davis, & Davis, 2003: 447) was utilised as the basis for the research model, to which factors that have the potential to impact consumer genetic testing adoption were added based on the reviewed clinical genetic testing literature. The list of constructs investigated is provided in Table 1 and the hypothesised influence of each construct on behavioural intention to use is depicted in Table 1.

UTAUT provides a useful framework through which to investigate usage decision factors. While conceptually similar across contexts (e.g. effort expectancy), each construct cannot be operationalised in the same way for DTC genetic testing as for information technology. Operationalising each construct requires a re- restatement of its definition and minor modification to the scale items through extraction of common themes from the genetic testing literature (Frost, Myers, & Newman, 2001: 101; Jacobsen, Valdimarsdottier, Brown, & Offit, 1997: 459; Cappelli, Surh, Walker, Korneluk, Humphreys, Verma, Hunter, Allanson, & Logan, 2001: 321; Riedijk, de Snoo, van Dijk, Bergman, van Haeringen, Silberg, van Elderen, T. M. T., & Tibben, 2005: 738; Bish, Sutton, & Golombok, 2000: 35), making them relevant to the consumer genetic testing context while preserving the conceptual integrity of the construct. Individual innovativeness is an important adoption factor in Innovation Diffusion theory; specific scale items were therefore included to directly measure the impact of innovativeness of the individual on usage intention. Eight constructs were identified from the literature as relevant to DTC genetic testing (Table 1). The principles of the C-OAR-SE method for scale development in marketing (Rossiter, 2002: 305) were utilised to refine the constructs and scale items based on the scale items provided in the literature. C-OAR-SE favours the creation of constructs based on conceptual validity instead of data-driven factor analysis. The construct of facilitating conditions in the UTAUT was removed from the research model as it was too broadly defined and was previously found not to be significant in predicting intention (Venkatesh, Morris, Davis, & Davis, 2003: 468).

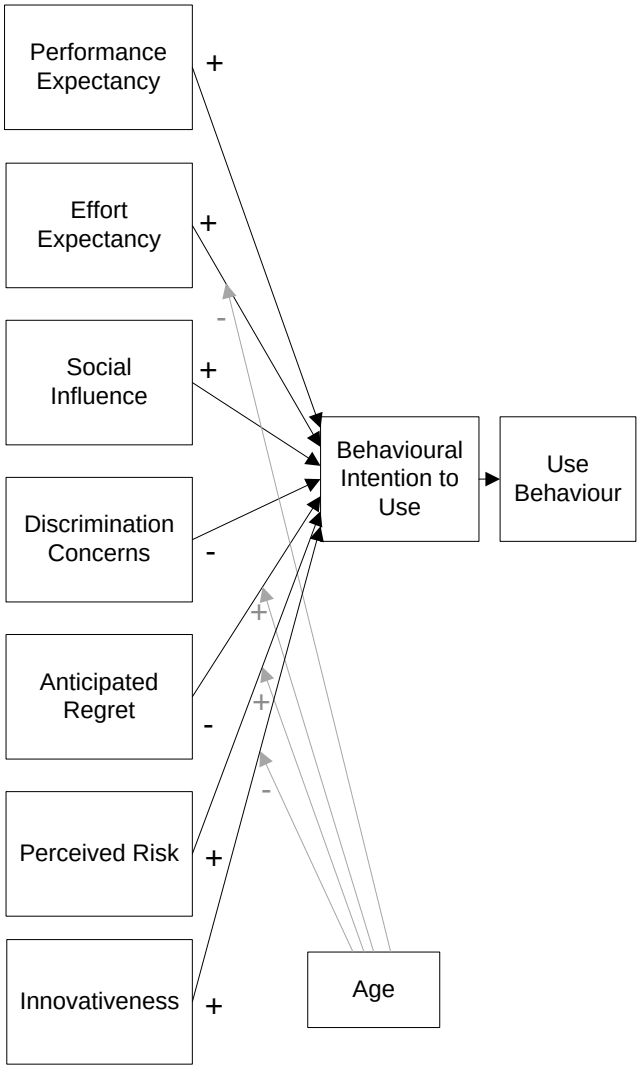
A moderator is a variable that "alters the direction or strength of the relation between a predictor and an outcome" (Frazier, Tix, & Barron, 2004: 116). As in the UTAUT, age is predicted to moderate the effects of several constructs on BITU; it is anticipated that age will moderate the effects of effort expectancy, anticipated regret, perceived risk and innovativeness. The anticipated directionality of the impact of the moderator is provided in Figure 1.

Table 1 Research model constructs

Construct	DTC Testing Construct Definition and Source of the Construct in its Original Form	Hypothesised Impact on BITU
Behavioural intention to use (BITU)	Consumer's planned intent to use consumer genetic tests (Venkatesh, Morris, Davis, & Davis, 2003: 460).	
Performance expectancy (PE)	The degree to which a consumer believes that using DTC tests will provide useful information (Venkatesh, Morris, Davis, & Davis, 2003: 425).	+
Effort expectancy (EE)	The degree of ease associated with the use of DTC tests (Venkatesh, Morris, Davis, & Davis, 2003: 425).	+
Social influence (SI)	Consumer's perception of the degree to which people in the consumer's social network whom they believe are important would	+

Construct	DTC Testing Construct Definition and Source of the Construct in its Original Form	Hypothesised Impact on BITU
	endorse the use of DTC tests (Venkatesh, Morris, Davis, & Davis, 2003: 451).	
Discrimination concerns (DC)	Belief that information derived from DTC tests will be used to negatively discriminate against an individual (Taylor, Treloar, Barlow-Stewart, Stranger, & Otlowski, 2008: 20).	-
Anticipated regret (AR)	Consumer's fear that testing would reveal negative information that the consumer would prefer not to know (Sheeran & Orbell, 1999: 2107; Frost, Myers, & Newman, 2001: 103).	-
Perceived risk (PR)	A consumer's belief that they are at an elevated risk of developing a genetic disease (Frost, Myers, & Newman, 2001: 101; Cappelli, Surh, Walker, Korneluk, Humphreys, Verma, Hunter, Allanson, & Logan, 2001: 321).	+
Innovativeness (IN)	A consumer's openness to new experiences and novel stimuli, including the ability to recognize the potential application of new ideas and products (Bearden, Netemeyer, 1999: 552).	+

Figure 1 Proposed Research Model



4.2. Sample

Non-probability sampling was used with a reliance on available subjects. Similar to the approach of McGuire et al (2009: 3) a link to a questionnaire was distributed on the social network Facebook (www.facebook.com), with a request for respondents to distribute the survey link to others in their social circles in a pseudo snowball sampling method (Zikmund, 2003: 384). An additional request for response was then distributed electronically to 161 MBA students. The universe included all individuals with access to Facebook or email. The sample set to be used in analysis was limited to South African consumers to allow for the resultant data to be used specifically in the context of South Africa; this was achieved through post-response filtering based on a demographic question relating to the respondent's country of residence.

4.3. Measuring Instrument

The study used a self-administered, online questionnaire; a five point summated rating attitudinal scale (Likert) (Zikmund, 2003: 312) was utilised with responses on a continuum of strongly disagree, disagree, neutral, agree and strongly agree. Scale items were derived from several sources and modified to suit the genetic testing context as previously discussed.

An initial questionnaire was piloted to a small sample (N=17). Cronbach's Alpha scores were computed to assess the reliability of the scale items proposed. Refinements were made to the questionnaire, including the removal of several scale items that were found to be superfluous.

4.4. Data Analysis

Frequency analysis of the responses, cross-tabulated by demographic factors and the response to the dependent variable of behavioural intention to use (BITU), was performed. Exploratory R-type factor analysis (Hair, Anderson, Tatham, & Black, 1998: 95) was applied to the data set using orthogonal VARIMAX rotation to elicit a subset of factors from the survey variables. These were compared to the initial set of constructs proposed. The internal reliability of the factors was then assessed using calculations of Cronbach's Alpha (Hair, Anderson, Tatham, & Black, 1998: 118). Following an initial investigation of the correlation of the factors, stepwise linear multiple regression analysis using a forward-selection approach (Hair, Anderson, Tatham, & Black, 1998: 141) was conducted to determine the optimal model for explaining the variance of BITU due to the factors obtained in the factor analysis. SAS version 9.2 was used to conduct all analyses. Regression analysis was performed in preference to Structural Equation Modelling as several factors had less than the three variables recommended for SEM (Hair, Anderson, Tatham, & Black, 1998: 598).

5
Results

One hundred and ten (110) usable responses were identified from the 127 received – 11 were incomplete and 6 were not from South Africa. Initial analysis indicated that the data was not normally distributed (Kurtosis value of 3.021) (Hair, Anderson, Tatham, & Black, 1998: 73) One outlier response was identified through the use of studentised residuals (Hair, Anderson, Tatham, & Black, 1998: 223) as having a residual value of -4.458. Exclusion of the outlier from the data set (leaving N=109 observations) had a dramatic effect on the normality of the data, reducing Kurtosis to 0.425 and Skewness to 0.157. These measures and other descriptive statistics support the assumptions for multiple regression analysis (Hair, Anderson, Tatham, & Black, 1998: 172).

5.1. Respondent Demographics and Behavioural Intention to Use

Respondents were 58% male with a modal age range of 25-34; 30% of respondents were over the age of 34. The majority where white (65%), with 17% Black and 11% Indian. 50% hold or are completing masters-level degrees and 30% hold or are completing bachelor's degrees. Of all respondents, 83% reported earning salaries above R20,000 per month.

The responses were divided into three groups by average behavioural intention to use (BITU) response; 1-2.25 was taken to indicate a mostly negative attitude toward using the tests (i.e. would not use the test), 2.5-3.5 was taken to indicate an overall neutral attitude toward taking the tests while values between 3.75 and 5 were taken to indicate a positive intention to use consumer genetic tests. 21.1% of respondents were negative, 46.8% of respondents were neutral and 32.1% of respondents were positive (Figure 2). Demographics are provided in

Table 2, with cross-tabulation by BITU category.

Figure 2 Frequency distribution of Behavioural Intention to Use responses

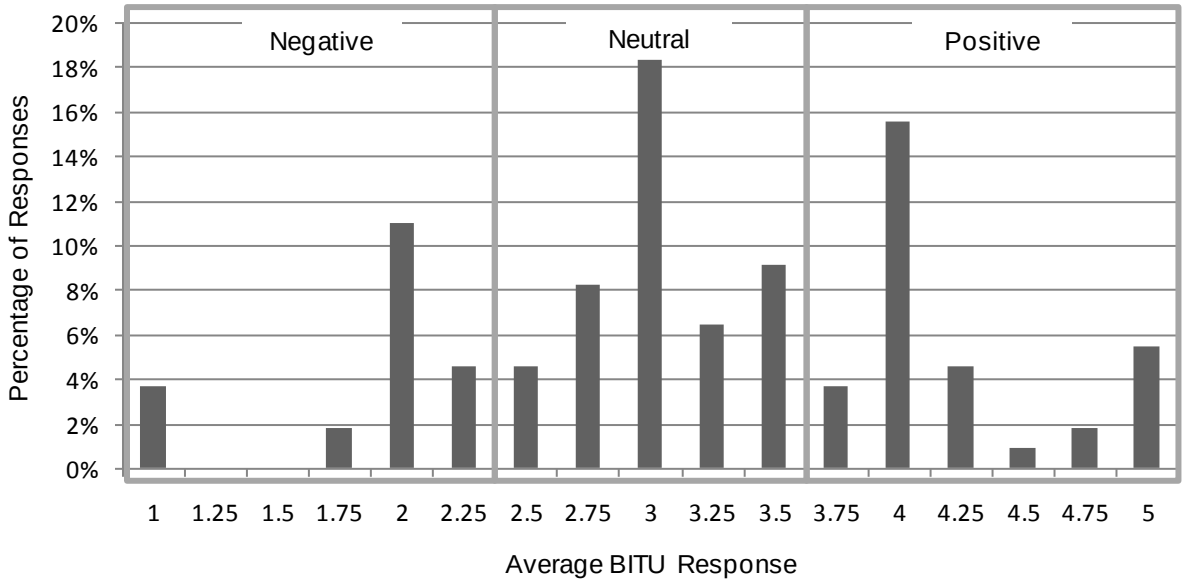


Table 2 BITU by demographic factors

		Negative n=23 n (%)	Neutral n=51 n (%)	Positive n=35 n (%)	Total N=109 n (%)
Gender					
	male	13 (12)	24 (22)	25 (24)	63 (58)
	female	10 (9)	27 (25)	9 (8)	46 (42)
Age					
	18-24	0 (0)	1 (1)	2 (2)	3 (3)
	25-34	15 (14)	33 (30)	26 (24)	74 (68)
	35-49	7 (7)	14 (13)	7 (6)	28 (26)
	> 50	1 (1)	3 (3)	0 (0)	4 (4)
Race					
	Black	3 (3)	10 (9)	5 (5)	18 (17)

	Negative n=23 n (%)	Neutral n=51 n (%)	Positive n=35 n (%)	Total N=109 n (%)
Coloured	3 (3)	2 (2)	0 (0)	5 (5)
Indian	2 (2)	4 (4)	6 (6)	12 (11)
White	14 (13)	34 (31)	23 (21)	71 (65)
Asian	1 (1)	0 (0)	1 (1)	2 (2)
Other	0 (0)	1 (1)	0 (0)	1 (1)
Income Group				
0 - R5,000	0 (0)	1 (1)	1 (1)	2 (2)
R5,001 - R8,000	0 (0)	2 (2)	0 (0)	2 (2)
R8,001 - R10,999	0 (0)	1 (1)	1 (1)	2 (2)
R11,000 - R19,999	3 (3)	8 (7)	1 (1)	12 (11)
> R20,000	20 (18)	39 (36)	32 (29)	91 (83)
Education Level				
Matric	0 (0)	1 (1)	0 (0)	1 (1)
Technikon Dip/Degree	2 (2)	8 (7)	5 (5)	15 (14)
Bachelors Degree	7 (6)	15 (14)	11 (10)	33 (30)
Masters	12 (11)	25 (23)	17 (16)	54 (50)
Doctorate	2 (2)	2 (2)	2 (2)	6 (6)

5.2. Factor Analysis

The Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) (Kaiser, 1970: 401) was determined for the scale items. All variables had values of 0.57 or greater other than the scale item "Finding out unpleasant information from the test would upset me" (0.43). The overall MSA value was 0.73; the use of factor analysis is therefore supported by the data. The variable with a low MSA proved to load significantly onto Factor 7 in the factor analysis and it was therefore not deleted from the analysis.

