MODELLING INVESTOR BEHAVIOUR IN THE SOUTH AFRICAN CONTEXT

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DECLARATION

I declare that:

"MODELLING INVESTOR BEHAVIOUR IN THE SOUTH AFRICAN CONTEXT"

is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references, and that this dissertation has not previously been submitted by me for a degree at any other university.

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Z Dickason

October 2017

Vanderbijlpark

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To whom it may concern

This is to confirm that I, the undersigned, have language edited the **thesis** of

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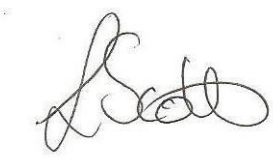
The responsibility of implementing the recommended language changes rests with the author of the thesis.

Yours truly,



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ABSTRACT

Key terms: behavioural finance, investor behaviour, factors influencing investment decisions, survey of consumer finances (SCF), satisfaction with life scale (SWL); domain-specific risk-taking scale (DOSPERT); Grable and Lytton risk tolerance scale (GL-RTS)

Modelling investor behaviour in the South African context is important for investment companies to profile their clients. Investor profiles include elements of risk tolerance and investor personalities; however, from this study it is important to include elements of behavioural finance as well. Historically, it was believed that investors make rational investment decisions, but as concluded from this study, it is evident that investors make irrational investment decisions. Irrational behaviour of investors includes behavioural finance biases such as representativeness bias, overconfidence bias, anchoring bias, gambler's fallacy, availability bias, loss aversion, regret aversion, mental accounting bias and self-control bias.

In order to profile investors accurately, behavioural finance elements should be added to existing measures of risk tolerance levels and investor personalities. From the theoretical and empirical objectives, an insight was provided in investor behaviour. The theoretical objectives illustrated an in-depth analysis of risk tolerance; different investor personalities were described; origin of behavioural finance was discussed and a theoretical framework was contextualised. From the theoretical objectives it can be concluded that socioeconomic factors influence the risk tolerance level investors are willing to take. Moreover, behavioural finance biases are influencing investor behaviour.

The primary objective of this study was to construct an investor behaviour profiling model by linking each behavioural finance bias to a specific level of risk tolerance. The research design consisted of a literature review and an empirical study by applying a quantitative approach and positivistic paradigm. The target population was investors in South Africa and the sampling method that was applied, was a convenience sampling method to obtain an unbiased sample.

The research instrument was a self-administered questionnaire that was distributed to over 200 000 participants of an investment company. Demographic questions were asked related to province of origin, mother-tongue language, gender, ethnic group, and age. The questionnaire

also consisted of the following scales: survey of consumer finances (SCF); behavioural finance; satisfaction with life scale (SWL); domain-specific risk-taking scale (DOSPERT) and Grable and Lytton risk tolerance scale (GL-RTS).

The results from the study indicated that if an investor has a low to medium risk tolerance level, this investor might be subject towards the representativeness bias, anchoring bias, loss aversion, overconfidence bias, gambler's fallacy, availability bias, regret aversion, self-control bias or mental accounting bias. As a result, behavioural finance biases can potentially influence the investment choices of an investor and ultimately the risk tolerance level of investors.

The findings were utilised to develop a model to determine which behavioural finance biases are subject towards a specific level of risk tolerance. As a result, these findings will make a significant contribution towards the way financial investment companies profile their clients. By implementing this investor profile model, investment companies are given the opportunity to profile their clients more accurately according to the type of bias they are influenced by and the level of risk this type of investor will be willing to tolerate. A more accurate investor profile will lead to the achievement of the investor's desired financial position.

Future research can contribute to determine whether the type of assets investors invest in influences irrational investor behaviour and decisions. If investors invest in specific assets in an asset portfolio, those investments might have an influence on behavioural finance.

LIST OF ABBREVIATIONS

EMH	Efficient market hypothesis
SCF	Survey of consumer finances
SWL	Satisfaction with life
DOSPERT	Domain-specific risk-taking scale
GL-RTS	Grable and Lytton risk tolerance scale
EU	Expected utility
BPT	Behavioural portfolio theory
MPT	Modern portfolio theory
BPT-SA	Behavioural portfolio theory – single mental account
SP/A	Security potential/aspiration
BPT-MA	Behavioural portfolio theory – multiple mental account
EUT	Expected utility theory
SPSS	Statistical package for the social studies
LRM	Linear regression model
ANOVA	Analysis of variance

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CHAPTER 1: INTRODUCTION

"An investment in knowledge pays the best interest"

- Benjamin Franklin

1.1 INTRODUCTION

Chaudhary (2013) confirmed that investors and markets do not always operate in a rational manner. Classical investment theories assume that investors aim towards maximising return during acts of rational and irrational behaviour. Investor behaviour affects the financial wellbeing of individual investors in terms of market focus areas and the interpretation of and acting upon information posed to them.

There are two investing paradigms; the first one is the efficient market hypothesis (EMH). Fama (1965) established the theory in the 1960s and stated that efficiency is based on strong, semi-strong and weak-forms of efficient market hypothesis. Authors such as Clarke *et al.* (2001:1) and Gupta *et al*. (2014:56) argue that an efficient market is a market where prices always fully reflect available information with regards to stock prices.

The EMH suggests that investors who invest in stock markets have rational expectations where prices are predictable, thereby maintaining that all investing decisions are based on rational attitudes. The EMH theory has expanded from stock market to the efficiency of funding and human resources, prediction, dividends and portfolio management (Clarke *et al.*, 2001:1; Gupta *et al*., 2014:56).

The opposite is also true. When investors act irrationally, make random decisions, equilibrium prices may deviate. Irrationality is the opposite of rationality and occurs when an investor makes non-optimal choices when investing money. Investors do not always act rationally (Chaudhary, 2013:1). Rationality in economics is viewed when an individual chooses one of the most advantageous options, given their preferences, in their perceived opportunity set (Vriend, 1996:268-269). Moreover, Vriend (1996:269) stated that all apparent costs and benefits are accounted for in terms of information, transaction and decision-making costs.

The second paradigm is the theory of behavioural finance that originated due to inefficiencies in the market and irrational behaviour of investors (Chaudhary, 2013:1). Behavioural finance attempts to understand the reasoning of investors during the decision-making process. The phenomenon of behavioural finance originated due to inefficiencies in the market and irrational behaviour of investors. The focus of behavioural finance is one of the reasons why individuals take certain actions in the market and to determine why markets behave contrary to expectations. The focus is on investor market behaviour that is based on human behavioural, psychological and sociological attitudes that will lead to successful and profitable investing (Malloy, 2011:9; Chaudhary, 2013:2; Gupta *et al*., 2014:56). Sewell (2005:1) states that behavioural finance is the "influence of psychology on the behaviour of financial practitioners and the subsequent effect on markets". Psychologists such as Kahneman and Tversky (1979:263-291) found in their research that heuristics and biases affect investors' decision-making and formulated the prospect theory in 1979.

1.2 PROBLEM STATEMENT

Traditional finance theories view investors as rational; however, Singh (2012:116-122) challenged this view by stating that cognitive psychology views investors as irrational decision makers. Investors make decisions based on emotions and logic (Chaudhary, 2013:1) and not only on available information as stated under the EMH. Jagongo and Mutswenje (2014:92-102) argue that behavioural finance is not only based on psychology but also on sociology (Malloy, 2011:9; Chaudhary, 2013:2). Thus, behavioural finance challenges efficient market theories by stating that markets can be inefficient due to human irrationality (Shleifer, 2000:11).

The central problem statement of the study is formulated against the framework of the preceding introduction and rationale. Investment companies in South Africa treat investors as rational due to their measurement instrument that mainly incorporates risk tolerance and risk personalities. The measurements used by South African investment companies are compiled based on institutional intellect in terms of rational investor behaviour (Di Dottorato, 2013:47).

As a result, investment companies make no provision for testing irrational behaviour in South Africa. Moreover, investors are irrational as per behavioural finance evidence and this component should be included in the measurements to get an accurate profile for the potential

investor. This study aimed to model investor behaviour based on academic intellect to measure risk tolerance, risk personalities and behavioural finance (Envestnet, 2014:2).

1.3 OBJECTIVES OF THE STUDY

The objectives of the study consist of primary, theoretical and empirical objectives.

1.3.1 Primary objective

The primary objective for this study was to develop a model against which investment companies could profile their clients more accurately by adding behavioural finance elements to existing measures of risk tolerance. To achieve the primary objective, the researcher formulated theoretical and empirical objectives.

1.3.2 Theoretical objectives

The following theoretical objectives were formulated:

- Provide an in-depth analysis of risk tolerance;
- Differentiate between the different investor personalities;
- Analyse the reasons for the origin of behavioural finance; and
- Contextualise theoretical framework for investor behaviour.

1.3.3 Empirical objectives

The empirical portion of this study included the following objectives:

- Determine the risk personalities of the sample;
- Determine the level of risk tolerance for the sample;
- Analyse the effect of demographical factors on satisfaction with life;
- Report the effect of demographical factors on risk tolerance;
- Analyse the potential link between risk tolerance and investor personalities;
- Develop a link between risk tolerance, investor personality and behavioural finance; and
- Construct a model to profile investor behaviour considering behavioural finance and risk tolerance.

1.4. RESEARCH DESIGN AND METHODOLOGY

The study comprises a literature review and an empirical study and the researcher followed a quantitative approach by applying the positivistic paradigm as it challenges the traditional notion of "the absolute truth of knowledge" (Phillips & Burbules, 2000:15; Henning, *et al.*, 2004:17; Walliman, 2011:21). Positivism is concerned with human behaviour that is passive, controlled and determined by the external environment, based on realism. Researchers applying the positivistic approach use scientific methods (quantification) to measure all phenomena.

1.4.1 Literature review

The literature study focused on the different classification types of investors and the behavioural finance theories (causes of market inefficiencies that led to the existence of behavioural finance). This theory considers previous research on focus areas in both South Africa and abroad. The researcher consulted literature sources from national and international databases, such as books, journals and reports.

1.4.2 Empirical study

The empirical portion of this study comprised the following methodological dimensions:

1.4.2.1 Target population and sampling frame

The target population identified for this study is investors within South Africa. The sampling frame consisted of a convenience sample of a South African investment company. The researcher chose an investment company in South Africa that obtains funds from investors and provides professional management services, thereby fulfilling its business goals such as investing funds for returns from capital appreciation; investment income; asset management; stockbroking; trusts; wills; estate planning; and group and short-term insurance.

1.4.2.2 Sample, sample method and sample size

The researcher applied a convenience sampling method. This was done to obtain an unbiased sample. Convenience sampling is a "kind of non-probability or non-random sampling in which members of the target population are selected for the study if they meet certain practical criteria" (Dörnyei, 2007:787-792). This relates to criteria such as geographical proximity, easy

accessibility and participants' willingness to participate in the study. The selection criteria of convenience sample, therefore, have been based solely on the ease of obtaining a sample (Lavrakas, 2008:149). The choice of investors in South Africa, the clients of whom to include in the research was based on convenience; however, the clients in the sample (South African investment company) were selected randomly to obtain an unbiased sample.

The questionnaire was distributed to 200 000 participants of an investment company because the researcher aimed to survey 1 000 participants. Demographic questions relating to province of origin, gender, ethnic group, mother-tongue language and age were included in the questionnaire to overcome the limitations of convenience sampling. This assisted to determine the degree to which the sample was representative of the target population and, accordingly, the extent to which the findings of this study might be generalised to that population. The questionnaire was sent electronically to the participants.

1.4.2.3 Measuring instrument and data collection method

The primary quantitative data for this study was collected by means of a self-administered questionnaire. A self-administered questionnaire is when the researcher aims to apply research methods to "develop a query that every potential respondent will interpret in the same way, be able to respond to accurately and be willing to answer" (Dillman, 2000:804). A verified questionnaire was used to measure risk tolerance and investor personalities.

The questionnaire was composed of the following sections:

- **Demographic information**

Demographic information is when variables are being investigated of general information such as age, gender, race, marital status, language and income.

- **Survey of consumer finances (SCF)**

SCF is a triennial statistics survey of balance sheets, pension income and demographic characteristics of investors (Hanna *et al*., 2008:98).

- **Behavioural finance**

Behavioural finance theories/biases are captured on a ranking scale to determine the theory or bias to which an investor is subjected.

- **The satisfaction with life scale (SWL)**

This scale assesses a person's satisfaction with his/her life as a whole. It gives normative data (Diener *et al.*, 1985:71).

- **Domain-specific risk-taking scale (DOSPERT)**

This scale assesses different components of risk attitudes such as risk-taking, risk perception and perceived expected benefits. This involves six domains, namely social, recreational, investment, gambling, health and/or safety and ethical domains (Weller *et al.*, 2015:1).

- **Grable and Lytton risk tolerance scale (GL-RTS)**

This scale assesses financial risk tolerance to manage financial decision-making processes to reach financial goals (Gilliam *et al.*, 2010:30-43).

The questionnaire was sent electronically to a South African investment company and the company reloaded the questionnaire onto a system that is used to interact with their clients. Before the distribution of the questionnaire to the participants, the promotor of this study viewed it to ensure it was error-free. Thereafter, this electronic version of the questionnaire was distributed to the participants via the company's system and was returned electronically.

1.4.2.4 Statistical analysis

The captured data were analysed using the statistical package IBM Statistical Package for the Social Studies (SPSS), Version 23.

1.5. ETHICAL CONSIDERATIONS

The research study conforms to ethical standards of academic research (NWU, 2016:15). The necessary permission to perform the study was obtained from the investment company concerned. As the company screened the participants, the researcher had no knowledge of the

client database of the company concerned, thereby ensuring anonymity. No identifying marks were placed on the responses received. The researcher only received the raw data from the company concerned. Confidentiality regarding all the information provided by the investors was guaranteed. The company collecting the data indicated that they had no concerns for the data to be published if the company is not mentioned in any way.

1.6. CHAPTER CLASSIFICATION

This study comprises the following chapters:

Chapter 1 Introduction and background to the study:

In this chapter, the efficient market hypothesis theory as well as the development of behavioural finance theory was introduced.

Chapter 2 Risk tolerance:

Risk tolerance was theoretically examined in terms of risk capacity and risk appetite. Attention was given to risk propensity, risk perception and risk behaviour. Behavioural biases in decision making, risk tolerance and demographical factors were addressed.

Chapter 3 Behavioural finance:

This chapter analysed the origin of efficient market hypothesis. The efficient market hypothesis gave birth to market anomalies, which resulted in the scope for behavioural finance. In addition, the various behavioural finance theories were analysed and discussed.

Chapter 4 Research design and methodology:

A description of the research process was provided as well as a detailed discussion of the methodological process that was followed and the statistical methods to analyse the data that was collected.

Chapter 5 Results and findings:

In this chapter a descriptive analysis as well as a regression analysis was conducted on the influence of demographic factors on individuals' risk tolerance. In addition, the effect of risk

tolerance on investor personalities was examined. A model was developed to link the above with relevant behavioural finance theories.

Chapter 6 Conclusions and recommendations:

This chapter contains the summary and conclusions of the study. This chapter highlighted the influence of demographical factors on risk tolerance, the influence of risk tolerance on investor personalities and the link with behavioural finance.

CHAPTER 2: RISK TOLERANCE

2.1 INTRODUCTION

Risk can be identified on a daily basis in a person's life. Risk has two components, namely exposure and uncertainty (Su, 2012:6). Uncertainty occurs when there is a state of not knowing if something is true or false or if one is aware of it or not. Exposure on the other hand is an individual condition. Risk occurs when there is exposure to a proposition of which a person is uncertain and is based on three factors, namely what could happen, how likely is that scenario to take place and what would the consequence be if a certain event occurs (Holton, 2004:22). Researchers such as Samson, Reneke and Wiecek (2009:87-99) believed that uncertainty follows a set of actions or distributions that are quantifiable. Risk can be affected by factors and characteristics such as control, choice and human subjectivity consisting of background, preferences and perceptions (Mabalane, 2015:8).

Investor theory implies that investors invest rationally to maximise their utility for a given level of risk that requires rational financial decisions (Shikuku, 2013:1). Most investments are associated with some level of risk; however, many other factors impact individual investment decision-making. If investors have sound knowledge of investing (typically in equity, fixed deposits, real estate, or gold) the individual investor will benefit from this knowledge. The review of the literature shows that there is abundant research on risk aspects and indicates that it has an influence on individual decision-making.

The risk of probabilities was developed by Daniel Bernoulli in 1738 whereby people could determine future risks, marginal utilities and loss aversion (law of large numbers) (Bernstein, 1996:3). Bernstein concluded there was a relationship between accumulated wealth in relation to requiring guaranteed returns on investments with less perceived risks.

Risk tolerance became prominent from the 1900s onwards. Little research was done between the Great Depression and the end of World War II. The reason for this was attributed to social and political problems. Near the end of World War II, in the late 1940s, attention was given to Bernoulli's logic-based explanation of risk-taking propensities. Slovic (1966:169-176) questioned the validity and reliability of the questionnaires to be of predictive use and

consensus was reached that one-dimensional questions (choice dilemmas questionnaire) do not show how risk-averse or risk-tolerant investors perceive themselves to be (Wallach & Kogan, 1959:555-563; 1961:23-26). There was no particular reason to believe that a person who takes risks in one area of life is necessarily willing to take risks in all areas (MacCrimmon & Wehrung, 1986). Moreover, Kahneman and Tversky (1979:266) stated that people were more willing to take risks when they anticipated losses than when they anticipated certain gains. As a result, if investors were exposed to more potential losses there would be an increase of threats of risk tolerance.

A specific consequence of risk tolerance may be selective consideration of or total ignoring of risk in making investment decisions. In other words, the willingness of the individual can influence investment decisions to tolerate risk. When investors make decisions under risk, it impacts on outcome probabilities that are known, whereas when investors make decisions under uncertainties, the probabilities are unknown. There is a relationship between risk propensity, risk perception and risk-taking behaviour of investors. The amount of risk an individual can tolerate is determined by risk appetite and risk capacity where individual investors tend to have a specific amount of risk they are comfortable taking in the investment process. It is sometimes difficult to distinguish between risk tolerance and risk perception – these two risk characteristics influence one another and interact with each other, and often are addressed separately in the literature. Therefore, it is important to investigate the relationship between financial risk tolerance, risk perception and investment decision-making.

Based on the preceding discussion, this chapter will describe the risk tolerance of investor behaviour that relates to the risk the investor owner is willing to take and how much return the investor is pursuing. Both organisations as well as investors need to understand risk perception, risk appetite and risk tolerance as there are gaps between perceived and actual risks. An investor is faced with the possibility of an identifiable loss. Financial risk tolerance affects the short- and long-term goals of investors. The only time risk tolerance might change is when there are external influences such as major life events.

2.2 RISK TOLERANCE DEFINED

Before defining risk tolerance, one needs to understand that people may be risk averse and make choices under risk. Most decisions entail a certain degree of risk and the investor might

have to consider that he/she is expected to have informed knowledge of which categories are attributable to risky outcomes and information regarding the probability of outcomes (Rasouli & Timmermans, 2014). Bernstein (1995:8) explained risk as a matter of measurement and instinct, reflecting basic underpinning of society when people, if they have a lack of control over their lives and futures, leave it to change. Risk forms an important part of people's decision-making in everyday life. Therefore, risk occurs when there is uncertainty concerning an outcome.

Financial risk tolerance refers to the amount of risk or the attitude of a person that is willing to take risks when making a financial decision or investing money, for example, saving for retirement purposes (Grable, 2016:19). An investor needs to make important financial choices regarding investment products, asset allocation and/or fund accumulation strategies. These choices have been attributed to risk tolerance. One, therefore, needs to investigate and consider the variables involved and the investor's tolerance for risk and capital market expectations.

Behavioural economists from different disciplines view financial risk tolerance with different methodology and focuses (Linciano & Soccorso, 2012:8). Risk tolerance has different meanings for investment companies. An investment company may be willing to undertake a maximum risk to achieve its business strategy and objective while operating within the broad risk appetite (Koller, 2011:68). An investor needs to decide on how much risk he/she is willing to undertake and in which investment company. The investor may also experience risk negatively or as an opportunity.

Caspi *et al.* (2005:453-484) believed that risk tolerance has a higher long-term stability in comparison to personality characteristic influences. Goldstein & McElligott (2014:7) views risk as a cognitive behaviour that encompasses a risk limit. Individuals often find themselves in a situation where more than one outcome is determined by their attitude (Sahi & Kalra, 2013). However, it can be challenging to measure risk tolerance as subjectivity plays a role when taking risks.

Researchers such as Hanna *et al*. (2004:27-45) observed four methods of measuring risk tolerance, namely determining investors' investment choices, asking a combination of investment and subjective questions, assessing their actual behaviour and examining hypothetical scenarios. Cordell (2001:38) made a distinct differentiation between objective and

subjective risk tolerance. Objective risk is coherent with risk capacity, whereas subjective risk involves accepting variations in asset returns (Barksy *et al*., 1997:537-579; Hanna *et al.*, 2008:96-108).

Risk tolerance must be measured in such a way that it remains within the domain of risk appetite; it should be flexible to allow for increased risk taking when investing money (Goldstein & McElligott, 2014:8).

2.3 RESEARCH ON RISK TOLERANCE

Table 2.1 provides an overview of previous studies on risk tolerance. The purpose of each study is indicated.

Table 2.1: Research on financial risk tolerance

Research studies	Risk tolerance aim
Levin *et al*. (1986:48-64)	To determine if contextual and situational variables play a role
Roszkowski and Snellbecker (1990:237-246)	To determine if contextual and situational variables play a role
Roszkowski *et al.* (1993)	To determine if different occupations play a role to differentiate between different financial risk levels
Sulloway (1997)	To investigate the role of demographics, socio-economic status, attitudes about money and personality
Sung and Hanna (1996a:227-228)	To investigate the effect of demographic variables
Wang and Hanna (1997:27-32)	To establish the relationship between age and financial risk tolerance and investigating effects of demographic and socio-economic factors
Carducci and Wong (1998:355-359)	To investigate the role of demographics, socio-economic status, attitudes about money and personality
Grable and Lytton (1998:61-73)	To investigate several variables: age, gender, marital status, occupation, self-employment, income, race, education

Research studies	Risk tolerance aim
Grable and Joo (1999:53-58)	To test the strength of demographic and socio-economic factors
Grable and Joo (2000:151-157)	To combine different variables (demographic, socio-economic and psychological factors) to understand risk tolerance
Grable (2000:625-630)	To examine demographical factors, socio-economic factors and attitudes pertaining to risk taking behaviours
Hallahan *et al*. (2004:57-79)	To group demographic, socio-economic and psychological into bio psychological and environmental factors
Kamiya *et al.* (2007)	To investigate if contextual and situational factors play a role
Grable and Roszkowski (2008:905-923)	To establish the role of psychology in risk tolerance
Gilliam and Chatterjee (2010:43-50)	To investigate if high level of education plays a role
Van de Venter *et al.* (2012:794-800)	To determine financial risk as a personal trait

Source: Author compilation

Table 2.2: Contextual and situational factors of financial risk tolerance

Researchers	Findings
Levin *et al.* (1986:48-64)	Contextual and situational factors play a role in financial risk tolerance
Roszkowski and Snellbecker (1990:237-246)	Contextual and situational factors play a role in financial risk tolerance
Kamiya *et al.* (2007)	Contextual and situational factors play a role in financial risk tolerance
Roszkowski *et al.* (1993)	Occupations determine different financial risk levels

Researchers	Findings
Sulloway (1997); Carducci and Wong (1998:355-359)	Demographics; socio-economic status; attitudes about money and personality play a role to influence financial risk tolerance
MacCrimmon and Wehrung (1986)	Risk tolerance in relation to demographics was limited

Source: Author compilation

Contextual and situational factors of financial risk tolerance are examined in Table 2.2. MacCrimmon and Wehrung (1986) found that risk tolerance in relation to demographics was limited. These researchers found there were unrealistic settings that did not portray the actual risks that investors face and found contradictory research, concluding that researchers did not consider the multidimensionality of risk and subjectivity of risk tolerance.

However, Sung and Hanna (1996a:227) found that the characteristics of demographic variables are deemed important such as years leading to retirement, high education levels, race, being self-employed and non-investment income. Wang and Hanna (1997:30) established that there is a relationship between age and risk tolerance.

Grable and Lytton (1998:61-73) found in their research that age and gender were the most important variables influencing risk tolerance along with other characteristics such as marital status, occupation, self-employment, income, race and education. In 1999, Grable and Joo added that high levels of education, financial knowledge, internal locus of control, marital status, professional occupation, high income, solvency and economic expectations are important variables affecting financial risk tolerance. However, Grable and Joo (2000:156) did not consider gender, age and marital status to be important influences. On the other hand, Mazumdar (2014:47) found there is no evidence of a relationship between financial knowledge and investment behaviour.

In Australia, Hallahan *et al.* (2004:59) group demographic, socio-economic and psychological factors into bio psychological and environmental factors based on the model of Irvin (1993). Hallahan *et al.* (2004:56-74) emphasised that factors such as higher education (bachelor or higher), unmarried status, high income (net worth and household), high financial knowledge

and self-esteem need to be considered. Emphasis also was placed on environmental factors during this study.

Grable and Roszkowski (2008:921) and Kaplansi *et al*. (2015:145-168) found that emotion was a significant factor in determining risk tolerance. Happy people were found to have higher risk tolerance levels than unhappy people.

Gilliam and Chatterjee (2010:43-50) determined that a high level of education plays a role whereas Roszkowski and Davey (2010:43) and Van de Venter *et al*. (2012:800) determined that risk can be considered a personal trait that tends to change over time in conjunction with the influence of external factors.

In further studies, Gibson *et al*. (2013:28) found that investors that were financial clients had a higher level of risk perception and believed income and investment knowledge have a positive influence on risk tolerance. However, this researcher believed that gender and age have a negative impact on risk tolerance.

2.4 FACTORS INFLUENCING RISK TOLERANCE

Many factors impact risk tolerance when investors make investment decisions. Whereas risk tolerance is a dependent variable, other factors are independent variables. The prospect theorists Tversky and Kahneman (1981:453-458) found that outcomes can be either positive or negative. Positive effects could lead to positive investors concerned more with winning rather than losing, thereby experiencing good general feelings and market expectations. Due to various financial risk tolerance assessment methodologies, it was found that there are demographic, socio-economic as well as psychological factors that impact financial risk tolerance (Van de Venter *et al*., 2012:794; Nguyen, 2015:26,29). A person's tolerance highly influences a person's decision-making process. Irwin (1993) developed one of the first models to demonstrate these factors (Table 2.3). This table also indicates which factors are assumed more tolerant.

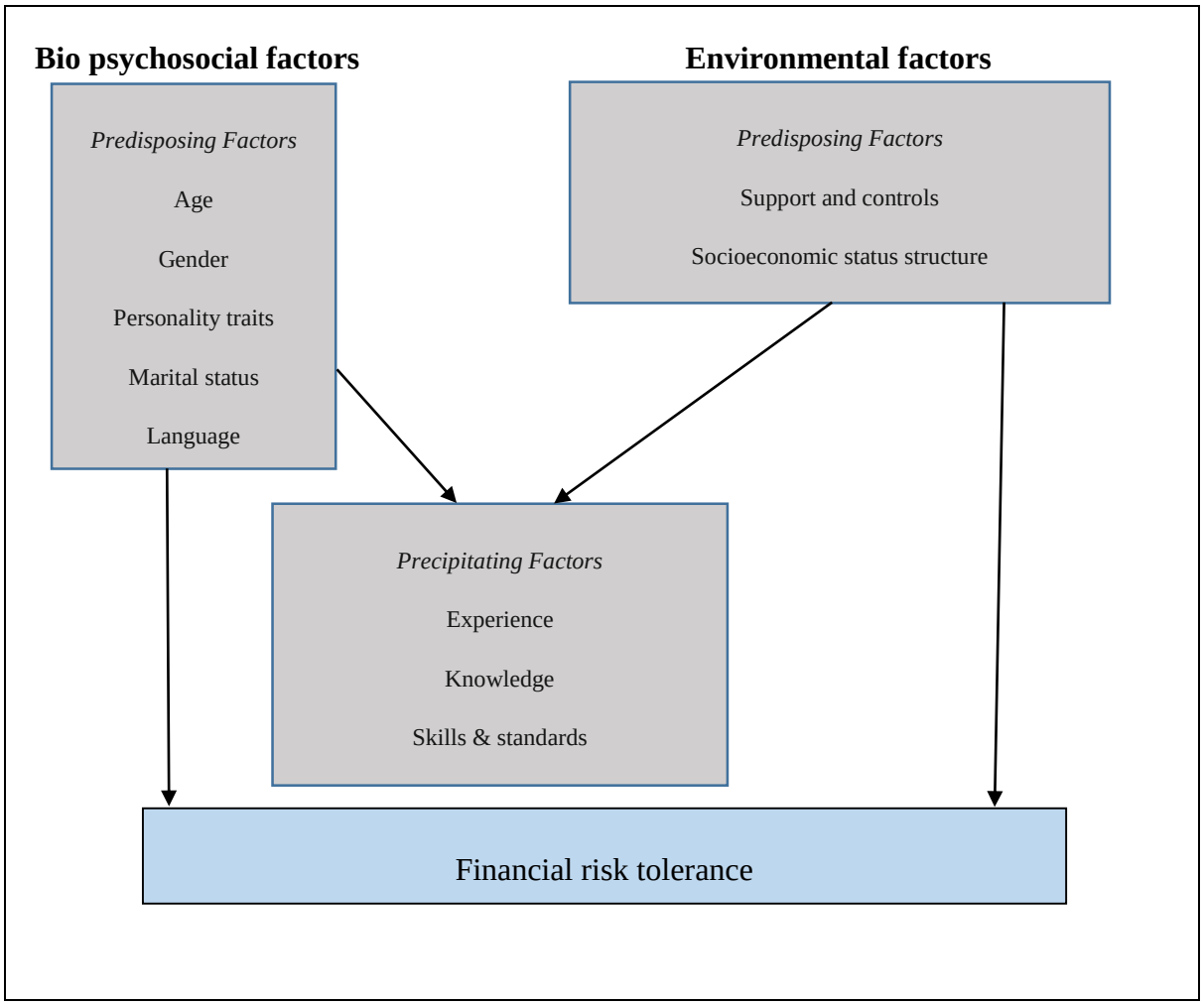
Table 2.3 Factors associated with financial risk tolerance

Individual characteristics	Assumed to be more tolerant
Age	Younger people
Education	Bachelor's degree or higher
Employment status	Employed full-time
Ethnicity	Non-Hispanic white
Financial knowledge	High
Financial satisfaction	High
Gender	Male
Homeownership	Owner
Household size	Large
Income	High
Income source	Business owner
Income variability	Stable and predictable
Locus of control	Internal
Marital status	Single
Marital/gender interaction	Single male
Mood	Happy
Net worth	High
Occupation	Professional
Personality	Type A
Religiosity	Less religiosity
Self-esteem	High
Sensation seeking	High

Source: Irwin (1993)

From Table 2.3 it can be concluded that individual characteristics play a role in risk tolerance as well as which factors are assumed to be more tolerant. Figure 2.1 presents a graphic presentation of a conceptual model of the main principal factors affecting risk tolerance, namely bio psychosocial, environmental and precipitating factors.