Although constructs were suggested from the literature, exploratory factor analysis (Hair, Anderson, Tatham, & Black, 1998: 95) was utilised in preference to confirmatory factor analysis to understand the structure of the data for comparison with the suggested constructs. An orthogonal rotation was undertaken using the VARIMAX method and latent root criterion. The model converged in 11 iterations with a total communality estimate of 15.95. The 23 retained variables (excluding those items measuring the dependent variable BITU) were determined to form eight factors. Seven of the factors were the constructs proposed as part of the research model. The data indicates an 8th factor, based entirely on a single scale item originally part of Innovativeness – "I try new products without worrying about what my friends and neighbours think of the product". This item loaded onto innovativeness (0.457) as well as the 8th factor (0.648). As this item did not load onto the expected construct and is not supported by theory as a standalone factor, this factor was dropped from further analysis. The scale item "People who are important to me believe that genetic testing is a good idea" (proposed as part of the social influence construct) loaded onto three different factors. The loading on each of the three factors was statistically significant (0.369 and above). For a sample of at least 100 subjects, factor loadings of 0.3 or above are regarded as significant (Kline, 1994: 52). The variable was retained as part of social influence given support for this variable from genetic testing theory (Frost, Myers, & Newman, 2001: 105). All other scale items loaded to their proposed construct (Table 3) with minimal cross-factor loading. The cumulative variation explained by the 7 retained factors is 64.99%.

Table 3 Factor categorisation for scale items

Factor Items		Factor Loading
Factor 1: Performance expectancy		
v12	Information on my genes would help me to take better control of my life.	0.612
v13	Taking a genetic test would help me to understand myself.	0.743
v14	I believe the tests will reveal useful information.	0.663
v15	I believe the tests will be accurate.	0.658
v16	I believe genetic tests are more accurate than other diagnostic techniques.	0.608
Factor 2: Effort expectancy		
v17	Learning enough to understand my results would be easy for me.	0.600
v18	I would easily be able to administer the tests myself.	0.747
v19	I would be able to understand the outcomes of the test myself.	0.815
Factor 3: Social influence		
v20	People who have taken a genetic test have more prestige.	0.796
v21	People who are important to me think that I should take genetic tests.	0.599
v22	Someone in my social circle who is not related to me and that I respect has taken a genetic test.	0.479
v23	People who are important to me believe that genetic testing is a good idea.	0.369
Factor 4: Discrimination concerns		
v26	I fear that if other people found out about my genetic information they would discriminate against me.	0.761
v27	I am concerned that my insurer, medical aid or employer will use my genetic information to discriminate against me.	0.836
v28	I am worried that my genetic information will be used against me.	0.881
Factor 5: Anticipated regret		
v24	If the test revealed something bad I would regret taking it.	0.670
v25	Finding out unpleasant information from the test would upset me.	0.869
Factor 6: Perceived risk		
v10	As a result of my genes, I believe I am more likely than my peers to experience bad health.	0.820
v11	Compared to the average person, I think I am at a higher risk of genetic disease.	0.899
Factor 7: Innovativeness		
v29	I know more than others on the latest new products.	0.834
v30	I like to try new and different things.	0.759
v31	I tend to try out new technologies before any of my peers.	0.738

5.3. Construct validity

Low cross-factor loading observed in the factor analysis indicates high discriminant validity. To measure construct reliability, standardised Cronbach's alpha coefficient scores were calculated as summarised in Table 4. All values are above 0.63; Cronbach's alpha values of 0.6 and above are considered significant in exploratory research (Hair, Anderson, Tatham, & Black, 1998: 118). Perceived risk and anticipated regret were measured using two scale items each, below the minimum number required for Cronbach's

alpha analysis. The Pearson correlation coefficient for the perceived risk items was 0.65 ($p<0.0001$) and for anticipated regret measured 0.33 ($p=0.0004$) indicating statistically significant linear association.

Table 4 Factors with variances explained and Cronbach's alphas/Pearson's correlation coefficients

Factor	Factor Abbreviation	Percentage of Variance	Cronbach's Alpha/ *Corr. Coefficient*
Behavioural intention to use	BITU		0.938
Performance expectancy	PE	2.920	0.748
Effort expectancy	EE	2.047	0.739
Social influence	SI	1.730	0.637
Discrimination concerns	DC	2.454	0.817
Anticipated regret	AR	1.414	*0.647 (p<.0001)*
Perceived risk	PR	1.788	*0.334 (p=0.0004)*
Innovativeness	IN	2.411	0.760

5.4. Regression Analysis

A regression analysis (Pearson's correlation coefficient) was performed for all independent constructs/factors and the dependent variable (Table 5). Significant correlation exists between the dependent variable (BITU) and performance expectancy, effort expectancy, social influence, perceived risk and innovativeness at $p<0.001$. Discrimination concerns and anticipated regret are not significantly correlated with BITU. The sign of the correlation relationship between BITU and each variable was compared to the anticipated influence on BITU given by the research model. All statistically significant correlations have coefficients with signs as anticipated in the research model.

Correlation exists between performance expectancy and the following independent variables: effort expectancy, social influence, perceived risk and innovativeness. Social influence is also correlated with effort expectancy, perceived risk with social influence and innovativeness with social influence. The coefficients measure 0.499 and below, under the 0.9 threshold for likely multicollinearity (Hair, Anderson, Tatham, & Black, 1998: 191); the Variance Inflation Factor and other multicollinearity diagnostics are calculated as part of the regression model.

Interaction variables were created to investigate the influence of age as a moderator on the effect of the following factors on BITU as per the research model: EE, AR, PR and IN. Dummy coding (Frazier, Tix, & Barron, 2004: 125) was used to create replacement variables for the non-metric (categorical) values of age; dummy variable DA was created as a coefficient with a value of 0 for respondents under 35 and 1 for respondents 35 and older. The resultant interaction variables EEDA, ARDA, PRDA and INDA were examined for correlations with all other factors (not shown). No correlations were observed between the interaction variables and BITU.

Table 5 Correlation matrix with Pearson's correlation coefficients and p-values

	PE	EE	SI	DC	AR	PR	IN	BITU
PE	1	0.479**	0.499**	0.227	0.024	0.271**	0.257**	0.721**
		<.0001	<.0001	0.018	0.806	0.004	0.007	<.0001
EE	0.479**	1	0.389**	0.129	0.063	0.198	0.393**	0.485**
	<.0001		<.0001	0.180	0.517	0.039	<<.0001	<.0001
SI	0.499**	0.389**	1	0.147	0.032	0.334**	0.291**	0.585**
	<.0001	<.0001		0.128	0.741	0.000	0.002	<.0001
DC	0.227	0.129	0.147	1	0.194	0.173	0.173	0.055
	0.018	0.180	0.128		0.043	0.072	0.072	0.569
AR	0.024	0.063	0.032	0.194	1	0.196	0.038	-0.033
	0.806	0.517	0.741	0.043		0.042	0.693	0.730
PR	0.272	0.198	0.334**	0.173	0.196	1	0.116	0.310**
	0.004	0.039	0.000	0.072	0.042		0.230	0.001
IN	0.257**	0.393**	0.291**	0.173	0.038	0.116	1	0.428**
	0.007	<.0001	0.002	0.072	0.693	0.230		<.0001
BITU	0.721**	0.485**	0.585**	0.055	-0.033	0.310**	0.428**	1
	<.0001	<.0001	<.0001	0.569	0.730	0.001	<.0001	

The values in the second line of each row indicate the p-values. ** indicates statistical significant at p<0.05. PE: Performance Expectancy. EE: Effort Expectancy. AR: Anticipated Regret. SI: Social Influence. DC: Discrimination Concerns. IN: Innovativeness. BITU: Behavioural Intention to Use.

Stepwise estimation (Hair, Anderson, Tatham, & Black, 1998: 178) was utilised to estimate the regression equation for the independent and interaction variables' influence on BITU. The estimated regression model (Table 6) was shown via ANOVA to be statistically significant in explaining BITU (Table 7) with all variables significant at the 95% level.

The initial step of the regression analysis revealed the R-squared value of performance expectancy's correlation with BITU as 0.5192 (p<0.0001), indicating that nearly 52% of variation in BITU can be attributed to a positive response to performance expectancy. The inclusion of social influence increases the R-squared value to 0.5867 (indicating that social influence accounts for approximately 6.75% of BITU). With the inclusion of innovativeness, the R-squared value increases to 0.6287; innovativeness accounts for a further 4.2% of the variation in BITU. Discrimination concerns, when added to the model, accounts for an additional 2.16% of BITU variation, bringing the total R-squared value to 0.6503. Two additional interaction variables are then added to the final model. These interaction variables take into account the age category of the respondents, incorporating the mediating effect of age on innovativeness and perceived risk. Together, these variables account for a further 2.96% of the variation in BITU. Effect sizes (incremental variance explained) of interaction variables are expected to be small (Frazier, Tix, & Barron, 2004: 118). No further variables were significant at p<0.05.

The estimated regression model (Table 6) accounts for approximately 68% of the variance in Behavioural Intention to Use. The effect of possible multicollinearity between the factors was assessed using the Variance Inflation Factor (VIF). VIF values for the independent variables were all 1.4 or below; VIFs for the interaction variables were below 6.7 which is high but below the commonly accepted cutoff value of 10 (Hair, Anderson, Tatham, & Black, 1998: 193). The regression model can be assessed without modification.

Table 6 Regression model: coefficients and collinearity diagnostics

Variable	Parameter Estimate	Standard Error	Sum of Squares	F Value	Sig.	Collinearity Statistics	
						TOL	VIF
Intercept	-1.08495	0.34179	3.00049	10.08	0.002		
PE	0.81574	0.09697	21.07106	70.76	<.0001	0.71398	1.40061
SI	0.36785	0.09507	4.45788	14.97	0.0002	0.72066	1.38762
DC	-0.17073	0.05869	2.51945	8.46	0.0045	0.91641	1.09121
IN	0.32311	0.07387	5.69788	19.14	<.0001	0.8407	1.18949
INDA	-0.24907	0.09004	2.27834	7.65	0.0067	0.15004	6.66486
PRDA	0.26919	0.13179	1.24233	4.17	0.0437	0.14931	6.69729

INDA is the dummy variable for modelling the mediating effect of age on innovativeness' effect on BITU, PRDA is the dummy variable modelling the mediating effect of age on perceived risk's effect on BITU. DA = 1 for respondents aged 35 and older and 0 for respondents younger than 35.

Table 7 ANOVA Test for regression model

Source	DF	Sum of Squares	Mean Square	F Value	Sig.
Model	6	64.44051	10.74008	36.07	<.0001
Error	102	30.37257	0.29777		
Corrected Total	108	94.81307			

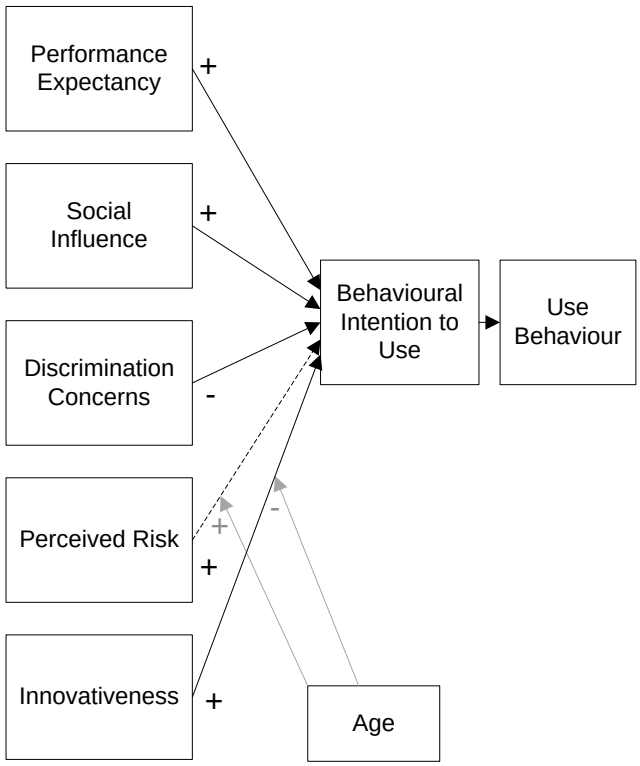
6 Conclusions and recommendations

The majority of respondents were neutral towards the use of consumer genetic tests (46.8%). This may reflect a lack of familiarity with genetic tests and their usefulness. Only 21.1% of respondents expressed a clear negative intention to use consumer genetic tests, indicating that the majority of the respondents are addressable as potential consumers. Further education on consumer genetic testing may be needed to move consumers from neutral to positive intention to use.

6.1. Factors influencing intention to use

The proposed research model, while comprehensive, has been demonstrated to include factors that are not of importance to the intention of the sampled consumers to use genetic tests. A restated model containing only those significant factors identified in the multiple regression provides a parsimonious view on the importance of performance expectancy, social influence, discrimination concerns, innovativeness (moderated by age) and perceived risk (for respondents 35 and older) on BITU (Figure 3). The final regression model explains approximately 68% of the variance in behavioural intention to use this is a high percentage in comparison to previous findings that TPB models account for an average of only 39% of variance (Armitage & Conner, 2001: 471).

Figure 3 DTC adoption model



Performance expectancy was found to be the strongest predictor of behavioural intention to use, explaining approximately 52% of the variance. This finding is in line with previous results (Venkatesh, Morris, Davis, & Davis, 2003: 447). The South African consumers surveyed may view consumer genetic tests as purely functional, implying that the performance of the test is the most important attribute. Social Influence explained 6.75% of the variation in behavioural intention to use. In line with Innovation Diffusion theory, the diffusion of innovations is a social process and people who have come into contact with important others that have used the tests or endorse their usage are more likely to express intent to use the tests in future. Discrimination concerns had a small but statistically significant negative effect on BITU, in line with previous research (Lapham, Kozma, & Weiss, 1996: 623). Despite South Africa's strong anti-discrimination legislation including the Bill of Rights (Republic of South Africa, 1996: 1247) consumers are still concerned that they may be discriminated against based on their genetic details.

The innovativeness of the individual explained approximately 4.2% of variation in behavioural intention to use; this is in line with the concepts of Innovation Diffusion which indicate that individuals who consider themselves to be more innovative are more likely to adopt innovations. In addition, respondents aged below 35 showed an increase in BITU where age was introduced as a moderator of the impact of innovativeness on BITU; younger innovative individuals are more likely to adopt genetic tests. When respondents were 35 or over, perceived risk was a variable with statistically significant impact on BITU; older individuals may be more health conscious and aware of their own risks and are therefore more willing to use tests if they perceive themselves to be at risk of a disease. This supports the findings of Jacobsen, Valdimarsdottier, Brown & Offit (1997: 463).

6.2. Factors lacking significant Influence on BITU

Effort expectancy, usually a major factor in technology adoption, was not retained in the estimated regression model despite significant correlation with BITU. Due to the novelty of genetic testing products, consumers do not have a reference point to benchmark the effort expectancy (ease of use) associated with the product. Framing of the introductory text for the questionnaire, which explained that

most tests require only a spit sample, may have increased the values of effort expectancy and reduced EE as a barrier to use in the perceptions of the respondents. Innovativeness was found to correlate with effort expectancy; it would appear that individuals who consider themselves to be innovative believe that they will have little trouble in using - and understanding the results of DTC genetic tests. Social influence and effort expectancy were also found to be weakly correlated; individuals who have others in their social circle that have taken genetic tests may have an understanding of the ease of taking these tests.

Perceived risk, while correlated with BITU, was only retained in the regression model when mediated by age (significant only for consumers over the age of 35). While some previous findings are that PR influences the likelihood to adopt testing (Hadley, Jenkins, Dimond, Nakahara, Grogan, Liewehr, Steinberg, & Kirsch, 2003: 577), other studies (Frost, Myers, & Newman, 2001: 108; Cappelli, Surh, Walker, Korneluk, Humphreys, Verma, Hunter, Allanson, & Logan, 2001: 330) have found no influence on testing usage and PR. The intention to test when one knows one is at risk may only be significant in older individuals; younger individuals, even when they know they are at risk, may not be concerned enough about their health to pursue genetic tests.

Anticipated regret was not retained in the estimated regression model and did not display significant correlation with BITU. South African consumers in the sample appear to prefer having knowledge about their genes despite the consequences of that knowledge.

6.3. Practitioner implications

The sample held a high number of well educated (80% with a Bachelors' degree of above) and affluent (84% reported earning salaries above R20,000 per month) individuals. This sample reflects the attributes of ID's innovators and early adopters and is a useful cohort to analyse. As consumer genetic tests are likely to be expensive and require an understanding of the principles of genetics to be useful, this group of innovators is likely to be the first adopters of DTC genetic tests in South Africa. The opinions of this sample group are therefore of value to first-mover businesses interested in the DTC market in South Africa.

It is anticipated that DTC genetic tests will require substantial marketing investment to educate and inform consumers of the presence and usefulness of the tests, which are new to the South African market, given the predominantly neutral intention to adopt. Given the immaturity of the market and the significant influence of performance expectancy on usage intention, marketers should advertise DTC genetic tests with a focus on functional efficacy and performance. The cohort examined in this study includes a set of people who rate themselves as innovative; innovativeness and effort expectancy are correlated which may indicate that innovative individuals will not need to be convinced of the ease of use of the product before using it; effort expectancy is less of a consideration and marketers can de-prioritize ease-of-use messages for the initial adopters. As discrimination concerns has a negative influence on intention to adopt, marketers should include data privacy and confidentiality statements to reassure consumers that their data will not be used in ways that could compromise their privacy and lead to discrimination.

Consumers aged 35 and above who perceive they are at risk are more likely to intend to use DTC genetic tests; marketers should target older consumers with a likelihood of genetic disease. Young consumers who consider themselves innovative are likely to be early adopters of DTC genetic tests and should be specifically targeted to build a network of users. Given the strong effect of social influence on intention to use, the presence of early adopters will increase the uptake of DTC tests by others in their social network as expected by ID theory. Social networks and informed others is an important way to expand the use of consumer products (Peres, Muller, & Mahajan, 2010: 93). Doctors and nurses who hold strong social influence and are associated with healthcare could be targeted as early adopters who will spread the word.

Marketers should consider advertising where they can reach innovative consumers and linking the use of DTC genetic tests to other innovative products.

7
Limitations and further research

The Theory of Planned Behaviour (on which the antecedent models for this research are based) is a "deliberative processing model" and as such implies that "individuals make behavioural decisions based on careful consideration of available information" (Conner & Armitage, 1998: 1429, p. 1430). It assumes that "people are logical and rational in their decision making" (Sandberg & Conner, 2008: 589, p. 590). A recent trend in consumer behaviour is the recognition of the irrationality of consumers in purchasing decisions. This class of research has been called behavioural economics and describes the instinctual, habitual and subconscious drivers of consumption decisions, primarily related to impulse-buying of - and brand responses to consumer products such as cigarettes and soft drinks (Lindstrom, 2008:). The purchase of a genetic test is likely to require a substantial amount of thought and deliberation; the TPB and related models are anticipated to be applicable but impulse-related purchase behaviour should be considered in further research.

The sample was not representative of the average South African consumer and is prone to several biases including affluence, race and education level; factors identified in the DTC adoption model may not be applicable to all members of the South African population.

The questionnaire developed for this research consisted of items from various literature sources and has gone some way to standardising questions for the constructs under analysis in the context of DTC genetic tests. Further refinement of the scale items could be conducted in future to improve the reliability of the constructs. Additional scale items per construct could be added to the questionnaire in future, allowing other statistical methods that require more than two items per construct to be applied such as Structural Equation Modelling.

Not all factors relevant to consumer genetic testing may have been identified. While the percentage variation described by the factors in the final model is high relative to previously published consumer behaviour models, additional factors might increase the amount of explainable variation. Future research could include factors from other behavioural models. Preference for DTC tests or clinical tests could be further examined; intention to use DTC genetic tests may be reduced if consumers do not trust DTC tests relative to those conducted by clinicians.

8
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TECHNICAL REPORT

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

GORDON INSTITUTE OF BUSINESS SCIENCE

TECHNICAL REPORT

Explanatory Note

This document contains the statistical reports used in the creation of the SAJEMS article entitled "Factors affecting intent to use consumer genetic tests: a revised technology acceptance model".

Table of Contents

1. RAW RESPONSE DATA

RespondentID	CollectorID	StartDate	EndDate	IP Address	I live in Sou	I am...	My age is...	My populat	My monthly	My Highest	Read each statement carefully, then indicate your agreement or disagreement in the columns provided.										Read each statement carefully, then indicate your agreement or disagreement in the columns provided.												
					Response	Response	Response	Response	Response	Response	As a result	I fear that i	I try new p	Compared	Taking a ga	Learning e	Finding out	I intend to	I plan to us	I believe th	People who	I believe ge	People who	If the test r	I am conce	I am worrie	If I could a	Information	I would ea	I would be	I predict th	I tend to tr	I believe th	I like to try	Someone i	People who	I know mor
1141494930	14901873	08/23/2010	08/23/2010	41.132.164.148	1	1	3	4	4	7	4	1	3	1	4	5	3	4	4	3	3	3	1	4	4	4	4	5	5	4	4	3	5	3	4	4
1141521508	14901873	08/23/2010	08/23/2010	41.245.189.171	1	2	5	4	5	7	2	2	5	2	1	5	2	3	3	4	3	3	3	1	2	1	3	4	4	3	5	3	5	5	1	4	4
1141522148	14901873	08/23/2010	08/23/2010	41.240.112.90	1	1	3	4	5	5	3	3	4	3	4	4	4	3	3	4	2	4	2	2	4	3	4	4	4	4	4	3	4	4	2	3	3
1141576379	14901873	08/23/2010	08/23/2010	41.145.41.96	1	2	2	4	4	5	4	2	4	4	4	4	4	3	3	4	1	3	3	1	2	2	4	4	3	3	3	3	3	2	3	3	2
1141604139	14901873	08/23/2010	08/23/2010	109.66.118.216	2	1	3	4	4	6																											
1141611631	14901873	08/23/2010	08/23/2010	41.245.189.171	1	2	2	4	1	4	2	2	4	2	4	4	4	4	4	4	3	4	2	4	3	2	4	4	2	3	4	2	4	4	3	3	2
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1141834069	14901873	08/24/2010	08/24/2010	41.26.76.99	1	1	3	4	5	4	1	2	4	1	4	4	1	4	4	4	1	3	3	1	3	2	4	3	3	3	4	4	4	4	3	3	2
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1141849823	14901873	08/24/2010	08/24/2010	137.215.44.162	1	2	4	4	4	6	1	1	3	1	4	4	2	4	4	4	2	4	3	2	2	1	3	5	4	4	3	2	3	4	3	3	3
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1141870056	14901873	08/24/2010	08/24/2010	41.31.249.53	1	2	4	4	5	4																											
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1141897683	14901873	08/24/2010	08/24/2010	41.247.175.48	1	2	3	3	5	3	2	1	3	1	3	3	2	2	2	1	2	3	2	2	2	4	4	4	4	4	2	3	4	4	2	2	2
1141918563	14901873	08/24/2010	08/24/2010	192.168.0.91	1	2	3	4	4	5	4	4	4	3	3	4	4	3	2	3	3	3	2	2	2	4	4	4	3	4	2	2	4	3	4	2	2
1141923497	14901873	08/24/2010	08/24/2010	41.56.49.239	1	2	4	4	5	4	1	2	4	1	4	4	4	3	3	5	4	3	3	2	3	2	4	3	5	4	3	5	4	5	1	3	3
1141925848	14901873	08/24/2010	08/24/2010	41.3.252.93	1	1	3	4	5	5	2	3	3	2	4	3	2	3	3	4	2	3	3	2	3	2	3	2	3	3	3	2	3	4	2	3	2
1141926919	14901873	08/24/2010	08/24/2010	41.241.154.253	1	2	4	4	4	6	2	2	2	1	1	4	2	1	1	1	1	2	1	1	2	2	1	2	2	2	1	2	2	2	1	2	2
1141929906	14901873	08/24/2010	08/24/2010	41.121.44.49	1	2	3	4	5	4	2	1	5	2	3	2	5	3	3	3	1	3	3	1	2	1	3	4	5	3	3	1	4	2	1	4	1
1141941974	14901873	08/24/2010	08/24/2010	80.227.150.94	2	1	4	4	5	6																											
1141950630	14901873	08/24/2010	08/24/2010	41.28.87.44	1	2	4	4	5	6	3	2	4	2	4	4	4	4	4	4	3	3	4	2	2	2	4	4	4	4	4	3	4	4	3	4	3
1141953785	14901873	08/24/2010	08/24/2010	41.16.70.243	1	2	4	4	5	5	2	2	4	2	4	4	4	3	2	4	1	3	2	2	4	4	3	4	4	2	2	2	4	4	4	2	3
1141959923	14901873	08/24/2010	08/24/2010	196.7.217.162	1	2	3	4	5	6	5	1	4	5	5	5	5	5	5	5	1	4	3	4	3	2	5	5	5	4	5	5	4	5	1	3	3
1141961657	14901873	08/24/2010	08/24/2010	196.210.209.174	1	2	5	4	4	4	2	1	4	2	4	4	4	3	3	4	2	4	3	1	2	2	4	4	4	3	3	3	4	4	3	3	2
1141988842	14901873	08/24/2010	08/24/2010	41.135.5.90	1	2	5	4	4	3	2	2	4	2	3	3	2	2	2	3	2	3	2	1													
1142008693	14901873	08/24/2010	08/24/2010	41.185.123.232	1	1	3	4	5	5	2	3	4	2	4	3	4	4	4	3	2	3	3	3	3	4	4	3	3	4	5	3	5	3	3	5
1142169751	14901873	08/24/2010	08/24/2010	41.16.28.227	1	2	3	4	5	5	2	3	4	2	4	5	5	3	3	4	2	5	3	2	4	2	3	4	5	5	3	4	2	5	3	3	4
1142225303	14901873	08/24/2010	08/24/2010	41.132.237.94	1	1	4	4	5	5	1	4	4	5	4	5	4	3	3	4	1	3	2	2	2	2	3	5	2	4	3	4	4	4	3	3	4
1142457887	14901873	08/24/2010	08/24/2010	41.121.9.195	1	1	3	4	5	6	2	2	4	2	3	4	4	2	2	3	2	3	4	2	4	3	3	3	4	4	2	3	4	4	4	4	2
1142814377	14901873	08/25/2010	08/25/2010	165.145.181.12	1	2	3	4	4	5	4	2	5	3	4	5	2	3	3	5	1	3	1	1	2	2	3	4	4	5	3	2	4	3	2	4	2
1142824154	14901873	08/25/2010	08/25/2010	41.247.126.11	1	2	3	4	4	5	2	2	4	2	5	3	4	3	3	4	2	3	2	2	4	4	4	4	2	3	4	2	3	4	2	3	2
1142826657	14901873	08/25/2010	08/25/2010	41.247.126.11	1	1	3	4	4	5	2	2	4	2	4	4	2	3	3	4	2	3	2	2	2	4	4	4	4	4	4	2	4	4	2	4	4
1142827858	14901873	08/25/2010	08/25/2010	196.210.138.111	1	1	3	4	5	4	2	1	5	4	5	5	2	5	5	5	1	3	3	1	2	2	5	3	3	5	5	5	3	5	3	3	5
1142855804	14901873	08/25/2010	08/25/2010	168.142.192.41	1	1	3	1	5	6	2	2	5	1	3	5	2	3	4	4	1	2	3	1	4	3	4	4	5	4	4	4	3	5	2	3	4
1143028997	14901873	08/25/2010	08/25/2010	196.215.13.143	1	2	5	4	5	4	2	3	4	2	4	4	3	3	3	3	3	3	3	3	3	3	3	4	3	3	2	4	3	4	1	3	3
1143114753	14901873	08/25/2010	08/25/2010	168.142.192.41	1	2	4	4	5	6	2	2	4	2	2	3	4	2	2	4	3	3	1	3	3	3	3	2	2	2	3	4	3	4	3	1	3
1143188343	14901873	08/25/2010	08/25/2010	62.190.138.253	1	2	3	1	5	6	2	2	4	2	5	5	2	3	3	5	4	3	3	5	5	5	4	4	4	2	4	4	4	4	3	3	2
1143274112	14901873	08/25/2010	08/25/2010	41.3.91.130	1	2	3	4	4	6	3	4	4	3	5	4	2	3	3	4	3	3	5	5	4	4	4	4	4	3	4	3	4	3	3	3	4
1143673101	14901873	08/26/2010	08/26/2010	41.15.165.188	1	2	3	4	5	6	1	1	4	3	4	5	4	1	1	4	3	3	3	1	1	1	1	3	3	5	1	5	3	5	2	3	2
1143836847	14901873	08/26/2010	08/26/2010	41.29.234.116	1	2	3	4	5	6	2	2	4	2	4	4	4	3	3	4	1	3	3	2	2	2	3	3	4	3	3	2	3	4	2	3	1
1144805850	14901873	08/27/2010	08/27/2010	unknown	1	1	3	4	5	5	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	4	1	1	1
1144945579	14901873	08/27/2010	08/27/2010	41.241.217.148	1	2	3	4	5	5	3	3	4	3	3	3	4	4	3	4	3	3	3	3	4	3	3	4	3	4	3	4	3	4	4	1	4	3
1145598760	14901873	08/28/2010	08/28/2010	41.2.210.181	1	1	3	4	5	6	2	5	4	3	5	5	1	2	2	4	2	2	1	1	5	5	3	4	4	3	2	2	5	3	3	1	2
1145915973	14901873	08/29/2010	08/29/2010	41.9.115.237	1	1	4	4	5	6	3	2	4	3	4	4	2	4	3	5	2	3	3	2	4	3	5	5	3	4	4	4	4	5	3	4	2
1145966758	14901873	08/29/2010	08/29/2010	41.174.56.222	1	2	3	4	2	4	2	4	4	2	5	4	3	3	3	4	2	3	2	3	3	3	3	4	3	3	3	3	4	4	2	2	3
1146382084	14901873	08/30/2010	08/30/2010	41.145.150.95	1	1	3	4	1	6	4	3	2	4	3	4	3	3	2	4	3	3	4	1	4	3	3	4	3	3	3	2	3	3	3	3	2
1146694851	14901873	08/30/2010	08/30/2010	41.112.223.253	1	1	2	3	5	5	2	4	4	2	4	4	4	5	4	5	2	3	3	2	4	3	4	4	3	4	4	4	3	3	4	2	3	4
1146897410	14901873	08/30/2010	08/30/2010	196.210.176.39	1	2	3	3	5	5	4	3	4	3	3	4	2	3	3	4	2	3	3	4	3	2	2	4	3	2	2	3	3	4	2	3	3
1147843519	14901873	08/31/2010	08/31/2010	41.27.103.241	1	1	3	3	5	6	2	2	4	3	3	3	3	2	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1147844173	14901873	08/31/2010	08/31/2010	196.215.47.92	1	2	4	4	5	6	2	3	5	1	3	4	5	4	2	4	1	3	3	2	2	2	3	2	2	2	3	2	4	4	3	3	2
1147859416	14901873	08/31/2010	08/31/2010	41.208.2.180	1	1	4	1	5	5	2	4	5	1	4	4	3	2	1	4	2	3	3	2	4	4	2	4	2	4	3	2	4	4	2	4	2
1147871784	14901873	08/31/2010	08/31/2010	41.132.232.163	1	2	3	3	5	6	4	1	4	2	3	4	4	2	2	3	1	4	1	2	1	1	3	4	4	2	2	2	2	4	2	3	2
1147875019	14901873	08/31/2010	08/31/2010	41.18.4.17	1	1	3	4	5	6	2	2	4	2	4	4	3	4	4	4	3	4	4	2													
1147875171	14901873	08/31/2010	08/31/2010	41.29.182.148	1	1	3	4	5	6	2	1	3	2	2	5	3	3	3	3	1	3	2	1	3	3	3	3	4	4	3	4	4	2	3	4
1147936886	14901873	08/31/2010	08/31/2010	41.29.178.226	1	1	3	4	5	6	2	4	4	2	4	4	4	2	2	4	3	4	2	2	4	2	4	5	4	4	2	2	4	4	2	2	2
1148186578	14901873	09/01/2010	09/01/2010	196.11.134.77	1	1	3	4	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	3	3	3	5	5	4	5