Figure 2.1: Conceptual model of principal factors affecting financial risk tolerance



Source: Irwin (1993)

Cordell (2001:36-40) proposed a framework of risk tolerance and states that to compile a risk profile, four factors must be considered. These four factors were attitude, propensity, capacity and risk knowledge.

The above-mentioned factors can lead to increased or decreased levels of risk tolerance affecting a person's decision to change, adapt or terminate a risky behaviour. Sadiq and Ishaq (2014:1) stated that investor decisions are influenced by demographic factors on investor's level of risk tolerance. Grable (2016:25-27) emphasised although an investor might not have control over demographical factors, environmental factors may affect financial decisions due to influences from the social environment. This is important as a supportive environment is part of a person's life and helps to understand and shape investment behaviour. Both bio psychosocial and environmental factors play a role in a person's financial risk tolerance.

However, precipitating factors are found to also influence risk tolerance levels. These factors typically have an influence on a person's risk assessment as this impacts the decision-making process leading a person to modify and adjust risk tolerance levels and behaviour (Grable, 2016:27).

In most cases, the demographical factors are considered with financial risk tolerance, namely age, gender, race, marital status, and income and wealth. This study addresses these demographic factors.

2.4.1 Age

The age factor in investor risk tolerance has been investigated widely as this relates to a person's ability to measure financial losses. Older investors have less time to recoup or recover financial losses (Grable, 1997:14). The first researchers to investigate the relationship between risk tolerance and age were Wallach and Kogan (1961:24). These researchers found that older people were reluctant and cautious to take risks in their financial decision-making. Researchers such as Grable and Roszkowski (2008:907) and Gibson *et al.* (2013:34) found a negative relationship between age and risk tolerance. It can be assumed that young investors have more years to recover from financial losses due to risky investments.

On the other hand, researchers that found a positive relationship between age and risk tolerance were Botwinick (1966:347-353), Vroom and Pahl (1971:399-405), Baker and Haslem (1974:469-476), Okun and DiVesta (1976:571-576), Morin and Suarez (1983:1201-1216), Hawley and Fuji (1993:197-204), Wang and Hanna (1997), Grable (2000:625-630) and Van de Venter *et al*. (2012:795). These researchers found that older people tend to more risk tolerant. However, some researchers such as Sung and Hanna (1996b:13), and Grable and Joo (1999:56, 2000:628) reported no significant relationship between age and risk tolerance. Clark-Murphy *et al*. (2009:4-17) proved that as investors' age increases, it might lead to higher investments return. Anbar and Eker (2010:510) also held the view that there is no significant relationship between age and risk tolerance.

Cutler (1995:33) researched financial risk tolerance and concluded that risk tolerance is a one-dimensional attitude. Regardless of different opinions, it was found that researchers must consider age as an investor risk tolerance factor. As the rate of risk tolerance tends to decrease

more as people get older, it influences financial decision-making and investment choices and behaviour.

2.4.2 Gender

Gender is considered a demographic characteristic. Many researchers have investigated gender differences, but there is no universal agreement whether gender differences play a role in risk tolerance and financial decision-making. Gender influences have been investigated regarding decision processes, risk preferences and actual portfolio.

Earlier research considered the gender factor (male or female) as an important factor to contemplate as an investor risk tolerance factor (Higbee & Lafferty, 1972:249-251; Blume, 1978; Coet & McDermott, 1979:1283-1294; Rubin & Paul, 1979:585-596; Yip, 2000:3-4). The consensus was that male investors take more risks than females (Roszkowski *et al*., 1993). Another researcher, Slovic (1966:169), states that in some cultures it was believed that males tend to take greater risks than females. Sung and Hanna (1996a:226) confirmed that males are more risk tolerant than females.

Other researchers (Hawley & Fuji, 1993:197-204; Sung & Hanna, 1996b:11-20; Sharma, 2006:15; Anbar & Eker, 2010:510; Faff *et al.*, 2011:113; Van Schalkwyk, 2012; Cooper *et al*., 2014:275; Mazumdar, 2014:46; Rahmawati *et al*., 2015:373) also confirmed that males are more risk tolerant than females. However, this viewpoint of males being more risk tolerant than females has not been commonly accepted (Yip, 2000:3; Marinelli *et al.,* 2017:58-61). In contrast, some researchers found there is no evidence between gender and risk tolerance (Hanna, *et al*. 1998:10-11; Grable & Joo, 2004:77). Yao *et al.* (2005:55) even went further and established that risk tolerance is lower for unmarried females, followed by married females, married males and lastly unmarried males.

Research also was done on whether unmarried individuals present more risks tolerance (Hallahan *et al.,* 2004:62; Fan & Xiao, 2006:61). It appears there is a link between getting married and an increasing need for ensuring stability in the form of providing for children or regarding housing needs.

2.4.3 Race

People from different cultural backgrounds have different values, preferences and tastes that can affect their risk tolerance. It is believed that White people have the tendency to tolerate higher risk tolerance than non-Whites. The reasons for this belief is that White people might have more access to banks and financial institutions, have more investment opportunities and focus more on the future than non-Whites. Such investors thereby display more confidence in their decision-making skills and analysing abilities (MacCrimmon & Wehrung, 1986; Zhong & Xiao, 1995:107-114; Sung & Hanna, 1996a: 227-228). However, few studies have been done on the relationship between race and risk tolerance. Other researchers that investigated this relationship were Hawley and Fuji (1993:201), and Sung and Hanna (1996a:227-228). Only Leigh (1986:17-31) found that non-Whites took more risks than Whites did. Generally, most researchers and investment managers believe that there is a relationship between race and risk tolerance.

In South Africa, Metherell (2011) conducted a study and found a significant difference in risk tolerance between the White and Indian population. Another researcher in South Africa, Van Schalkwyk (2012) noted that African people had higher risk tolerance than White people.

From this discussion, it can be concluded that different race groups have different cultures with their own beliefs and behaviour that may impact investment behaviours. It, therefore, is important to understand the impact of cultural background in investment decisions and behaviours.

2.4.4 Marital status

Marital status (i.e. married, never married, divorced, separated and widowed) is an effective way to determine different levels of investor risks. Research has indicated that the effects of marital status on financial risk tolerance are uncertain and inconclusive (Cooper *et al.,* 2014:275).

Investors that are married, have more responsibilities for themselves, their spouses and dependants. Social risk often occurs in marital situations, as married people might experience a loss of self-esteem in their social circle such as colleagues and peers, if their investment choices lead to increased risk of loss (Roszkowski *et al.,* 1993:220). Other researchers

concluded that married people prefer less investment risk compared to unmarried individuals (Baker & Haslem, 1974:469-476; Lee & Hanna, 1991:126-140; Lazzarone, 1996:67-74; Sung & Hanna, 1996a:227-228, 1996b:11-20).

Despite research, there is little evidence to confirm that unmarried people take more risks than married individuals do (Roszkowski *et al.,* 1993:220). Conflicting findings exist on the relationship between risk tolerance and marital status, although investment managers believe that single individuals are more risk tolerant than married people. Some researchers found no evidence to support a relationship between marital status and risk tolerance (Hallahan *et al*., 2003:483-502; Grable & Roszkowski, 2008:905-923). In 2004, Hanna and Lindamood (2004:27-45) found in their research that wives were less willing to take financial risks than their husbands were.

2.4.5 Income and wealth

Researchers found that individuals with higher gross incomes tend to take higher investment risks than individuals with lower incomes (Cohn *et al*., 1975:608; Blum, 1976). Warren *et al*. (1990:74-77) found in their research that male investors with wealth and high income tend to invest more in stocks and bonds than females do. Shaw (1996:627-644), Grable and Lytton (1998:61-73), Grable and Joo (1999:53-56), Grable (2000:625-630), Grable and Joo (2004:73-82), Ardehali *et al.* (2005:491-499), Gibson *et al.* (2013:23-50) and Rahmawati, *et al.* (2015:376) agreed with high income versus higher investments. Despite ongoing research, the factor of income and risk tolerance is not conclusive, for example, that high salaries are predictive of taking greater investment risks.

Other demographic factors are occupation, self-employment and education. To summarise this briefly, it was found that self-employed people tend to be more risk tolerant than those that are employed by private firms (Leonard, 1995:91-96). Research indicates that nonprofessional occupations (clerical workers and unskilled/skilled labourers) have lower risk tolerance than professional people (educators, lawyers, doctors, business owners and others) (Grable, 1997:34).

Regarding education, research indicates that individuals with higher education levels take higher investment risks, although there is conflicting evidence to support this finding

(Rahmawati *et al.*, 2015:376; Yao *et al*., 2011:879-887). Other researchers that also investigated this relationship were Baker and Haslem (1974:469-476), MacCrimmon and Wehrung (1986), Sung and Hanna (1996b:11-20), Grable and Lytton (1998:61-73), Grable and Joo (1999:53-58), Grable (2000:625-630), Grable and Joo (2004:73-82), Ardehali *et al.* (2005:513) and Grable and Roszkowski (2008:922). These researchers maintained that a person with a higher level of education manages to assess risks and benefits better and more carefully than in the case of a person with less education. Some researchers believed that wealth and income play a bigger role than education (Van de Venter *et al.*, 2012:795).

To conclude, it is important to note that financial literacy plays a role as it affects risk tolerance. This relates to financial knowledge, skills, attitudes and knowledge (Gallery *et al.*, 2011:3-22; Mazumdar, 2014:47). Literate people tend to take more financial risks than illiterate people do as they understand financial situations better such as everyday decisions regarding their financial situation.

There is consensus among researchers that financial risk tolerance is related to all the factors discussed in this section, but there exists no universal agreement on whether financial risk changes over time and which factors play the most important role in this change. In fact, people with wealth and a good income may experience financial losses as well, due to risky investments.

2.5 RELATIONSHIP BETWEEN RISK TOLERANCE AND FINANCIAL/ INVESTMENT DECISIONS

There is a link between risk tolerance and investment decisions, especially regarding non-retired people contributing to their retirement funds. People that exhibit lower risk tolerance tend to invest less in contributing funds (Yuh & DeVaney, 1996:31-38; Hariharan *et al.*, 2000:166). It appears that risk-averse households tend to have a lower risk asset ratio (Cardak & Wilkins, 2009:850-860).

Regarding investment choices, it becomes clear that risk tolerance can be either a less stable factor or a personal trait that can change over time because of the influence of external factors (Roszkowski & Davey, 2010:42-53; Van de Venter *et al*., 2012:794-800). The opposite is also true; risk tolerant people tend to invest less in risk-free assets. It needs to be kept in mind that

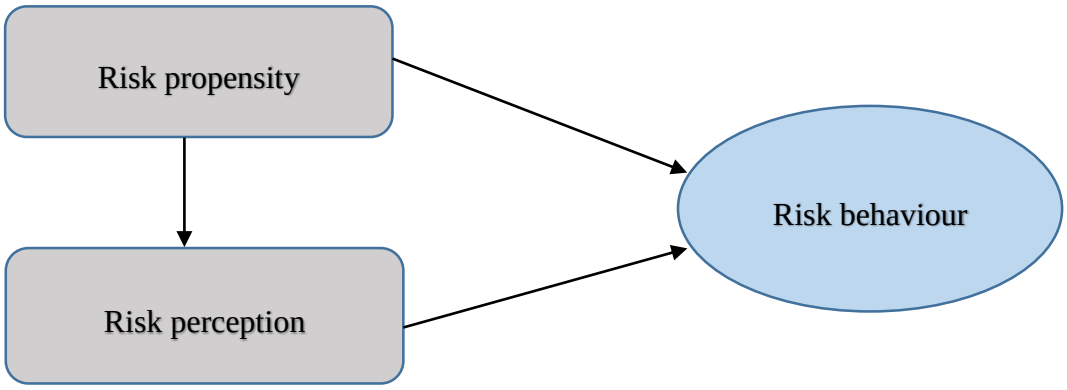
there are different opinions regarding which factors play a role in risk tolerance. This relates to factors such as gender, age, marital status and income.

2.6 RISK PROPENSITY, RISK PERCEPTION AND RISK BEHAVIOUR

Both risk perception (the way risk is perceived) and risk propensity (willingness to take risks) is important factors to consider when examining risk-taking behaviour as depicted in Figure 2.2.

Figure 2.2 shows that there is a relationship between risk propensity, risk perception and risk behaviour. Hamid *et al*. (2013:134) found in their results that the effect of risk propensity on an investor's risky behaviour only partially is mediated by risky behaviour because if investors become involved in risky situations, they will project risky behaviour. Other studies indicate that it is not the investors' propensity to take risks but rather their perception of risk and explanation for taking financial risks (Gilliam *et al.*, 2010:30-43). Investors view risk perception differently (Jain *et al.*, 2015:14).

Figure 2.2: Risk propensity, risk perception and risk behaviour



Source: Author compilation

2.6.1 Risk propensity

Risk propensity is when an individual tends to take or avoid risks. There is abundant research on risk propensity, claiming that it is based on three factors, namely investors' behaviour in typical risky situations, revealed risk attitudes originating from behaviour in naturally risky

situations and lastly, self-reported attitudes (MacCrimmon & Wehrung, 1986). Investors have different risk attitudes (tolerance) that exist independently of their circumstances affecting financial investment choices and decisions. Risk attitudes can be portrayed in people's attitudes, affecting their attitude and behaviour in terms of comfort or discomfort, happiness and unhappiness regarding their investment choices (Ajzen & Fishbein, 1977:888-918). Investors with low risk investments chose lower risk levels and vise versa (Dulebohn & Murray, 2007:45-582).

Risk propensity refers to the degree of risk that an investor is willing to take with respect to risk of loss. Measures for investment risk tolerance need to be done to assess an investor's attitude toward risks. Investment risk tolerance varies across individuals thereby influencing their investment behaviour. People often take risks in their personal life or in leisure activity, but when financial decisions must be made, they are risk-averse. Risk propensity is seen as a trait that may change over time, due to investors' experiences. When people learn from their interaction with external environmental factors, it may lead to changes in their risk propensity and risky behaviour (Sitkin & Weingart, 1995:1573-1592). Risk perception is viewed as an intervening or mediation variable between risk propensity and financial decision-making.

2.6.2 Risk perception

Risk tolerance and risk perception are concepts considered to be related but often lead to confusion and misunderstanding, as they are difficult to distinguish from each other (Hunter, 2002). Risk perception is a reality and an integral part of an investor's decision-making process (Finucane, 2002:236-243). Williams and Noyes (2007:66-85) determined that risk perception relates to a degree of uncertainty that is linked to decision outcomes. Uncertainty can lead to certain decision consequences such as succeeding or failing to meet certain outcomes. In the case of making financial decisions, an investor has to predict future or possible outcomes, although the future might be uncertain and lead to financial misjudgements (Sokolowska & Pohorille, 2000:339-369).

There seem to be two main qualitative dimensions driving risk perception, namely the unknown versus known risk, and dread- versus non-dreaded risk (Finucane, 2002:236-243). The first factor, the unknown risk, relates to when one does not know the unfamiliar, unobservable

hazard that might have certain consequences. On the other hand, when a hazard is dreaded and uncontrollable it might have serious or catastrophic results.

Hansson (2005:5-6) describes decision theory as an outcome when making decisions based on goal-directed behaviour. This theory is not based on technical apsects as it focuses on some human activities.

2.6.2.1 Loss outcome

Researchers such as Sokolowska and Pohorille (2000:339-369), Koonce *et al*. (2005:221-241), Sachse *et al*. (2012:435) describe the amount of potential losses that can be expected by investors. Loss outcome exists when financial decisions are based on the risk that investors take, thereby signifying uncertainty.

2.6.2.2 Gain outcome

Sokolowska and Pohorille (2000:339-369) and Koonce *et al*. (2005:221-241) investigated the potential gain outcomes that investors might expect. Investors aim at least to break even when investing, as they want to achieve selling and locking in financial gains (Byrne & Utkus, 2015).

2.6.2.3 Loss probability

Loss probability refers to the amount of potential loss that investors may expect (Sokolowska & Pohorille, 2000:339-369; Koonce *et al*., 2005:221-241; Sachse *et al.*, 2012:437-447). Probability of loss is the factor that best describes risk features. Loss probability indicates that outcomes are unknown or not meaningful (Hansson, 2005:27-28).

Financial risk perception relies on trust that is related to lower perceived risk. The literature has also indicated that financial risk perception as a subjectivist construct can be measured and predicted and that there are sophisticated and non-sophisticated investors (Kacperczyk, 2014:1). Investors that are more sophisticated perceive financial risk better than in the latter case. However, research indicates there is no complete model incorporating all variables. Risk perception varies depending on the type of investment. It appears that there is a link between behavioural variables and decision-theory variables. Both these factors can measure financial risk perception.

Affective and cognitive aspects can affect risk perception, as people rarely view risk as an objective measure but rather subjective (Linciano & Soccorso, 2012:8). Risk perception varies in different contexts and in different studies. Weber *et al.* (2002:267) state that risk perception is how risky financial decisions are from the viewpoint of investors. Risk perception can ultimately influence investment choices and investors aim to achieve optimal profit to achieve financial goals.

Individual investors' decisions are influenced by many psychological, socio-cultural and environmental factors and not a rational basis but bounded rationality (Aren & Zengin, 2016:656). As a result, it can be emphasised that the level of financial literacy and risk perception on choice of investment affects investors' behaviour. Financial literacy is an important factor, referring to financial knowledge and relates to people's ability to make informed decisions regarding their investment, use and management thereof (Schagen & Lines, 1996).

According to Renn (1998:50), human perception of risk is equated with loss. Garland (2003) emphasised that risk is subjective, whereas Hillson and Murray-Webster (2005) argued that many factors play a role such as cognitive as well as emotional factors. Subjective financial tolerance is taken into account when an investor makes insurance choices. Olsen and Cox (2001:29-36) agree with the notion that emotional dimension plays a role, whereas Garling *et al.* (2009:1-47) accentuate the role of demographics and personality. When investors receive sound advice and information, their risk perception can change and influence their decision-making (Nguyen, 2015:1).

2.6.3 Risk behaviour

A study by Chaarlas and Lawrence (2012:32-44), by means of a survey amongst various investors, identified four reasons on which investors base their investment decisions (Diacon, 2004:188-190):

- Investment decisions based on heuristics (price is the decisive factor leading to overconfidence;
- Representativeness influencing investors' decisions by means of mental accounting (grouping gains and losses);
- Discounting complex information (prefer easily adjustable pieces of information); and

- The existence of asymmetric patterns of distribution and use of information.

Risk propensity is based on investors' differences and situational influences affecting their risk-behaviour, whereas risk perception is affected often by cognitive biases that relate to different ways of thinking (heuristics).

2.7 RISK AND RISK TOLERANCE

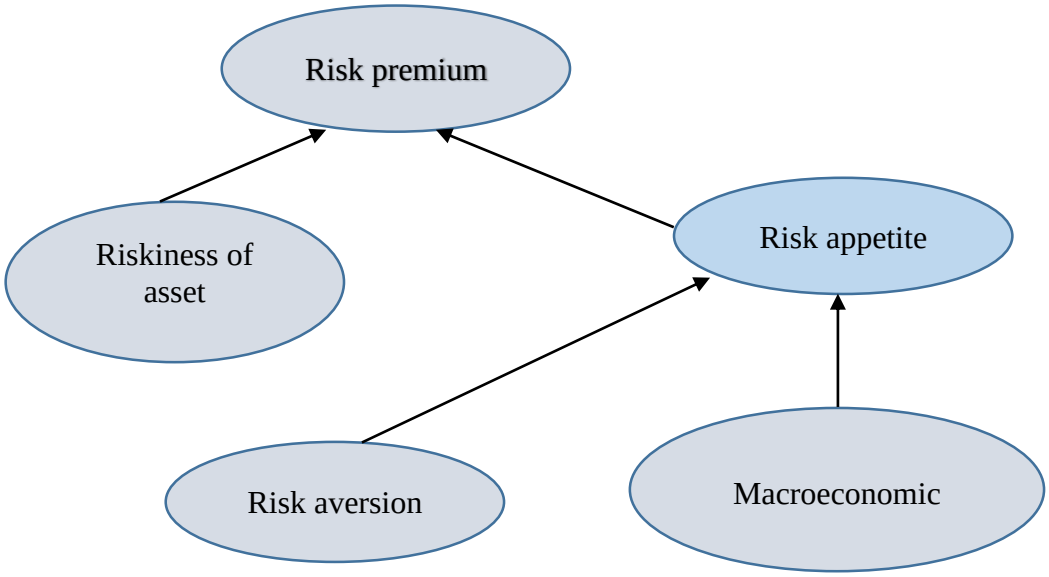
Risk is used in different concepts and can be divided into three categories, namely as being negative, neutral or positive. When risk is negative, it implies that there is a hazard typically a result of bad events, consequence or having been exposed to mischance (Irukwu, 1991:2). When risk is neutral, it signifies that risk is an uncertain event/condition that can have either a negative or a positive effect (Project Management Institute, 2000:127). Therefore, a positive risk can be defined as when a risk is seen as an opportunity being managed in a deliberate way to achieve a specific goal.

Financial risk tolerance depends on five categories, namely risk knowledge, risk propensity (objective risk), risk attitude (subjective risk), emotional capacity and risk capacity. The implication of risk tolerance to an investment company is when an organisation takes a specific risk to achieve its aims, strategy and objectives, while working within the broad risk appetite (Koller, 2011:68). Investors have their own levels of risk tolerance that depend on several factors.

2.7.1 Risk appetite

Risk appetite is sensitive to crises and economic events such as risk premium, riskiness of asset, risk-aversion and macroeconomic environment (Pompian, 2016). Risk premium refers to how much investors like/dislike risks and is directly linked to low risk appetite (Rongsirikul, 2012:9). Riskiness of assets is when asset prices impact the risk asset movement and the change in price at that specific moment (Rongsirikul, 2012:6). Risk-aversion occurs when there is a correlation between riskiness of assets and the actual excess returns (Rongsirikul, 2012:6). Risk appetite is influenced by both macroeconomic environment and investor's risk-aversion. Risk appetite responds to crises and economic events as depicted by Figure 2.3.

Figure 2.3: Relationship between risk concepts



Source: Author compilation

Risk appetite and risk capacity have an influence on investment behaviour as well as on the management of personal finances. Risk appetite for companies means that companies are willing to take risks that other companies tend to avoid. The term risk appetite is used frequently in companies, especially in management, and is defined often in terms of risk only on risk-return trade off and is measured relatively to regulatory and economic capital, rating thresholds or earnings (Bennet & Cusick, 2007:6).

Risk appetite for individuals implies that investors are willing to take financial risks. However, it decreases significantly when nearing retirement or when facing economic crises (Gai & Vause, 2005:169; Collard, 2009:5). Aren and Zengen (2016:661) found in their results that risk appetite varies by gender. Individuals and companies function in a risk culture, that is, they operate within their norms and behaviour to identify, understand, discuss and act on the current and future risk situation (RIMS 2012:3; Goldstein & McElligott, 2014:11).

For the investors, they have the challenge to determine what point on their risk and return trade-off provides one of the following (Bennet & Cusick, 2007:4):

- Low level of volatility to meet their financial needs and goals;
- Which highest return might be expected considering their tolerance for risk; and
- At which intermediated point the investor can maximise the investor utility.

Different studies yielded significant information on risk appetite. Dupoy (2009:18-33) describes risk appetite as the investor's willingness to buy risky assets. The FSB (2013) acknowledges that risk appetite refers to a firm's level and type of risk to achieve its business goals and strategic objectives. Shang and Chen (2012) agreed that one need the willingness to take risk and be able to do so and the risk should be tolerable and justifiable.

Wason (2006) states that risk appetite needs to reflect the level of risk that an individual is willing to take. Risk is an uncertainty over which people have no control and that can be positive or negative. Risk tolerance recognises that risk either has a negative or painful effect, whereas risk appetite has a positive element as well.

Individual investors need to understand their own risk appetite, although when making decisions regarding their profile of wealth, most investors infrequently understand their own risk appetite (Bennet & Cusick, 2007:5).

2.7.2 Risk capacity

Risk capacity is the financial stance to incur risks and depends on the level and types of risk an organisation is willing to take to reach its goals and business plans (Goldstein & McElligott, 2014:4). For the individual investor, it means there is an adjusted difference between market value of his/her investments and the market value of liabilities in the form of insurance liabilities and financial commitments. Risk capacity involves the investment's ability to cope with losses of their investment.

2.7.3 Risk limits

Risk limits refer to an organisation's ability to consider the investors' interests by limiting risk and achieving financial objectives. These risk limits can also involve liquidity risk, rebalancing risk and/or counterparty risk factors (Gordon, 2013:19).

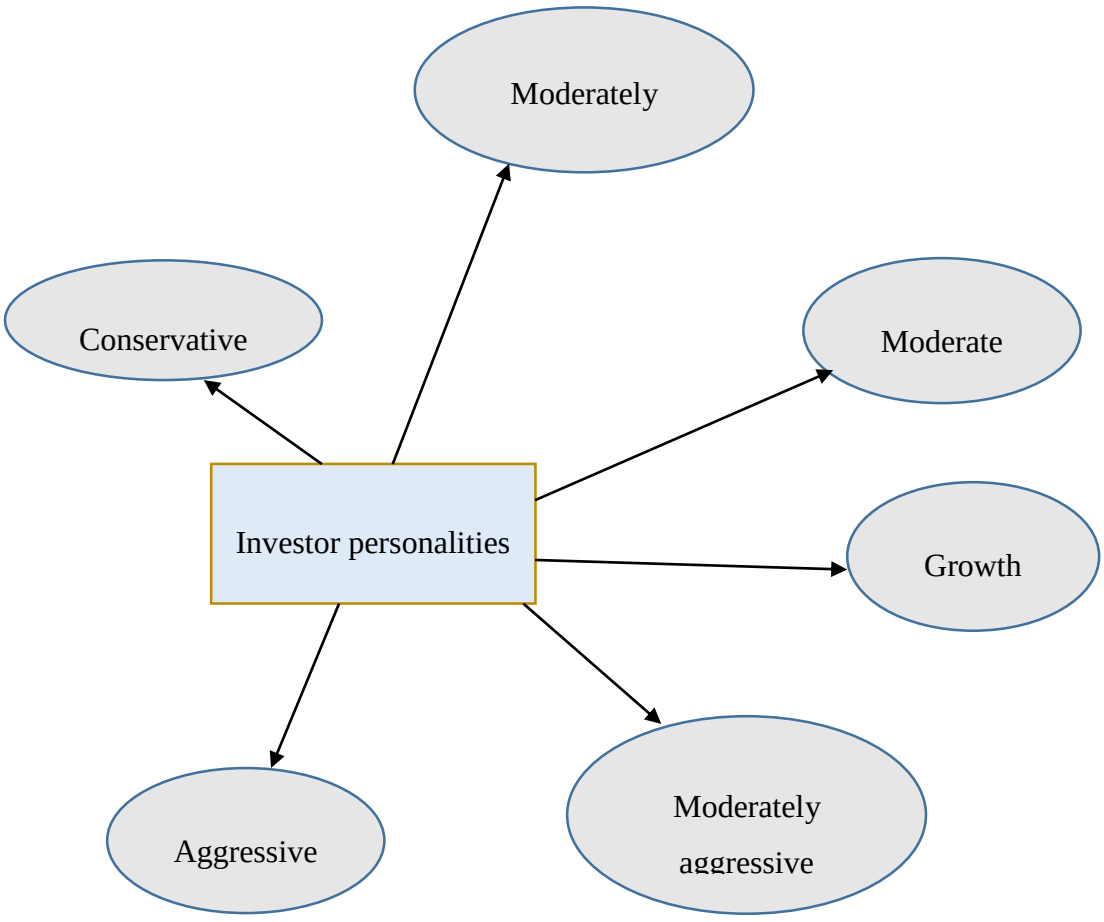
2.8 INVESTOR PERSONALITIES

Risk tolerance typically involves financial risk, speculative risk and investment risk. Financial risk refers to the way investors invest their money for short-term or long-term purposes (Grable, 2016:19). Speculative risk is when investors tend to risk their financial behaviour. Lastly,

investment risk combines knowledge and temperament of the investor in the valuation of financial risk tolerance (Gustafsson & Hellström, 2015:26).

Different types of investors are known in the market and investors are grouped typically by the different levels of risk that can be tolerated. Risk can be described as the potential difference between actual and expected income. The amount of risk investors can tolerate can classify them into certain investor personalities, namely conservative, moderate, growth- or aggressive investors (Pompian, 2016:7). Optimistic investors are viewed as people that have higher risk and return expectations in contrast with people experiencing lower sentiment. Moreover, there is a relationship between sentiment-creating factors, individual mood and expectations regarding stock market returns. Such an investor tends to buy stocks rather than sell (Kaplanski *et al.*, 2015:145-147). Figure 2.4 depicts a graphic presentation on investor personalities.

Figure 2.4: Investor personalities



Source: Adapted from Pompian (2016)

2.8.1 Conservative investors

This group of investors places great emphasis on financial security while maintaining their wealth, whether inherited or risking their capital to build wealth. Conservative investors tend to have a low risk tolerance, which indicates that the risk appetite and capacity to take risk is low. They tend to worry about their investments, are worried over short-term performance. Conservative investors, when being uncertain or uncomfortable, are slow when making decisions. This type of investors usually takes care of their family and likes to invest well in education and home ownership (APT Wealth Partners, 2014:1; Pompian, 2016:8).

This type of investor primarily seeks to minimise investment risk and loss of principal. These investors typically gain wealth through either inheritance or by investing in low risk investment opportunities. A characteristic that stands out is the cautiousness to take on excessive risks (Bourse Securities, 2016; Pompian, 2016:9). Therefore, the investment portfolio for these investors tends to be tedious due to the lack of, or slow reaction to, market changes. There is a strong correlation between investment and personal life behaviour.

To conclude, conservative investors are those whose portfolio has greater expected return and less portfolio risk.

2.8.2 Moderately conservative investors

This type of investor values principal investment but is willing to accept a small degree of risk desires greater liquidity and is willing to accept lower returns. These investors are also willing to accept minimal financial losses (APT Wealth Partners, 2014:1-4; Bourse Securities, 2016; Pompian, 2016:10).

2.8.3 Moderate investors

Moderate investors attempt to reduce risk and increase returns proportionately to seek higher long-term results. They have their own ideas about investing. This type of investor's behavioural bias is cognitive. Unfortunately, this group of investors tends to lack investment knowledge and will follow the trends set by friends or colleagues (Bourse Securities, 2016; Pompian, 2012). Moderate investors sometimes overestimate their risk tolerance and may even decide to put off their investment decisions without consulting professional advice.

Long term financial planning, therefore, is unimportant to these investors; they normally focus on the here and now situation. This leads to a situation where only current popular investment options are considered for investment purposes. Moderate investors are sometimes difficult because they lack the joy or have no aptitude for the investment process (APT Wealth Partners, 2014:1-4).