RespondentID	CollectorID	StartDate	EndDate	IP Address	I live in So	I am...	My age is..	My popular	My month	My Highest	Read each statement carefully, then indicate your agreement or disagreement in the columns provided.												Read each statement carefully, then indicate your agreement or disagreement in the columns provided.														
					Response	Response	Response	Response	Response	Response	As a result	I fear that	I try new p	Compared	Taking a g	Learning e	Finding out	I intend to	I plan to us	I believe th	People who	I believe g	People who	If the test	I am conce	I am worri	If I could a	Informatio	I would ea	I would be	I predict th	I tend to tr	I believe th	I like to try	Someone i	People who	I know mo
1148192859	14901873	09/01/2010	09/01/2010	193.103.207.10	1	1	3	1	5	5	3	2	4	3	4	3	2	3	3	4	2	4	2	2	2	2	4	4	2	2	3	3	4	4	2	3	2
1148199177	14901873	09/01/2010	09/01/2010	196.38.246.163	1	1	3	4	5	6	2	1	4	2	3	5	1	5	5	5	2	5	3	1	1	2	5	3	5	4	4	2	5	4	1	4	1
1148212366	14901873	09/01/2010	09/01/2010	196.25.47.196	1	2	4	3	5	6	1	1	1	1	1	4	1	1	4	1	1	1	2	1	1	1	1	1	2	1	1	2	3	1	1	1	1
1148210219	14901873	09/01/2010	09/01/2010	196.15.214.235	1	1	3	4	5	5	1	4	4	1	4	5	4	4	4	4	1	2	3	2	3	4	4	4	4	4	4	4	4	5	3	3	4
1148213302	14901873	09/01/2010	09/01/2010	41.208.207.180	1	2	3	4	5	6	2	3	4	1	2	4	4	2	2	3	2	3	2	2	3	3	2	3	3	4	2	2	3	4	4	3	4
1148213978	14901873	09/01/2010	09/01/2010	41.192.255.123	1	1	4	1	5	6	2	1	4	2	2	4	2	3	3	4	3	2	3	2	3	2	3	3	3	2	3	4	3	4	3	3	3
1148214981	14901873	09/01/2010	09/01/2010	41.193.56.114	1	2	3	2	5	5	3	4	3	2	2	4	4	2	2	3	3	3	2	2	4	4	2	3	3	4	3	3	3	4	3	3	3
1148215366	14901873	09/01/2010	09/01/2010	195.212.79.1	1	1	3	4	5	6	3	4	4	3	2	4	4	3	2	3	2	2	3	4	5	5	3	4	4	3	3	4	2	4	2	2	4
1148218934	14901873	09/01/2010	09/01/2010	196.8.104.59	1	1	3	3	5	5	3	1	5	4	5	5	2	5	4	5	2	4	3	2	4	1	5	5	5	4	5	5	5	4	1	4	2
1148221707	14901873	09/01/2010	09/01/2010	192.168.0.117	1	1	3	4	5	6	2	3	4	2	4	4	4	4	4	4	3	3	2	2	3	2	4	4	3	4	4	4	3	4	4	3	3
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1148223929	14901873	09/01/2010	09/01/2010	41.243.106.0	1	1	4	4	5	5	2	3	4	3	4	3	4	2	2	3	1	3	1	4	3	3	2	4	3	4	2	2	3	4	1	1	2
1148226584	14901873	09/01/2010	09/01/2010	196.25.218.130	1	1	3	1	5	6	1	2	4	1	5	5	5	4	4	5	2	4	2	1	1	2	5	4	3	3	4	5	4	5	2	2	5
1148228691	14901873	09/01/2010	09/01/2010	196.36.218.50	1	2	4	1	5	5	1	1	4	1	3	3	3	1	1	4	3	3	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3
1148228938	14901873	09/01/2010	09/01/2010	196.31.132.18	1	1	3	1	5	6	3	4	2	3	4	4	4	4	4	4	3	2	3	5	3	3	4	4	3	4	4	2	4	3	1	3	1
1148231382	14901873	09/01/2010	09/01/2010	196.23.50.163	1	1	4	1	5	6	3	4	2	2	4	5	5	3	3	4	2	4	2	2	4	5	4	2	4	4	5	3	3	4	3	2	3
1148232886	14901873	09/01/2010	09/01/2010	198.54.206.88	1	1	3	1	5	6	3	3	3	3	4	3	4	3	3	4	3	3	2	2	2	4	3	3	4	4	3	3	2	3	3	2	2
1148234096	14901873	09/01/2010	09/01/2010	196.36.218.50	1	1	4	1	5	5																											
1148248148	14901873	09/01/2010	09/01/2010	196.11.134.77	1	2	3	6	5	6	1	5	3	4	4	5	5	3	3	5	1	3	1	2	5	5	1	5	1	5	3	5	2	5	3	3	5
1148248991	14901873	09/01/2010	09/01/2010	41.15.214.70	1	1	4	1	5	5	2	5	1	2	5	5	1	3	3	5	2	3	3	1	5	4	4	5	4	5	4	4	4	4	3	3	3
1148261146	14901873	09/01/2010	09/01/2010	168.210.132.228	1	2	3	3	5	6	1	1	5	1	5	4	5	5	5	5	1	2	1	2	5	1	5	5	5	4	5	5	4	5	1	4	4
1148267069	14901873	09/01/2010	09/01/2010	196.34.54.84	1	1	3	4	5	6	2	2	4	2	2	4	4	2	2	4	1	2	2	2	2	2	2	4	4	2	4	4	4	4	1	2	2
1148271362	14901873	09/01/2010	09/01/2010	192.168.8.168	1	1	3	4	5	6	1	3	4	1	3	4	2	3	3	4	1	3	3	2	4	2	3	2	5	5	3	3	3	4	1	3	3
1148275298	14901873	09/01/2010	09/01/2010	196.37.192.205	1	1	4	3	5	5	3	4	4	2	4	4	2	4	4	4	2	3	2	2	2	2	4	4	4	4	4	4	4	4	4	3	2
1148284468	14901873	09/01/2010	09/01/2010	53.35.7.155	1	1	4	1	5	6	3	2	4	3	4	4	4	4	4	4	3	3	3	2	3	2	3	3	3	4	3	2	4	4	2	3	3
1148295617	14901873	09/01/2010	09/01/2010	155.91.64.11	1	2	4	1	5	5	1	3	4	1	3	4	3	3	3	5	3	1	1	4	3	3	2	1	4	4	3	2	3	4	3	3	3
1148297796	14901873	09/01/2010	09/01/2010	85.210.122.236	2	2	3	1	5	6	1	3	2	1	1	5	4	1	1	1	1	1	1	3	5	1	1	1	5	5	1	1	1	3	1	1	1
1148305863	14901873	09/01/2010	09/01/2010	10.8.217.8	1	1	3	4	5	7	3	3	3	3	3	3	3	2	3	2	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1148458073	14901873	09/01/2010	09/01/2010	62.154.199.74	1	1	4	4	5	6	2	1	5	3	2	2	4	2	1	1	1	3	1	3	4	3	2	3	3	3	2	4	2	4	1	3	3
1148368915	14901873	09/01/2010	09/01/2010	196.38.4.4	1	1	4	1	5	6	3	4	5	1	4	4	5	3	3	4	3	3	1	2	3	3	3	4	3	4	3	2	3	5	2	3	3
1148423390	14901873	09/01/2010	09/01/2010	41.28.173.172	1	1	3	4	5	6	3	2	4	4	2	4	4	3	1	3	1	2	1	3	2	2	2	2	4	4	2	3	3	4	1	2	3
1148423743	14901873	09/01/2010	09/01/2010	74.0.189.50	2	2	3	1	4	6	2	2	2	1	5	5	5	2	3	4	1	2	2	3	4	2	4	4	4	3	3	1	3	5	2	2	2
1148496055	14901873	09/01/2010	09/01/2010	196.30.29.50	1	1	4	2	5	6	3	2	2	3	2	2	4	1	2	2	2	3	2	3	4	4	1	3	1	1	3	1	4	4	1	1	1
1148512816	14901873	09/01/2010	09/01/2010	41.112.161.246	1	1	4	1	5	6	3	4	5	3	4	4	4	4	4	4	2	2	2	2	5	4	5	5	4	4	4	4	4	5	4	4	2
1148612959	14901873	09/01/2010	09/01/2010	196.7.217.162	1	1	3	1	5	6	2	3	5	3	4	4	2	2	4	4	1	3	3	2	3	3	4	4	4	4	4	4	3	4	1	3	3
1148641025	14901873	09/01/2010	09/01/2010	196.36.116.82	1	2	3	1	5	6																											
1148701645	14901873	09/01/2010	09/01/2010	41.17.144.28	1	2	3	3	5	6	4	1	4	4	5	5	5	4	5	4	2	2	5	4	1	1	4	3	5	4	4	4	4	3	3	1	5	1
1148704748	14901873	09/01/2010	09/01/2010	41.31.109.171	1	1	3	2	5	6	2	4	4	2	5	4	2	4	4	4	4	2	3	2	5	4	2	5	4	4	4	3	4	5	2	2	2
1148709149	14901873	09/01/2010	09/01/2010	41.121.17.0	1	2	3	1	5	6	2	2	4	2	4	3	4	3	3	4	2	2	3	2													
1148757118	14901873	09/01/2010	09/01/2010	196.15.214.235	1	1	3	1	5	4	1	1	1	1	3	2	2	1	1	4	1	2	3	1	1	1	1	1	1	4	1	2	1	4	2	2	2
1148781862	14901873	09/01/2010	09/01/2010	41.135.20.114	1	1	3	4	5	6	3	2	4	3	4	4	4	5	5	4	4	4	5	2	3	2	5	4	5	3	5	3	4	4	5	5	4
1148801387	14901873	09/01/2010	09/01/2010	144.178.119.188	2	2	3	4	5	5	2	4	5	2	4	4	4	3	3	4	2	3	3	2	5	5	3	4	2	5	3	4	4	5	3	3	4
1148805370	14901873	09/01/2010	09/01/2010	41.125.227.202	1	1	3	4	4	4	1	4	4	2	4	4	5	2	2	4	2	4	1	2	4	4	3	4	4	3	2	3	4	3	1	4	1
1148842727	14901873	09/01/2010	09/01/2010	41.135.66.26	1	1	3	4	5	6	3	3	5	3	5	5	4	4	4	4	4	3	2	2	2	2	4	4	5	4	4	3	4	4	5	3	5
1148844943	14901873	09/01/2010	09/01/2010	41.185.152.22	1	1	3	2	2	4	2	3	2	2	2	4	3	3	3	4	2	4	3	3	4	4	4	4	4	4	3	3	2	2	3	1	
1148840174	14901873	09/01/2010	09/01/2010	41.122.147.221	1	2	3	2	5	6	2	4	2	2	3	4	5	2	2	4	2	4	1	5	4	4	2	2	4	4	2	2	3	4	2	2	2
1148972769	14901873	09/01/2010	09/01/2010	41.132.192.87	1	1	3	4	5	6	4	3	4	4	3	4	5	4	4	4	3	3	3	2	3	3	4	4	4	4	4	4	4	4	3	3	3
1149191655	14901873	09/02/2010	09/02/2010	196.15.214.235	1	2	3	3	5	6	5	2	4	4	4	4	4	3	3	5	3	5	3	4	3	3	3	3	3	4	4	3	4	4	3	3	3
1149222140	14901873	09/02/2010	09/02/2010	41.213.2.106	1	1	4	4	5	4	2	4	5	2	4	3	5	3	3	4	1	3	3	4	4	4	3	3	3	2	4	4	3	4	1	2	4
1149245232	14901873	09/02/2010	09/02/2010	41.132.25.34	1	2	3	4	3	4	3	4	4	3	4	2	4	3	3	4	1	2	2	2	4	4	3	2	2	2	3	2	4	4	2	3	2
1149246885	14901873	09/02/2010	09/02/2010	41.244.8.79	1	1	3	4	5	6	2	2	4	2	3	4	3	2	2	4	2	4	2	2	2	2	4	2	4	4	4	4	4	4	2	2	2
1149257051	14901873	09/02/2010	09/02/2010	168.142.192.41	1	1	3	5	5	5	1	2	5	2	2	4	5	2	2	3	2	2	3	4	4	2	2	4	4	3	2	4	3	4	2	3	3
1149325006	14901873	09/02/2010	09/02/2010	196.7.217.162	1	1	3	4	5	6	1	2	4	2	3	4	4	3	3	4	2	4	3	2	2	2	4	3	3	3	3	4	3	4	2	3	4
1149336945	14901873	09/02/2010	09/02/2010	196.4.165.198	1	2	3	4	5	6	4	3	4	3	3	4	3	3	3	4	3	3	3	3	3	3	4	3	3	4	3	3	4	2	3	3	3
1149341504	14901873	09/02/2010	09/02/2010	41.28.131.18	1	1	3	4	5	5	2	2	5	2	4	4	5	4	3	5	3	3	3	2	2	1	4	3	4	4	4	2	3	5	2	3	2
1149384548	14901873	09/02/2010	09/02/2010	196.35.33.39	1	1	3	4	5	4	1	3	4	1	3	4	3	4	4	4	3	4	3	2	3	3	4	4	4	3	4	4	4	4	1	3	2
1149473306	14901873	09/02/2010	09/02/2010	196.212.138.174	1	2	3	4	5	5	4	3	4	3	5	4	2	5	5	5	5	4	3	3	5	4	5	5	4	4	5	3	4	5	5	4	4
1150143145	14901873	09/03/2010	09/03/2010	41.189.95.13	1	1	4	1	5	4	2	2	4	2	4	4	4	4	4	4	2	4	3	4	2	3	4	4	4	4	4	2	4	3	3	3	2
1150239794	14901873	09/03/2010	09/03/2010	41.31.22.211	1	1	3	4	5	5																											
1151050938	14901873	09/04/2010	09/04/2010	41.133.80.10	1	1	4	4	5	5	2	4	4	2	5	4	2	3	4	5	3	3	3	2	3	4	4	4	2	2	4	2	4	4	2	3	2
1151384168	14901873	09/05/2010	09/05/2010	196.210.183.167	1	1	3	4	5	5																											
1151424991	14901873	09/05/2010	09/05/2010	41.29.184.238	1	1	2	2	1	2																											
1151440673	14901873	09/05/2010	09/05/2010	41.121.18.78	1	2	3	3	5	6	3	3	4	3	5	5	4	4	4	4	1	4	4	2	3	2	4	4	3	4	4	3	4	4	4	4	2
1151532525	14901873	09/05/2010	09/05/2010	41.14.155.185	1	2	4	4	5	5	2	2	2	2	4	3	2	2	2	4	3	3	1	2	2	2	4	4	4	4	3	2	3	3	1	3	2