2.8.4 Growth investors

Growth investors are known to have medium to high risk tolerance levels and their behavioural bias orientation is cognitive (Pompian, 2016:13-15). Some growth investors are strong-willed and independent investors. They like to trust their gut and not consult other people when making decisions but are not always competent when doing their own research.

Growth investors are self-assured, involved in the investment environment and are comfortable when taking risks. As a result, these investors are willing to accept a portion of returns from irregular capital gains (Dow, 1998:9). This type of investor is willing to endure larger short-term financial losses in exchange to benefit from higher long-term returns.

To conclude, growth investors attempt to outperform the market to realise higher returns on investment portfolios.

2.8.5 Moderately aggressive investors

This type of investor values higher long-term returns rather than protecting their main investments and is willing to take significant risks and liquidity seems to present no problem (Merrill & Lynch, 2013:4).

2.8.6 Aggressive investors

Characteristics associated with aggressive investors are the willingness to tolerate very high risk and over-confidence in abilities and their behavioural bias orientation is emotional (Bourse Securities, 2016). Thus, a willingness exists to take substantial risk to maximise returns. In the chase for maximum returns it is almost a given that the investment portfolios of aggressive investors will change regularly simply because there will be an effort to continuously include the highest rate of return investment options into the portfolio. Corter and Chen (2006:369)

found in their research that investors with high risk tolerance scores tend to have higher-risk profiles.

2.9 SYNOPSIS

Risk tolerance is acknowledged as an important factor in an investor's life regarding investment choices, financial decisions, saving and other household goals. An investor's financial knowledge and economic expectations shapes his/her risk preferences. Risk preferences relate to an individual's attitude towards risk taking in different contexts by being attracted/repelled by riskier alternatives in contrast to less riskier investments. It, therefore, is clear that an investor needs to have a clear understanding of financial risk tolerance when he wants to make portfolio allocation decisions. If an investor does not consider financial risk tolerance, it can lead to disappointment.

CHAPTER 3: BEHAVIOURAL FINANCE

3.1 INTRODUCTION

Market inefficiencies led to the existence of behavioural finance. Zindel *et al*. (2014:11) described behavioural finance as encompassing three fields, namely knowledge of finance, economics as well as cognitive psychology when investors make financial decisions.

Behavioural finance originated due to the difficulties traditional finance experienced when investors tend to act in a completely different way than traditional finance suggests, namely to act irrationally (Thaler & Johnson, 1990:643-660). It stems from the observation that individual choices under uncertainty are not in line with rational decisions on which traditional finance theory is based (Thaler & Johnson, 1990:643-660; Lucarelli & Brighetti, 2011:3; Linciano & Soccorso, 2012:7).

Behavioural finance presents an integrated and complete portrait of investor irrationality. It is a valuable component to the capital financing structure upon which an economy depends. It is an evolving field indicating how psychological factors influence decision-making under conditions of uncertainty (Sewell, 2010). This relates to emotional and cognitive errors influencing individual investors' behaviour and applies to financial basics, investment knowledge (trading stocks, sell winning stocks and hold on to losing stocks), as well as borrowing knowledge (Shleifer, 2000:10; Mazumdar, 2014:47-55).

Investors only invest if there is a probability of making a profit, taking perceived costs and benefits into account (Vriend, 1995:268-269). Research indicates that investors make investment decisions based on forecasting, market timing and financial performance (Lintner, 1988:7-8). Forecasting is when people forecast an estimate as to the future value of a time series, when expecting a profit (Guerard, 2013:1). However, market timing is when investors attempt to predict the future direction the market takes and when they switch between asset classes and cash aiming to profit from changing market outlooks (Antoons, 2016:2). On the other hand, financial performance is how investors perform in the market and if financial objectives were achieved (Lucarelli & Brighetti, 2011:33).

Before discussing behavioural finance, attention is given to random walk hypothesis, efficient market hypothesis, rationality and irrationality.

3.2 RANDOM WALK HYPOTHESIS

Kendall (1953:11) observed the randomness and fluctuation of stock prices thereby establishing the random walk hypothesis. He concluded that prices tend to change randomly; however, changes between periods were too substantial to reflect systemic effects. This called for the need of external information to predict future stock prices considering the past prices that are independent from one another. Independence can be tested by applying serial correlation coefficients and by applying statistical methods (Andersson & Eriksson, 2013:28).

3.3 EFFICIENT MARKET HYPOTHESIS

Markets are neither strictly efficient nor strictly inefficient (Haugen, 1987:455-456). Efficient market theories are challenged by behavioural finance as it argues that markets can be inefficient due to irrational investment decisions by individuals (Shleifer, 2000:11). Samuelson (1965:41-49) established the origin of efficient market hypothesis, which states that properly anticipated prices fluctuate randomly (Lo, 2004:16).

The EMH has been operationalised by Roberts (1967) and Fama (1970:383-417). These authors believed an efficient market is when prices always reflect all available information, thereby calling it 'efficient' (being rational). Table 3.1 indicates some of the previous non-expected utility (EU) models.

Table 3.1: Non-expected utility models

Theory	Source
Weighted utility theory	Chew and MacCrimmon (1979)
Implicit EU	Dekel (1986:304-318); Chew (1989:273-298)
Regret theory	Bell (1982:961-981); Loomes and Sugden (1982:805-824)
Rank dependent utility theory	Quiggin (1982:323-343); Yaari (1987:95-115); Segal (1989:359-373)
Case based decision theory	Gilboa and Schmeidler (1995:141-153)

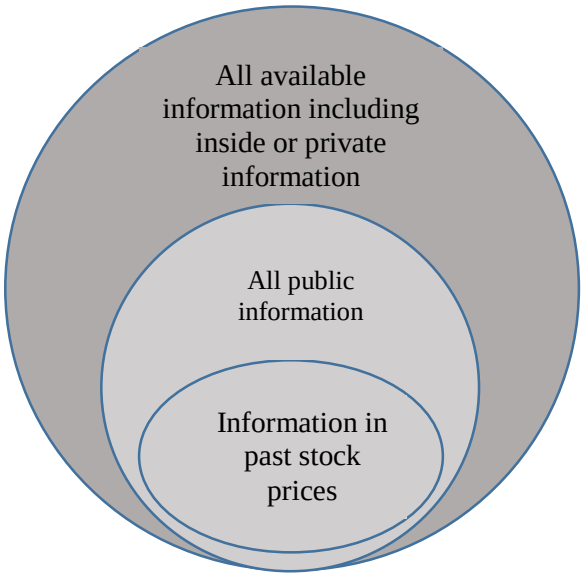
Theory	Source
Prospect theory	Kahneman and Tversky (1979:263-292); Tversky and Kahneman (1992:297-323)

Source: Author compilation

Risk-averse investors stated that EMH allows for price changes that were weighted properly by aggregate marginal utilities – if it is unforecastable; it implies that investors act rationally (LeRoy, 1973:436-446; Rubinstein, 1976:407-425; Lucas, 1978:1429-1446). The EMH incorporated three Ps of total investment management, namely prices, probabilities and preferences (Lo, 1999:87-129; Lo, 2004:16).

In an efficient market, the price of stock will reflect all available information (price equal to intrinsic value of the stock). This would prevent investors making abnormal profits overall, which will lead investors to unbeat the market. To do this, investors need to acquire financial knowledge and obtain the necessary information as the expansion of information causes markets to be more efficient, leading to increased access and quantity of recommendations (Andersson & Eriksson, 2013:27-30). Figure 3.1 demonstrates the term 'all relevant information' as related to the three forms of market efficiency (Bodie *et al*., 2013:237).

Figure 3.1: Presentation of all relevant information in the three markets



Source: Haugen (2001)

The efficient market hypothesis can have three forms, namely weak, semi-strong and strong forms.

3.3.1 Weak-form

In weak market efficiency, all the available information is based on historical prices/returns and reflects on the stock prices of past information (Haugen, 2001:574; Degutis & Novickytė, 2014:8). This information can be derived from analysing market trending data (includes historical prices, trading volumes/short interest) which is costly and readily obtainable (Bodie *et al*., 2013:238). The more information distributed publicly, the more investors may lose their interest in the stock as stock decreases in value (Fama, 1970:383-417). Therefore, it is difficult to make excess profits in a stock market.

The type of information found in weak-form includes the following (Degutis & Novickytė, 2014:8):

- Data on past prices; and
- Trading volume.

3.3.2 Semi-strong form

The semi-strong form of efficient market efficiency is characterised by the speed of price adjustments to all publicly available information. As in the case of the past prices of the weak-form, the semi-strong form can include the following (Dimson & Mussavian, 2000:963):

- Fundamental data on a production line of a firm;
- Management quality;
- Composition of balance sheet;
- Patents held;
- Earnings on forecasts; and
- Accounting practices.

It can be argued that if the above-mentioned information is available from public sources, it should be reflected in stock prices under the semi-strong efficiency market (Dodson, 2006:52).

3.3.3 Strong form

The strong market form incorporates all existing information known as historic, public and private information (also called insider information) (Clarke *et al.*, 2009). The information does not necessarily have to be public. In this case, it is possible for investors to earn excessive profits while trading on insider information (Malkiel, 2003:59-82). Insider information is not a legal practice (Schwert, 2003). Insiders should not be allowed to make a gain from access to inside information by buying company shares before making the information publicly available. On the other hand, based on inside information available to certain investors, investors tend to react differently in the market than expected. As a result, inside information is reflected in stock prices (Bodie *et al.*, 2013:238). The degree of efficiency differs across all markets and it is not true that 'all' information is reflected in stock prices. In an inefficient market, pricing behaviours tend to be a result of emotions or psychology (Haugen, 2001:576).

To conclude, EMH assumes, therefore, that all investors act rationally (Andersson & Eriksson, 2013:4). Behavioural finance has exposed many limitations and expectations and it was found that if expectations beat the market, investors might act rationally. However, when expectations are beaten by the markets, investors tend to act irrationally and this can lead to investors not believing in the efficient market hypothesis (Andersson & Eriksson, 2013:3-4).

Considering the EMH, market anomalies can occur in terms of market efficiency; this gave birth to the behavioural finance theory that plays a definite role in investment decisions. Market anomalies refer to the 'day of the week effect', 'January effect', 'turn of the month effect' and 'bubbles and crashes' (Andersson & Eriksson, 2013:2).

3.3.3.1 Day of the week effect

As markets are closed on Saturdays and Sundays, it is presumed that Mondays would have the highest returns. However, Mondays have the lowest return and a negative return on average. The other days of the week, Tuesdays to Fridays, indicate a positive return. These results do not reflect the EMH well (Andersson & Eriksson, 2013:30-31; Wachira, 2013).

3.3.3.2 January effect

Andersson and Eriksson (2013:31) found in their studies that over a period of 30 years there was a significant difference in returns regarding earning excess returns in small stocks compared to what the EMH would suggest. Large returns came in early January leading to excess profits. Investors tend to sell tax losses towards end of a year and invest large sums in small stocks at the beginning of a year.

3.3.3.3 Turn-of-the-month effect

Return during the turn-of-the-month appears to be higher/greater than the other days of the month, providing profit opportunities, which causes a problem for the EMH (Andersson & Eriksson, 2013:32).

3.3.3.4 Bubbles and crashes

Bubbles and crashes are also inconsistent with the EMH. A bubble refers to the time when market prices soar more than normal and rational behaviour. A crash, on the other hand, occurs when there is a significant drop in market-wide values (Jordan *et al.*, 2009:256-257). This is in contrast with the EMH that the price of stock equals its value and that investors act rationally.

3.4 NON-RANDOM WALK

Researchers doubted the random walk hypothesis and applied a simple volatility-based specification test (Lo & MacKinlay, 2002:39). They found there was an inconsistency test between the stochastic behaviour or return on weekly basis and the random walk hypothesis. It is argued that non-randomness of price changes allows for prediction.

To summarise, the EMH advocates a relation between risk and reward, but it appears to be unstable over time as different populations and regulatory environment and tax laws determine it. Another implication is that investors are not inclined to gather information and this will lead to the collapse of financial markets' price discovery. The last implication is that investment strategies will fluctuate between certain environments, first declining and then returning to profitability when the environmental conditions improve (Lo, 2004:24).

3.5 INVESTMENT DECISION-MAKING BIASES

Financial performance is about how investors perform in the market and if financial objectives were achieved. Table 3.2 indicates the fundamentals of traditional and behavioural approach as viewed by Lucarelli and Brighetti (2011:33).

Table 3.2: Differences between the traditional approach and behavioural approach

Rational approach **Investors:**	**Behavioural approach** **Investors:**
Have unbiased expectations	Have limited knowledge of possible outcomes and biased expectations
Make rational decisions	Have bounded rationality
Aim to achieve financial objectives	Follow an emotional approach
Strive for optimal outcome	Aim for satisfactory financial outcome

Source: Lucarelli & Brighetti (2011:33); Muhammad (2009:2)

The risk between the traditional approach and behavioural approach is also different as illustrated by Lucarelli & Brighetti (2011:33) in Table 3.3.

Table 3.3: Concept of risk in traditional and behavioural finance

Traditional finance	**Behavioural finance**
Objective	Subjective
One-dimensional	Multidimensional
Macro-perspective oriented	Micro-perspective
Strive for optimal outcome	Satisfactory financial outcome

Source: Lucarelli & Brighetti (2011:33); Muhammad (2009:2)

In the traditional approach, investors are objective, one-dimensional and macro-perspective oriented. The focus is on the behavioural risk concept where investors make financial decisions based on subjective nature of perceived risks. The multidimensional aspect for financial investors refers to past occurrences of an event and statistical measures. The microeconomic

concept is indicative of the individual decision-making process. In financial behaviour, investors aim for satisfactory financial outcomes (Lucarelli & Brighetti, 2011:33).

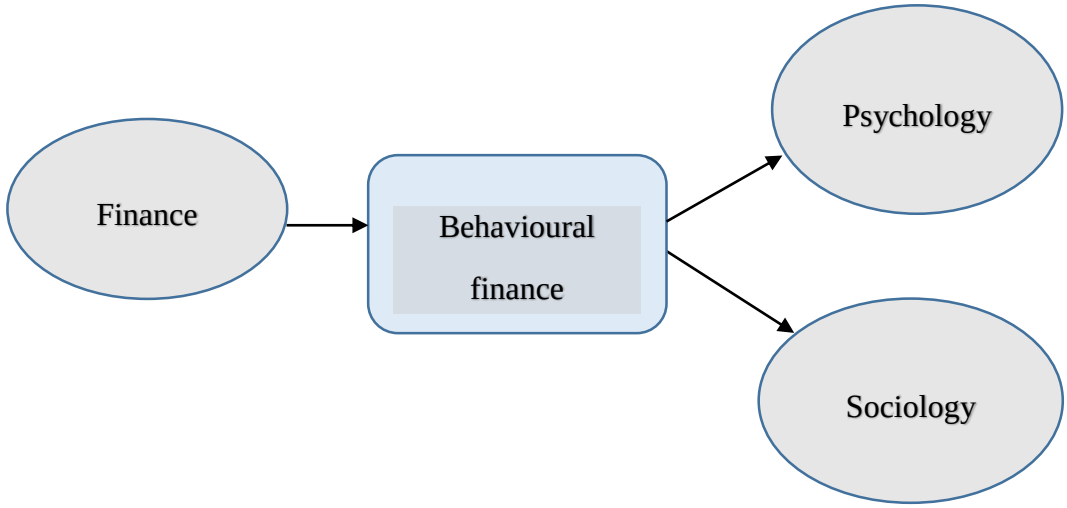
Behavioural finance has evolved increasingly in the finance industry. Financial services are being supplied to investors for example regarding their retirement money, investment strategies and portfolio returns (Massol & Molines, 2015:1). This is done to improve investors' knowledge of financial markets by applying behavioural science like psychology and sociology (Ricciardi & Simon, 2000:1; Lucarelli & Brighetti, 2011:2; Chaudhary, 2013:85-92).

Integrating economics with psychology creates an understanding on how heuristics gives insight into investor behaviour as they deviate from the logical economic assumption of rationality. The most common behavioural biases that describe heuristics are representativeness, over-confidence, anchoring, gamblers fallacy, availability bias and herding (Linciano & Soccorsio, 2012:7; Chaudhary, 2013:4; Jagongo & Mutswenje, 2014:95-102).

Other researchers have identified more concepts such as overreaction (De Bondt & Thaler, 1985:793-805), loss aversion (Kahneman & Tversky, 1979:263-291), regret (Bell, 1982:961-981; Clarke *et al.,* 1994:16-24), psychological accounting (Tversky & Kahneman, 1981:453-458), miscalibration of probabilities (Lichtenstein *et al.*, 1982) and hyperbolic discounting (Laibson, 1997:443-477). These factors play a role in human decision-making under uncertainty and may lead to undesirable outcomes for an individual, in this case, investors that might make systematic errors.

Behavioural finance argues that cognitive psychology can be applied to explain and understand deviations from rationality (anomalies) (Kahneman & Tversky, 1979:263-291). In prospect theory, value is assigned to gains and losses and not final assets and is a situation where probabilities are replaced by decision weights (Kahneman & Tversky, 1979:263). The most common concepts of heuristics are presented in Figure 3.2

Figure 3.2: Factors influencing behavioural finance



Source: Adapted from Chaudhary (2013:87)

Behavioural finance is in contrast with the traditional view of traditional finance, which is based upon investors' rational behaviour when making financial decisions to benefit their self-interests (Ritter, 2003:429; Lucarelli & Brighetti, 2011:2). It implies that an investor understands all financial markets (being stable) as well as their decisions, the effects of their actions and that they can integrate and process all available information presented to them. In believing that markets are stable, investors assume that the fundamental value of a security is reflected by its price (Barberis & Thaler, 2003:1055). This scenario is not true, as it seems that investors and financial markets do not have these characteristics; people make different choices and decisions, are limited in resolving some problems and often find it difficult to treat financial investment information (Simon, 1957).

From the literature research conducted, it can be concluded that traditional finance theories do not reflect financial behaviour accurately. Massol and Molines (2015:1) emphasised that the traditional finance paradigm is too restrictive, whereas behavioural finance theories can explain financial decisions and markets better (Baltussen, 2009:107).

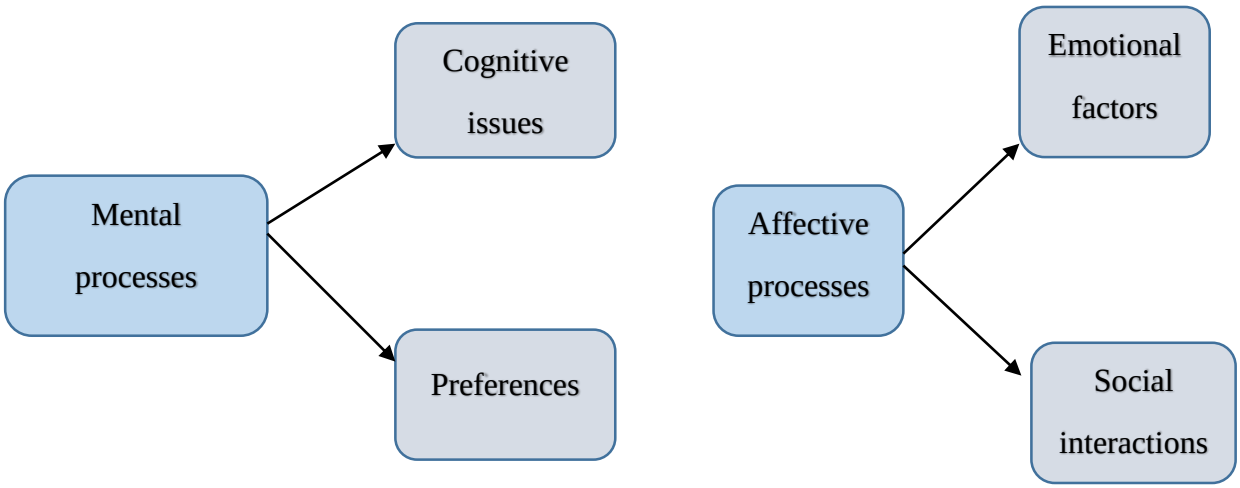
The EMH has lost a lot of ground in the 20th century when people realised that it is possible to predict stock markets partially, based on past prices as well as fundamental valuation metrics (Malkiel, 2003:59-82). Errors that investors make include impact returns and prices, provoking market inefficiencies in the form of over or under-reactions to information that influence market trends and even cause some crashes (Lin, 2011:325-350). Market anomalies are

attributed to several factors such as noise trading (investors making decisions without using fundamental data), overconfidence, mimicry, over optimism and lack of attention from investors (Massol & Molines, 2015:14).

Behavioural researchers get their information based on surveys, experiments or observations to determine investment behaviour. These techniques assist to determine how people think, act, or react. One needs to understand the nature of investors (bounded rationalities and their imperfections) to be able to help them make wise investment decisions (Massol & Molines, 2015:14). People are not able to rely or process available information correctly, but rather rely on heuristics to solve complex problems and to make judgements quickly and efficiently (Linciano & Soccorso, 2012:7)

Behavioural finance encompasses investment decision-making biases that involve mental as well as affective processes as illustrated in Figure 3.3.

Figure 3.3: Mental and affected processes



Source: Lucarelli & Brighetti (2011:34)

The investment decision-making biases are presented in Table 3.4.

Table 3.4: Investment decision-making biases

Investment decision-making biases	Theories	Biased effects
Cognitive issues	Heuristics: - Availability heuristic - Representativeness	Ease of recall bias Base rate neglect Sample size neglect Gambler's fallacy effect Trend chasing Halo effect
	Framing	Soothing effect Narrow framing Money illusion Preference reversals Context effects
	Overconfidence	Miscalibration Self-attribution bias Hindsight bias Cognitive dissonance Rationalisation Confirmation bias
	Anchoring and adjustment	Conservatism
	Ambiguity aversion	Familiarity bias
	Perceived control	Locus of control Illusion of control
	Mental accounting	Sequential choices
Preferences	Prospect theory	Utility over gains/losses Risk-aversion/seeking over gains/losses Loss aversion Small probabilities Overweighting Certainty effect

Investment decision-making biases	Theories	Biased effects
Emotional factors	Current feelings and mood Anticipation of future feelings	Misattribution bias Risk/loss aversion House money effect Break-even effect Omission bias Endowment effect Status quo bias
Social interaction	Person to person contagion Media contagion	Herding Rigid thinking Fundamental attribution error False consensus effect

Source: Lucarelli & Brighetti (2011:36)

3.5.1 Cognitive issues

The cognitive issues involve heuristics that consist of availability heuristics and representativeness. Behavioural economists noted that heuristics (mental shortcuts) are often utilised in humans' decision-making processes. Within the investment context, heuristics can lead to either poor or good investment decisions. As stated before, traditional finance views investors as rational and maximising, whereas Singh (2012:117) views investors as irrational decision-makers that are subject to cognitive illusions as illustrated in Figure 3.3.

3.5.1.1 Heuristics

Availability heuristics occur when decisions are based on only the most recent available information (in the absence of background information or incorrect interpretation of current information) (Kannadhasan, 2009; Abreu, 2014:7). Therefore, decisions based on new or recent available information can lead to a possible decrease in investment and/or investment returns. Tversky and Kahneman (1973:207-232) viewed availability as when people recall the

frequency of a class or probability of an event; they tend to do it as instances/occurrences come to mind. Availability produces biased estimates of events (Lucarelli & Brighetti, 2011:27).

Representativeness refers to making decisions based on stereotypes, in other words, seeing things the way other people see it. Thus, it is argued that investors base investment decisions on perceptions of patterns, which might have never existed (Kannadhasan, 2009). The result is that investors tend to overreact because it is believed that recent trends will be repeated (Singh, 2012:119). Tversky and Kahneman (1972:430-454) view representativeness as how people judge the probability that A belongs to B and vice versa. It is a cognitive bias resulting in people forming opinions on events familiar to them.

Although representativeness is a cognitive bias, it causes some biases such as recall bias, base rate neglect, sample size neglect, gambler's fallacy effect, trend chasing and the halo effect. Lucarelli and Brighetti (2011:37) explain the recall bias as a bias that occurs when it is easy to recall items that are more common; however, not all recall memories are available and more recent events may distort the estimate recall bias. Base rate neglect is when investors assess the estimated probability without considering the prior probability of evidence. Sample size neglect results when people tend to infer and form conclusions too quickly based on too few data points. This causes investors to believe that small sizes or numbers are sufficient (Rabin, 1998:11-46).

Gambler's effect originated from the notion that gamblers in general believe and are confident that they can outperform a market or system. In an investment context, the gambler's fallacy is evident when gambler investors incorrectly predict trend movements and/or reversals. These types of investors believe that one occurrence of one outcome might repeat itself (Barberis & Thaler, 2003:1054).

Trend chasing is a result of representativeness as people believe that trends might have systematic causes and tend to show a causal pattern, for example in stock prices. When a person likes a specific characteristic of one individual and applies it to all the outstanding characteristics of the same person, it is called the halo effect (Nisbett & Wilson, 1977:250-256).

3.5.1.2 Framing

Framing influences investors' decision-making processes and perceptions of risk. Some authors viewed it from two perspectives, namely the environment where decisions are made and the format in which decisions are worded (Kahneman & Tversky, 1979:263-291). As described in Table 3.5, the following biases of framing include the soothing effect, narrow framing, money illusion, preference reversals and context effects.

Table 3.5: Framing event

Framing event		Author
Soothing effect	Making pleasant choices rather than selecting best options	Lucarelli and Brighetti (2011:38)
Narrow framing	Make decisions at a specific time and not considering the big picture	Redelmeier and Tversky (1992:191-193); Read *et al.* (1999:171-197); Kahneman (2003:1449-1471)
Money illusion	Tend to think in nominal rather than monetary values	Shafir *et al*. (1997:341-374)
Preference reversals	When being faced by choice between binary lottery (high probability and low maximum payoff) versus the choice of lower probability and higher maximum payoff	Lucarelli and Brighetti (2011:38)
Context effects	When the presence of non-selected choice alternatives affect the choice of alternatives that are selected	Hirshleifer (2001:1533-1597)

Source: Author compilation

From Table 3.5, it can be concluded that framing involves how the perception of information can be applied to modify investors' perception of risk. Framing is therefore a framework within which a situation is presented (Abreu, 2014:11).

3.5.1.3 Overconfidence

Overconfidence is when a people believe in themselves and their own abilities with strong conviction (Ricciardi, 2008). Overconfidence is also viewed as when there is an overestimation of probabilities for a set of events (Massol & Molines, 2015:15); in other words, whether the probability that is assigned is greater than the portion being correct for all assessments regarding that probability (Mahajan, 1992:330). Over-confidence involves miscallibration, self-attribution bias, hindsight bias, cognitive dissonance, rationalisation and confirmation bias.

Miscallibration occurs when the confidence intervals that people assign to quantity estimates are too narrow when estimating probabilities (e.g. certain events occur 80 percent of the time, compared to events deemed impossible, only approximately 20 percent of the time). Research has indicated that men tend to be more confident than women and this decreases with experience (Massol & Molines, 2015:15). The opposite is true, namely that women are less confident than men (Barber & Odean, 2000:801). This explains why women invest less than men do. Overconfident investors tend to trade in high volume and prefer speculative markets (Ngoc, 2014:3). Shiller (1997) established in his research that overconfident people tend to underestimate the margins of error, whereas Barber and Odean (2001:773-806) believe that overconfident people do not follow rational investors because they are too proud to accept their beliefs.

When people misjudge their ability and have excessive confidence in their own accuracy of knowledge, they see themselves as being better than other people and, therefore, ascribe their success to their own skills (self-attribution bias) (Lucarelli & Brighetti, 2011:40); Andersson & Eriksson, 2013:36). Confidence is related closely to courage, but it is not the only factor that needs to be considered to achieve investment success (Bodie *et al*., 2013:267). Within an investment context, the issue is that illusions may exist within overconfident investors, which cause these investors to overestimate their abilities.

When people predict an event beforehand, it is called the hindsight bias (Lucarelli & Brighetti, 2011:40). People differ when it comes to confidence and self-awareness and it affects their ability to invest and trade. Odean (1998:1896-1897) emphasised that in any competitive market, only people with confidence succeed or survive in the market.

When people find themselves in risky situations (e.g. selecting and trading stocks), overconfidence can have implications for the investor, as well as the market itself. Overconfidence may lead to excessive trading as investors might have different views on the market leading to success. One needs to be aware of the danger as extreme amounts of trading can be hurtful leading to lower net returns of investors whose portfolio turnover is high (Odean, 1998:1911,1913). One of the dangers is that when an investor is overconfident, he might apply active strategies resulting in performing worse compared to passive investors (Eriksson & Andersson, 2013:37).

Financial cognitive dissonance occurs when investors feel anxious and tense when facing conflicts. They want to solve these conflicts and do it by justifying their choices or by changing their opinions (seen in stock markets) (Lucarelli & Brighetti, 2011:40; Massol & Molines, 2015:16). However, cognitive dissonance is not caused by self-justifying behaviour (Aronson *et al*., 1963:31-36; Mahaffy, 1996:392-402).

Rationalisation may occur if there is a plausible rationale for past choices helping investors to feel better about their decision-making skills or competence. The last biased of overconfidence is the confirmation bias that occurs when people interpret ambiguous evidence that is consistent with their prior beliefs (Lucarelli & Brighetti, 2011:40).

3.5.1.4 Anchoring

Kannadhasan (2009) referred to anchoring as a tendency in which humans excessively rely on a single piece of information when making decisions. This process is a psychological process that people undergo when making estimates and adjustment to determine a specific value by starting from the initial value leading up to give final answers (Kahneman & Tversky, 1974:1128). Investors tend to anchor too much on their initial belief or past history, giving insufficient weight to other factors (Lucarelli & Brighetti, 2011:39).

Investment anchoring relates, therefore, to the features and factors that investor's base their decisions on, which have an impact on factors, figures and indicators. However, it is difficult to scrutinise and evaluate all factors and investors tend to obtain information from the news, magazines and recommendations from investment companies (Eriksson & Andersson,

2013:39). This is especially the case in the stock market regarding their prices and past performances (Odean, 1999:1279-1298).

Odean (1999:1279-1298) warns that although investors follow past performances of investments, it may lead to momentum strategies, which means that an investor buys stocks with a positive recent return and sells stocks with poor recent return, thereby following the stock's momentum. This situation sheds some doubt on investors' rationality in following the anchoring behaviour (Bikhchandani & Sharma, 2001:279-290).

Conservatism is the result of initial probability estimate of anchoring and occurs when investors keep to their beliefs and do not want to change regardless of new evidence. They believe that it is costly to update new beliefs or when processing new information (Lucarelli & Brighetti, 2011:40).

3.5.1.5 Ambiguity aversion

Ambiguity aversion is when people are uncertain and do not like the outcome of probability distribution of a risk (gamble). This aversion relates to how competent people feel. When other people show them how bets could have fared better, or mention more qualified people to evaluate bets, these types of investors experience incompetence (Fox & Tversky, 1995:585-603). On the other hand, when people feel competent in evaluating a gamble, the opposite effect may occur, namely the familiarity bias. This implies that investors are more risk tolerant if they are more familiar with certain events, activities, or circumstances (Abreu, 2014:11; Lucarelli & Brighetti, 2011:41).

3.5.1.6 Perceived control

Perceived control involves locus of control and illusion of control. Locus of control is when people perceive the control they have regarding their personal behaviour and outcomes. This differs from illusion of control, which means a person perceives having control over outcomes of a situation regardless if it is uncontrollable or random (Baker & Nofsinger, 2002:97-116). Researchers that investigated the relationship between locus of control and risk-taking behaviour were McInish (1982:125-136), Maital *et al.* (1986) and Grable and Joo (2000:151-157).

3.5.1.7 Mental accounting

Life experiences are grouped into mental compartments and the difference between these compartments may influence investment behaviour more than life itself. The theory of mental accounting is when an investor invests funds, receives excessive returns on the investment and later only receives normal returns. When this happens, the investor prefers to remain in a hesitant position to sell during the period of receiving normal returns (Jagongo & Mutswenje, 2014:92-102). Therefore, it is the process of keeping track of gains and losses regarding financial decisions in separate mental accounts while re-examining it only intermittently when it becomes relevant (Thaler, 1985:199-214). The three categories of mental accounts are (Thaler, 1985:199-214):

- Consumption account (general expenses);
- Income account (revenues); and
- Wealth income (different sources of wealth).

It needs to be borne in mind that the above categories might undergo some misevaluation effects. Regarding consumption, when one makes a frequent judgement mistake, it is related to the overvaluation of repeated/hedonic consumption (hedonic framing). Regarding income, it appears that it generally is split according to either the propensity to use income (e.g. buying an item) compared to obtaining it occasionally (e.g. lottery win rather than salary increase). The last category, wealth income, is divided according to different sources of wealth and may only be relevant to the type of wealth involved. Mental accounting can lead to sub-optimal outcomes that may neglect the interaction between the different accounts and the effects that these accounts have on investors' financial choices (Lucarelli & Brighetti, 2011:42).

3.5.2 Preferences

Traditional models indicated that investors tend to evaluate risky gambles according to EU if they are aware of the objective probabilities. However, research has shown that people systematically violated this theory when they had to choose among risk choices or decisions (Lucarelli & Brighetti, 2011:42).

The prospect theory of behavioural finance will be discussed in the next section, as it is the most successful theory applying to financial applications. Preferences include utility over

gains/losses, risk-aversion/seeking over gains/losses, loss aversion, small probabilities, overweighting and certainty effect.

3.5.2.1 Prospect theory

Prospect theory is the alternative to the EU theory and aims to explain variation in risk tolerance (Guillemette & Nanigian, 2014:5). Prospect theory is when individuals make investment decisions under conditions of risk and capturing several biases, namely loss aversion, regret aversion, mental accounting and self-control (Abreu, 2014:20-40). Investors value gains and losses differently. Sewell (2007:2) viewed prospect theory as when investors assign values to gains and losses and not final assets and where investors replace probabilities by decision weights. The value function implies risk-aversion that is common for losses (risk seeking). Loss aversion occurs when losses are viewed more than gains (Sewell, 2007:2).

Prospect theory, therefore, is based on how a person's risk tolerance depends on how a situation or event is framed and where investors make decisions that are based on ordered assessment of consequences (Grable, 2016:22). When an investor compares a possible loss and the other option as gain, the investor tends to choose the latter option. This leads to an investor experiencing higher negative emotion regarding the loss instead of positive emotion of possible gains. Such an investor seems to miscalculate probabilities when weighing different options or alternatives. They show an aversion towards possible risks and concentrate more on losses and gains instead of focusing on current values of their investment (Andersson & Eriksson, 2013:34).

In a situation where an investor makes a series of profitable investments, they may take higher risks if they know that the investment is safe and may only incur a reasonable loss (Brealy *et al.,* 2011:326). Contradictory to this, Weber *et al*. (2002:263-290) felt that there appears to be a link between risky choices that can be predicted when people assess the severity and possible outcomes of choosing alternatives, subjectively and even with bias and error. These authors also found that this information could be integrated through means of expectations-based calculus to be able to make decisions. This led to risk-as-feelings theoretical perspectives.

The prospect theory is the primary behavioural finance theory that relates to investigating risk attitudes and behaviours. Both the endowment effect and prospect theory are related to loss

aversion. Loss aversion is when investors have the tendency to give an object up, rather than acquiring it (Kahneman *et al*., 1991:194). Moreover, loss aversion is when people assign more value/significance to avoiding loss rather than achieving gain (Lucarelli & Brighetti, 2011:43). Prospect theory involves self-control, which is aimed at avoiding losses and follows measures to protect investments (Kannadhasan, 2009). When temptations in the market occur, investors find themselves in a difficult position to exercise self-control on a regular basis.

Investors fear losses and this leads to irrationality. Irrationality occurs when an investor selects non-optional alternatives or when he/she is making disadvantageous decisions. This is, therefore, the opposite effect of how investors should act in the market. Investors behave differently, do not value the information, do not pay enough attention to information and/or integrity of sources that they receive and tend to be selective regarding investment information (Andersson & Eriksson, 2013:35). Investors tend to follow only the recommendations of financial analysts (Odean, 1998:1887-1934).

Investors may tend to be irrational in their beliefs about probabilities. This can lead to making errors in investment predictions and estimations and may disregard the fact that coincidence and chance play a role (Shleifer, 2000:11). When an investor is rational, it means that they can adjust to new information, interpret it. If they are not able to adapt to new information, they will make irrational decisions.

Loss aversion highlights the fact that different emotions are expressed towards gains and losses (Singh, 2012:120; Chaudhary, 2013:1). Thus, investors are more sensitive towards losses experienced than equal size gains and find it difficult to turn their losses into gains. Lo and Repin (2002:232-339) argued that emotional responses form part of real-time processing of financial risks and must be considered. One needs to be able to challenge emotions versus loss aversion.

Regret aversion illustrates the emotional reaction investors experience when an error was made in judgment (Quiggin, 1994:153-165). As such, investors are regret averse and attempt to manage regretful emotions (Zeelenberg & Pieters, 2006:3-18). These investors do not want to experience the regret emotion caused by a loss or nonperforming investment (Zeelenberg & Pieters, 2007:3-18).

This theory relates to how people assess their expected reaction to a future situation – it being emotion caused by a given outcome/state of events with the view of state of a forgone choice (Bell, 1982:961-981). Massol and Molines (2015:16) state that investors may choose to do the same thing, for example, selling a stock that has declined in value to avoid making a bad investment choice and not to have to report a loss. They also found that in this way, investors could motivate or rationalise their decisions. Massol and Molines (2015:17) mentioned that regret is based on two elements, namely subjective evaluation of the quality of a decision that was taken and the evaluation of the outcome that may have occurred.

3.5.3 Emotional factors

Many researchers only focused on cognitive issues and disregarded emotional factors of investment decisions and risk perception and this led to a new awareness in the financial field as 'risk as feeling' is being a significant part in investment decision-making (Loewenstein *et al.*, 2001:267-286; Slovic *et al*., 2004:311-322). Emotional factors are manifested in current feelings and mood as well as anticipation of future feelings (Loewenstein *et al.,* 2001:277-286; Olson, 2006:193-203; Grable, 2016:22).

When people experience happy moods, they tend to be more optimistic when making decisions, making choices and forming judgements compared to being in a bad mood (Lerner *et al*., 2014:8). When a person is in a bad mood, he might make incorrect judgements or misattribution biases (Ross, 1977). This is called regret theory, as this involves the consequence of making investments, which do not generate positive returns (Quiggin, 1994:153-165).

Moods tend to affect abstract judgements rather than specific ones (e.g. concrete information). Emotional factors include misattribution bias, risk/loss aversion, house money effect, break-even effect, omission bias, endowment effect and status quo bias. Anticipation of future feelings plays a role in decision-making. The consequences of avoiding unpleasantness are described in the following section (Table 3.6).

Table 3.6: Anticipation of future feelings in decision-making

Effect	Description	Source
Regret aversion	Having negative feelings regarding final decisions and when an error was made in judgement.	Quiggin (1994:153-165)
Risk-aversion	People are risk averse for gains of moderate to high probability as well as losses of low probability.	Sewell (2007)
Loss aversion	People assign more value/significance to avoiding loss rather than achieving gain.	Lucarelli and Brighetti (2011:43)
House money effect	When investors are willing to gamble with money that was won recently.	Thaler and Johnson (1990:643-660)
Break-even effect	When people experiencing a loss and have the chance to make this loss up.	Lucarelli and Brighetti (2011:46)
Omission bias	When regret is stronger for decisions involving action rather than passivity.	Ritov and Baron (1990:263-277)
Endowment effect	When people hold on to things, rather than exchanging them for better alternatives (swopping a lottery ticket for equivalent value). People value assets higher than in the case that what they would pay to acquire this asset and are willing to pay versus willingness to accept.	Kahneman *et al.* (1991:194)
Status quo bias	Preferring the choice designated as the default or status quo among a list of alternatives, to avoid the chance of being responsible for a worse outcome, which would have materialised from choosing one of the other available options.	Samuelson and Zeckhauser (1988:7-59)

Source: Author compilation

3.5.4 Social interaction

Social interaction involves person-to-person contagion and media contagion of ideas as behaviour is important for decision-making and investment processes. Investors can learn from other people by observing their actions, but when they take too much notice of other people's ideas or facts, it can lead to some biases such as herding, rigid thinking, fundamental attribution error and false consensus effect (Lucarelli & Brighetti, 2011:46).

Herding or herd behaviour is when investors follow the same procedure as other investors regardless of being sure if those investors are more informed or skilled (Lux, 1995:882). Herding is not exclusively an irrational mimicking behaviour but can be spurious herding or intentional herding. The first (spurious) herding behaviour is when investors face the same impressions or information from which they deduce the same decisions whereas intention herding relates coming to the same conclusion as others, thereby copying them (Bikhchandani & Sharma, 2001:281).

However, when investors follow other investors' recommendations, spurious herding does not apply. These investors do not reach conclusions on their own. Herding has an influence on financial markets and volatility, destabilising of markets and fragility of financial systems may follow. Herding can lead to volatility, causing investors to follow incorrect direction and investing in the reverse direction of the herding behaviour (Bikhchandani & Sharma, 2001:279-280).

Rigid thinking occurs when people display habitual behaviours (Argote *et al*., 1989:58-74). Fundamental attribution, on the other hand, is when investors underestimate the value of importance of external circumstances while overestimating the importance of disposition to determine other people's behaviour (Ross, 1977; Shefrin & Statman, 1985:777-790). A false consensus effect occurs when investors are under the impression that people mistakenly believe that other people share their beliefs more than they really do and is supported by their overconfidence actions. People/investors tend to disregard the fact that other people might make a mistake (Ross, 1977). This is called the disposition effect and it occurs when people tend to hold on to stock portfolios with low performance and rather sell stocks with positive performances (Shefrin & Statman, 1985:790).

3.6 THE RISK-RETURN TRADE-OFF ANOMALIES

Traditional finance focuses on models based on testable predictions, whereas behavioural finance focuses on developing new theories and interpretations (Lucarelli & Brighetti, 2011:47). As this study investigates behavioural finance, less attention is given to traditional finance. Investors need to follow certain actions (positive investment decision process) and have knowledge on what they should do (normative decision process). There is a difference between micro-perspective (anomalies of investments of a single individual) and macro-perspective puzzles (anomalies of the market) (Table 3.7).

Table 3.7 indicates the behavioural explanations of micro-perspective puzzles about under-diversification and naïve diversification. From Table 3.7 it can be concluded that the different micro-perspective puzzles have behavioural explanations.

Table 3.7: Micro-perspective puzzles

Micro-perspective puzzles	**Behavioural bias**	**Behavioural explanation**	**Source**
	Familiarity	How investors behave in financial situations.	Baker and Nofsinger (2002:98); Benartzi (2001:1747-1764); Benartzi and Thaler (2002:1593-1616)
	Overconfidence	Investors intentionally choose to hold focused and under-diversified portfolios. They believe they will gain better performance by active trading and underweight evidence believing stock is a bad investment.	Goetzmann and Kumar (2008:433-463)

Micro-perspective puzzles	**Behavioural bias**	**Behavioural explanation**	**Source**
Under-diversification (propensity to invest heavily in only a few assets)	Trend chasing	Investors that are more sensitive tend hold less diversified portfolios.	Goetzmann and Kumar (2008:433-463)
	Status quo	Investors tend to maintain their previous asset allocations, despite large variations in returns and hence in their portfolio's risk-return characteristics (e.g. in many retirement programmes).	Samuelson and Zeckhauser (1988:7-59)
	Narrow framing	Investors care about fluctuations in their individual stocks instead of fluctuations in their total portfolios. They sometimes yield sub-optimal and under-diversified portfolios. They only select few stocks that are remarkably similar in their volatilities (risk habitat hypothesis).	Dorn and Huberman (2010:155-173)
	Herding	Some investors change their behaviours and do not accurately weigh the effects of these parallel	Grinblatt *et al.* (1995:1088-1105); Nofsinger and Sias (1999:2263-2295);

Micro-perspective puzzles	Behavioural bias	Behavioural explanation	Source
		behaviours upon the overall portfolio.	Grinblatt and Keloharju (2000:43-67)
Naïve diversification: Tend to diversify in a naïve and simplified fashion (do not follow the normative rule of the mean-variance approach)	Diversification heuristic	Investors tend to equally divide their resources among the investment lines offered by the plan.	Benartzi and Thaler (2002:1593-1616)
Excessive trading: justifying more trading on rational grounds	Overconfidence	Investors tend to believe they have information strong enough to justify a trade, but in truth, the information is too weak to warrant any action	Odean (1999:1279-1298); Barber and Odean (2000:773-806)
	Trend chasing	Investors tend to extrapolate long-term trends from short-term evidences resulting in a high portfolio turnover following the market, having the illusion of anticipating future trends.	Goetzmann and Kumar (2008:433-463)

Micro-perspective puzzles	Behavioural bias	Behavioural explanation	Source
The selling decision: Holding on to stocks that have fallen in value, too long and selling stocks that have risen in value too soon (e.g. the disposition effect)	Prospect theory	Investors tend to dislike incurring losses much more than making gains. They are willing to gamble in the domain of losses and to avoid risks in the domain of gains.	Barberis and Xiong (2009:751-784); Shefrin and Statman (1985:777-790)
	Regret aversion	Investors postpone the sale of a losing investment believing it is a way to postpone the sense of regret.	Quiggin (1994:153-165)
The buying decision: the propensity to buy a stock that has caught their attention without taking the main prescriptions of the mean-variance optimal	Availability	Investors tend to buy high attention stocks believing their memories are more 'available'.	Odean (1999:1279-1298); Barber and Odean (2000:773-806)

Micro-perspective puzzles	Behavioural bias	Behavioural explanation	Source
strategy into account			

Source: Author compilation

Evidence of risk and mispricing effect of macro-perspective puzzles is described in Table 3.8.

Table 3.8: Macro-perspective puzzles

Macro-perspective puzzles	Description
Size effect	Stocks with a small market capitalisation tend to earn higher (risk adjusted) returns than bigger stocks.
Value effect	Stocks with a higher measure of fundamental value relative to market value tend to earn higher returns than stocks with a low measure.
Momentum effect	Stocks that have performed well over the past year tend to earn higher returns than stocks that have performed poorly.
Volatility effect	Stocks with low historical volatility tend to exhibit superior risk adjusted returns.
Long-term reversal effect	Stocks that have performed badly during the past three to five years tend to outperform stocks that performed well.
Post-earning announcement Effect	Stocks with surprisingly good earnings tend to outperform stocks with surprisingly bad earnings during the next 60 days.
Equity puzzle effect	Stocks tend to outperform bonds over long horizons by a difference that is too large to

Macro-perspective puzzles	Description
	be explained by any rational asset pricing theory.

Source: Lucarelli & Brighetti (2011:50)

The behavioural trends have already been discussed in detail in previous sections; therefore, they will be addressed only briefly.

3.7 BEHAVIOURAL FINANCIAL THEORIES ON RISK-RETURN TRADE-OFF

The behavioural financial theories on risk-return trade-off differ from the traditional financial theory, the behavioural portfolio theory and asset pricing.

3.7.1 Behavioural portfolio theory

The behavioural portfolio theory (BPT) has been developed by Shefrin and Statman (2000:127-151) and differs from the modern portfolio theory (MPT) of traditional finance. BPT is presented in two versions:

- Single mental account BPT version (BPT-SA), based on Lopes's (1987) two-factors theory of risky choice security potential/aspiration (SP/A theory); and
- Multiple mental account BPT version (BPT-MA) (combining Lopes's 1987 model with Kahneman and Tversky's (1979:263-292) prospect theory).

3.7.1.1 Single mental account BPT

Investors view this portfolio as a single mental account, where they take covariance into consideration (Markowitz, 1952:77-91). This portfolio is very similar to a mean-variance framework regarding the optimisation process, but it differs from the variables that are used as inputs (Lucarelli & Brighetti, 2011:51). Three forces drive investors, namely security (concern on how to avoid low levels of wealth), potential (desire to reach high levels of wealth) and aspiration (goal of achieving a specific target level). Investors tend to think of their portfolio as a pyramid of many accounts (Shefrin & Statman, 2000:127-151).

3.7.1.2 Multiple mental account BPT

In this account, investors segregate their portfolios into distinct mental accounts as if overlooking covariance (Lucarelli & Brighetti, 2011:52). In this version, investors' money is divided into layers (Shefrin & Statman, 2000:127-151):

- Downside protection layer (protecting them from poverty); and
- Upside potential layer (having the chance becoming rich)

3.7.1.3 Behavioural asset pricing theory

This theory was analysed by Shefrin and Statman (1994:323-349) and they found that there are mistaken beliefs on equilibrium prices in security markets that result from noise traders interacting with information traders in the market. They advocate the notion of a behavioural beta, explaining that when prices are inefficient, it would lead to mispricing.

Since the above-mentioned biases form part of investors' decision-making processes, one needs to consider that biases may cause possible distortions in the market behaviour; it can cause markets to deviate from vital values. Listed below are some of the most common results of the biases (Singh, 2012:121):

- They lead to an extrapolation of historical trends (aimed to predict future expected investment results);
- Lack of appropriate reaction to price changes;
- Excessive focus on popular stocks with desirable returns; and
- Deficient attention to fundamentals underlying a stock.

3.8 RELATIONSHIP BETWEEN RISK TOLERANCE AND BEHAVIOURAL FINANCE

The relationship between behavioural finance and risk tolerance is of importance as the latter influences the shaping of individual financial behaviours. Risk tolerance is the inverse of risk-aversion and occurs when a person hesitates to act in such a manner that would guarantee a certain payoff or result rather than choosing an alternative that has a certain outcome (Grable, 2016:19).

The different financial decisions that an investor makes refer to examples like (Grable, 2016:19):

- Debt versus saving decisions of individuals;
- Type of mortgage they select;
- Credit use and management;
- Saving for retirement;
- Saving for specific purposes; and
- Investing for short- and long-term.

Risk tolerance has been studied, which affects different areas outside economics such as consumer behaviour (MacCrimmon & Wehrung, 1986), business (Fitzpatrick, 1983:249-254) and other fields. Researchers that investigated risk tolerance in the field of finance were Markowitz (1952:77-91), Cohn *et al.* (1975:605-620) and Siegel and Hoban (1982:481-487).

Before discussing the relationship between behavioural finance and risk tolerance, one needs to discuss the expected utility theory framework (EUT) as this model was linked previously to risk-taking behaviours. EUT is based upon the assumption that investors act rationally while risk preferences remain the same (Grable, 2016:20). Markowitz (1952:70) developed the MPT as an extension to the EUT that is based on a risk-averse individual's satisfaction regarding portfolio returns at a certain level of risk. MPT means that investors take risks if the returns with risk prove to be high. Risk tolerance in this theory, therefore, is based on hypothetical gambles, expecting highest returns (Grable, 2016:20-21).

Although EUT was accepted as the favourable method regarding risk tolerance and risk-taking behaviour, it was found that researchers Weber and Milliman (1997:129) and Olson (2006:193-203) pointed out several discrepancies. Friedman and Savage (1948:279-304) and Allais (1953:504-546) did research and found two possible options. First, when investors had a choice between a sure payoff and a payoff with three probabilities and, secondly, when investors had to choose between two options with varying probabilities of success. In this research, it was found that investors mainly chose the sure gain in the first choice.

Compared to the first option, investors chose the low probability payoff of the second option. Some studies show there is a conflict between the normative theory and actual behaviour (Ellsberg, 1961:643-669; Tversky, 1969:31-48; Coombs, 1975; Kahneman & Tversky,

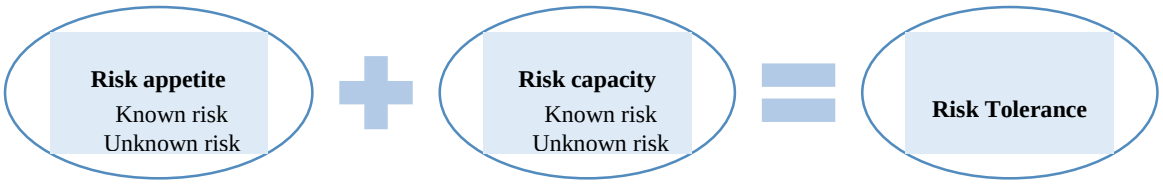
1979:263-291; Tversky & Kahneman, 1981:454-458; Loomes & Sugden, 1982:805-824; Bell, 1982:961-981; Payne *et al*., 1984:1350-1361; Shefrin & Statman, 1985:777-779).

The work of Kahneman and Tversky (1979:266) emphasise the importance of the magnitudes of potential losses and gains relating to chances of occurrence and exposure to potential loss. They emphasised that potential losses may contribute to the degree of threat versus opportunity in risk situations. These investors concluded that investors are more willing to take risks when certain losses are anticipated, with sure gains and absolute rewards that may be expected. This led to prospect theory that became the foundation for behavioural finance framework to study risk attitudes and behaviours (Tversky & Kahneman, 1981:453-458). The prospect theory was addressed in Section 3.5.2.

3.9 INVESTOR TYPE CLASSIFICATION

Chapter 2 addressed the different types of investors and discussed that investors are grouped by the different level of risk that can be tolerated. The investors that were discussed are classified into four different types of investors, namely conservative, moderate, growth or aggressive investors (Pompian, 2016:7). Risks tolerance is composed of risk appetite and risk capacity. Pompian (2016:6) highlights that the unknown risks under risk appetite and risk capacity tend to cause behavioural problems with investors. Figure 3.4 illustrates the risk tolerance equation.

Figure 3.4: Risk tolerance equation



Source: Pompian (2016)

In the context of behavioural finance, known risks can easily be identified, measured and be accounted for by financial advisors as it needs to be understood. If investors understand the

known risks, they can easily accept results from their investment decisions; however, behavioural finance is identified in the unknown risks (Pompian, 2016:10)

Unknown risk is when investors are under the impression that all risk is included in the known risk area, but in fact, some risk exists beyond that and results in investors not understanding or accepting the risks (Bessis, 2010:30). This leads to uncertainty (Pompian, 2016:10).

Table 3.9 indicates the investor type classification and risk tolerance, thereafter a discussion will follow.

Table 3.9: Risk tolerance and types of biases

	Conservative	**Moderate**	**Growth**	**Aggressive**
Risk Tolerance	Low	Medium	High	Very High
Bias types	Emotional	Cognitive	Cognitive	Emotional
Biases	Endowment; Loss aversion; Status quo; Anchoring; Mental accounting.	Regret; Hindsight; Framing; Cognitive Dissonance; Recency.	Conservatism; Availability; Confirmation; Representativeness; Self-attribution.	Over-confidence; Self-control; Affinity; Illusion of control; Outcome.

Source: Pompian (2016:8)

3.9.1 Conservative investors

Conservative investors tend to have a low risk tolerance, which indicates that risk appetite and risk capacity is low, therefore, these investors have different characteristics and biases such as (Pompian, 2016:9-10):

- Loss aversion bias (experience losses more than gains and find it difficult to turn their investment around);
- Status quo bias (maintain their investments the same);
- Endowment bias (assign greater value to investment they already own e.g. real estate);
- Anchoring bias (are often influence by purchase points and will hesitate to sell until the prices rebounds); and

- Mental accounting bias (prefers to treat investments on where the sums are mentally categorised).

Investors' portfolio risk tends to be tedious, which can be attributed to slow reaction of market changes. One of the strongest characteristics of this type of investor is their cautiousness to take on excessive risks (Megginson *et al.,* 2010:161). This group focuses on future generations as they place great emphasis on financial security. They seek to minimise investment risk and loss of principal. Wealth is gained through inheritance/investing in low risk investment properties (Bourse Securities Limited, 2016).

Moderately conservative investors tend to value principal investment and are willing to accept a small degree of risk. They desire greater liquidity and are willing to accept lower returns. These investors are also willing to accept minimal financial losses (Pompian, 2016:10).

To conclude, conservative investors have a portfolio with greater expected return and less portfolio risk.

3.9.2 Moderate investors

This group of investors tend to take reasonable level of risks while increasing returns proportionality to achieve long-term results (Bourse Securities Limited, 2016). They also appear to have their own ideas about investing. Their behavioural bias is cognitive and is likely to experience typical emotions (regret aversion under prospect theory). They often lack investment knowledge and tend to follow the trend set by their friends or colleagues. The behavioural biases of moderate investors are the following (Pompian, 2016:11-13):

- Recency bias (recall and emphasise recent events);
- Hindsight bias (perceive past investments outcomes as if being predictable);
- Framing bias (tend to respond differently to situations based on context in which choices are presented (framed));
- Cognitive dissonance bias (attitudes, emotions, beliefs, or values); and
- Regret aversion bias (avoid taking decisive actions because of fear of making informed decisions leading to timid investment choices and based on previous losses).

These investors regard long-term financial planning as not so important as they focus only where current investment options are suitable for investment purposes. However, they often

tend to overestimate their ability to tolerate risk and tend to be difficult as they lack the joy, or they tend not to have the aptitude for the investment process.

3.9.3 Growth investors

This group of investors have medium to high risk tolerance. Their behavioural bias orientation is also cognitive. They tend to trust their gut regarding investment and do not like to consult other people when making decisions but appear to be very competent when doing their own research. The behavioural biases associated with this type of investor include the following (Pompian, 2016:11-13):

- Representativeness bias (is a result of a flawed or poor perceptual framework when processing new information);
- Self-attribution (self-enhancing) bias (tend to attribute their success to their innate talents while blaming failures on outside influences or situations);
- Confirmation bias (seek only information confirming their beliefs on investments rather than contradicting it); and
- Availability (estimating the probability of an outcome especially as it appears in their lives).

To conclude, growth investors are often self-assured, enjoy their investments and are comfortable when taking risks. They are willing to accept a portion of return from irregular capital gains (Dow, 1998:9). They often want to outperform the market to achieve higher returns on their investment portfolios and are willing to endure larger short-term financial losses so that they can benefit from higher long-term returns.

3.9.4 Aggressive investors

Moderately aggressive investors value higher long-term returns rather than accepting principal and are willing to take significant risks and liquidity presents no problem to the investor (Merrill & Lynch, 2013; Bourse Securities Limited, 2016).

Aggressive investors are willing to tolerate very high risk and display over-confidence in their own abilities. Their behavioural orientation, therefore, is emotional and this characteristic forms part of the heuristic sub-section of cognitive illusion. Investment portfolios of aggressive investors tend to change regularly as they attempt to include the highest rate of return investment options continuously, thereby displaying higher risk profiles (Corter & Chen,

2006:369; Bourse Securities Limited, 2016). The biases of this group include (Pompian, 2016:15-17):

- Overconfidence bias (overestimates the quality of this judgment);
- Self-control bias (tends to consume today instead of saving for the next day);
- Affinity bias (tends to make irrational uneconomical investment decisions based on his belief how it may reflect its values);
- Illusion of control bias (believing in their ability to control/influence investment outcomes, when they cannot do so); and
- Outcome bias (focuses on the outcome of a process instead on the process to achieve the outcome).

From the above discussion, it appears that investors are classified in different groups, namely conservative, moderate, growth and aggressive investors and that they display different behavioural biases.

3.10 SYNOPSIS

Markets are not always efficient due to various market anomalies that exist. Therefore, share prices do not always reflect the true value of shares causing investors to either underreact or overreact based on the type of investors they are, namely conservative, moderate, growth and aggressive investors. Behavioural finance highlights the importance of psychological and sociological effects on investment behaviour. Individuals tend to fail to take corrective steps regarding debt for instance. Understanding what behavioural finance entails will enable investors to make decisions more efficiently and effectively.

It can be concluded that the phenomenon where investment decisions are based on emotion rather than on fact is known as behavioural finance. The latter means that investors under certain conditions may make emotional rather rational investment decisions. Emotional reactions when making decisions can influence certain behaviour. This relates to worry, dread, anxiety and fear. If an investor is in a good mood, he/she tends to view risky situations better than investors that are in a bad mood. Therefore, an opportunity exists to consider if a certain level of risk tolerance can be associated with a certain risk personality and behavioural finance theory.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

Assessment of risk tolerance and risk personalities tends to be measured in many ways, such as professional or personal judgment, heuristics, objectively, single item questioning, risk scales and/or mixed measures (Grable, 2016:22). In this chapter, the choice of the research methodology to meet the primary objective of this study will be discussed. To do this, a model against which investment companies could profile their clients more accurately by adding behavioural finance elements to existing measures of risk tolerance and investor personalities, will be developed.

Sections to be discussed include the following:

- Research design investigates the positivist, constructivist, participatory and pragmatist worldview.
- Research approach describes the different data collection methods, namely the qualitative, quantitative and mixed methods research approach. The preferred research approach for this study also is discussed in this section.
- Sampling process relates to the target population, sample frame, sample method and sample size. In this section, the probability and non-sampling procedures will be addressed. This section will also explain which sampling method was applicable for this study.
- Material and data collection instruments. The questionnaire used for data collection will be discussed. Within this section, the format and design of the data collection instrument will be addressed, highlighting the principles of the questionnaire design, administration and pre-testing of the questionnaire.
- Data collection procedures involve the ethical consideration, the pilot study and management of information.
- Preliminary data analysis.
- Statistical analysis. The criteria of reliability of validity will be discussed consisting of content-, face-, criterion- and construct validity. In this section, attention will be given to correlations analysis versus regression analysis.

The section to follow will discuss the research design.

4.2 RESEARCH DESIGN

Before discussing the research design, one needs to visualise an 'idealised' research process. Research is a process carried out in stages. A research approach relates to the steps that the researcher will take to undertake the research study. A research design refers to decisions that are made pertaining to the research approach and methods that would apply to a research study (Babbie, 2007:112). Table 4.1 illustrates other definitions regarding research design.