2. Scale Items and Proposed Constructs

I am...	Male=1 Female=2
My age is...	< 18 = 1 18-24 = 2 25-34 = 3 35-49 = 4 > 50 = 5
My population group is...	Black = 1 Coloured = 2 Indian = 3 White = 4 Asian=5 Other = 6
My monthly household income is...	0 - R5,000 = 1 R5,001 - R8,000 = 2 R8,001 - R10,999 = 3 R11,000 - R19,999 = 4 > R20,000 = 5
My Highest Level of Education (posessed or completing) is...	Primary School = 1 Some High School = 2 Matric = 3 Technikon Diploma/Degree = 4 Bachelors Degree = 5 Masters = 6 Doctorate = 7
Behavioural Intention to Use	I intend to use a genetic test in the future.
	I plan to use a genetic test in the future.
	I predict that I will use a genetic test in the future.
	If I could afford to, I predict I would use a genetic test in the future.
Perceived Risk (possible Moderator)	As a result of my genes, I believe I am more likley than may peers to experience bad health.
	Compared to the average person, I think I am at a higher risk of genetic disease.
Performance Expectancy	Information on my genes would help me to take better control of my life.
	Taking a genetic test would help me to understand myself.
	I believe the tests will reveal useful information.
	I believe the tests will be accurate.
	I believe genetic tests are more accurate than other diagnostic techniques.
Effort Expectancy	Learning enough to understand my results would be easy for me.
	I would easily be able to adminster the tests myself.
	I would be able to understand the outcomes of the test myself.
Social Influence	People who have taken a genetic test have more prestige.
	People who are important to me think that I should take genetic tests.
	Someone in my social circle who is not related to me and that I respect has taken a genetic test.

	People who are important to me believe that genetic testing is a good idea.
Anticipated Regret	If the test revealed something bad I would regret taking it.
	Finding out unpleasant information from the test would upset me.
Discrimination Concerns	I fear that if other people found out about my genetic information they would discriminate against me.
	I am concerned that my insurer, medical aid or employer will use my genetic information to discriminate against me.
	I am worried that my genetic information will be used against me.
Innovativeness	I know more than others on the latest new products.
	I like to try new and different things.
	I tend to try out new technologies before any of my peers.
	I try new products without worrying about what my friends and neighbours think of the product.

3. Identification and Removal of Outlier

The UNIVARIATE Procedure

Variable: res1 (Studentized Residual)

Moments			
N	110	**Sum Weights**	110
Mean	0.00320904	**Sum Observations**	0.35299487
Std Deviation	0.99851929	**Variance**	0.99704078
Skewness	-0.6804176	**Kurtosis**	3.02050289
Uncorrected SS	108.678577	**Corrected SS**	108.677444
Coeff Variation	31115.7845	**Std Error Mean**	0.09520508

Basic Statistical Measures			
Location		**Variability**	
Mean	0.003209	**Std Deviation**	0.99852
Median	0.071518	**Variance**	0.99704
Mode	.	**Range**	7.38072
		Interquartile Range	1.29736

Tests for Location: Mu0=0				
Test	**Statistic**		**p Value**	
Student's t	**t**	0.033707	**Pr > |t|**	0.9732
Sign	**M**	6	**Pr >= |M|**	0.2942
Signed Rank	**S**	161.5	**Pr >= |S|**	0.6322

Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	**W**	0.961794	**Pr < W**	0.0031
Kolmogorov-Smirnov	**D**	0.080452	**Pr > D**	0.0799
Cramer-von Mises	**W-Sq**	0.108448	**Pr > W-Sq**	0.0888
Anderson-Darling	**A-Sq**	0.641139	**Pr > A-Sq**	0.0940

Quantiles (Definition 5)			
Quantile	**Estimate**	**50% Median**	0.07152
100% Max	2.92266	**25% Q1**	-0.63377
99%	2.00301	**10%**	-1.12331
95%	1.37513	**5%**	-1.62769
90%	1.11633	**1%**	-2.02627
75% Q3	0.66359	**0% Min**	-4.45806

Extreme Observations			
Lowest		**Highest**	
Value	**Obs**	**Value**	**Obs**
-4.45806	72	1.43746	27
-2.02627	68	1.63668	61
-1.90794	17	1.88584	41
-1.84271	43	2.00301	47
-1.63636	64	2.92266	3

```
Stem Leaf                                #              Boxplot
   2 9                                   1                 0
   2 0                                   1                 |
   1 69                                  2                 |
   1 000000012234444                    15                 |
   0 5666788888999                      13              +-----+
   0 000001111111222222233333344 44     29              *--+--*
  -0 444333222211111110                 18              |     |
  -0 99998777766655                     14              +-----+
  -1 431111000                           9                 |
  -1 986655                              6                 |
  -2 0                                   1                 |
  -2
  -3
  -3
  -4
  -4 5                                   1                 0
     ----+----+----+----+----+----
```

The UNIVARIATE Procedure

Variable: res1 (Studentized Residual)

Moments			
N	109	**Sum Weights**	109
Mean	0.00309036	**Sum Observations**	0.33684914
Std Deviation	1.00056275	**Variance**	1.00112582
Skewness	0.15749277	**Kurtosis**	0.42537781
Uncorrected SS	108.12263	**Corrected SS**	108.121589
Coeff Variation	32376.909	**Std Error Mean**	0.09583653

Basic Statistical Measures			
Location		**Variability**	
Mean	0.003090	**Std Deviation**	1.00056
Median	0.074655	**Variance**	1.00113
Mode	.	**Range**	5.51418
		Interquartile Range	1.35260

Tests for Location: Mu0=0

Test	Statistic		p Value	
Student's t	t	0.032246	Pr > |t|	0.9743
Sign	M	2.5	Pr >= |M|	0.7018
Signed Rank	S	21.5	Pr >= |S|	0.9485

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.988193	Pr < W	0.4586
Kolmogorov-Smirnov	D	0.049755	Pr > D	>0.1500
Cramer-von Mises	W-Sq	0.038204	Pr > W-Sq	>0.2500
Anderson-Darling	A-Sq	0.25373	Pr > A-Sq	>0.2500

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	3.362347	50% Median	0.074655
99%	2.365717	25% Q1	-0.67641
95%	1.547927	10%	-1.2939
90%	1.284604	5%	-1.81337
75% Q3	0.676184	1%	-2.06941
		0% Min	-2.15183

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
-2.15183	17	1.58875	19
-2.06941	68	1.66873	16
-2.03796	25	1.86017	41
-1.92699	43	2.36572	47
-1.86063	91	3.36235	3

```
Stem Leaf                          #          Boxplot
   3 4                             1             0
   2                                              |
   2 4                             1             |
   1 55679                         5             |
   1 000001123344                 12             |
   0 5567777888899                13          +-----+
   0 00111112222333333333333444   25          *--+--*
  -0 4444433322221111110          19          |     |
  -0 987777776665                 12          +-----+
  -1 44332211110000               14             |
  -1 9988                          4             |
  -2 210                           3             |
     ----+----+----+----+----+
```

4. BITU Descriptive Statistics by Demographics

The responses were divided into three groups by average behavioural intention to use (BITU) response; 1-2.25 was taken to indicate a mostly negative attitude toward using the tests (i.e. would not use the test), 2.5-3.5 was taken to indicate an overall neutral attitude toward taking the tests while values between 3.75 and 5 were taken to indicate a positive intention to use consumer genetic tests.

The FREQ Procedure

Frequency Percent Row Pct Col Pct	Table of intent by v1			
	intent	v1(v1)		
		Male	Female	Total
	Mostly negative	13 11.93 56.52 20.63	10 9.17 43.48 21.74	23 21.1
	Mostly Neutral	24 22.02 47.06 38.1	27 24.77 52.94 58.7	51 46.79
	Mostly positive	26 23.85	9 8.26	35 32.11

	74.29	25.71	
	41.27	19.57	
Total	63	46	109
	57.8	42.2	100

Frequency	Table of intent by v2				
Percent	intent	v2(v2)			
Row Pct		**18-24**	**25-34**	**35-49**	**>50**	**Total**
Col Pct						
	Mostly negative	0	15	7	1	23
		0	13.76	6.42	0.92	21.1
		0	65.22	30.43	4.35	
		0	20.27	25	25	
	Mostly Neutral	1	33	14	3	51
		0.92	30.28	12.84	2.75	46.79
		1.96	64.71	27.45	5.88	
		33.33	44.59	50	75	
	Mostly positive	2	26	7	0	35
		1.83	23.85	6.42	0	32.11
		5.71	74.29	20	0	
		66.67	35.14	25	0	
	Total	3	74	28	4	109
		2.75	67.89	25.69	3.67	100

Frequency	Table of intent by v3						
Percent	intent	v3(v3)						
Row Pct		**Black**	**Coloured**	**Indian**	**White**	**Asian**	**Other**	**Total**
Col Pct								
	Mostly negative	3	3	2	14	1	0	23
		2.75	2.75	1.83	12.84	0.92	0	21.1
		13.04	13.04	8.7	60.87	4.35	0	
		16.67	60	16.67	19.72	50	0	
	Mostly Neutral	10	2	4	34	0	1	51
		9.17	1.83	3.67	31.19	0	0.92	46.79
		19.61	3.92	7.84	66.67	0	1.96	
		55.56	40	33.33	47.89	0	100	
	Mostly positive	5	0	6	23	1	0	35
		4.59	0	5.5	21.1	0.92	0	32.11
		14.29	0	17.14	65.71	2.86	0	
		27.78	0	50	32.39	50	0	
	Total	18	5	12	71	2	1	109
		16.51	4.59	11.01	65.14	1.83	0.92	100

Frequency	Table of intent by v4

Percent / Row Pct / Col Pct	intent	v4(v4)					
		0-R5000	R5001-R8000	R8001-10999	R11000-R19999	>R20000	Total
	Mostly negative	0	0	0	3	20	23
		0	0	0	2.75	18.35	21.1
		0	0	0	13.04	86.96	
		0	0	0	25	21.98	
	Mostly Neutral	1	2	1	8	39	51
		0.92	1.83	0.92	7.34	35.78	46.79
		1.96	3.92	1.96	15.69	76.47	
		50	100	50	66.67	42.86	
	Mostly positive	1	0	1	1	32	35
		0.92	0	0.92	0.92	29.36	32.11
		2.86	0	2.86	2.86	91.43	
		50	0	50	8.33	35.16	
	Total	2	2	2	12	91	109
		1.83	1.83	1.83	11.01	83.49	100

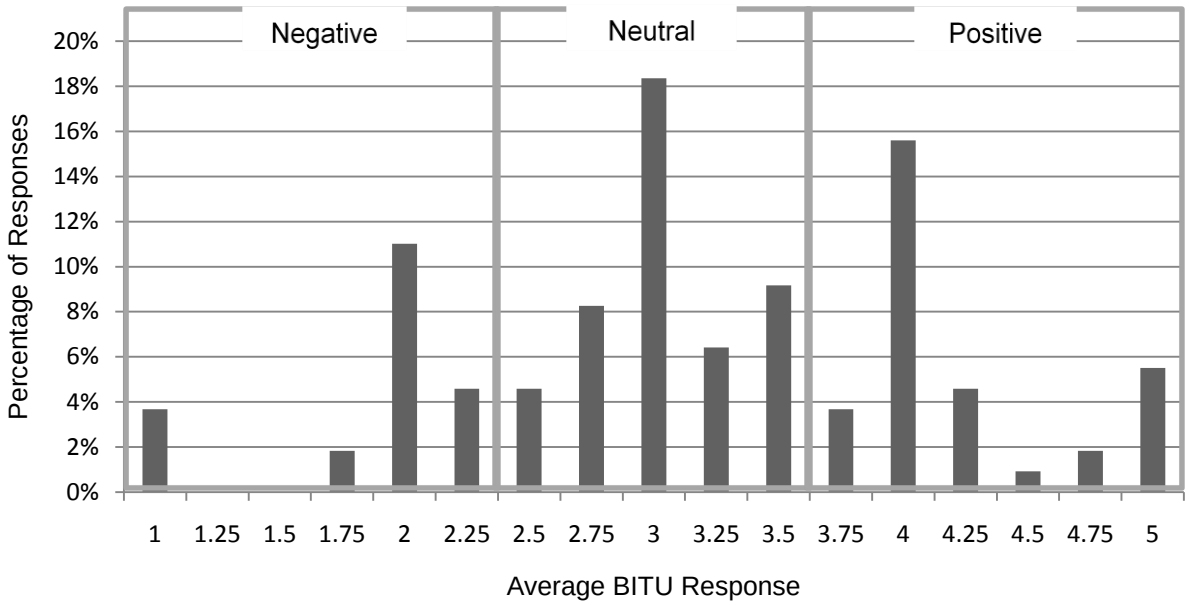
Frequency / Percent / Row Pct / Col Pct	Table of intent by v5						
	intent	v5(v5)					
		Matric	Tech Dip	Bachelors	Masters	Doctorate	Total
	Mostly negative	0	2	7	12	2	23
		0	1.83	6.42	11.01	1.83	21.1
		0	8.7	30.43	52.17	8.7	
		0	13.33	21.21	22.22	33.33	
	Mostly Neutral	1	8	15	25	2	51
		0.92	7.34	13.76	22.94	1.83	46.79
		1.96	15.69	29.41	49.02	3.92	
		100	53.33	45.45	46.3	33.33	
	Mostly positive	0	5	11	17	2	35
		0	4.59	10.09	15.6	1.83	32.11
		0	14.29	31.43	48.57	5.71	
		0	33.33	33.33	31.48	33.33	
	Total	1	15	33	54	6	109
		0.92	13.76	30.28	49.54	5.5	100

The information was restated in tabular format for ease of reference.