Table 4.1: Research design definitions

Definition	Source
It is a process of operating variables so that it can be measured by selections of samples of participants to study and to collect data to be used as a basis for testing hypotheses and to analyse the results of the study.	Thyer (1993:94)
It is the overall structure for the processes that the researcher follows in the study including the collection of data and the data analysis procedure.	Leedy and Ormrod (2005:85)
A research design serves as a guideline to realise the research through the implementation of the selected design.	Mouton (2001:108); Leedy and Ormrod (2005:88)

Source: Author compilation

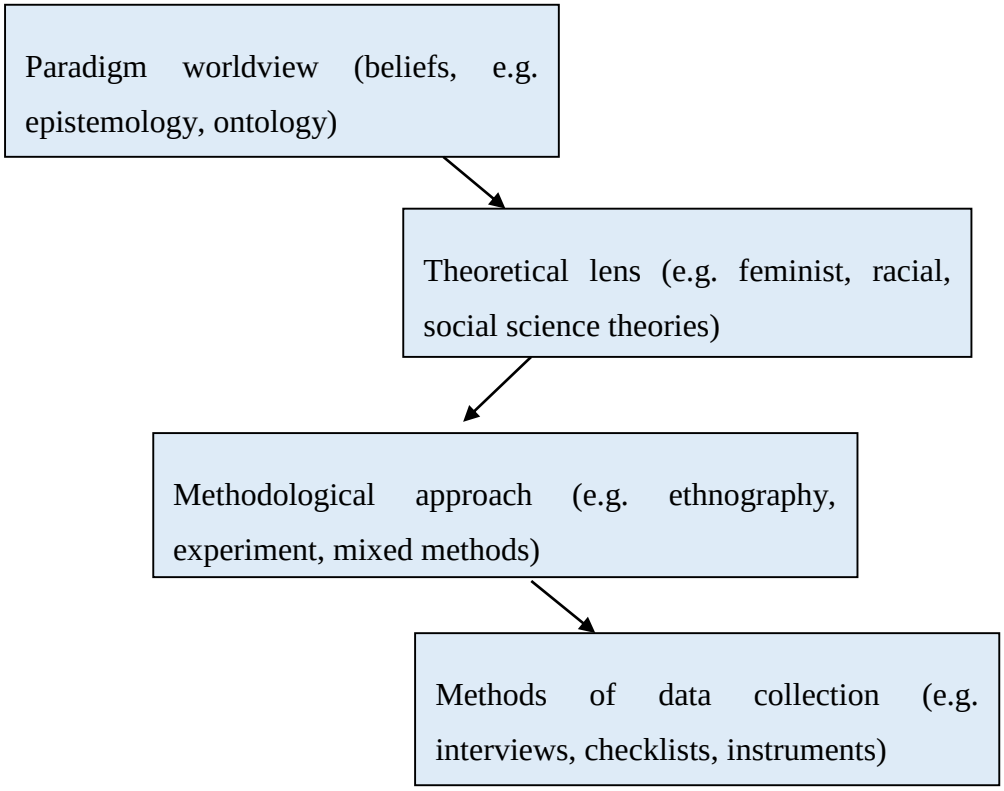
A researcher needs to apply a research design during the planning stages of a research project as it indicates a plan of how the research will be conducted. It is, therefore, a blueprint of actions to be taken to answer the research question in a satisfactory manner. A research design includes a research method, operationalising constructs of interest and devising a sampling strategy that is appropriate for the study (Bhattacherjee 2012:21-22). This is necessary to provide results that are judged credible.

Research can be either basic or applied. Basic or pure research refers to empirical observation to be able to refine a formulated theory (De Vos, 1998:8). It focuses on extending the knowledge base of the discipline. The researcher has decided, for this study, to utilise applied research, as it will aim to solve problems in practice. The researcher aims to (Roll-Hansen, 2009:1-4):

- Investigate facts that are relevant to the specific problems that are applicable;
- Develop practical knowledge in understanding investors;
- Summarise that which is known within the research;
- Predict facts that have not yet been observed; and
- Give an indication of questions that are relevant for further research.

A research design process always begins with philosophical assumptions when researchers decide to undertake a study where they might also bring their own assumptions to their research project. This involves their own worldviews, paradigms, or a set of beliefs. Figure 4.1 shows the four steps of designing a study to address the research problem.

Figure 4.1: Different worldviews



Source: Adapted from Crotty (1998); Creswell and Plano-Clark (2011:71)

The starting point of a research design involves adopting a worldview where researchers' own ontological beliefs about the nature of reality and problems are investigated regarding the nature and perception of the worldview that was adopted (Creswell & Plano-Clark, 2011:38-42). The epistemological beliefs refer to investigating the relationship between the researcher

and topic being investigated (Fayolle *et al.*, 2005:136-137). Opposing paradigms or worldviews are discussed in Table 4.2.

Table 4.2 describes the different worldviews or paradigms. From this table, it could be concluded that each paradigm is applicable to certain research designs (e.g. quantitative, qualitative and mixed method). For this study, the researcher applied a quantitative research design and, therefore, the positivist paradigm was followed. A discussion on the different world paradigms are discussed in the next section.

Table 4.2: The different worldviews or paradigms

Issue	Positivism	Critical theory	Constructivism	Participatory
Ontology	Naive realism – 'real' reality but also understanding	Historical realism is virtual reality shaped by social, political, cultural, economic, ethnic and gender values crystallised over time	Relativisms are local and specific constructed realities	Participative reality is subjective- or objective reality that is co-created by the mind and given cosmos
Epistemology	Dualist/objectivist: findings are true	Transactional/ Subjectivist: are value mediated findings	Transactional/ Subjectivist: findings are created	Critical subjectivity in participatory transaction with cosmos is extended epistemology of experiential, propositional and practical knowing: findings are co-created
Methodology	Experimental/ manipulative hypotheses are verified and chiefly quantitative methods	Dialogic/dialectical	Hermeneutic/dialectical	Political participation in collaborative action inquiry; primacy of the practical; use of language

Issue	Positivism	Critical theory	Constructivism	Participatory
				is grounded in shared experiential context
Type of approach	Top-down approach	Bottom-up approach	Participant approach	Question approach
Axiology	Propositional: Knows that the world is an end and is intrinsically valuable	Propositional, transactional: Knowledge is intrinsically valuable to social emancipation as an end in itself.	Propositional, transactional: Knowledge is intrinsically valuable to social emancipation as an end in itself.	Practical knowing flourishing with a balance of autonomy, co-operation, hierarchy in a culture. Is an end in itself and is intrinsically valuable
Values	Unbiased values	Biased values	Biases are negotiated	Biased and unbiased values

Source: Neuman (2007); Creswell & Plano-Clark (2011:72)

4.2.1 Positivist worldview

This worldview generally is found in quantitative studies. In the positivist worldview, the researcher bases the study on the assumptions of knowledge, causation, reductionism, the observation of variables and testing existing theories (Creswell & Plano-Clark, 2011:72; Vosloo, 2014:301-302).

The objects of social sciences, namely people, are applied for the implementation of the scientific research processes and methods (Glicken, 2003:20; Lincoln *et al*., 2011:108,122). Positivism challenges the traditional notion of the absolute truth of knowledge (Phillips & Burbules, 2000:15; Henning, *et al.*, 2004:17; Walliman, 2011:21). The positivistic approach allowed for the factual events to be observed empirically and for coherent and rational analysis (Aliyu *et al.*, 2014:83).

Yu *et al*., (2014:81) argues that the positivist worldview, as a research strategy, is an approach based on the ontological principle and believes that truth and reality must be free and independent. Several other authors agree with this viewpoint, namely Goetz and LeCompte (2004), Hollis (2004), Gough (2005), Griffin (2006) and Venkatesh (2007).

4.2.2 Constructivist worldview

Constructivism (generally found in qualitative studies) focuses on the understanding or meaning of a participant based on a specific phenomenon. This approach uses the individual perspectives of participants to generate new theories and follows the bottom-up approach (Creswell & Plano-Clark, 2011:73; Vosloo, 2014:300,305). Participants play an active role as they aim to encourage/improve the social world.

4.2.3 Participatory worldview

In a participatory paradigm, political issues influence the cultural belief where the participants play an active role on political issues as the research is conducted with a qualitative approach (Creswell & Plano-Clark, 2011:73).

4.2.4 Pragmatist worldview

The pragmatist worldview uses qualitative and quantitative research, called mixed methods. During a pragmatist worldview, the research questions are deemed more important than the

research process itself (Tashakkori & Teddlie, 2003:1-41; Cameron, 2011:101; Creswell & Plano-Clark, 2011:74).

4.2.5 Research design for this study

The research design of the current study is a descriptive quantitative research method. This method was deemed applicable as it provides for systematic and objective gathering of information from a representative sample through submitting questionnaires (Creswell & Plano-Clark, 2011:31). This study followed a positivistic research paradigm. A research design involves considering the type of worldviews (e.g. epistemology, ontology), theoretical lenses (e.g. social science theories), methodological approaches (ethnography, experiment and mixed methods) and data collection methods (e.g. interviews, checklists and instruments).

4.2.6 Participants

The participants of this study are investors of an investment company in South Africa.

4.3 RESEARCH APPROACH

There are different research approaches that can be followed in a research study, namely qualitative, quantitative and mixed methods. Table 4.3 depicts the differences between these methods.

Table 4.3: Different research approaches

	Qualitative	**Quantitative**	**Mixed method**
Methods used	Emerging methods	Predetermined questions	Established and emerging methods
Aim	To give a complete, detailed description	To classify features, count them and to construct statistical methods to explain what is being observed	To classify in both qualitative and quantitative methods combined
Researchers	Knows in advance what they are looking for	May only roughly know in advance	May only roughly know in advance

	Qualitative	Quantitative	Mixed method
		what they are looking for	what they are looking for
Questions	Open-ended questions where participants can elaborate on answers	Are based on the instrument	Questions can be open-ended or closed-ended
Measuring data	Is in the form of interview answers, observation, or audio	Measurable (numeric)	Various forms of data
Analysis	Text and image analysis	Statistical analysis	Statistical and text analysis
Interpretation	Apply themes or patterns	Statistical interpretations	Interpret data from both databases

Source: Adapted from Neill (2007)

4.3.1 Qualitative research approach

In a qualitative approach, insight is gained from a specific topic using emerging methods and a small number of participants. In this approach, a social paradigm is selected as it provides participants with a set of realities and their decisions are based on their human intellects (Guba & Lincoln, 1994:111).

4.3.2 Quantitative research approach

The quantitative approach aims to test theories, determine facts, demonstrate relationships between variables and predict outcomes. This approach aims to ensure objectivity, generalisability and reliability (Weinreich, 2009). Data often are used to generate new hypotheses based on the results of data collected from different variables; it focuses on, or is interested in, causes concerning the testing of different quantitative measures.

Leedy and Ormrod (2005:94-97) describe the characteristics of the quantitative process as a process to answer questions about relationships among measured variables. Quantitative studies usually refer to the characteristics of a population (De Vos *et al*., 2011:96). Techniques in this research approach can include random selection of research participants from the study population in an unbiased manner (Van der Merwe, 1996).

Quantitative research designs are either descriptive (subjects are usually measured once) or experimental (subjects are measured before and after a treatment). A descriptive study establishes associations between variables. In a quantitative research approach, the positivist paradigm is applied as it allows factual events to be observed empirically and to conduct a coherent and rational analysis process (Aliyu *et al*., 2014:83). The procedural diagram for this study is illustrated in Figure 4.2.

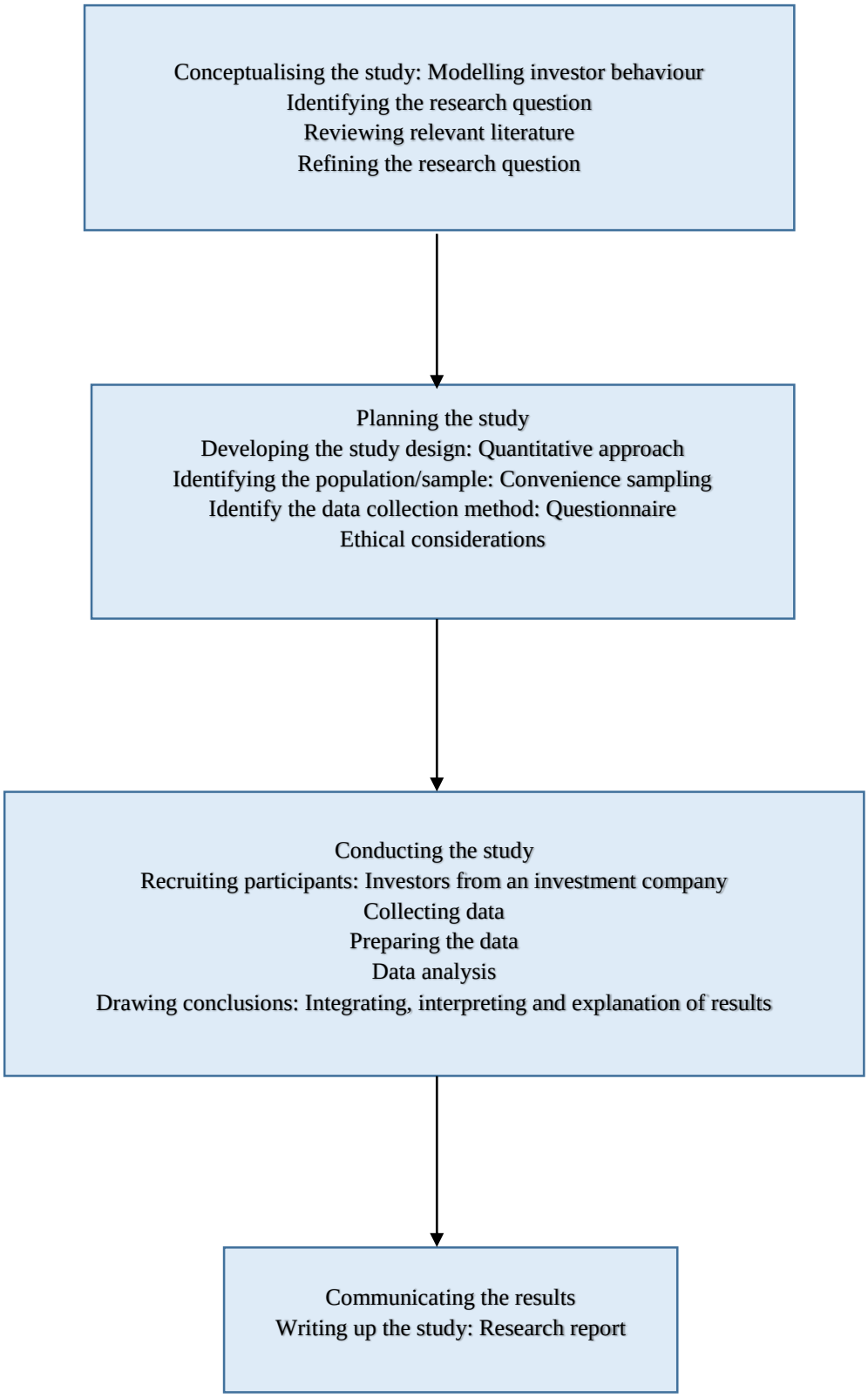
4.3.3 Mixed methods research approach

In the mixed method approach, both qualitative and quantitative approaches are applied because if only one approach is used, it would be deficient. It is used in parallel form (Kemper *et al.*, 2003). When mixed data (numerical and text) and alternative tools such as statistics and analysis are applied using the same method, the qualitative research paradigm is used for one phase of the study and the quantitative research paradigm is used for another phase of the study.

4.3.4 Research approach for this study

The research approach included conceptualising the study, planning the study, conducting the study and communicating the study. This is illustrated in Figure 4.2.

Figure 4.2: Quantitative research process of this study



Source: Author compilation

4.4 SAMPLING PROCEDURE

A representative sample is a sample that reflects the same characteristics of a target population (Stangor, 2015:117). Marshall (1996:522) indicated that it is very important to select the correct sample. It rarely is possible, realistic, or ethical to study a complete population. Onwuegbuzie and Collins (2007:282) indicate that sampling is the process of selecting a piece or segment that represents the whole. Quinlan (2011:208) supports this viewpoint and defines the sampling process as all the units applicable to the research study. The sample process assists in determining the target population, sample frame, sample size and sample method (Stangor, 2015:112).

The sample process is a complex procedure, whereas research designs are sequential (Onwuegbuzie & Collins, 2007:282). The target population, sample size and methods that were chosen for the quantitative research will be discussed.

4.4.1 Defining the target population

By applying the quantitative research approach, the researcher could interpret the findings in terms of their general applicability to a part of the population of investors in South Africa. The purpose was to obtain representative data of individuals possessing certain characteristics (De Vos, 2002:271; Leedy & Ormrod, 2005:2010). One needs to select a target population carefully, since if incorrectly done, it will lead to skewed results, as it will not display the true characteristics of that population (Stagnor, 2015:112). In other words, the population parameters should be set (Quinlan, 2011:206). The target population is investors from an investment company in South Africa. The researcher distributed questionnaires via the investment company to over 200 000 investors. The aim was to reach 1 000 participants.

Demographic questions such as province of origin, gender, ethnic group, mother-tongue language and age were included in the questionnaire. The questionnaires were sent electronically to the participants to complete in an online format.

4.4.2 Sample frame

A convenience sampling frame was applied to obtain an unbiased sample. Participants were selected for the study if they met certain criteria such as geographical proximity, easy accessibility and their willingness to participate in the study (Lavrakas, 2008:149). The investment company selected the participants solely on the basis of the ease of obtaining a

sample. The choice of investors in South Africa was based on convenience; however, the clients in the sample (from a South African investment company) were selected randomly to obtain an unbiased sample.

4.4.3 Sample method

A sampling method is the technique used to draw a sample from a population (Mathers *et al*., 2009:6). Sampling methods can be categorised between probability sampling, non-probability sampling and convenience sampling.

4.4.3.1 Probability sampling

Probability sampling is based on the rule that every individual in the target population has an equal probability of being selected in the sample (Quinlan, 2011:209). There are diverse types of sampling, as described in Table 4.4.

Table 4.4: Probability sample

Type of sample	Description	Source
Simple random sampling	A random sample from a complete list of participants that has the same probability of being selected.	Barreiro and Albandoz, (2001:5)
Random sampling	If the same member of the population cannot be selected again.	Barreiro and Albandoz, (2001:5)
Stratified sampling	The population is divided into subgroups so that each unit belongs to a single stratum and then selects units from those strata.	Teddlie and Yu (2007:79)
Systematic sampling	It is equivalent to random sampling if the elements are numbered in a random manner.	Barreiro and Albandoz, (2001:10)

Type of sample	Description	Source
Cluster sampling	The sampling unit is not an individual but a group occurring naturally in the population.	Teddlie and Yu (2007:79)

Source: Author compilation

The next type of sampling is non-probability sampling.

4.4.3.2 Non-probability sampling

Non-probability sampling can be used for both quantitative as well as qualitative research (Marshall, 1996:523; Creswell & Plano-Clark, 2011:174-175; Quinlan, 2011:214). Non-probability sampling includes convenience sampling, judgmental/purposive sampling, or theoretical sampling, as illustrated in Table 4.5.

Table 4.5: Non-probability sample

Type of sample	Description	Sub-section of sample	Source
Convenience sampling	Involves the most accessible participants to save time and costs		Marshall (1996:523); Quinlan (2011:214)
Judgment sampling/ purposive sampling	The most productive sample included in the research. Participants may have specific reactions or experiences, agree or disagree or might conform to certain beliefs/ attitudes Can include quota or snowball sampling (finding participants	Quota sampling (participants refer the researcher to potential participants)	Yang and Banamah (2013:5-6)

Type of sample	Description	Sub-section of sample	Source
	that are not easily accessible)		
Theoretical sampling	Theory-driven samples where theories are built from existing samples		Lynch (2010)

Source: Author compilation

4.4.4 Selecting a sample size

The sample size for this study was 200 000 participants from an investment company in South Africa. This sample size reflects the same characteristics of the target population. The investment company concerned determined this sample size.

4.5 MATERIAL AND DATA COLLECTION INSTRUMENTS

The researcher used questionnaires to measure risk tolerance, investor personalities and behavioural finance biases.

4.5.1 Format and design of the data collection instrument

Questionnaires are one of the principle methods of collecting data in a survey research to answer research questions. It involves a set of questions on a form, which is completed by the respondents of a research study (Leedy & Ormrod, 2005:3). The format and design of data collection instruments need to be constructed according to certain principles in such a manner that the criteria of reliability and validity can be ensured.

4.5.1.1 Principles of the format and design of the questionnaire

Before the researcher utilised the questionnaire, a thorough literature research was conducted regarding research methodology. A set of guidelines was established and followed:

Aim and justification for the use of a questionnaire

The researcher wanted to obtain an accurate and broad overview of a representative sample of a large population, in this case investors of a designated investment company. This was done by means of submitting a questionnaire to participants at this investment company. Mouton

(2001:152) and Leedy and Ormrod (2005:184-185) discuss in their research that questionnaires are used widely in survey research.

Length of the questionnaire

Regarding the length of questionnaires, it needs to be kept in mind that if participants are interested in the research topic, they are more likely to fill in and return even quite lengthy questionnaires (Oppenheim, 1966:35). A questionnaire needs to brief and only include the necessary information to collect the essential questions to ensure that a situation does not occur later where information might be missing. Respondents need to communicate as much information as possible, in the shortest time available, when completing the questionnaire.

Instructions

Instructions on the questionnaire need to be stated clearly in written form (Babbie, 1992:157; Leedy & Ormrod, 2005:190). In this case, the researcher provided clear, precise instructions on the questionnaires, requesting the respondents to mark the appropriate box with a cross.

Language

A questionnaire has to be in a language that the participants in the study can understand (Leedy & Ormrod, 2005:37-42; Mouton, 2001:102). For this study, the data collection instruments were presented in English. The reasons for only submitting the questionnaires in English were because the verified questionnaires (on risk tolerance and investor personalities) were only available in English and the diversity of languages at the investment company concerned.

Formulation of questions

It is important to formulate questions in such a way to reach the main goal of the study. The questions must aim to understand and determine every detail of the whole process of the study undertaken by the researcher. The researcher constructed the questions according to certain principles and found that the questions were appropriate for this study (Leedy & Ormrod, 2005:54, 110, De Vos *et al*., 2011:192):

- The sentences were specific, brief, short and clear;
- The respondents could understand the vocabulary, style and sentence order;
- Negative questions were avoided;
- The questions were posed unambiguously and precisely;

- Possible leading questions that could enforce a specific response were omitted;
- Every question was relevant to the purpose of the questionnaire;
- Only one thought or item was reflected per question;
- Abstract questions were avoided; and
- Questions were presented in general, non-threatening terms.

Types of questions

Questions in a questionnaire can be either open- or closed-ended. Open-ended questions allow the participants to give their own opinions in their own words, whereas closed-ended questions are pre-determined questions where participants cannot express their opinions freely (Neuman, 2007:260). In this study, the questionnaires consisted of closed-ended questions in which the respondents had to select one of the specific response choices provided by the researcher. The advantage of the latter type of question in this study meant that the responses could be coded easily.

4.5.1.2 Design and administration of the questionnaire

The questionnaires were distributed to 200 000 investors in the investment company. All the questionnaires had the same format and the same number of questions. Table 4.6 illustrates the different categories of the questionnaire followed by a discussion.

Table 4.6: Description of the questionnaire

Division of questions	Nature of category	Reason for inclusion	Format of questions
	Demographical information	To obtain general background information such as age, gender, race, marital status, language and income. To determine if demographic factors	Closed-ended questions were used. Participants had to tick-off the relevant answers.

Division of questions	Nature of category	Reason for inclusion	Format of questions
Section A		can influence investor decisions.	
	Survey of consumer finances	To investigate people's balance sheets and or pension, income, and demographic characteristics of investors. To measure for investment choice attitudes and experience.	Closed-ended questions were used. Participants had to tick-off the relevant answers.
	Behavioural finance	To determine to which theory or bias an investor is subjective towards.	Closed-ended questions were used. Participants had to tick-off the relevant answers.
Category B	The satisfaction with life-scale	To assess a person's satisfaction with his/her life as a whole.	Closed-ended questions were used. Participants had to tick-off the relevant answers.
Category C	Domain specific risk-taking scale	To determine different components of risk attitudes such as risk-taking, risk perception and perceived expected benefits.	Closed-ended questions were used. Participants had to tick-off the relevant answers.

Division of questions	Nature of category	Reason for inclusion	Format of questions
Category D	Grable and Lytton risk tolerance scale	To assess financial risk tolerance to manage the financial decision-making process to reach financial goals.	Closed-ended questions were used. Participants had to tick-off the relevant answers.

Source: Author compilation

Before discussing the various elements of the questionnaire, attention needs to be given to what measurement and scaling involves. Measurement indicates that the researcher has assigned numbers or symbols to characteristics of objects that adhere to certain pre-specific rules (Malhotra & Birks, 2006:292-294). The primary scales of measurement can be divided amongst four primary scales, namely (Malhotra, 2010:282):

- Nominal where numbers are assigned to respondents;
- Ordinal where rank orders are being assigned;
- Interval referring to performance rating on 1 to 10 scales; and
- Ratio indicating the time to finish in seconds.

Table 4.7 illustrates the different primary scales of measurement.

Table 4.7: Measurement of scaling: fundamentals, comparative and non-comparative scaling

Scaling	Basic characteristics	Permissible statistics	
		Descriptive	Inferential
Nominal	Numbers identify and classify objects.	Percentages, mode	Chi-square binomial test
Ordinal	Numbers indicate relative positions of the objects but not the magnitude of differences between them.	Percentages, median	Rank-order correlation, Friedman ANOVA

Scaling	Basic characteristics	Permissible statistics	
		Descriptive	Inferential
Interval	Differences between objects can be compared, zero point is arbitrary.	Range, mean, standard deviation	Product-moment correlations, t-tests, ANOVA, regression, factor analysis
Ratio	Zero point is fixed; ratios of scale values can be computed.	Geometric mean, harmonic mean	Coefficient of variation

Source: Author compilation

4.5.1.2.1 Category A

The first section of Category A of the questionnaire is composed out of demographic information required from the respondents. Typical information required from the respondents includes personal and environmental factors such as age, gender, race, marital status, nationality, income, language and annual income. The information is used to gather background knowledge about the respondents and to determine if demographic factors can possibly influence investor decisions. The idea is to determine, for example, if respondents are categorised in a certain age category, what the relevant risk tolerance level for the respondents are or to determine if income influences investors' risk tolerance levels. Grable (2000:625-630) researched the area of possibility where demographic information influences investor decisions and found that one or more factors influence investors' risk tolerance level.

The second section of Category A of the questionnaire is the SCF, which uses a single risk-tolerance question. This scale continues to be widely used by researchers. The reason for this is that the measure item is the only direct measure of risk attitudes in the SCF (Gilliam *et al.*, 2010:31-32).

The third section of Category A of the questionnaire is the behavioural finance theories/biases that are captured on a ranking scale to determine which theory or bias an investor is subjective towards. For this section of the questionnaire, statements were compiled from the various theories of behavioural finance. Up to date, there has not been a published verified scale for behavioural finance. As a result, some statements were formed from the theories described below (Table 4.8).

Table 4.8: Theories, descriptions and statements

Theory	Description	Statement
Representativeness	Investor decisions made on stereotypes refers to the representativeness bias of behavioural finance. As a result, Kannadhasan (2009) argues that some investors base investment decisions on inaccurate market participant perceptions and patterns. Moreover, investors tend to overreact in the market because of the perception of pattern repetition (Singh, 2012:119). Therefore, investors will only consider investing in shares that offer a high return and did not have a deficient performance in the past.	I often make decisions based on my perception /opinion.
Overconfidence	A close relationship exists between confidence and courage and the combination of the two factors may lead to overconfidence (Bodie *et al*., 2013:267). Overconfidence is a result of investors who tend to overestimate their investment capabilities. Moreover, because of overconfidence, investors attempt to time the market in such a manner in order to outperform the market (Singh, 2012:118).	I often overestimate my own investment abilities
Anchoring	Innumerable information is available to use in the market to base investment decisions on, but anchoring exists in the market when investors only rely on a single piece of information (Kannadhasan, 2009). Due to the propensity of investors to rely on a single	I tend to rely on a single piece of information to make investment decisions.

Theory	Description	Statement
	piece of, mostly historical, information the adjustment to additional information, tend to be relatively slowly.	
Gamblers fallacy	A notion in the market exists that gamblers can outperform the market the majority of the time. Gamblers fallacy is a result of "gambler" investors that inaccurately predict market movements and fail to outperform the market (Singh, 2012:118). Gambler investors are confident in their abilities to outperform the market and bet on the future trend of the market.	I predict market movements accurately.
Availability bias	Investment decisions based on only the most recent available information are classified in the availability bias category (Kannadhasan, 2009). Typically, these investors lack background information and tend to interpret current information incorrectly. Since investment decisions are based only on recent available information, they could possibly impede positive investment returns, which could simultaneously reflect in poor portfolio returns.	My investment decisions are based only on the most recent available information.
Loss aversion	Investors reflect loss aversion when they mentally experience a given loss more drastically than a gain of the same size (Singh, 2012:120). As a result, different emotions i.e. joy, anxiety, excitement and these investors typically experience more emotions when gains and losses are	I would rather hold onto investments with negative returns instead of selling and taking the loss.

Theory	Description	Statement
	realised. Moreover, investors tend to hold on to investments that deliver negative returns and will attempt to reduce losses by taking more risks. Thus, it can be concluded from the bias that investors tend to hold onto non-performing investments with the hope that investments will deliver positive returns in the future.	
Regret aversion	Regret aversion is a bias experienced by investors when realising errors were made in the judgement process of investors (Quiggin, 1994). This bias is evident when investors make investment decisions and regret certain steps in the decision-making process due to failure of delivering expected returns. Investors experience grief when returns are not realised due to underperforming investments, moreover investors also experience a feeling of guilt for making incorrect decisions. Zeelenberg and Pieters (2007) state that investors will attempt to manage situations to avoid regret and be regret averse.	I regret some of the investment decisions I have taken in the past.
Mental accounting	Information related to specific events is grouped into specific compartments, which reflect the mental accounting bias. However, information can differ related to specific events, which possibly affect behaviour more than the event itself (Jagongo & Mutswenje, 2014:92-102).	When I receive high profit margins, I tend to hold onto investments to receive even higher profit margins

Theory	Description	Statement
	Mental accounting can be explained with two scenarios, the first scenario is when an investor invests money and receives excessive returns and the second scenario is when an investor invests money and receives normal returns. The investor then typically compares the two scenarios and the reaction will be hesitant to dispose investments with normal returns. As a result, the excessive returns will motivate investors, due to the comparison between compartment information, to wait until higher returns are achieved.	
Self-control	Previous studies indicate that investors are subjected to temptation and attempt to exercise self-control in order to reduce temptations. The crux of self-control is to avoid losses and protect investments (Kannadhasan, 2009).	I exercise self-control when making investment decisions.

Source: Author compilation

4.5.1.2.2 Category B

The SWL scale is based on a five-item scale and involves the emotional/affective component and the judgemental/cognitive component. This scale was developed to measure the judgmental component of subjective well-being (Diener, 1985:72). Various researchers investigated the SWL scale. This scale aims to investigate a person's satisfaction with the respondent's life as a whole (Tatarkiewics, 1976); however, not domains such as health and finances, but rather integrating the domains selected (Pavot & Diener, 1993:164-172). Normative data is used for this scale. Life satisfaction, when assessed by the SWL, shows there is degree of temporal stability (e.g. for a few years). This scale is recommended for being a complement to scales, usually focusing on psychopathology of a person's emotional well-being. It uses a person's own criteria and to check changes in life satisfaction during the course

of a clinical intervention (Pavot & Diener, 1993:164-172). However, the scale does not describe it as a positive or negative effect. Andrews and Whitey (1976) observe that the judgemental component that plays a role has not been investigated fully. Participants need to indicate how much they agree/ disagree with each of the five items using a seven-point scale, which ranges from (7) strongly agree to (1) strongly disagree.

Diener *et al*. (1985:71-75) and Pavot *et al.* (1991:149-161) indicate that the scale was compared to other scales and found it to be a valid and reliable scale measuring a person's life satisfaction. It can be applied to a wide range of age groups as well as to applications. The SWL appears, therefore, to be a stable and global phenomenon and not only a momentary judgement based on fleeting influences.

4.5.1.2.3 Category C

Research indicates that there is a need for a scale that can effectively assess individual differences in people's attitude to risk and it must be noted that people differ in their risk attitude (Weber *et al*., 2002:263). The original Dospert scale was developed in 2002 and was revised in 2006. The purpose of the 2002 Dospert scale was to assess risk preference through self-report in five domains, namely financial (investment, gambling), health/safety, recreational bungee (jumping off a bridge), ethical (passing off someone else's work as your own) and social (admitting your tastes are different from those of a friend). Characteristics of the scale include the following (Weber *et al*., 2002:263-284):

- Rates the likelihood of engaging in a behaviour using the risk-taking scale using five-point ratings (1 = extremely unlikely to 5 = extremely likely);
- Rates the perceived riskiness of a behaviour using the risk perception scale using five-point ratings (1 = not at all risky to 5 = extremely risky); and
- Rates the amount of benefits expected from a behaviour using the expected benefits scale using five-point ratings (1 = no benefits at all to 5 = great benefits).

Based on this observation, risk-taking is domain-specific rather than reflections of a stable attitude or trait of a person. The advantage of this scale is that it provides opportunities for researchers to assess both conventional- as well as perceived-risk attitudes in the five domains (Weber *et al*., 2002:284).

The Dospert scale of Weber *et al*. (2002:263-290) was revised in 2006 (Blais & Weber, 2006:33-47). It is a shorter version (25% shorter) and more applicable to suit a broader range

of ages, cultures and educational levels, and involves the five risk domains as the Dospert scale of 2002. The Dospert scale of 2006 displays the following characteristics:

- 30 items rated two times each;
- Rates the likelihood of engaging in a behaviour using the risk-taking scale using seven-point ratings (1 = extremely unlikely to 7 = extremely likely); and
- Rates the perceived riskiness of a behaviour using the risk perception scale using seven-point ratings (1 = not at all risky to 7 = extremely risky).

The risk-taking responses of the 30-item version of the new Dospert scale effectively evaluates a person's behavioural intentions or their likelihood to act or engage in risky situations/activities or behaviours. The risk-perception, on the other hand, evaluates respondents' intuitive level assessment; that is how their risk-taking behaviour is measured by applying a seven-point rating scale.

4.5.1.2.4 Category D

The Grable and Lytton scale was developed in 1999 and has been applied by consumers, researchers and financial advisors to determine a person's willingness to engage in risky financial behaviour. This scale's validity and reliability has remained stable over the years (from 2007 to 2013) (Kuzniak *et al.,* 2015:177-192). A brief discussion of the historical development of the Grable and Lytton scale follows.

In 1999, Grable and Lytton published an article in Financial Services Review and presented a 13-item scale that is still widely used. At that time, there were few financial risk tolerance scales and the Grable and Lytton scale provided valuable insights into measuring risk tolerance. The researchers aimed to reach the following objectives for this scale. They were looking for a scale that (Grable & Lytton, 1999:163-181):

- Was applicable to the field of risk tolerance;
- Allowed for combining questions and answers into a risk scale;
- Was relevant to making financial decisions;
- Would be easy to administer; and
- Could adhere to criteria of validity and reliability.

In 1986, Lytton and Grable used questions that were developed by MacCrimmon and Wehrung (1986) that led questions to be consistent, not redundant, interesting questions to answer and that could be completed in a short time. They based their 13-item scale development found in

MPT and concluded that risk and return are related (Markowitz, 1952:77-91). The list originally involved 50 items but was later reduced to 20 risk questions. After that, Grable and Lytton developed eight categories for questioning (Kuzniak *et al*., 2015:179):

- Guaranteed versus probable gambles;
- General risk choice;
- Choice between sure loss and sure gain;
- Risk as experience and knowledge;
- Risk as a level of comfort;
- Speculative risk;
- Prospect theory; and
- Investment risk.

The researchers then applied factor analysis procedures to evaluate data from a convenience sample to obtain a better number of items and it led to only 13 items (compared to 20 items). The final version of the Grable and Lytton scale encompasses three main factors, namely investment risk, risk comfort and experience and, lastly, speculative risk. Cronbach's scale of reliability was measured by applying Cronbach's *a* - 0.77, which became the most typical estimate (Kuzniak *et al*., 2015:188).

In 2003, Lytton and Grable investigated the scale again to test its concurrent validity (how well a scale corresponds with actual behaviour). They concluded that scale scores were positively associated with equity ownership while negatively related to fixed-income and adult sample. Other researchers found that the Grable and Lytton scale can be applied to indicate a person's willingness to make risky investments (Gilliam *et al.*, 2010:30-43; Grable & Schumm, 2010:117-131). Since 1999, more than 200 000 people (or consumers) have used this scale to evaluate financial risk tolerance (Grable & Joo, 2001:55-66). In 2004, Grable and Joo (2004:73-82) established that the term risk tolerance is linked to the description of a person's willingness to undertake financial decisions in their behaviour where outcomes may be uncertain and might potentially be negative.

The questionnaire can be viewed in Annexure C. All the questions were closed-ended questions and the participants only had to tick off the relevant boxes in response to the questions that were asked of them. The researcher concluded that a questionnaire as a form of quantitative

data collection method was applicable to allow respondents to interpret the questions as accurately as possible (Dillman, 2000:804).

From the discussion, it can be concluded that a questionnaire is an effective quantitative tool that can be implemented for systematic and objective gathering of information from a representative sample. This means that findings were interpreted in terms of their general applicability to a part of the population of investors in an investment company in South Africa.

For the researcher to determine percentages and frequencies of responses, the analysis of the questionnaire included quantitative analysis, especially where detailed responses occurred. The researcher applied statistical procedures to describe and summarise the data obtained from the questionnaire survey to determine the collection of scores that were obtained (Leedy & Ormrod, 2005:252).

4.6 DATA COLLECTION PROCEDURE

The data collection procedure consisted of a consent form where the investment company informed the participants of the study to be undertaken by the researcher. The consent form ensured the participants that any given information would remain confidential. After permission was granted, the participants completed a questionnaire. The questionnaire adhered to ethical considerations.

4.6.1 Ethical considerations

As discussed in Chapter 1, the research study conforms to the ethical standards of academic research (NWU, 2016:15). Ethical considerations are a set of moral values and principles that are widely accepted by scientists conducting research as it provides guidelines on correct conduct regarding the participants (De Vos *et al*., 2011:114). Researchers have to anticipate ethical issues that would be addressed in their research plans. The investment company informed the participants about the aims and procedures of the study, whereas the investment company signed the consent form as can be viewed in Annexure A. The ethics clearance number for this study is ECONIT-2017-012 as can be viewed in Annexure B.

For this study, the ethical considerations involved the following:

- Informed consent. This is the most important aspect of ethically appropriate research and it indicates the participants' notion of free will. The consent letter gave enough information about the research project and their consent to agree to take part in the study (Pedroni &

Pimple, 2001:2-3). Permission to perform the study was obtained from the investment company concerned.

- Ensuring anonymity of the participants (De Vos, 1998; Leedy & Ormrod, 2005:102). The company screened the participants and the researcher had no knowledge of the client database of the company concerned. There were no identifying marks placed on the responses received. Anonymity is ensured when the researcher or reader cannot identify a given response with a specific respondent and no identifying marks were placed on the responses received.
- No deceptions occurred and there was no deliberate misrepresentation of facts posed to the respondents. The researcher presented the questions in the questionnaires in a clear, precise and unambiguous manner (De Vos, 1998; Leedy & Ormrod, 2005:102).
- The investment company gave permission for that data to be published, provided that the company is not mentioned in any way.
- Voluntary participation. Participants were informed of their right to withdraw from the study at any time during the research process (Rubin & Babbie 2005:71; Babbie 2007:26-27; Bhattacherjee 2012:127).
- The findings will be released and made available to the reading public in written form as a scientific research report (De Vos, 1998). This was also explained in the letter of informed consent (Appendix A). Results will be published in a thesis and at least two articles will be published in an academic journal.
- All the data will be archived for at least five years. After ethical clearance was obtained from the Research Committee of the Faculty of Economic Sciences and Information Technology at the North West University (NWU) (Annexure B), the researcher conducted the research study.

4.6.2 Pilot study

A researcher needs to ensure reliability of a research study by conducting a pilot test before the main study can be executed. A pilot study usually forms an integral part of the research process because it aims to confirm how the researcher formulated the research problems and how to execute the planning for a new modus operandi to continue the investigation (De Vos, 1998). When conducting a pilot study, the researcher aims to detect possible flaws in the measurement process such as ambiguous instruction and inadequate time limits. Researchers can also identify non-verbal behaviour on the part of participants that might reflect on discomfort of wording of

the questions being posed to them (Nakazawa, 2012:7). The researcher did not conduct a pilot study in this case since the investment company did not give their permission to conduct a pilot study. The investment company did not allow the researcher to access their database twice and it was agreed to access their database and distribute questionnaires only once. The study was approved without executing a pilot study.

4.6.3 Management of information

Management of information in this study refers to how the researcher will manage the availability of accurate records of the investment company (Bhattacherjee, 2012:110). The researcher of this study applied the following principles (Creswell, 2007:142) to ensure anonymity and confidentiality:

- Make backup copies of computer files;
- Protect participants' anonymity by means of only applying unidentified numbers on the questionnaires;
- Store tapes of transcriptions and notes in a secure place in a locked cabinet to which only the researcher has access; and
- Erase data five years after completion of the research.

4.7 DATA ANALYSIS

Data analysis is the process of bringing order, structure and meaning to the collected data (Schurink *et al.*, 2011:397). In this study, the researcher executed an in-depth analysis of the responses given by the participants. This was necessary to validate the theory generated against the responses obtained during the interviews with all the participants. Data analysis is the procedure that the researcher applies to identify patterns in the data posed to the participants, thereby purposefully collecting data from chosen individuals on target topics, confirming or refuting the information (Maree 2010:297).

4.8 STATISTICAL ANALYSIS

Processing of the data was done at the NWU. The captured data was analysed using the statistical package SPSS, Version 23. Analysis of data was performed in Excel for Windows 10. Descriptive statistics are when numeric data are analysed quantitatively using statistical tools in two ways, namely descriptive statistics and inferential statistics (De Vos *et al*., 2011:251). Inferential analysis is the statistical testing of hypotheses (theory testing in Section 5.5) (De Vos *et al.*, 2011:251).

This statistical package allows the researcher to determine percentages and frequencies of responses since it provides for detailed responses. The researcher applied descriptive statistical procedures to describe and summarise the data obtained from the questionnaire survey to determine the collection of scores obtained (Leedy & Ormrod, 2005:252).

In this way, the researcher could reduce large amounts of data and draw conclusions (De Vos, 1998). Descriptive statistical techniques were suitable to organise, analyse and interpret the quantitative data. The Likert scale was applied to record the measurements from a low to high level of the variable of interest. This was deemed necessary to obtain indications of typical tendencies and outliers as it is a valuable tool to reduce the data and to ensure construct validity (Welman *et al*., 2005:115).

4.8.1 Reliability

The criterion of reliability is necessary to ensure validity since it is more achievable than validity. Reliability can be reached when the researcher can provide concise, clear and simple instruction as well as by keeping the length of the questionnaire within reasonable limits. The researcher had to ensure that questions were user-friendly and that respondents could answer the questions as effortlessly as possible (Leedy & Ormrod, 2005:93,190-192).

4.8.2 Validity

Validity is the extent to which type of measurement measures what it presumes to measure as accurately as possible and is difficult to measure due to constructs being abstract and since they cannot be directly observed or be isolated. This criterion usually is established by process of accumulating evidence where the researcher attempts to ensure that the instrument measures what it is supposed to measure as accurately as possible. Validity is the most important part of all researchers conducting a study, as it measures dependent variables (Leedy & Ormrod, 2005:28; Welman *et al*., 2005:142-144; De Vos *et al*., 2011:173).

There are various types of validity such as content validity, face validity and construct validity (De Vos, 1998; Leedy & Ormrod, 2005:92).

4.8.2.1 Content validity

This criterion refers to the extent to which the instrument is really measuring the characteristic and whether it provides an adequate sample or items representing the concept (Kumar,

2005:180; Neuman, 2014:216). In this study, the researcher used the questionnaire as a valid instrument to measure investor behaviour in the South African context.

4.8.2.2 Face validity

This criterion refers to the concept of what it appears to measure. If this type of validity is not considered, resistance might be encountered from the respondents that can affect the results adversely. One needs to ensure the cooperation of the participants. For this study, by means of submitting a questionnaire, the researcher attempted to ensure that the participants would give their cooperation. By means of the distribution and the completion of the questionnaires it also contributed to face validity as it indicates relationship (similarities/correlation) between the researcher's ability to describe concept and the descriptions of the categories that were measured (Churchill & Iacobucci, 2002:257).

4.8.2.3 Criterion validity

The criterion construct validity refers to more than one measurement that is involved. It also compares scores on an instrument with external criteria known, or believed, to measure the concept, trait or behaviour being studied (De Vos *et al.*, 2011:174).

4.8.2.4 Construct validity

A construct aims to organise and make sense out of the environment and variables used to describe a construct/concept. Construct validity is then the extent to which a questionnaire measures a theoretical concept (Pedhazur & Schmelkin, 1991:86; Ary *et al.*, 2006:38-39,243; De Vos *et al*., 2011:174).

If external validity lacks in a study, then the findings cannot be applied beyond the narrow confines of a study. A sample, therefore, must be reasonably representative of the population for a research study (Suter, 1998:132).

4.8.3 Correlation analysis versus regression analysis

Correlational analysis examines the differences in characteristics or variables of two or more entities and determines the strength of the relationship between variables (Campbell & Campbell, 2008:3). Chi-square tests were used to test for relations between certain variables and the chi-square test was used with a 5 percent level of significance.

Regression is a statistical technique that attempts to describe the relationship between variables more in detail. Regression appears in the linear regression model (LRM). This model studies the relationship between a pair of variables that appear in a data set. The two variables, X and Y are two measured outcomes for each variable in the data set (Campbell & Campbell, 2008:3-6).

4.9 SYNOPSIS

This chapter analysed the research methodologies used for the empirical portion of the study. The research methodologies correspond with the research objectives stipulated in Chapter 1. This chapter mainly focussed on the research design, research approach, sampling procedure, material and data collection instruments, data collection procedures, data analysis and statistical analysis. The information discussed step-by-step in this chapter will assist with the analysis and interpretation in Chapter 5.

CHAPTER 5: RESULTS AND FINDINGS

5.1 INTRODUCTION

This chapter discusses the results and findings of the study. Based on the study, it appears that research in the field of investor behaviour in South Africa must satisfy the unique demands of investor behaviour and be relevant to the context. This was done by establishing primary, theoretical, and empirical objectives.

The current research study aimed to fulfil the objectives of the study, namely to develop a model against which investment companies could profile their clients more effectively by applying behavioural finance elements to existing measures of risk tolerance. This indicates that there are practical implications for investors as there is a need in South Africa for research that aims to provide findings applicable to the study.

This chapter contains the results and findings for the study. A critical evaluation of this study is provided related to modelling investor behaviour in the South African context. From this chapter, the theoretical research as well as the conclusions that were drawn from the theoretical research, in relationship to the empirical research study described in the previous chapters, to make recommendations that will have practical implications for investor behaviour.

The findings of the study include coding of the scales (codes and constructs that were measured and the value of the questions that were posed in the questionnaire) and demographical information (age; race; marital status; nationality; home province; language and annual income) of investors. The coding of the scales (Annexure D) was applied to the following measures: survey of consumer finances, behavioural finance, satisfaction with life, Dospert scale and risk tolerance.

Risk tolerance has a daily influence on a person's life and is concerned with exposure and uncertainty. Risk tolerance implicates that people may be risk averse and make investment choices under conditions of risk. The study highlights factors influencing risk tolerance such as biosocial, environmental and precipitating factors. This led to the conclusion that there is a relationship between risk tolerance and financial investment decisions.

Other aspects that play a role in investment behaviour are risk propensity, risk perception, risk behaviour, risk appetite and capacity as well as risks limits. In the field of investor behaviour,

investor personalities play a vital role as there are differences between conservative, moderate, growth and aggressive investors.

The study addressed the descriptive statistics that were applied on the following:

- Frequencies and descriptive statistics of SWL;
- Dospert, risk tolerance and sections;
- Confirmatory factor analysis (Dospert);
- Survey of consumer finances (SCF) - frequencies;
- Adjusted behavioural finance bias - frequencies;
- Risk tolerance test question - frequencies; and
- Level of risk tolerance for financial risk section, speculative risk section and investment risk sections.

In the next section the demographical information is discussed.

5.3 DEMOGRAPHICAL INFORMATION

The demographic information for this study includes the following frequencies and percentages on age, gender, race, marital status, nationality, home province, language and annual income.

Table 5.1: Age

Age category	Frequency (*f*)	Percentage (%)
16-24	37	3.2
25-34	241	20.6
35-49	411	35.1
50+	482	41.2

Table 5.1 presents the age categories for this study, which were divided into four main categories for the 1 171 participants (refer to Section 4.4). The first age category is 16-24 years, which are represented by only 3.2 percent of the sample. Only 37 out of the 1 171 participants were classified into this age category. The second age category was grouped from the age of 25 to 34. This age category represented 20.6 percent of the sample with a total of 241 participants. From the sample, a total of 411 (35.1%) are grouped into the age category of 35 to 49. The majority of the participants were found in the age category of 50 years and older representing 41.2 percent of the sample as illustrated by Figure 5.1.

Figure 5.1: Age distribution

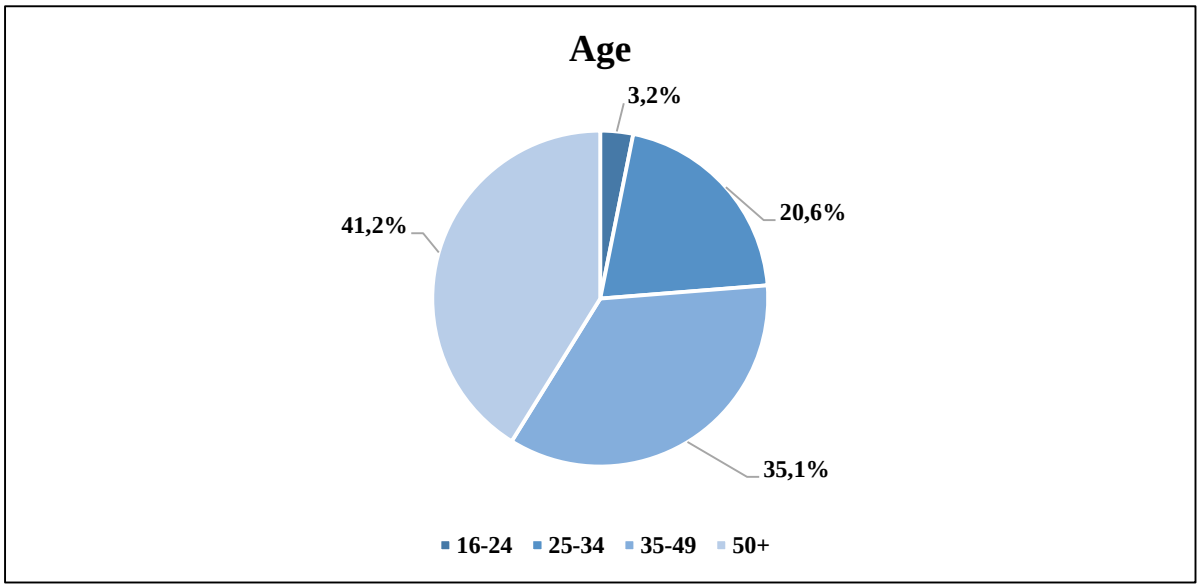


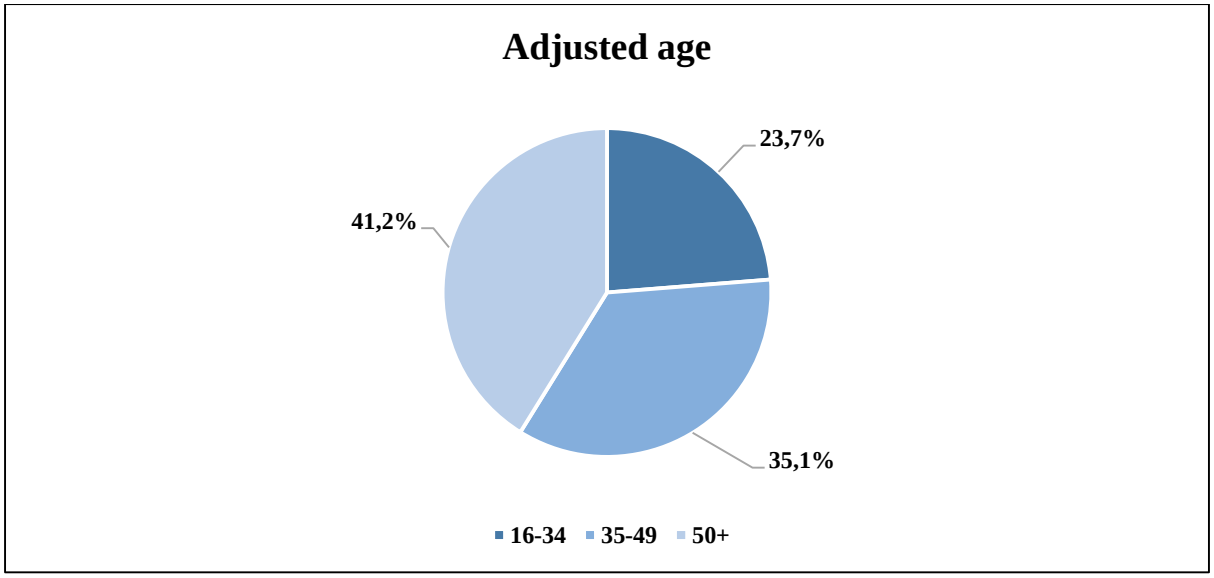
Figure 5.1 displayed that age category 16-24 and 25-34 represented a small portion of the sample and these categories were combined. The adjusted age categories are illustrated in Table 5.3 and Figure 5.2.

Table 5.2: Adjusted age categories

Age category	Frequency (*f*)	Percentage (%)
16-34	278	23.7
35-49	411	35.1
50+	482	41.2

From Table 5.2, age category 50+ represents 41.2 percent followed by the age category 35-49 (35.1%) and the adjusted age category 16-34 (23.7%).

Figure 5.2: Adjusted age distribution



The next table, Table 5.3, shows the distribution of the sample amongst gender. The majority (53.4%) of the sample were classified as females towards the 46.6 percent that represents males (Figure 5.3).

Table 5.3: Gender

Gender	Frequency (*f*)	Percentage (%)
Male	546	46.6
Female	625	53.4

Figure 5.3 displays the gender distribution between males and females and the majority of the sample that participated in the questionnaire are females (53.4%).

Figure 5.3: Gender distribution

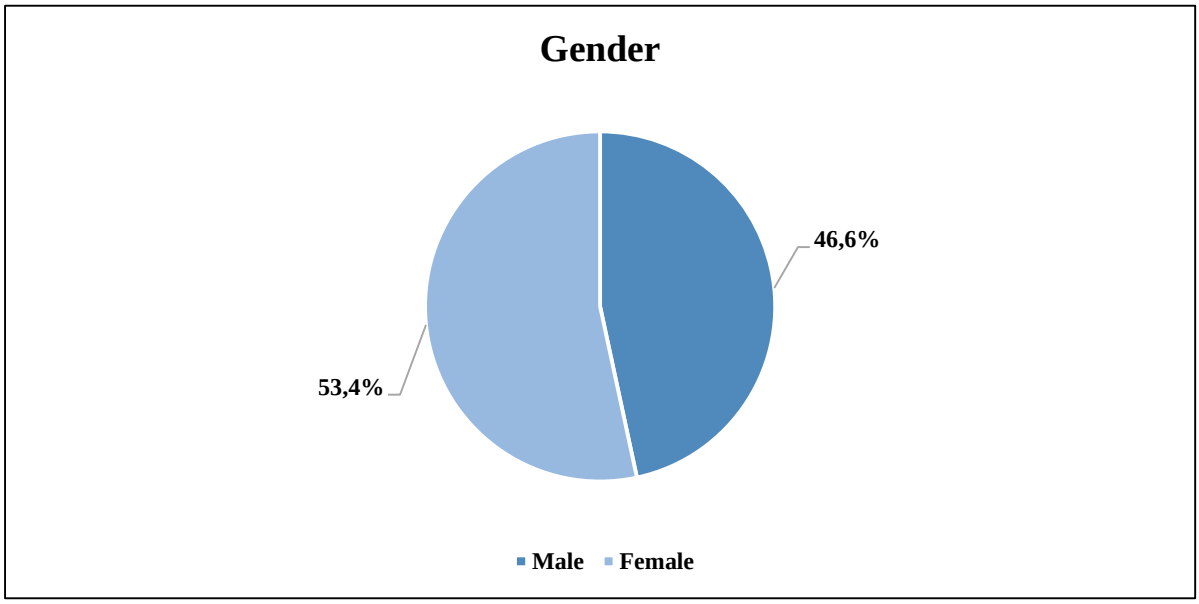


Figure 5.3 indicates that 46.6 percent of the participants are males. The next table, Table 5.4, indicates the frequency and percentage of ethnicity.

Table 5.4: Ethnicity

Ethnicity	Frequency (*f*)	Percentage (%)
African	230	19.6
White	746	63.7
Coloured	94	8.0
Asian	101	8.6

As presented in Table 5.4 the majority of the sample (63.7%) were classified as White race, which was followed by the African race at 19.6 percent. Figure 5.4 shows that the Coloured and Asian race represented a smaller segment of the sample with 8.0 percent and 8.6 percent respectively. Figure 5.4 displays the ethnicity distribution.

Figure 5.4: Ethnicity distribution

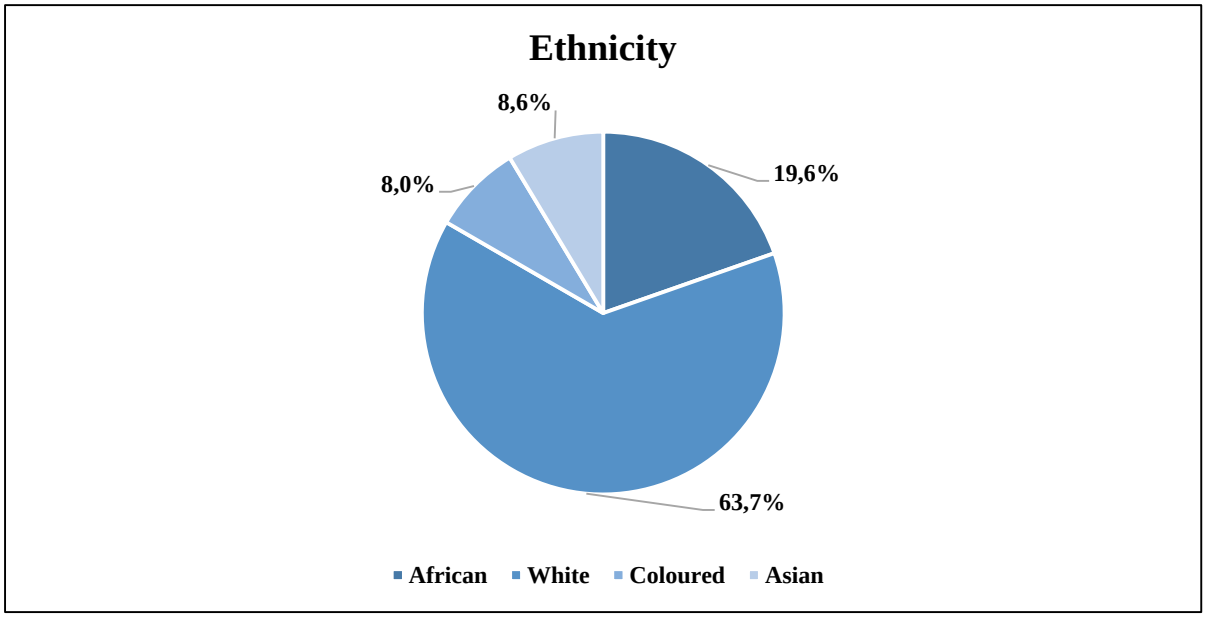


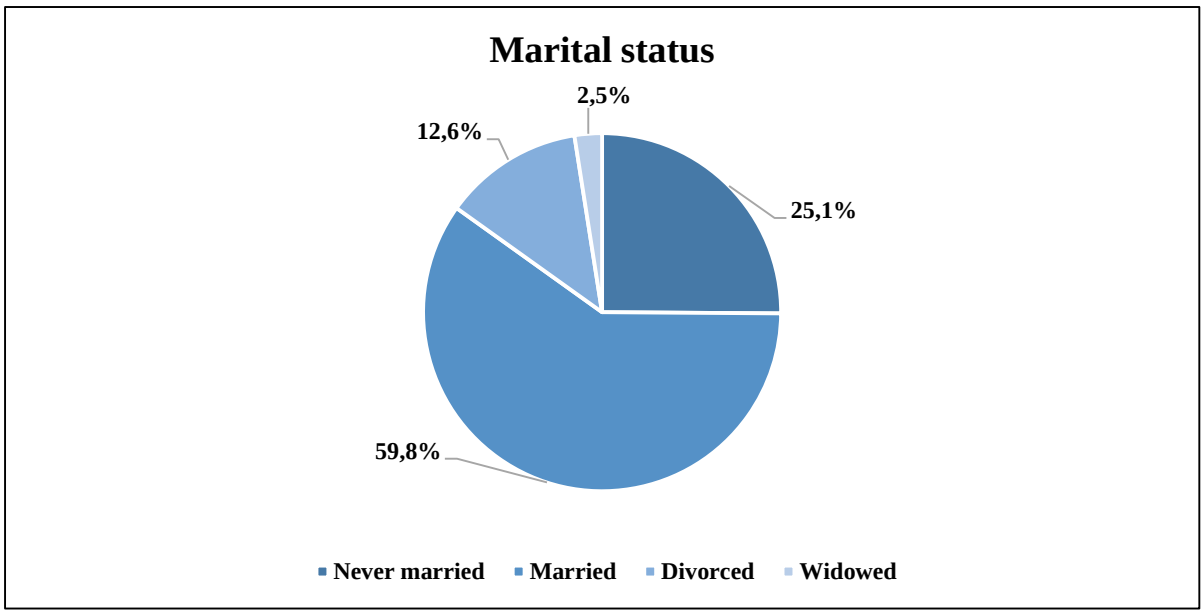
Figure 5.4 shows that the Coloured and Asian race represented a smaller segment of the sample with 8.0 percent and 8.6 percent respectively. Table 5.5 indicates the different marital stages, namely never married, married, divorced and widowed.