	Behavioural Intention to Use			
	Negative n=23 n (%)	Neutral n=51 n (%)	Positive n=35 n (%)	Total N=109 n (%)

Gender					
	male	13 (12)	24 (22)	25 (24)	63 (58)
	female	10 (9)	27 (25)	9 (8)	46 (42)
Age					
	18-24	0 (0)	1 (1)	2 (2)	3 (3)
	25-34	15 (14)	33 (30)	26 (24)	74 (68)
	35-49	7 (7)	14 (13)	7 (6)	28 (26)
	> 50	1 (1)	3 (3)	0 (0)	4 (4)
Race					
	Black	3 (3)	10 (9)	5 (5)	18 (17)
	Coloured	3 (3)	2 (2)	0 (0)	5 (5)
	Indian	2 (2)	4 (4)	6 (6)	12 (11)
	White	14 (13)	34 (31)	23 (21)	71 (65)
	Asian	1 (1)	0 (0)	1 (1)	2 (2)
	Other	0 (0)	1 (1)	0 (0)	1 (1)
Income Group					
	0 - R5,000	0 (0)	1 (1)	1 (1)	2 (2)
	R5,001 - R8,000	0 (0)	2 (2)	0 (0)	2 (2)
	R8,001 - R10,999	0 (0)	1 (1)	1 (1)	2 (2)
	R11,000 - R19,999	3 (3)	8 (7)	1 (1)	12 (11)
	> R20,000	20 (18)	39 (36)	32 (29)	91 (83)
Education Level					
	Matric	0 (0)	1 (1)	0 (0)	1 (1)
	Technikon Dip/Degree	2 (2)	8 (7)	5 (5)	15 (14)
	Bachelors Degree	7 (6)	15 (14)	11 (10)	33 (30)
	Masters	12 (11)	25 (23)	17 (16)	54 (50)
	Doctorate	2 (2)	2 (2)	2 (2)	6 (6)

5. BITU RESPONSES GRAPH



BITU	Frequency	Percentage Respondents	Cumulative Frequency	Cumulative Percent
1	4	3.67%	4	3.67%
1.25	0	0.00%	6	5.50%
1.5	0	0.00%	6	5.50%
1.75	2	1.83%	6	5.50%
2	12	11.01%	18	16.51%
2.25	5	4.59%	23	21.10%
2.5	5	4.59%	28	25.69%
2.75	9	8.26%	37	33.94%
3	20	18.35%	57	52.29%
3.25	7	6.42%	64	58.72%
3.5	10	9.17%	74	67.89%
3.75	4	3.67%	78	71.56%
4	17	15.60%	95	87.16%
4.25	5	4.59%	100	91.74%
4.5	1	0.92%	101	92.66%
4.75	2	1.83%	103	94.50%
5	6	5.50%	109	100.00%

6. DESCRIPTIVE STATISTICS OF RESPONSE FOR EACH CONSTRUCT

Variable: pe

Moments			
N	109	Sum Weights	109
Mean	3.46972477	Sum Observations	378.2
Std Deviation	0.64081901	Variance	0.410649
Skewness	-0.7995241	Kurtosis	1.02162694
Uncorrected SS	1356.6	Corrected SS	44.3500917
Coeff Variation	18.4688714	Std Error Mean	0.06137933

Basic Statistical Measures			
Location		Variability	
Mean	3.469725	Std Deviation	0.64082
Median	3.600000	Variance	0.41065
Mode	3.400000	Range	3.40000
		Interquartile Range	0.80000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	56.52921	Pr > |t|	<.0001
Sign	M	54.5	Pr >= |M|	<.0001
Signed Rank	S	2997.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.953138	Pr < W	0.0007
Kolmogorov-Smirnov	D	0.135577	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.254849	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	1.511644	Pr > A-Sq	<0.0050

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	4.8	50% Median	3.6
99%	4.6	25% Q1	3.2
95%	4.4	10%	2.6
90%	4.2	5%	2.2
75% Q3	4	1%	1.6
		0% Min	1.4

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
1.4	79	4.4	49
1.6	101	4.6	56
1.8	59	4.6	63
1.8	7	4.6	96
2.2	31	4.8	53

```
Stem Leaf                     #             Boxplot
  48 0                        1                |
  46 000                      3                |
  44 00                       2                |
  42 00000000                 8                |
  40 000000000000000         15          +-----+
  38 0000000000000           13          |     |
  36 000000000000000         15          *-----*
  34 00000000000000000       17          |  +  |
  32 0000000000              10          +-----+
  30 000000                   6                |
  28 00000000                 8                |
  26 000                      3                |
  24 00                       2                |
  22 00                       2                |
                     20
  18 00                       2                0
  16 0                        1                0
  14 0                        1                0
              ----+----+----+----+
Multiply Stem.Leaf by 10**-1
```

The UNIVARIATE Procedure

Variable: ee

Moments			
N	109	Sum Weights	109
Mean	3.65137615	Sum Observations	398
Std Deviation	0.7417382	Variance	0.55017556
Skewness	-0.9685418	Kurtosis	1.88145434

Uncorrected SS	1512.66667	Corrected SS	59.4189602
Coeff Variation	20.3139356	Std Error Mean	0.07104563

Basic Statistical Measures			
Location		Variability	
Mean	3.651376	Std Deviation	0.74174
Median	3.666667	Variance	0.55018
Mode	4.000000	Range	4.00000
		Interquartile Range	0.66667

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	51.3948	Pr > |t|	<.0001
Sign	M	54.5	Pr >= |M|	<.0001
Signed Rank	S	2997.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.927126	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.1596	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.427536	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	2.330855	Pr > A-Sq	<0.0050

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	5	50% Median	3.66667
99%	5	25% Q1	3.33333
95%	4.66667	10%	2.66667
90%	4.66667	5%	2.33333
75% Q3	4	1%	1.33333
		0% Min	1

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
1.00000	79	4.66667	90
1.33333	59	4.66667	96
1.33333	30	5.00000	14
2.00000	15	5.00000	63
2.33333	83	5.00000	93

```
Stem Leaf                                #              Boxplot
  50 000                                 3                  |
  48                                                        |
  46 7777777777                         10                  |
  44                                                        |
  42 33333333                            8                  |
 40 00000000000000000000000000          27             +-----+
 38                                                     |     |
 36 77777777777777777777                23             *--+--*
 34                                                     |     |
 32 33333333333333333                   17             +-----+
  30 00000000                            8                  |
  28                                                        |
  26 777777                              6                  |
  24                                                        |
  22 333                                 3                  |
 20 0                                   1
 18
 16
 14
  12 33                                  2                  *
  10 0                                   1                  *
                ----+----+----+----+----+--
               Multiply Stem.Leaf by 10**-1
```

The UNIVARIATE Procedure

Variable: ar

Moments			
N	109	Sum Weights	109
Mean	2.86697248	Sum Observations	312.5
Std Deviation	0.91702569	Variance	0.84093612
Skewness	-0.0290285	Kurtosis	-0.1854356
Uncorrected SS	986.75	Corrected SS	90.8211009
Coeff Variation	31.9858561	Std Error Mean	0.08783513

Basic Statistical Measures			
Location		Variability	
Mean	2.866972	Std Deviation	0.91703
Median	3.000000	Variance	0.84094
Mode	3.000000	Range	4.00000
		Interquartile Range	1.50000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	32.64038	Pr > |t|	<.0001
Sign	M	54.5	Pr >= |M|	<.0001
Signed Rank	S	2997.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.952492	Pr < W	0.0007
Kolmogorov-Smirnov	D	0.190697	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.481955	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	2.342898	Pr > A-Sq	<0.0050

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	5	50% Median	3
99%	5	25% Q1	2
95%	4.5	10%	1.5
90%	4	5%	1
75% Q3	3.5	1%	1
		0% Min	1

Extreme Observations

Lowest		Highest	
Value	Obs	Value	Obs
1	107	4.5	47
1	79	4.5	51
1	76	4.5	96
1	61	5.0	21
1	42	5.0	63

```
Stem Leaf                                    #             Boxplot
  50 00                                      2                |
  48                                                          |
  46                                                          |
  44 0000000                                 7                |
  42                                                          |
  40 0000000                                 7                |
  38                                                          |
  36                                                          |
  34 0000000000000000                       16             +-----+
  32                                                       |     |
  30 000000000000000000000000000000000000   37             *-----*
  28                                                       |  +  |
  26                                                       |     |
  24 0000000000                             10             |     |
  22                                                       |     |
  20 000000000000000000                     18             +-----+
  18                                                          |
  16                                                          |
  14 000000                                  6                |
  12                                                          |
  10 000000                                  6                |
              ----+----+----+----+----+----+----+--

                  Multiply Stem.Leaf by 10**-1
```

The UNIVARIATE Procedure

Variable: si

Moments			
N	109	Sum Weights	109
Mean	2.47018349	Sum Observations	269.25
Std Deviation	0.65060937	Variance	0.42329256
Skewness	0.64052272	Kurtosis	2.15273077
Uncorrected SS	710.8125	Corrected SS	45.7155963

Coeff Variation	26.3385039	Std Error Mean	0.06231708

Basic Statistical Measures			
Location		Variability	
Mean	2.470183	Std Deviation	0.65061
Median	2.500000	Variance	0.42329
Mode	2.500000	Range	3.75000
		Interquartile Range	0.75000

Note: The mode displayed is the smallest of 2 modes with a count of 20.

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	39.63895	Pr > |t|	<.0001
Sign	M	54.5	Pr >= |M|	<.0001
Signed Rank	S	2997.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.943985	Pr < W	0.0002
Kolmogorov-Smirnov	D	0.140907	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.285862	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	1.670784	Pr > A-Sq	<0.0050

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	4.75	50% Median	2.5
99%	4.75	25% Q1	2
95%	3.5	10%	1.75
90%	3.25	5%	1.5
75% Q3	2.75	1%	1
		0% Min	1

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
1.00	79	3.50	91
1.00	59	3.50	98
1.00	50	4.25	56
1.25	101	4.75	24
1.25	32	4.75	63

```
Stem Leaf                     #             Boxplot
  46 55                       2                0
44
  42 5                        1                0
40
38
36
  34 00000                    5                |
  32 55555                    5                |
  30 00000000                 8                |
  28                                           |
 26 55555555555555555555     20             +-----+
 24 00000000000000000000     20             *--+--*
 22 55555555555555555        17             |     |
 20 00000000000000000        17             +-----+
18                                             |
  16 555555                   6                |
  14 000                      3                |
  12 55                       2                |
  10 000                      3                |
                ----+----+----+----+
             Multiply Stem.Leaf by 10**-1
```

The UNIVARIATE Procedure

Variable: dc

Moments			
N	109	**Sum Weights**	109
Mean	2.81345566	**Sum Observations**	306.666667
Std Deviation	0.93451336	**Variance**	0.87331521
Skewness	0.15806275	**Kurtosis**	-0.4619886
Uncorrected SS	957.111111	**Corrected SS**	94.3180428
Coeff Variation	33.2158551	**Std Error Mean**	0.08951015

Basic Statistical Measures			
Location		**Variability**	
Mean	2.813456	**Std Deviation**	0.93451
Median	2.666667	**Variance**	0.87332
Mode	3.000000	**Range**	4.00000
		Interquartile Range	1.33333

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	31.4317	Pr > |t|	<.0001
Sign	M	54.5	Pr >= |M|	<.0001
Signed Rank	S	2997.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.974772	Pr < W	0.0362
Kolmogorov-Smirnov	D	0.099789	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.160608	Pr > W-Sq	0.0183
Anderson-Darling	A-Sq	0.945941	Pr > A-Sq	0.0176

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	5	50% Median	2.66667
99%	5	25% Q1	2
95%	4.33333	10%	1.66667
90%	4	5%	1.33333
75% Q3	3.33333	1%	1
		0% Min	1

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
1	79	4.33333	46
1	66	4.66667	42
1	59	4.66667	54
1	27	5.00000	43
1	25	5.00000	76

Stem	Leaf	#	Boxplot
50	00	2	|
48			|
46	77	2	|
44			|
42	3333	4	|
40	000000000000	12	|
38			|
36	77777	5	|
34			|

```
32 3333333333              10            +-----+
30 000000000000000000      19            |     |
28                                       |  +  |
26 777777777777            12            *-----*
24                                       |     |
22 3333333333333           13            |     |
20 0000000000000000        16            +-----+
18                                          |
16 777777                   6               |
14                                          |
12 333                      3               |
10 00000                    5               |
             ----+----+----+----+
          Multiply Stem.Leaf by 10**-1
```

The UNIVARIATE Procedure

Variable: in1

Moments			
N	109	**Sum Weights**	109
Mean	3.3058104	**Sum Observations**	360.333333
Std Deviation	0.77529822	**Variance**	0.60108733
Skewness	0.07030476	**Kurtosis**	-0.2823625
Uncorrected SS	1256.11111	**Corrected SS**	64.9174312
Coeff Variation	23.4525918	**Std Error Mean**	0.0742601

Basic Statistical Measures			
Location		**Variability**	
Mean	3.305810	**Std Deviation**	0.77530
Median	3.333333	**Variance**	0.60109
Mode	3.333333	**Range**	3.66667
		Interquartile Range	1.00000

Tests for Location: Mu0=0				
Test	**Statistic**		**p Value**	
Student's t	**t**	44.51664	**Pr > |t|**	<.0001
Sign	**M**	54.5	**Pr >= |M|**	<.0001
Signed Rank	**S**	2997.5	**Pr >= |S|**	<.0001

Tests for Normality				
Test	**Statistic**		**p Value**	
Shapiro-Wilk	**W**	0.978596	**Pr < W**	0.0764

Kolmogorov-Smirnov	**D**	0.101315	**Pr > D**	<0.0100
Cramer-von Mises	**W-Sq**	0.168776	**Pr > W-Sq**	0.0142
Anderson-Darling	**A-Sq**	0.925502	**Pr > A-Sq**	0.0195

Quantiles (Definition 5)			
Quantile	**Estimate**		
100% Max	5	**50% Median**	3.33333
99%	5	**25% Q1**	2.66667
95%	4.66667	**10%**	2.33333
90%	4.33333	**5%**	2
75% Q3	3.66667	**1%**	1.66667
		0% Min	1.33333

Extreme Observations			
Lowest		**Highest**	
Value	**Obs**	**Value**	**Obs**
1.33333	100	4.66667	107
1.66667	59	5.00000	43
2.00000	101	5.00000	49
2.00000	79	5.00000	86
2.00000	47	5.00000	94

```
Stem Leaf                  #          Boxplot
  50 0000                  4             |
  48                                     |
  46 777                   3             |
  44                                     |
  42 33333333              8             |
  40 00000000000           11            |
  38                                     |
 36 77777777777777777      17          +-----+
 34                                      |     |
 32 333333333333333333     21          *--+--*
 30 0000000000000          13            |     |
 28                                      |     |
 26 777777777777777        15          +-----+
  24                                     |
  22 3333333333            10            |
  20 00000                 5             |
  18                                     |
  16 7                     1             |
```

```
14                                      |
12 3                        1           |
          ----+----+----+----+-
Multiply Stem.Leaf by 10**-1
```

The UNIVARIATE Procedure

Variable: BITU

Moments			
N	109	Sum Weights	109
Mean	3.17431193	Sum Observations	346
Std Deviation	0.93696255	Variance	0.87789883
Skewness	-0.1035872	Kurtosis	-0.2571685
Uncorrected SS	1193.125	Corrected SS	94.8130734
Coeff Variation	29.5170284	Std Error Mean	0.08974474

Basic Statistical Measures			
Location		Variability	
Mean	3.174312	Std Deviation	0.93696
Median	3.000000	Variance	0.87790
Mode	3.000000	Range	4.00000
		Interquartile Range	1.50000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	35.37045	Pr > |t|	<.0001
Sign	M	54.5	Pr >= |M|	<.0001
Signed Rank	S	2997.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.971272	Pr < W	0.0185
Kolmogorov-Smirnov	D	0.096729	Pr > D	0.0134
Cramer-von Mises	W-Sq	0.150136	Pr > W-Sq	0.0236
Anderson-Darling	A-Sq	0.948879	Pr > A-Sq	0.0174

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	5	50% Median	3
99%	5	25% Q1	2.5

95%	5	**10%**	2
90%	4.25	**5%**	1.75
75% Q3	4	**1%**	1
		0% Min	1

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
1.00	101	5	24
1.00	79	5	41
1.00	59	5	56
1.00	25	5	86
1.75	31	5	96

```
Stem Leaf                     #             Boxplot
  50 000000                   6               |
  48                                          |
  46 55                       2               |
  44 0                        1               |
  42 55555                    5               |
  40 00000000000000000       17             +-----+
  38                                        |     |
  36 5555                     4             |     |
  34 0000000000              10             |     |
  32 5555555                  7             |     |
  30 000000000000000000000   20             *--+--*
  28                                        |     |
  26 555555555                9             |     |
  24 00000                    5             +-----+
  22 55555                    5               |
  20 000000000000            12               |
  18                                          |
  16 55                       2               |
  14                                          |
  12                                          |
  10 0000                     4               |
              ----+----+----+----+
           Multiply Stem.Leaf by 10**-1
```

The UNIVARIATE Procedure

Variable: pr

Moments			
N	109	Sum Weights	109
Mean	2.38990826	Sum Observations	260.5
Std Deviation	0.91124101	Variance	0.83036018
Skewness	0.52997186	Kurtosis	0.08320308
Uncorrected SS	712.25	Corrected SS	89.6788991
Coeff Variation	38.1287025	Std Error Mean	0.08728106

Basic Statistical Measures			
Location		Variability	
Mean	2.389908	Std Deviation	0.91124
Median	2.000000	Variance	0.83036
Mode	2.000000	Range	4.00000
		Interquartile Range	1.00000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	27.38175	Pr > |t|	<.0001
Sign	M	54.5	Pr >= |M|	<.0001
Signed Rank	S	2997.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.932131	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.206918	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.540452	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	2.807734	Pr > A-Sq	<0.0050

Quantiles (Definition 5)			
Quantile	Estimate		
100% Max	5	50% Median	2
99%	5	25% Q1	2
95%	4	10%	1
90%	3.5	5%	1
75% Q3	3	1%	1
		0% Min	1

Extreme Observations

Lowest		Highest	
Value	Obs	Value	Obs
1	103	4.0	73
1	79	4.0	107
1	67	4.5	17
1	60	5.0	63
1	59	5.0	96

```
Stem Leaf                                          #              Boxplot
  50 00                                            2                 0
48
46
  44 0                                             1                 |
  42                                                                 |
  40 000000                                        6                 |
  38                                                                 |
  36                                                                 |
  34 00000000                                      8                 |
  32                                                                 |
 30 00000000000000000000                          22              +-----+
 28                                                                 |     |
 26                                                                 |     |
 24 00000000000                                   11                |     |
 22                                                                 |  +  |
 20 0000000000000000000000000000000000000000      37              *-----*
18                                                                    |
 16                                                                   |
 14 000000000                                      9                 |
 12                                                                   |
 10 0000000000000                                 13                |
              ----+----+----+----+----+----+----+--
                  Multiply Stem.Leaf by 10**-1
```

7. FACTOR CATEGORISATION

Kaiser's Measure of Sampling Adequacy: Overall MSA = 0.72969817					
v10	**v11**	**v12**	**v13**	**v14**	**v15**
0.5951507	0.5839521	0.8193259	0.8185994	0.8337634	0.6928049
v16	**v17**	**v18**	**v19**	**v20**	**v21**
0.7950778	0.8397809	0.7397163	0.6968219	0.7236411	0.8165233
v22	**v23**	**v24**	**v25**	**v26**	**v27**
0.7499978	0.8080372	0.6004803	0.428735	0.7164569	0.667111
v28	**v29**	**v30**	**v31**	**v32**	
0.6513706	0.7073923	0.7529814	0.6979272	0.65644	

Eigenvalues of the Correlation Matrix: Total = 23 Average = 1				
	Eigenvalue	**Difference**	**Proportion**	**Cumulative**
1	5.307508	2.866177	0.2308	0.2308
2	2.441331	0.473314	0.1061	0.3369
3	1.968016	0.349563	0.0856	0.4225
4	1.618453	0.282115	0.0704	0.4928
5	1.336339	0.183397	0.0581	0.5509
6	1.152942	0.030506	0.0501	0.6011
7	1.122436	0.114545	0.0488	0.6499
8	1.007891	0.140515	0.0438	0.6937
9	0.867376	0.062458	0.0377	0.7314
10	0.804918	0.086857	0.035	0.7664
11	0.718061	0.055243	0.0312	0.7976
12	0.662818	0.109477	0.0288	0.8264
13	0.553341	0.042472	0.0241	0.8505
14	0.510869	0.023677	0.0222	0.8727
15	0.487192	0.015137	0.0212	0.8939
16	0.472055	0.062278	0.0205	0.9144
17	0.409777	0.050833	0.0178	0.9322
18	0.358944	0.071253	0.0156	0.9478
19	0.287691	0.010055	0.0125	0.9603
20	0.277636	0.021011	0.0121	0.9724
21	0.256625	0.063348	0.0112	0.9836
22	0.193277	0.008773	0.0084	0.992
23	0.184504		0.008	1

8. Factor Analysis

8 factors will be retained by the MINEIGEN criterion.

Rotated Factor Pattern									
		Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
v13	v13	0.74332	0.19168	0.12975	0.10865	0.10442	0.10415	0.02030	0.05065
v14	v14	0.66299	0.05931	0.16606	0.22855	-0.05493	0.14891	0.00505	-0.07325
v15	v15	0.65786	0.07101	-0.17335	-0.00620	-0.04478	0.06021	-0.17291	0.40070
v12	v12	0.61164	0.23368	0.20748	0.17555	0.26863	0.07400	-0.09154	0.06204
v16	v16	0.60794	-0.16809	-0.03420	0.10427	0.13537	0.19127	0.26320	-0.16430
v28	v28	0.02670	0.88060	0.07158	-0.06240	0.12697	0.12905	0.03364	-0.06859
v27	v27	0.05204	0.83561	0.10146	0.12283	-0.00071	0.01485	-0.00993	0.18503
v26	v26	0.20293	0.76145	0.02550	0.01095	0.04001	-0.01066	0.12131	-0.21467
v29	v29	-0.03165	0.12968	0.83426	0.17938	0.05151	0.08468	0.08863	-0.18568
v30	v30	0.17419	0.06902	0.75949	-0.00907	-0.12432	0.16279	-0.00298	0.11285
v31	v31	0.09688	0.02270	0.73825	0.24511	0.16872	-0.02818	-0.09241	0.14673
v19	v19	0.14634	0.06587	0.22575	0.81536	-0.00140	-0.05694	0.00357	-0.21748
v18	v18	0.14736	0.00185	0.00664	0.74657	0.05470	0.24854	0.11758	0.33715
v17	v17	0.45323	0.09783	0.29522	0.60006	0.09672	0.01262	-0.03624	-0.01438
v23	v23	0.40167	-0.21309	0.09845	0.41025	0.17255	0.36868	-0.07761	0.17439
v11	v11	0.20041	0.08725	0.10530	-0.00813	0.89904	-0.01927	0.08336	-0.03204
v10	v10	0.02219	0.07708	-0.05126	0.11241	0.82013	0.29673	0.07266	0.02788
v20	v20	0.13405	0.22923	0.06627	-0.01711	0.06236	0.79570	0.02071	-0.04203
v21	v21	0.22415	-0.12497	0.08518	0.24802	0.22957	0.59918	-0.04783	0.09578
v22	v22	0.27760	0.07283	0.25247	-0.02813	0.02960	0.47897	0.01442	-0.45559
v25	v25	0.08766	-0.03393	0.07098	0.00290	0.00881	-0.16148	0.86892	0.02642
v24	v24	-0.15732	0.30812	-0.08576	0.05247	0.19074	0.24796	0.66988	0.07393
v32	v32	0.19460	-0.08893	0.45672	0.03471	0.02409	0.03107	0.18234	0.64838

Variance Explained by Each Factor							
Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
2.9200145	2.4541115	2.4105304	2.0470306	1.7882365	1.7297735	1.4136682	1.1915501

Final Communality Estimates: Total = 15.954915					
v10	v11	v12	v13	v14	v15
0.788416	0.87556	0.592447	0.642636	0.55347	0.664002
v16	v17	v18	v19	v20	
0.561063	0.673252	0.771393	0.792084	0.71442	
v21	v22	v23	v24	v25	v26

0.557814	0.584953	0.58687	0.681862	0.795749	0.684266
v27	**v28**	**v29**	**v30**	**v31**	**v32**
0.760894	0.823806	0.798148	0.66672	0.674324	0.710765

9. CONSTRUCT RELIABILITY CALCULATIONS

Cronbach alpha: Behavioural Intention to Use

The CORR Procedure

4 Variables:	v6 v7 v8 v9

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
v6	109	3.11927	1.01584	340.00000	1.00000	5.00000	v6
v7	109	3.01835	1.06268	329.00000	1.00000	5.00000	v7
v8	109	3.22018	0.94632	351.00000	1.00000	5.00000	v8
v9	109	3.33945	1.05602	364.00000	1.00000	5.00000	v9

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.937318
Standardized	0.938208

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
v6	0.871368	0.911651	0.869887	0.913855	v6
v7	0.875885	0.910229	0.876685	0.911662	v7
v8	0.857473	0.917489	0.857086	0.917964	v8
v9	0.807237	0.932799	0.809161	0.933123	v9

Pearson Correlation Coefficients, N = 109
Prob > |r| under H0: Rho=0

	v6	v7	v8	v9
v6	1.00000	0.88141	0.78151	0.74736
v6		<.0001	<.0001	<.0001
v7	0.88141	1.00000	0.80620	0.73698
v7	<.0001		<.0001	<.0001
v8	0.78151	0.80620	1.00000	0.79547
v8	<.0001	<.0001		<.0001
v9	0.74736	0.73698	0.79547	1.00000

v9	<.0001	<.0001	<.0001	

Cronbach alpha: Performance Expectancy

The CORR Procedure

5 Variables:	v12 v13 v14 v15 v16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
v12	109	3.54128	0.98631	386.00000	1.00000	5.00000	v12
v13	109	3.55963	1.04022	388.00000	1.00000	5.00000	v13
v14	109	3.84404	0.87321	419.00000	1.00000	5.00000	v14
v15	109	3.39450	0.77002	370.00000	1.00000	5.00000	v15
v16	109	3.00917	0.82210	328.00000	1.00000	5.00000	v16

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.752478
Standardized	0.748000

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
v12	0.566764	0.690080	0.556926	0.686928	v12
v13	0.647680	0.655453	0.638092	0.655658	v13
v14	0.543646	0.699627	0.536085	0.694741	v14
v15	0.401194	0.746220	0.400957	0.743312	v15
v16	0.439946	0.734774	0.439171	0.729938	v16

Pearson Correlation Coefficients, N = 109
Prob > |r| under H0: Rho=0

	v12	v13	v14	v15	v16
v12	1.00000	0.55937	0.34620	0.28924	0.40491
v12		<.0001	0.0002	0.0023	<.0001
v13	0.55937	1.00000	0.56589	0.34605	0.31877
v13	<.0001		<.0001	0.0002	0.0007

v14	0.34620	0.56589	1.00000	0.31268	0.32447
v14	0.0002	<.0001		0.0009	0.0006
v15	0.28924	0.34605	0.31268	1.00000	0.25751
v15	0.0023	0.0002	0.0009		0.0069
v16	0.40491	0.31877	0.32447	0.25751	1.00000
v16	<.0001	0.0007	0.0006	0.0069	

Cronbach alpha: Effort Expectancy

The CORR Procedure

3 Variables:	v17 v18 v19

Simple Statistics							
Variable	**N**	**Mean**	**Std Dev**	**Sum**	**Minimum**	**Maximum**	**Label**
v17	109	3.91743	0.84029	427.00000	1.00000	5.00000	v17
v18	109	3.51376	0.99643	383.00000	1.00000	5.00000	v18
v19	109	3.52294	0.90877	384.00000	1.00000	5.00000	v19

Cronbach Coefficient Alpha	
Variables	**Alpha**
Raw	0.735152
Standardized	0.739494