Table 5.5: Marital status

Marital status	Frequency (*f*)	Percentage (%)
Never married	294	25.1
Married	700	59.8
Divorced	148	12.6
Widowed	29	2.5

Table 5.5 shows that from this sample the majority (59.8%) is married whilst 25.1 percent of the sample's status reflected never married. A small portion (12.6%) of this sample listed their status as divorced, whereas 2.5 percent stated they are widowed (Figure 5.5). The following figure, Figure 5.5, displays the marital status distribution.

Figure 5.5: Marital status distribution



The divorced and widowed category is represented by a small number of the sample and it was decided to group them together and label it 'no longer married' as presented in Table 5.6 and Figure 5.6.

Table 5.6: Adjusted marital status

Marital status	Frequency (*f*)	Percentage (%)
Never married	294	25.1
Married	700	59.8
No longer married	177	15.1

Table 5.6 displays that the newly adjusted 'no longer married' category represents 15.1 percent of the sample. In Figure 5.6 the adjusted martial distribution is displayed.

Figure 5.6: Adjusted marital status

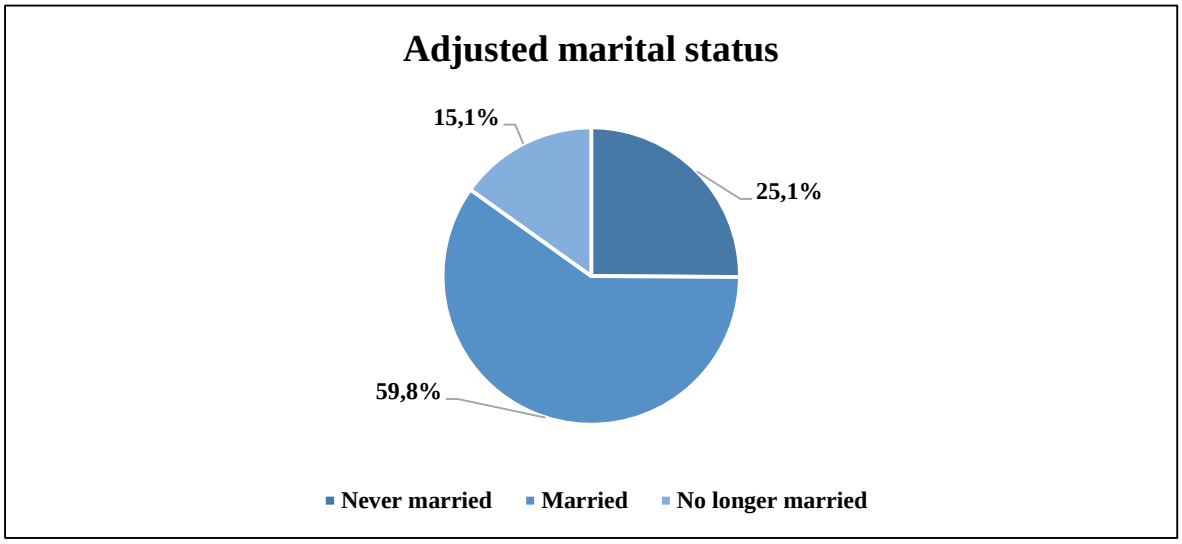


Table 5.7 and Figure 5.7 depict the frequencies and percentages of nationality of various countries and the distribution.

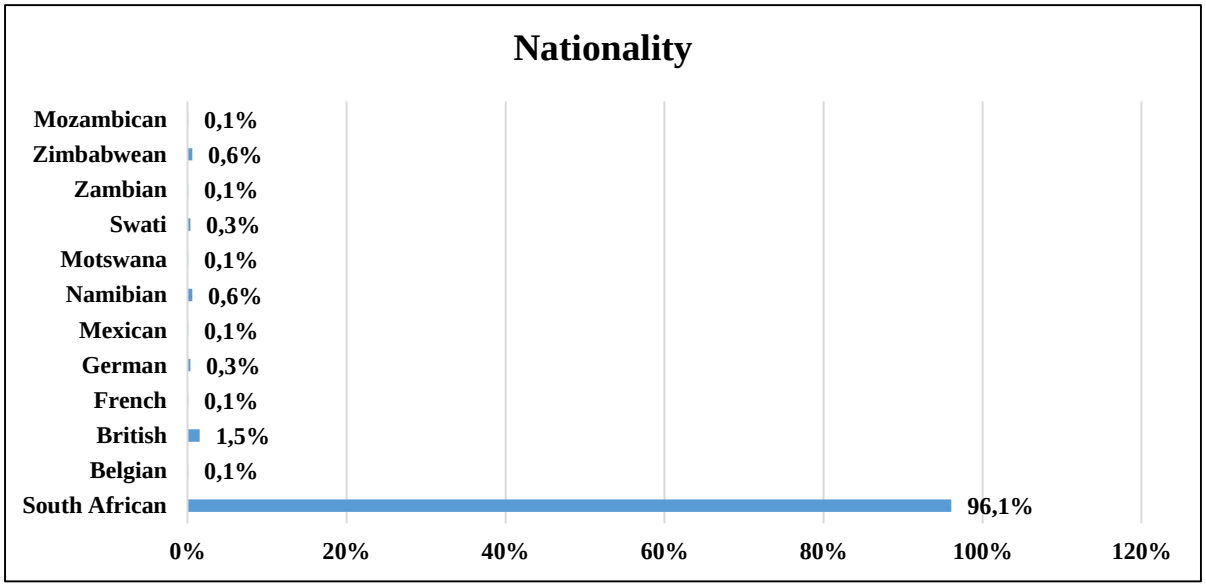
Table 5.7: Nationality

Nationality	Frequency (*f*)	Percentage (%)
South African	1 125	96.1
Belgian	1	0.1
British	18	1.5
French	1	0.1
German	4	0.3
Mexican	1	0.1
Namibian	7	0.6
Motswana	1	0.1
Swati	4	0.3
Zambian	1	0.1
Zimbabwean	7	0.6
Mozambican	1	0.1

As presented by Table 5.7, the majority (96.1%) of this sample has a South African nationality. This sample also represented other countries, namely Britain (1.5%), Namibia (0.6%) and Zimbabwe (0.6%) and so forth.

Figure 5.7 represents the nationality distribution across countries, namely South Africa (96.1%), Britain (1.5%), Namibia (0.6%) and Zimbabwe (0.6%) and so forth.

Figure 5.7: Nationality distribution



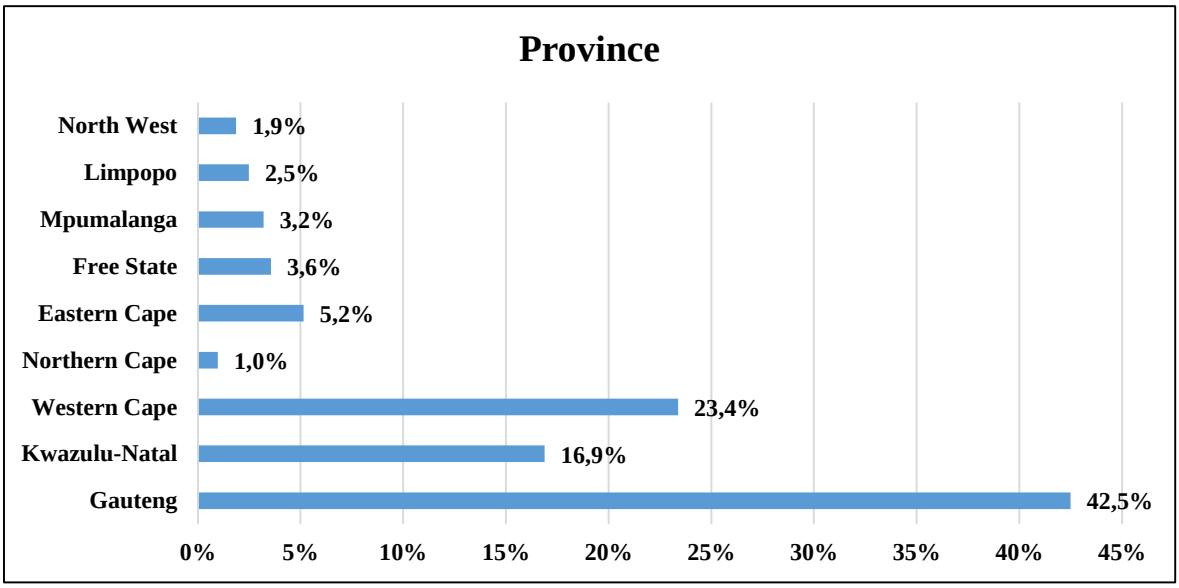
From Figure 5.7 it can be concluded that the majority of the sample has a South African nationality followed by a British nationality with 1.5 percent; while Table 5.8 indicates the different provinces in South Africa as well as Figure 5.8 that shows the distribution.

Table 5.8: Province

Province	Frequency (*f*)	Percentage (%)
Gauteng	478	42.5
Kwazulu-Natal	190	16.9
Western Cape	263	23.4
Northern Cape	11	1.0
Eastern Cape	58	5.2
Free State	40	3.6
Mpumalanga	36	3.2
Limpopo	28	2.5
North West	21	1.9

All the provinces were represented by this sample of which the majority (42.5%) of the sample are located in Gauteng as indicated by Table 5.8. Moreover, 23.4 percent of the sample are located in the Western Cape province followed with 16.9 percent from the Kwazulu-Natal province.

Figure 5.8: Province distribution



From Figure 5.8 it is clear that all other provinces represented less than 6 percent of the sample. Table 5.9, depicts the frequencies and percentages of home languages in South Africa.

Table 5.9: Home language

Home language	Frequency (*f*)	Percentage (%)
English	611	52.7
Afrikaans	375	32.4
isiXhosa	25	2.2
isiZulu	47	4.1
Xitsonga	6	0.5
siSwati	7	0.6
Sepedi	23	2.0
Sesotho	22	1.9
isiNdebele	5	0.4
Setswana	29	2.5
Tshivenda	9	0.8

Table 5.9 illustrates that the main home language for this sample is English (52.7%) followed by Afrikaans home language (32.4%). Various other languages were represented by this sample, for example isiXhosa (2.2%), isiZulu (4.1%), Xitsonga (0.5%), siSwati (0.6%), Sepedi (2.0%), Sesotho (1.9%), isiNdebele (0.4%), Setswana (2.5%) and Tshivenda (0.8%). Figure 5.9 indicates the home language distribution.

Figure 5.9: Home language distribution

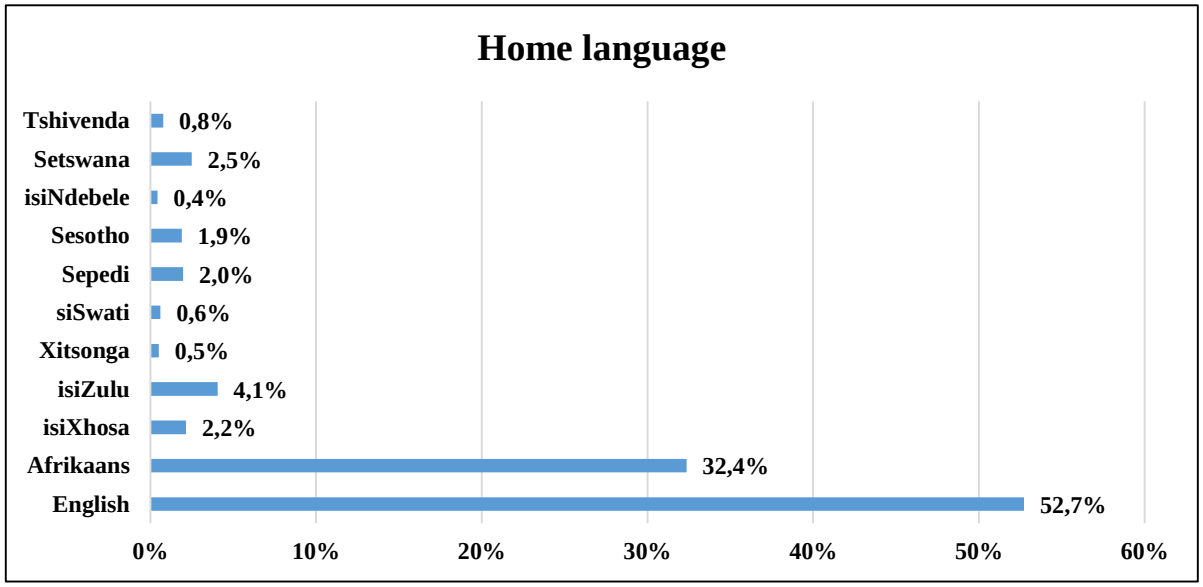


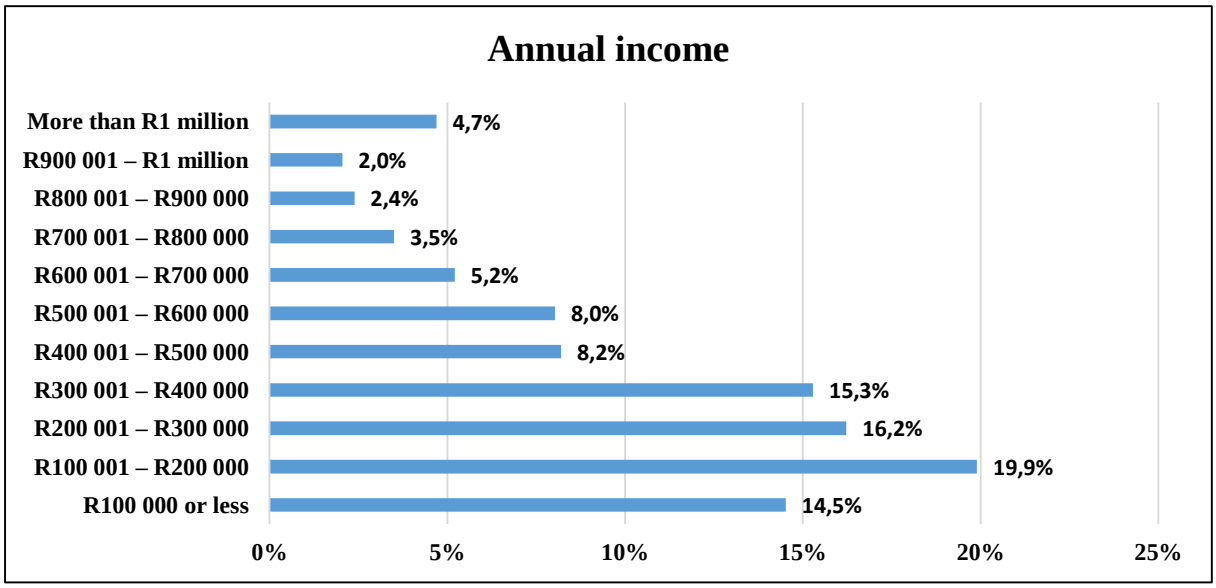
Figure 5.9 shows that English home language distribution is the highest (52.7%), followed by Afrikaans (32.4%) and the other languages. Table 5.10 and Figure 5.10 illustrates the annual income distribution.

Table 5.10: Annual income

Annual income	Frequency (*f*)	Percentage (%)
R100 000 or less	170	14.5
R100 001 – R200 000	233	19.9
R200 001 – R300 000	190	16.2
R300 001 – R400 000	179	15.3
R400 001 – R500 000	96	8.2
R500 001 – R600 000	94	8.0
R600 001 – R700 000	61	5.2
R700 001 – R800 000	41	3.5
R800 001 – R900 000	28	2.4
R900 001 – R1 million	24	2.0
More than R1 million	55	4.7

It is evident from Table 5.11 that the majority of the sample (19.9%) receives an income of between R100 001 and R200 000 per annum. This income bracket is followed by the R200 001-R300 000 per annum income group with 16.2 percent. Figure 5.10 indicates that only 4.7 percent of the sample receives more than R1 million per annum.

Figure 5.10: Annual income distribution



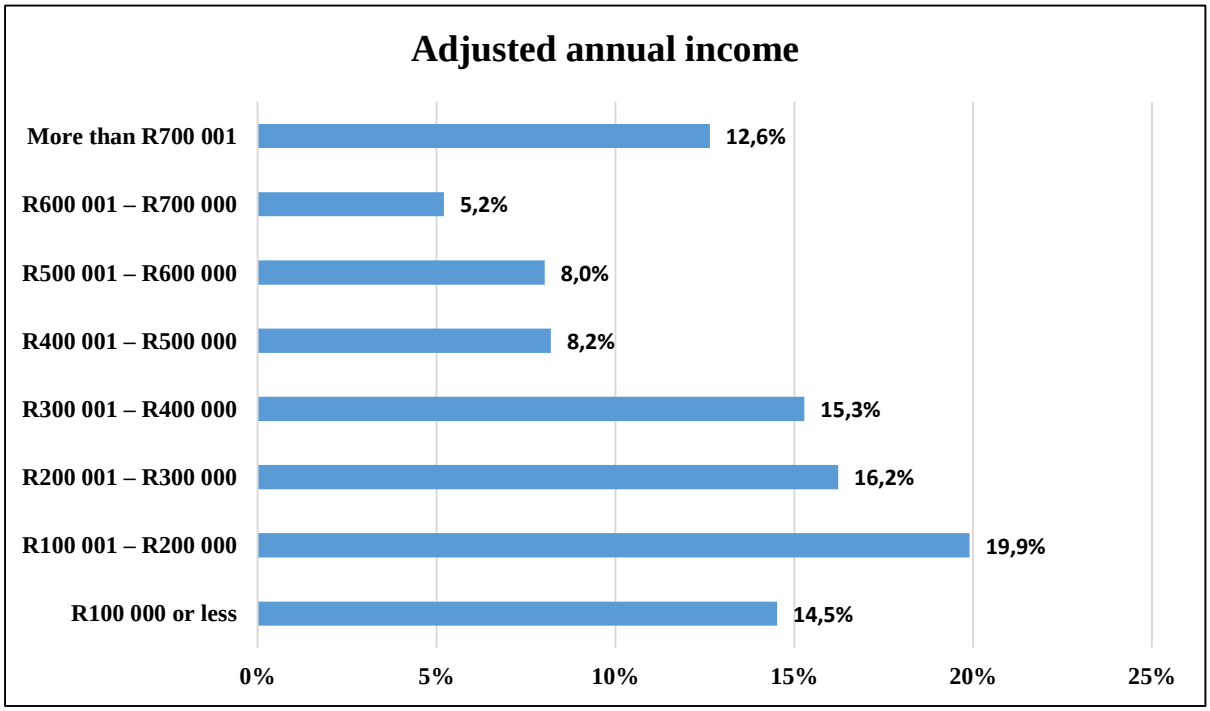
From Table 5.10 and Figure 5.10 it can be gathered that the majority of the sample receives an annual income of less than R400 000. The majority (19.9%) of the sample receives an annual income between R100 001 and R200 000. The minority (2.0%) of the sample was grouped into the R900 001 and R1 million income bracket.

Table 5.11 and Figure 5.11 illustrate the adjusted annual income.

Table 5.11: Adjusted annual income

Annual income	Frequency (*f*)	Percentage (%)
R100 000 or less	170	14.5
R100 001 – R200 000	233	19.9
R200 001 – R300 000	190	16.2
R300 001 – R400 000	179	15.3
R400 001 – R500 000	96	8.2
R500 001 – R600 000	94	8.0
R600 001 – R700 000	61	5.2
More than R700 001	148	12.6

Figure 5.11: Adjusted annual income



Due to the small number of the sample that receives an annual income of R700 001 and more it was decided to group the R700 001-R800 000, R800 001-R900 000, R900 001-R1 million and R1 million and more into one category (Table 5.11 and Figure 5.11).

5.4 DESCRIPTIVE STATISTICS

The purpose of descriptive statistics is to present systematic and objective information that were gathered from the representative sample from the questionnaire that was applied (Creswell & Plano-Clark, 2011:31).

Table 5.12 depicts the different frequencies for SWL.

Table 5.12: Frequencies for SWL

Range	Frequency (*f*)	Percentage (%)
5 – 9	66	5.6
10 – 14	143	12.2
15 – 19	205	17.5
20 – 24	261	22.3
25 – 29	331	28.3
30 – 35	165	14.1

Table 5.12 indicates the different ranges, namely 5-9; 10-14; 15-19; 20-24; 25-29 and 30-35. The ranges have the following meaning:

- 5-9 Extremely dissatisfied;
- 10-14 Dissatisfied;
- 15-19 Slightly below average in life satisfaction;
- 20-24 Average score;
- 25-29 High score; and
- 30-35 Very high score; highly satisfied.

Table 5.12 indicated that 28.3 percent of the participants are satisfied with their lives and obtained a high score followed by the range of 20-24 where participants received an average score for satisfaction with life. Table 5.13 indicates the different frequencies for Dospert.

Table 5.13: Frequencies and percentages for Dospert

	Frequency (*f*) Low	**Percentage (%) Low**	**Frequency (*f*) High**	**Percentage (%) High**
Dospert	595	50.8	576	49.2
Dospert Construct 1: Ethical	628	53.6	543	46.4
Dospert Construct 2: Financial	603	51.5	568	48.5
Dospert Construct 3: Health	598	51.1	573	48.9
Dospert Construct 4: Recreational	611	52.2	560	47.8
Dospert Construct 5: Social	614	52.4	557	47.6

The first empirical objective is to determine the risk personalities of the sample. A median was used to obtain the middle point of the Dospert scale and for each construct. From this middle

point, Dospert and constructs were divided between high and low risk. High willingness to take on risk refers to a more aggressive investor, whereas low indicates low willingness to take on risk. The low willingness to take on risk refers to a more conservative investor. From Table 5.13, it can be gathered that the majority of the sample are conservative, in other words they have a low willingness to take on risks. It can be concluded that the Dospert scale (50.8%), ethical construct (53.5%), financial construct (51.5%), health construct (51.1%), recreational construct (52.2%) and the social construct (52.4%) all have a low willingness to take on risk. As a result, the sample can be viewed to have a conservative type of investor personality.

Table 5.14: Descriptive statistics for SWL and Dospert

Construct	No of questions	Average inter-term correlation	Std Dev	Skewness	Kurtosis	Cronbach's alpha
SWL	5	0.611	1.427	-0.373	-0.683	0.887
Dospert	28	0.170	0.822	0.191	-0.198	0.852
Dospert Construct 1: Ethical	6	0.227	0.883	1.310	1.762	0.638
Dospert Construct 2: Financial	6	0.304	1.000	0.632	0.465	0.723
Dospert Construct 3: Health	4	0.374	1.453	0.807	-0.165	0.705
Dospert Construct 4: Recreational	6	0.453	1.607	0.327	-0.958	0.832
Dospert Construct 5: Social	6	0.284	1.141	-0.708	0.481	0.704

The SWL scale obtained an average inter-term correlation of 0.611. The average inter-term correlation should be between 0.15 and 0.50 as suggested by Clark and Watson (1995:316). The SWL scale is a little over the suggested range but none the less Diener *et al*. (1985) and

Pavot *et al.* (1991:149-161) indicate that the scale was compared to other scales and found it to be a valid and reliable scale measuring a person's life satisfaction.

As represented in Table 5.14, the average inter-term correlation for the Dospert scale is 0.170, which is between the range of 0.15 and 0.50. As a result, the average inter-term correlation value for the Dospert scale was deemed suitable.

Variance is the mean squared deviation from the mean (Malhotra, 2010:487). As a result standard deviation can be expressed as the square root of the variance (Levine *et al.*, 2014:142). From Table 5.15 it can be gathered that a standard deviation of 0.822 for the Dospert scale was obtained and a standard deviation of 1.427 for the SWL scale.

Cronbach's alpha is the average of all possible split-half coefficients resulting from different ways of splitting the scale items (Malhotra, 2010:319). This coefficient varies between zero and one and a value lower than 0.6 is indicative of unsatisfactory internal consistency reliability. As shown in Table 5.14 a Cronbach alpha of 0.852 was obtained for the Dospert scale, which included 28 items. Moreover, a Cronbach alpha was obtained of 0.887 for the SWL scale. Thus, each scale is over the recommended level of 0.6, which can be deemed as internal consistency reliability.

Table 5.15: Descriptive statistics for risk tolerance and sections

	No of questions	Mean	Std Dev	Skewness	Kurtosis
Risk tolerance	14	1.914	.257	-.043	-.452
Financial risk	5	1.941	.284	.006	-.226
Speculative risk	4	1.954	.496	.082	-.692
Investment risk	5	1.856	.321	.074	-.267

Variance is the mean squared deviation from the mean (Malhotra, 2010:487). As a result standard deviation can be expressed as the square root of the variance (Levine *et al.*, 2014:142). From Table 5.15 it can be gathered that the highest standard deviation was obtained for the speculative risk section (Std Dev = .496). Speculative risk also obtained the highest mean score of 1.954. If the data value is below zero the curve is flatter than a normal distribution based on kurtosis. Moreover, it can be concluded that only risk tolerance delivers a negative value for skewness, which is in return indicative of a negatively skewed symmetry of distribution.

Financial risk, speculative risk and investment risk have a positive skewness value, which results in a positive right skewed distribution.

Table 5.16: Confirmatory Factor Analysis (Dospert)

Construct	Average inter-term correlation	Std Dev	Skewness	Kurtosis	Cronbach's alpha	Variance explained %
Dospert	0.170	0.822	0.191	-0.198	0.852	
Ethical	0.227	0.883	1.310	1.762	0.638	35.681
Financial	0.304	1.000	0.632	0.465	0.723	43.502
Health	0.374	1.453	0.807	-0.165	0.705	53.196
Recreational	0.453	1.607	0.327	-0.958	0.832	54.800
Social	0.284	1.141	-0.708	0.481	0.704	40.340

The most commonly used measure for central tendency is the mean, in other words the average value (Malhotra, 2010:486). This measure is mainly used to calculate the average value after data have been collected by either using an interval or ratio scale. As represented in Table 5.16, the average inter-term correlation for the entire Dospert scale is 0.170, which is between the range of 0.15 and 0.50 (Clark & Watson, 1995:316) as suggested. Moreover, the mean per construct range from 0.227 to 0.453, which are also between the suggested values. As a result, the mean value per construct and for the entire Dospert scale is deemed suitable.

Variance is the mean squared deviation from the mean (Malhotra, 2010:487). As a result, standard deviation can be expressed as the square root of the variance (Levine *et al.*, 2014:142). The highest standard deviation was obtained for the recreational construct (Std Dev = 1.607).

The shape of a distribution can be examined by either skewness or kurtosis (Malhotra, 2010:488). Skewness focus on the symmetry about the mean, where the tendency of deviations from the mean tend to be larger in one direction than in the other. If the data represents a negative skewness value, the curve will result in a slight left skew. Kurtosis on the other hand measures the peak or flatness of the curve, which is demarcated by frequency distribution (Malhotra, 2010:488). A normal distribution is characterised by a zero kurtosis. If the data value for the kurtosis is above zero, the curve is more peaked than a normal distribution. If the data value is below zero the curve is flatter than a normal distribution.

From Table 5.16 it can be concluded that only the social construct deliver a negative value, which is in return indicative of a negatively skewed symmetry of distribution. The remaining constructs and Dospert delivers a positive skewness value. On the other hand, the kurtosis value, which is indicative of the peakedness of the distribution, suggest that the data set is fairly flatter than a normal distribution as the Dospert scale is below zero.

Cronbach's alpha is the average of all possible split-half coefficients resulting from different ways of splitting the scale items (Malhotra, 2010:319). This coefficient varies between zero and one and a value lower than 0.6 is indicative of unsatisfactory internal consistency reliability. As shown in Table 5.16 the Cronbach alpha of 0.852 was obtained for the overall scale, which included 28 items. The Cronbach alpha per construct ranged from 0.628 to 0.832. Thus, each construct is over the recommended level of 0.6, which can be deemed as internal consistency reliability.

The variance explained illustrates how well the questions per construct represent the scale. The variance explained should ideally be above 30 percent. For the Dospert scale the variance explained range from 35.681 percent to 54.800 percent. As a result, the constructs are representative of the scale.

Table 5.17: Survey of consumer finances – frequencies

Statement	No	Frequency (*f*)	Percentage (%)
Take substantial financial risks expecting to earn substantial returns	1	111	9.5
Take above average financial risks expecting to earn above average returns	2	287	24.5
Take average financial risks expecting to earn average returns	3	509	43.5
Not willing to take any financial risks	4	264	22.5

From the sample 9.5 percent (1) and 24.5 percent (2) are classified into the high risk tolerance category. The majority of the sample seems to be more risk averse as 43.5 percent (3) and 22.5

percent (4) of the participants are grouped into the low risk tolerance categories as represented in Table 5.17.

The ranking question for behavioural finance biases was adjusted to a point where only the behavioural finance bias was accounted for which was ranked first, in other words most relevant. If a participant ranked a behavioural finance bias as first, it was counted as part of the frequencies.

Table 5.18: Adjusted behavioural finance bias

Behavioural Finance Bias	Frequency (*f*)	Percentage (%)
Representativeness	513	45.3
Overconfidence	30	2.7
Anchoring	15	1.3
Gambler's fallacy	9	.8
Availability bias	72	6.4
Loss aversion	39	3.4
Regret aversion	70	6.2
Mental accounting	53	4.7
Self-control	331	29.2

In Table 5.18, 45.3 percent of the participants ranked the representativeness bias as most relevant, followed by self-control (29.2%); availability bias (6.4%); regret aversion (6.2%); mental accounting (4.7%); loss aversion (3.4%); overconfidence (2.7%); anchoring (1.3%) and gambler's fallacy (0.8%).

A risk tolerance test question formed part of the questionnaire to ensure the sample is low risk tolerance or high risk tolerance. Table 5.19 indicates that this question had four statements, which had to be rated from strongly disagree to strongly agree.

Table 5:19: Risk tolerance test question – frequencies

	Strongly agree	**Disagree**	**Neither agree or disagree**	**Agree**	**Strongly agree**
It's hard for me to win a bargain/argument	219	458	322	140	32

	Strongly agree	Disagree	Neither agree or disagree	Agree	Strongly agree
When travelling, I like to take new routes	66	159	163	488	295
I like to try new foods, new places and totally new experiences	32	62	103	497	477
When driving a car, I would always obey the traffic rule and avoid dangerous situation	28	88	154	446	455

Table 5.19 indicates the number of responses per statement. For the first statement, 458 participants indicated that they disagree with the statement followed by 322 neither agreeing nor disagreeing participants. For the second statement, 488 of the participants agree with the statement whilst 295 participants strongly agree. From the participants, 497 indicated they agree with the third statement and 477 participants strongly agree. The last statement, 455 participants strongly agree followed by 446 participants that agree. The risk tolerance question was grouped into either low risk tolerance or high risk tolerance (Table 5.20).