Cronbach Coefficient Alpha with Deleted Variable					
Deleted Variable	**Raw Variables**		**Standardized Variables**		**Label**
	Correlation with Total	**Alpha**	**Correlation with Total**	**Alpha**	
v17	0.584726	0.625714	0.586535	0.627536	v17
v18	0.530410	0.691387	0.530851	0.692774	v18
v19	0.571130	0.634439	0.575474	0.640717	v19

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0			
	v17	**v18**	**v19**
v17	1.00000	0.47136	0.52996
v17		<.0001	<.0001
v18	0.47136	1.00000	0.45723

v18	<.0001		<.0001
v19	0.52996	0.45723	1.00000
v19	<.0001	<.0001	

Cronbach alpha: Social Influence

The CORR Procedure

4 Variables:	v20 v21 v22 v23

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
v20	109	2.16514	0.95756	236.00000	1.00000	5.00000	v20
v21	109	2.48624	0.94883	271.00000	1.00000	5.00000	v21
v22	109	2.31193	1.05143	252.00000	1.00000	5.00000	v22
v23	109	2.91743	0.80655	318.00000	1.00000	5.00000	v23

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.629875
Standardized	0.636672

Cronbach Coefficient Alpha with Deleted Variable					
Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
v20	0.392349	0.572950	0.384108	0.590343	v20
v21	0.469396	0.515949	0.488690	0.514643	v21
v22	0.363060	0.601102	0.359651	0.607255	v22
v23	0.430472	0.552768	0.435323	0.553965	v23

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0				
	v20	**v21**	**v22**	**v23**
v20	1.00000	0.29807	0.33462	0.22163
v20		0.0016	0.0004	0.0206
v21	0.29807	1.00000	0.24566	0.50062
v21	0.0016		0.0100	<.0001
v22	0.33462	0.24566	1.00000	0.22719
v22	0.0004	0.0100		0.0175
v23	0.22163	0.50062	0.22719	1.00000
v23	0.0206	<.0001	0.0175	

Cronbach alpha: Discrimination Concerns

The CORR Procedure

3 Variables:	v26 v27 v28

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
v26	109	2.59633	1.14762	283.00000	1.00000	5.00000	v26
v27	109	3.09174	1.07618	337.00000	1.00000	5.00000	v27
v28	109	2.75229	1.05546	300.00000	1.00000	5.00000	v28

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.815025
Standardized	0.817482

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
v26	0.601964	0.815517	0.602910	0.815608	v26
v27	0.631199	0.780968	0.636477	0.782634	v27
v28	0.776854	0.634007	0.777858	0.634901	v28

Pearson Correlation Coefficients, N = 109
Prob > |r| under H0: Rho=0

	v26	v27	v28
v26 v26	1.00000	0.46509 <.0001	0.64289 <.0001
v27 v27	0.46509 <.0001	1.00000	0.68863 <.0001
v28 v28	0.64289 <.0001	0.68863 <.0001	1.00000

Innovativeness

The CORR Procedure

3 Variables:	v29 v30 v31

Simple Statistics							
Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
v29	109	2.77982	1.04844	303.00000	1.00000	5.00000	v29
v30	109	3.98165	0.69364	434.00000	2.00000	5.00000	v30
v31	109	3.15596	1.06436	344.00000	1.00000	5.00000	v31

Cronbach Coefficient Alpha	
Variables	Alpha
Raw	0.747692
Standardized	0.760360

Cronbach Coefficient Alpha with Deleted Variable					
Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
v29	0.630002	0.599543	0.626847	0.637556	v29
v30	0.548094	0.726383	0.548251	0.726435	v30
v31	0.606649	0.633466	0.598756	0.669925	v31

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0			
	v29	v30	v31
v29	1.00000	0.50367	0.57040
v29		<.0001	<.0001
v30	0.50367	1.00000	0.46795
v30	<.0001		<.0001
v31	0.57040	0.46795	1.00000
v31	<.0001	<.0001	

Correlations Perceived Risk

The CORR Procedure

2 Variables:	v10 v11

Simple Statistics							
Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label

v10	109	2.41284	1.00195	263.00000	1.00000	5.00000	v10
v11	109	2.36697	1.00610	258.00000	1.00000	5.00000	v11

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0		
	v10	**v11**
v10 v10	1.00000	0.64743 <.0001
v11 v11	0.64743 <.0001	1.00000

Correlations Anticipated Regret

The CORR Procedure

2 Variables:	v24 v25

Simple Statistics							
Variable	**N**	**Mean**	**Std Dev**	**Sum**	**Minimum**	**Maximum**	**Label**
v24	109	2.35780	1.06739	257.00000	1.00000	5.00000	v24
v25	109	3.37615	1.17685	368.00000	1.00000	5.00000	v25

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0		
	v24	**v25**
v24 v24	1.00000	0.33413 0.0004
v25 v25	0.33413 0.0004	1.00000

10. CORRELATION ANALYSIS

The CORR Procedure

13 Variables:	pe ee ar si dc in1 eeda arda sida in1da BITU pr prda

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
pe	109	3.46972	0.64082	378.20000	1.40000	4.80000
ee	109	3.65138	0.74174	398.00000	1.00000	5.00000
ar	109	2.86697	0.91703	312.50000	1.00000	5.00000
si	109	2.47018	0.65061	269.25000	1.00000	4.75000
dc	109	2.81346	0.93451	306.66667	1.00000	5.00000
in1	109	3.30581	0.77530	360.33333	1.33333	5.00000
eeda	109	1.00306	1.62320	109.33333	0	4.66667
arda	109	0.84404	1.39725	92.00000	0	4.50000
sida	109	0.69954	1.13996	76.25000	0	3.50000
in1da	109	0.93578	1.50546	102.00000	0	4.66667
BITU	109	3.17431	0.93696	346.00000	1.00000	5.00000
pr	109	2.38991	0.91124	260.50000	1.00000	5.00000
prda	109	0.61468	1.03108	67.00000	0	4.00000

Pearson Correlation Coefficients, N = 109
Prob > |r| under H0: Rho=0

	pe	ee	ar	si	dc	in1	eeda	arda	sida	in1da	BITU	pr	prda

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0													
	pe	**ee**	**ar**	**si**	**dc**	**in1**	**eeda**	**arda**	**sida**	**in1da**	**BITU**	**pr**	**prda**
pe	1.00000	0.47888 <.0001	0.02381 0.8059	0.49917 <.0001	0.22704 0.0176	0.25736 0.0069	0.04252 0.6607	-0.07668 0.4281	0.05112 0.5975	-0.01323 0.8914	0.72056 <.0001	0.27173 0.0043	-0.00100 0.9917
ee	0.47888 <.0001	1.00000	0.06278 0.5167	0.38918 <.0001	0.12943 0.1798	0.39285 <.0001	-0.03841 0.6917	-0.22716 0.0175	-0.08853 0.3600	-0.12711 0.1878	0.48461 <.0001	0.19841 0.0386	-0.16113 0.0942
ar	0.02381 0.8059	0.06278 0.5167	1.00000	0.03209 0.7405	0.19407 0.0432	0.03821 0.6932	-0.01839 0.8495	0.17877 0.0629	-0.04855 0.6161	0.00158 0.9870	-0.03338 0.7304	0.19561 0.0415	0.02118 0.8270
si	0.49917 <.0001	0.38918 <.0001	0.03209 0.7405	1.00000	0.14686 0.1275	0.29053 0.0022	0.00228 0.9812	-0.14394 0.1354	0.06662 0.4913	-0.03270 0.7357	0.58484 <.0001	0.33410 0.0004	-0.05007 0.6051
dc	0.22704 0.0176	0.12943 0.1798	0.19407 0.0432	0.14686 0.1275	1.00000	0.17318 0.0717	-0.00912 0.9250	-0.00003 0.9997	-0.02268 0.8149	-0.01591 0.8696	0.05510 0.5693	0.17319 0.0717	0.02881 0.7661
in1	0.25736 0.0069	0.39285 <.0001	0.03821 0.6932	0.29053 0.0022	0.17318 0.0717	1.00000	-0.03182 0.7426	-0.09802 0.3106	-0.03738 0.6996	0.02403 0.8041	0.42836 <.0001	0.11581 0.2304	-0.05972 0.5373
eeda	0.04252	-	-	0.00228	-	-	1.00000	0.89089	0.97002	0.96546	-	-	0.90803

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0													
	pe	**ee**	**ar**	**si**	**dc**	**in1**	**eeda**	**arda**	**sida**	**in1da**	**BITU**	**pr**	**prda**
	0.6607	0.03841 0.6917	0.01839 0.8495	0.9812	0.00912 0.9250	0.03182 0.7426		<.0001	<.0001	<.0001	0.10132 0.2945	0.18757 0.0508	<.0001
arda	-0.07668 0.4281	-0.22716 0.0175	0.17877 0.0629	-0.14394 0.1354	-0.00003 0.9997	-0.09802 0.3106	0.89089 <.0001	1.00000	0.86481 <.0001	0.90931 <.0001	-0.20537 0.0322	-0.18633 0.0524	0.88500 <.0001
sida	0.05112 0.5975	-0.08853 0.3600	-0.04855 0.6161	0.06662 0.4913	-0.02268 0.8149	-0.03738 0.6996	0.97002 <.0001	0.86481 <.0001	1.00000	0.95576 <.0001	-0.06267 0.5174	-0.18144 0.0590	0.90597 <.0001
in1da	-0.01323 0.8914	-0.12711 0.1878	0.00158 0.9870	-0.03270 0.7357	-0.01591 0.8696	0.02403 0.8041	0.96546 <.0001	0.90931 <.0001	0.95576 <.0001	1.00000	-0.13531 0.1607	-0.18519 0.0539	0.91645 <.0001
BITU	0.72056 <.0001	0.48461 <.0001	-0.03338 0.7304	0.58484 <.0001	0.05510 0.5693	0.42836 <.0001	-0.10132 0.2945	-0.20537 0.0322	-0.06267 0.5174	-0.13531 0.1607	1.00000	0.31007 0.0010	-0.10475 0.2784
pr	0.27173 0.0043	0.19841 0.0386	0.19561 0.0415	0.33410 0.0004	0.17319 0.0717	0.11581 0.2304	-0.18757 0.0508	-0.18633 0.0524	-0.18144 0.0590	-0.18519 0.0539	0.31007 0.0010	1.00000	-0.04064 0.6748
prda	-0.00100	-0.16113	0.02118	-0.05007	0.02881	-0.05972	0.90803	0.88500	0.90597	0.91645	-0.10475	-0.04064	1.00000

Pearson Correlation Coefficients, N = 109 Prob > |r| under H0: Rho=0													
	pe	**ee**	**ar**	**si**	**dc**	**in1**	**eeda**	**arda**	**sida**	**in1da**	**BITU**	**pr**	**prda**
	0.9917	0.0942	0.8270	0.6051	0.7661	0.5373	<.0001	<.0001	<.0001	<.0001	0.2784	0.6748	

11. STEPWISE REGRESSION

The STEPWISE Procedure

Model: MODEL1

Dependent Variable: BITU

Number of Observations Read	109
Number of Observations Used	109

Stepwise Selection: Step 1

Variable pe Entered: R-Square = 0.5192 and C(p) = 44.3071

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	49.22757	49.22757	115.55	<.0001
Error	107	45.58551	0.42603		
Corrected Total	108	94.81307			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	-0.48123	0.34577	0.82523	1.94	0.1669
pe	1.05355	0.09801	49.22757	115.55	<.0001

Bounds on condition number: 1, 1

Stepwise Selection: Step 2

Variable si Entered: R-Square = 0.5867 and C(p) = 25.3388

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	55.62947	27.81473	75.24	<.0001
Error	106	39.18361	0.36966		
Corrected Total	108	94.81307			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	-0.78861	0.33044	2.10538	5.70	0.0188
pe	0.83468	0.10536	23.19942	62.76	<.0001
si	0.43187	0.10378	6.40190	17.32	<.0001

Bounds on condition number: 1.3319, 5.3275

Stepwise Selection: Step 3

Variable in1 Entered: R-Square = 0.6287 and C(p) = 14.2929

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	3	59.61256	19.87085	59.27	<.0001
Error	105	35.20052	0.33524		
Corrected Total	108	94.81307			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	-1.32223	0.35070	4.76535	14.21	0.0003
pe	0.78739	0.10127	20.26592	60.45	<.0001
si	0.36467	0.10073	4.39350	13.11	0.0005
in1	0.26128	0.07580	3.98309	11.88	0.0008

Bounds on condition number: 1.3837, 11.559

Stepwise Selection: Step 4

Variable dc Entered: R-Square = 0.6503 and C(p) = 9.6088

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	4	61.65332	15.41333	48.34	<.0001
Error	104	33.15976	0.31884		
Corrected Total	108	94.81307			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	-1.12065	0.35118	3.24689	10.18	0.0019
pe	0.82886	0.10011	21.85490	68.54	<.0001
si	0.36878	0.09825	4.49205	14.09	0.0003
dc	-0.15220	0.06016	2.04076	6.40	0.0129
in1	0.28322	0.07443	4.61671	14.48	0.0002

Bounds on condition number: 1.3942, 19.907

Stepwise Selection: Step 5

Variable in1da Entered: R-Square = 0.6666 and C(p) = 6.5489

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	63.19817	12.63963	41.18	<.0001
Error	103	31.61490	0.30694		
Corrected Total	108	94.81307			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	-1.04184	0.34635	2.77738	9.05	0.0033
pe	0.82919	0.09823	21.87210	71.26	<.0001
si	0.36098	0.09646	4.29845	14.00	0.0003
dc	-0.15435	0.05903	2.09835	6.84	0.0103
in1	0.28922	0.07308	4.80775	15.66	0.0001
in1da	-0.07955	0.03546	1.54486	5.03	0.0270

Bounds on condition number: 1.3942, 29.914

Stepwise Selection: Step 6

Variable prda Entered: R-Square = 0.6797 and C(p) = 4.4798

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	64.44051	10.74008	36.07	<.0001
Error	102	30.37257	0.29777		
Corrected Total	108	94.81307			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	-1.08495	0.34179	3.00049	10.08	0.0020
pe	0.81574	0.09697	21.07106	70.76	<.0001
si	0.36785	0.09507	4.45788	14.97	0.0002
dc	-0.17073	0.05869	2.51945	8.46	0.0045
in1	0.32311	0.07387	5.69788	19.14	<.0001
in1da	-0.24907	0.09004	2.27834	7.65	0.0067
prda	0.26919	0.13179	1.24233	4.17	0.0437

Bounds on condition number: 6.6973, 110.59

Variable	TOL	VIF
Intercept		
pe	0.71398	1.40061

si	0.72066	1.38762
dc	0.91641	1.09121
in1	0.84070	1.18949
in1da	0.15004	6.66486
prda	0.14931	6.69729

All variables left in the model are significant at the 0.1500 level.