Table 5.20: Level of risk tolerance for risk tolerance test question

	Risk Tolerance Test Question		Total
	Low Risk Tolerance	High Risk Tolerance	
Frequency	602	569	1 171
Percentage %	51.4	48.6	100

Table 5.20 indicates that the majority of the participants are low risk tolerance (51.4%) followed by 48.6 percent high risk tolerance. A mean value was calculated for Table 5.20, which equates to 3.562. If the participants calculated mean is lower than 3.562 they are classified to be low risk tolerant. However, if the participants mean value is higher than 3.562, the participants are classified as high risk tolerant. As a result, from this sample it can be concluded that 51.4 percent of the participants are low risk tolerant and 48.6 percent of the participants are high risk tolerant.

The level of risk tolerance was tested for three sections, namely financial risk, speculative risk and investment risk. The five sub questions for financial risk were grouped into low-, medium-

and high-risk tolerance questions. Table 5.21 represents the frequency and percentage of the three levels of risk tolerance for the five financial risk questions. It can be concluded from Table 5.21 that the majority of the participants are low to medium risk tolerant for financial risk.

Table 5.21: Level of risk tolerance for financial risk section

	Risk Tolerance – Financial Risk Section		
	Low Risk Tolerance	**Medium Risk Tolerance**	**High Risk Tolerance**
Q1 Frequency (*f*)	189	958	24
Q1 Percentage (%)	16.1	81.8	2.0
Q2 Frequency (*f*)	219	921	31
Q2 Percentage (%)	18.7	78.7	2.6
Q3 Frequency (*f*)	155	749	267
Q3 Percentage (%)	13.2	64.0	22.8
Q4 Frequency (*f*)	67	725	379
Q4 Percentage (%)	5.7	61.9	32.4
Q5 Frequency (*f*)	774	37	360
Q5 Percentage (%)	66.1	3.2	30.7

The four sub questions for speculative risk were grouped into low-, medium- and high-risk tolerance questions. Table 5.22 represents the frequency and percentage of the three levels of risk tolerance for the four speculative risk questions. Table 5.22 clearly indicates low risk tolerance to medium risk tolerance levels for speculative risk.

Table 5.22: Level of risk tolerance for speculative risk section

	Risk Tolerance – Speculative Risk Section		
	Low Risk Tolerance	**Medium Risk Tolerance**	**High Risk Tolerance**
Q1 Frequency (*f*)	605	262	304
Q1 Percentage (%)	51.7	22.4	26.0
Q2 Frequency (*f*)	347	179	645
Q2 Percentage (%)	29.6	15.3	55.1
Q3 Frequency (*f*)	220	644	307

	Risk Tolerance – Speculative Risk Section		
	Low Risk Tolerance	**Medium Risk Tolerance**	**High Risk Tolerance**
Q3 Percentage (%)	18.8	55.0	26.2
Q4 Frequency (*f*)	518	436	217
Q4 Percentage (%)	44.2	37.2	18.5

The five sub questions for investment risk were grouped into low-, medium- and high-risk tolerance questions. Table 5.23 represents the frequency and percentage of the three levels of risk tolerance for the five investment risk questions. The majority of the participants are grouped into low risk tolerance and medium risk tolerance.

Table 5.23: Level of risk tolerance for investment risk section

	Risk Tolerance – Investment Risk Section		
	Low Risk Tolerance	**Medium Risk Tolerance**	**High Risk Tolerance**
Q1 Frequency (*f*)	771	366	34
Q1 Percentage (%)	65.8	31.3	2.9
Q2 Frequency (*f*)	250	865	57
Q2 Percentage (%)	21.3	73.8	4.9
Q3 Frequency (*f*)	343	597	231
Q3 Percentage (%)	29.3	51.0	19.7
Q4 Frequency (*f*)	162	609	400
Q4 Percentage (%)	13.8	52.0	34.2
Q5 Frequency (*f*)	270	673	228
Q5 Percentage (%)	23.1	57.5	19.5

To conclude, the SCF measures the risk attitude of a sample by using one risk tolerance question. As a result, Table 5.17 indicates from the SCF question that this sample is low risk tolerant, the risk tolerance test question from Table 5.20 indicates that this sample is low risk tolerant. Moreover, risk tolerance was grouped into three sections, namely financial risk, speculative risk and investment risk. These sections were divided into low, medium and high risk tolerant categories. Table 5.21 to Table 5.23 clearly indicate the risk tolerance level for this sample is between low risk tolerance and medium risk tolerance.

5.5 HYPOTHESIS TESTING

An analysis of variance test (ANOVA) one-way was used as well as the Tukey post hoc test, which is generally the most preferred test for conducting post hoc tests on a one-way ANOVA (Pallant, 2007).

5.5.1 Satisfaction with life

It is recommended that the SWL scale is added to the risk tolerance profile of investment companies since there is a link between satisfaction of life and risk tolerance, which will ultimately influence the overall risk profile of an investor. According to Statman (2015:26), a relationship exists between risk tolerance and satisfaction with life where people who are unsatisfied with their lives tend to tolerate more risk. Hence, making it possible for financial investment companies to more accurately analyse investor profiles.

A null-hypothesis had to be stated to determine the statistical difference between age categories, gender, ethnicity, marital status, behavioural finance and satisfaction with life. Differences were determined by undertaking a one-way ANOVA set at a confidence level of 95 percent. The following hypotheses were formulated:

Null hypothesis (H_{01}): There is no significant differences for SWL in terms of age categories, gender, ethnicity, marital status and behavioural finance biases.

Alternative hypothesis (H_{01}): There is a significant difference for SWL in terms of age categories, gender, ethnicity, marital status and behavioural finance biases.

Table 5.24: SWL and age categories

		Sum of squares	Df	Mean Square	F	Sig.
SWL	Between groups	1 151.702	2	757.851	15.230	.000*
	Within groups	58 120.107	1 168	49.760		
	Total	59 635.809	1 170			

*Significant at $p < 0.05$ level

From Table 5.24 it is clear that there is a statistical differences between SWL and age categories ($p < 0.05$). As a result the null hypothesis (H_{01}) can be rejected and the alternative hypothesis concluded (H_{01}).

Table 5.25: Significant differences between age categories for SWL

Age category	Mean	Age category	Mean	Comment
16-34	20.710	50+	23.180	**Age category 50+ is more satisfied with life than age category 16-34**
35-49	21.000	50+	23.180	**Age category 50+ is more satisfied with life than age category 35-49**
50+	23.180	16-34	20.710	**Age category 50+ is more satisfied with life than age category 16-34 and age category 35-49**
		35-49	21.000	

Table 5.25 represents that from this sample, participants 50 years of age and older tend to more satisfied with their lives than participants in age category 16-34 and participants in age category 35-49. Thieme and Dittrich (2015:14) confirmed this statement by highlighting the fact that older people are more satisfied with their lives than younger people.

Table 5.26 indicates that a significant difference exist between gender and SWL. As a result the null hypothesis (H_{01}) can be rejected and the alternative hypothesis (H_{01}) concluded.

Table 5.26: SWL and gender

		Sum of squares	Df	Mean Square	F	Sig.
SWL	Between groups	489.405	1	489.405	9.673	.002*
	Within groups	59 146.403	1 169	50.596		
	Total	59 635.809	1 170			

*Significant at $p < 0.05$ level

From Table 5.27 it can be concluded that males are more satisfied with life than females as males obtained a higher mean value than females. Moreover, Shirazi and Khan (2013:111) found in their research that males experience higher life satisfaction than females.

Table 5.27: Significant differences between gender for SWL

Gender	Mean	Gender	Mean	Comment
Male	22.520	Female	21.220	**Males are more satisfied with life than females**

A significant difference was identified for SWL and different ethnicity groups as represented in Table 5.28. As a result the null hypothesis (H_{01}) can be rejected and the alternative hypothesis (H_{01}) concluded.

Table 5.28: SWL and ethnicity

		Sum of squares	df	Mean Square	F	Sig.
SWL	Between groups	848.070	3	282.690	5.612	.001*
	Within groups	58 787.739	1 167	50.375		
	Total	59 635.809	1 170			

*Significant at $p < 0.05$ level

A significant difference between White participants and Coloured participants were identified as Table 5.29 view White participants are more satisfied with their lives than Coloured participants. Kannemeyer (2016:16) confirmed that Whites appear to have higher levels of life satisfaction consistently over time, whereas African people have lower satisfaction than the Coloured population, confirming that the Coloured people seem to have lower life satisfaction than White people.

Table 5.29: Significant differences between ethnicity for SWL

Ethnicity	Mean	Ethnicity	Mean	Comment
White	22.360	Coloured	19.540	**White participants are more satisfied with life than Coloured participants**

Ethnicity	Mean	Ethnicity	Mean	Comment
Coloured	19.540	White	22.360	**White participants are more satisfied with life than Coloured participants**

As shown in Table 5.30, a significant difference exists between marital status groups and SWL. As a result the null hypothesis (H_{01}) can be rejected and the alternative hypothesis (H_{01}) concluded.

Table 5.30: SWL and marital status

		Sum of squares	df	Mean Square	F	Sig.
SWL	Between groups	1 463.766	2	731.883	14.695	.000*
	Within groups	58 172.043	1 168	49.805		
	Total	59 635.809	1 170			

*Significant at $p < 0.05$ level

From Table 5.31 it can be concluded for this sample that married participants are more satisfied with their lives than never married participants or no longer married participants. Shirazi and Khan (2013:109) confirmed in their study, that people with life-long marriages seem to be more satisfied with their lives.

Table 5.31: Significant differences between marital status groups for SWL

Marital status	Mean	Marital status	Mean	Comment
Never married	20.260	Married	22.730	**Married participants are more satisfied with life than never married participants**
Married	22.730	Never married	20.260	**Married participants are more satisfied with life than never married**
		No longer married	20.850	

Marital status	Mean	Marital status	Mean	Comment
				participants and no longer married participants
No longer married	20.850	Married	22.730	**Married participants are more satisfied with life than and participants no longer married**

The significance level in Table 5.32 is smaller than 0.05, which is illustrative of a significant difference between annual income groups and SWL. As a result the null hypothesis (H_{01}) can be rejected and the alternative hypothesis (H_{01}) concluded.

Table 5.32: SWL and annual income

		Sum of squares	Df	Mean Square	F	Sig.
SWL	Between groups	4 522.586	7	646.084	13.634	.000*
	Within groups	55 113.223	1 163	47.389		
	Total	59 635.809	1 170			

*Significant at $p < 0.05$ level

Table 5.33 clearly indicates that for this sample, the more income per annum participants receive the more these participants are satisfied with their lives (Botha, 2013:10). Other authors support this view (Easterlin, 1995:35-48; 2001:465-484). Positional status indicates that there is a positive association that can be obtained between life satisfaction and perceived relative income as supported in the viewpoint in international and South African research (Posel & Casale, 2011:195-223). The lower the annual income, the lower the level of life satisfaction.

Table 5.33: Significant differences between annual income groups for SWL

Annual income	Mean	Annual income	Mean	Comment
R100 000 or less	19.500	R300 001-R400 000	22.360	**Participants earning R100 000 or less per annum are less**
		R400 001-R500 000	23.250	
		R500 001-R600 000	22.210	

Annual income	Mean	Annual income	Mean	Comment
		R600 001-R700 000	24.720	**satisfied with life than participants earning between R300 001-R400 000 per annum, R400 001-R500 000 per annum, R500 001-R600 000 per annum, R600 001-R700 000 per annum and more than R700 001 per annum**
		R700 001 or more	25.360	
R100 001-R200 000	19.850	R300 001-R400 000	22.360	**Participants earning between R100 001-R200 000 per annum are less satisfied with life than participants earning between R300 001-R400 000 per annum, R400 001-R500 000 per annum, R600 001-R700 000 per annum and more than R700 001 per annum**
		R400 001-R500 000	23.250	
		R600 001-R700 000	24.720	
		R700 001 or more	25.360	
R200 001-R300 000	21.240	R600 001-R700 000	24.720	**Participants earning between R200 001-R300 000 per annum are less satisfied with life than participants earning between R600 001-R700 000 per annum and more than R700 001 per annum**
		R700 001 or more	25.360	
R300 001-R400 000	22.360	R100 000 or less	19.500	**Participants earning between R300 001-**
		R700 001 or more	25.360	

Annual income	Mean	Annual income	Mean	Comment
				R400 000 per annum are more satisfied with life than participants earning R100 000 or less per annum and are less satisfied with life than participants earning R700 0001 or more per annum
R400 001-R500 000	23.250	R100 000 or less	19.500	**Participants earning between R400 001-R500 000 per annum are more satisfied with life than participants earning R100 000 or less per annum and participants earning between R100 001-R200 000 per annum**
		R100 001-R200 000	19.850	
R500 001-R600 000	22.210	R100 000 or less	19.500	**Participants earning between R500 001-R600 000 per annum are more satisfied with life than participants earning R100 000 or less per annum and are less satisfied with life than participants earning R700 001 or more per annum**
		R700 001 or more	25.360	
R600 001-R700 000	24.720	R100 000 or less	19.500	**Participants earning between R600 001-R700 000 per annum are more satisfied with life than participants earning R100 000 or less per**
		R100 001-R200 000	19.850	
		R200 001-R300 000	21.240	

Annual income	Mean	Annual income	Mean	Comment
				annum, between R100 001-R200 000 per annum and between R200 001-R300 000 per annum
R700 001 or more	25.360	R100 000 or less	19.500	**Participants earning R700 001 or more per annum are more satisfied with life than participants earning R100 000 or less per annum, between R100 001-R200 000 per annum, between R200 001-R300 000 per annum, between R300 001-R400 000 per annum and between R500 001-R600 000 per annum**
		R100 001-R200 000	19.850	
		R200 001-R300 000	21.240	
		R300 001-R400 000	22.360	
		R500 001-R600 000	22.210	

A significant difference exist between behavioural finance biases and SWL, which indicates that the null hypothesis (H_{01}) can be rejected and the alternative hypothesis (H_{01}) concluded at the 5 percent significance level.

Table 5.34: SWL and behavioural finance biases

		Sum of squares	Df	Mean Square	F	Sig.
SWL	Between groups	1 905.151	8	238.144	4.795	.000*
	Within groups	55 768.506	1 123	49.660		
	Total	57 673.657	1 131			

*Significant at $p < 0.05$ level

As represented by Table 5.35, participants subject towards the regret aversion bias are less satisfied with their lives than participants subject towards the representativeness bias, gambler's fallacy, loss aversion and self-control bias. Lerner *et al.* (2014:8) found in their

research that when people are in a happy mood, they tend to be more optimistic when they make decisions and choices compared to being in a bad mood. Such a person might make wrong decisions or have misattribution biases (Ross, 1977) and as a result, his situation is called regression theory (Quiggin, 1994:153-165). Moods can affect abstract judgement and is compared to concrete (abstract) ones. There are different emotional factors (misattribution bias, risk/loss aversion, house money effect, break-even effect, omission bias, endowment effect and status quo bias) that can possible influence the level of life satisfaction of individuals.

Table 5.35: Significant differences between behavioural finance biases for SWL

Behavioural finance bias	Mean	Behavioural finance bias	Mean	Comment
Representativeness	21.410	Regret aversion	18.470	**Participants subject towards the representativeness bias are more satisfied with life than participants subject towards regret aversion and less satisfied with life than participants subject towards self-control**
		Self-control	23.150	
Gambler's fallacy	27.220	Regret aversion	18.470	**Participants subject towards the gambler's fallacy are more satisfied with life than participants subject towards the regret aversion**
Loss aversion	23.410	Regret aversion	18.470	**Participants subject towards loss aversion are more satisfied with life than participants subject towards regret aversion**

Behavioural finance bias	Mean	Behavioural finance bias	Mean	Comment
Regret aversion	18.470	Representativeness	21.410	**Participants subject towards regret aversion are less satisfied with life than participants subject towards representativeness, gambler's fallacy, loss aversion and self-control**
		Gambler's fallacy	27.220	
		Loss aversion	23.410	
		Self-control	23.150	
Self-control	23.150	Representativeness	21.410	**Participants subject towards self-control are more satisfied with life than participants subject towards representativeness and regret aversion**
		Regret aversion	18.470	

5.5.2 Dospert and constructs

A null-hypothesis had to be stated to determine the statistical difference between age categories, gender, ethnicity, marital status, behavioural finance and Dospert/ constructs. Differences were determined by undertaking a one-way ANOVA set at a confidence level of 95 percent. The following hypotheses were formulated:

> Null hypothesis (H_{02}): There is no significant difference for Dospert/ constructs in terms of age categories, gender, ethnicity, marital status and behavioural finance.
>
> Alternative hypothesis (H_{02}): There is a significant difference for Dospert/ constructs in terms of age categories, gender, ethnicity, marital status and behavioural finance.

Table 5.36 represents the results obtained for statistical differences between Dospert/ constructs and age categories. Moreover, the null hypothesis can be rejected and the alternative hypothesis concluded.

Table 5.36: Dospert/ constructs and age categories

		Sum of squares	Df	Mean Square	F	Sig.
Dospert Total	Between groups	31.839	2	15.919	24.487	.000*
	Within groups	759.351	1 168	.650		
	Total	791.190	1 170			
Ethical	Between groups	9.050	2	4.525	5.839	.003*
	Within groups	905.215	1 168	.775		
	Total	914.265	1 170			
Financial	Between groups	21.414	2	10.707	10.866	.000*
	Within groups	1 150.891	1 168	.985		
	Total	1 172.306	1 170			
Health	Between groups	13.711	2	6.856		
	Within groups	2 456.895	1 168	2.104	3.259	.039*
	Total	2 470.606	1 170			
Recreational	Between groups	166.070	2	83.035	33.944	.000*
	Within groups	2 857.162	1 168	2.446		
	Total	3 023.232	1 170			
Social	Between groups	16.318	2	8.159	6.320	.002*
	Within groups	1 507.920	1 168	1.291		
	Total	1 524.237	170			

*Significant at $p < 0.05$ level

From Table 5.37 it is clear that there are statistical differences between age categories and Dospert, age categories and the ethical construct, age categories and the financial construct, age categories and the health construct, age categories and the recreational construct and age categories and the social construct where the null hypothesis is rejected ($p < 0.05$) and the alternative hypothesis concluded. The statistical differences found were further investigated with the Tukey HSD test in order to establish where the specific variances occur.

Table 5.37: Significant differences between age categories for Dospert

Age categories	Mean	Age categories	Mean	Comment
16-34	3.450	35-49	3.182	**Participants in age category 16-34 are more willing to take overall risks than participants in age categories 35-49 and 50+**
		50+	3.025	
35-49	3.182	16-34	3.450	**Participants in age category 35-49 take fewer risks overall than participants in age category 16-34 and take more risks than participants 50+**
		50+	3.025	
50+	3.025	16-34	3.450	**Participants in age category 50+ are willing to take fewer risks than participants 16-34 years and 35-49 years**
		35-49	3.182	

From Table 5.37 it is clear that the younger participants are more willing to take risks. For this sample, participants in age category 16-34 are more willing to take more risks than participants in age category 35-49 and in age category 50+. Young people tend to be more aggressive investors compared to older people that are deemed to be more conservative investors (Weber, 2009).

Table 5.38: Significant differences between age categories for ethical construct

Age categories	Mean	Age categories	Mean	Comment
16-34	2.040	50+	1.813	**Participants aged between 16-34 are willing to take more ethical risks than participants 50+ years**
50+	1.813	35-49	1.907	**Participants 50+ years are willing to take less ethical risks than participants 35-49 years**

Table 5.38 illustrates that participants in age category 16-34 are willing to take more ethical risks followed by participants in age category 35-49. Rolinson *et al.* (2013:870) found in his research that people's ethical risk taking behaviour, reduces relatively smoothly as they get older.

Table 5.39: Significant differences between age categories for financial construct

Age categories	Mean	Age categories	Mean	Comment
16-34	3.053	35-49	2.747	**Participants aged 16-34 are willing to take more financial risks than participants 35-49 and 50+ years**
		50+	2.726	
35-49	2.747	16-34	3.053	**Participants aged between 34-49 are willing to take less financial risks than participants 16-34 years**
50+	2.726	16-34	3.053	**Participants 50+ are willing to take less financial risk than**

Age categories	Mean	Age categories	Mean	Comment
				participants 16-34 years

From Table 5.39 it can be concluded that participants in age category 16-34 are willing to take more financial risks than participants in age category 35-49 and participants in age category 50+. This statement is confirmed by Rolinson *et al.* (2013:870) who mentioned young people are willing to take more financial risks than older people.

Table 5.40: Significant differences between age categories for health construct

Age categories	Mean	Age categories	Mean	Comment
16-34	2.849	50+	2.571	**Participants between the age of 16-34 are willing to take more health risks than participants 50+ years**
50+	2.571	16-34	2.849	**Participants aged 50+ years are willing to take fewer health risks than participants aged 16-34 years**

As represented in Table 5.40 participants in age category 16-34 are willing to take more health risks than participants in age category 50+. Coleman and Hagell (2015:17) also found as part of their research that people's health risk taking behaviour reduces proportionally as they get older.

Table 5.41: Significant differences between age categories for recreational construct

Age categories	Mean	Age categories	Mean	Comment
16-34	3.962	35-49	3.326	**Participants aged 16-34 are willing to take more recreational risks than participants aged 35-49 and 50+**
		50+	2.992	

Age categories	Mean	Age categories	Mean	Comment
35-49	3.326	16-34	3.962	**Participants aged 34-49 are willing to take less recreational risks than participants aged 16-34 and more recreational risks than participants 50+ years**
		50+	2.992	
50+	2.992	16-34	3.962	**Participants 50+ years are willing to take fewer recreational risks than participants aged 16-34 and 35-49 years**
		35-49	3.326	

Age category 16-34 are willing to take more recreational risks than participants in age category 35-49 and participants in age category 50+ as illustrated by Table 5.41. Rolinson *et al.* (2013:870) emphasised that when people take recreational risk, it reduces more from young to middle age than when they get older.

Table 5.42: Significant differences between age categories for social construct

Age categories	Mean	Age categories	Mean	Comment
16-34	5.148	50+	4.874	**Participants aged 16-34 are willing to take more social risks than participants 50+ years**
35-49	2.081	50+	4.874	**Participants 35-49 years are willing to take less social risks than participants 50+ years**
50+	4.874	16-34	5.148	**Participants 50+ years are willing to take fewer social risks than participants 16-34 years and more social risks**
		35-49	2.081	

Age categories	Mean	Age categories	Mean	Comment
				than participants 35-49 years

Table 5.42 highlighst that participants in age category 16-34 are willing to take more social risks than participants in age category 35-49 and participants in age category 50+. However, participants in age category 50+ are willing to take more social risks than participants in age category 34-49. Tymula *et al.* (2012:17139) found in their research that risk in the social domain reduces more in the case for old people than young people.

Table 5.43 represents the results obtained for statistical differences between Dospert/ constructs and gender. The null hypothesis (H_{02}) is rejected for Dospert and gender, ethical construct and gender, financial construct and gender, health construct and gender, recreational construct and gender and the alternative hypothesis (H_{02}) concluded. However, the null hypothesis (H_{02}) is concluded for the social construct and gender where the alternative hypothesis (H_{02}) is rejected as $p > 0.05$.

Table 5.43: Dospert/ constructs and gender

		Sum of squares	Df	Mean Square	F	Sig.
Dospert Total	Between groups	29.135	1	29.135	44.694	.000*
	Within groups	762.055	1 169	.652		
	Total	791.190	1 170			
Ethical	Between groups	11.904	1	11.904	15.421	.000*
	Within groups	902.362	1 169	.772		
	Total	914.265	1 170			
Financial	Between groups	18.398	1	18.398	19.639	.000*
	Within groups	1 153.907	1 169	.987		

		Sum of squares	Df	Mean Square	F	Sig.
	Total	1 172.306	1 170			
Health	Between groups	118.213	1	118.213	58.745	.000*
	Within groups	2 352.393	1 169	2.012		
	Total	2 470.606	1 170			
Recreational	Between groups	75.415	1	75.415	29.907	.000*
	Within groups	2 947.817	1 169	2.522		
	Total	3 023.232	1 170			
Social	Between groups	2.303	1	2.303	1.769	.184
	Within groups	1 521.934	1 169	1.302		
	Total	1 524.237	1 170			

*Significant at $p < 0.05$ level

Table 5.43 indicates that there are no statistical differences between the social construct and gender ($p > 0.05$). As a result, the null hypothesis (H_{02}) cannot be rejected for this construct. However, the null hypothesis (H_{02}) is rejected for Dospert and gender, ethical construct and gender, financial construct and gender, health construct and gender, recreational construct and gender, social construct and gender ($p < 0.05$), where the alternative hypothesis (H_{02}) is concluded.

Table 5.44: Significant differences between gender for Dospert

Gender	Mean	Gender	Mean	Comment
Male	3.350	Female	3.034	**Male participants are willing to take more overall risks than females**

As represented in Table 5.44, male participants, for this sample, are willing to take more overall risks than females. Wolchover (2011) found in her research that men are in general more willing to take risks compared to women.

Table 5.45: Significant differences between gender for ethical construct

Gender	Mean	Gender	Mean	Comment
Male	2.008	Female	1.806	**Male participants are willing to take more ethical risks than females**

Table 5.45 indicates that for this sample, males are willing to take more ethical risks than the female participants. Harris *et al.* (2006:48) concludes in their study that in different real-world domains men display more risky behaviours than women, especially towards ethical risk.

Table 5.46: Significant differences between gender for financial construct

Gender	Mean	Gender	Mean	Comment
Male	2.945	Female	2.694	**Male participants are willing to take more financial risks than females**

It can be viewed from Table 5.46 that for this sample, males tend to be more willing to take financial risks compared to females. Blais and Weber (2006:33) found in their research that people can differ when they make decisions relating to financial versus recreational risks. From previous research done by Harris *et al.* (2006:50) and Kapoor (2015:2) men take more financial risks than women, even though women have a bigger urge and likelihood to engage in risk-type behaviours, women instead prefer to take less risk to perceive greater benefit.

Table 5.47: Significant differences between gender for health construct

Gender	Mean	Gender	Mean	Comment
Male	3.017	Female	2.380	**Male participants are willing to take more health risks than females**

In terms of health, male participants are likely to take more health risks than females as gathered from Table 5.47. Blais and Weber (2006:34) and Franco and D'Angelo (2011:10) confirm with their respective studies that males take more health risks than females.

Table 5.48: Significant differences between gender for recreational construct

Gender	Mean	Gender	Mean	Comment
Male	3.611	Female	3.102	**Male participants are willing to take more recreational risks than females**

Table 5.48 displays that male participants take more recreational risks than female participants. Wolchover's (2011) theory corresponds with the above mentioned statement as men in general take more recreational risks than females.

Table 5.49 present the results obtained for statistical differences between Dospert/ constructs and ethnicity.

Table 5.49: Dospert/ constructs and ethnicity

		Sum of squares	Df	Mean Square	F	Sig.
Dospert Total	Between groups	3.443	3	1.148	1.700	.165
	Within groups	787.747	1 167	.675		
	Total	791.190	1 170			
Ethical	Between groups	43.874	3	14.625	19.608	.000*
	Within groups	870.391	1 167	.746		
	Total	914.265	1 170			
	Between groups	50.308	3	16.769	17.442	.000*

		Sum of squares	Df	Mean Square	F	Sig.
Financial	Within groups	1 121.998	1 167	.961		
	Total	1 172.306	1 170			
Health	Between groups	14.293	3	4.764	2.264	.079
	Within groups	2 456.313	1 167	2.105		
	Total	2 470.606	1 170			
Recreational	Between groups	14.081	3	4.694	1.820	.142
	Within groups	3 009.151	1 167	2.579		
	Total	3 023.232	1 170			
Social	Between groups	13.988	3	4.663	3.603	.013*
	Within groups	1 510.249	1 167	1.294		
	Total	1 524.237	1 170			

*Significant at $p < 0.05$ level

From Table 5.49 it is clear that there are no statistical differences between Dospert and ethnicity, the health construct and ethnicity and between the recreational construct and ethnicity ($p > 0.05$). As a result, the null hypothesis (H_{02}) cannot be rejected for Dospert and the above mentioned constructs. However, the null hypothesis (H_{02}) is rejected for the ethical construct and ethnicity, financial construct and ethnicity, social construct and ethnicity ($p < 0.05$) and the alternative hypothesis (H_{02}) concluded. The statistical differences found were further investigated with the Tukey HSD test in order to establish where the specific variances occur.

Table 5.50: Significant differences between ethnicity for ethical construct

Ethnicity	Mean	Ethnicity	Mean	Comment
African	2.272	White	1.780	

Ethnicity	Mean	Ethnicity	Mean	Comment
		Asian	1.839	**African participants are willing to take more ethical risks than White and Asian participants**
Coloured	2.003	African	2.272	**Coloured participants are willing to take less ethical risks than African participants**
Asian	1.839	African	2.272	**Asian participants are willing to take less ethical risks than African participants**

It can be seen from Table 5.50 that African participants take more ethical risks than White participants and Asian participants. Moreover, African participants also take more ethical risks than Coloured participants. Wilson (2016:20) highlights from her research that non-Whites take more ethical risks than Whites.

Table 5.51: Significant differences between ethnicity for financial construct

Ethnicity	Mean	Ethnicity	Mean	Comment
African	3.184	White	2.667	**African participants are willing to take more financial risks than White and Coloured participants**
		Coloured	2.870	
White	2.667	African	3.184	**White participants are willing to take fewer financial risks than African and Asian participants**
		Asian	2.971	
Coloured	2.870	African	3.184	**Coloured participants are less willing to take**

Ethnicity	Mean	Ethnicity	Mean	Comment
				less financial risks than African participants
Asian	2.971	White	2.667	**Asian participants are willing to more financial risks than White participants**

Table 5.51 represents that African participants are willing to take more financial risks than White participants and Coloured participants. Moreover, White participants take fewer risks than Asian participants. From a previous research study of Wilson (2016:20) it was confirmed that non-Whites take on more financial risks than Whites.

Table 5.52: Significant differences between ethnicity for social construct

Ethnicity	Mean	Ethnicity	Mean	Comment
White	5.080	Coloured	4.742	**White participants are willing to take more social risks than Coloured participants**
Coloured	4.742	White	5.080	**Coloured participants are willing to take less social risks than White participants**

From Table 5.52 it can be concluded that White participants are willing to take more social risks than Coloured participants. This statement is confirmed by Wilson (2016) as White participants had a higher mean value than non-White participants and, as a result, Whites are willing to take more social risks compared to non-Whites.

Table 5.53 represents the results obtained for statistical differences between Dospert/ constructs and marital status.

Table 5.53: Dospert/constructs and marital status

		Sum of squares	Df	Mean Square	F	Sig.
Dospert Total	Between groups	11.774	2	5.887	8.822	.000*
	Within groups	779.416	1 168	.667		
	Total	791.190	1 170			
Ethical	Between groups	13.026	2	6.513	8.441	.000*
	Within groups	901.240	1 168	.772		
	Total	914.265	1 170			
Financial	Between groups	16.511	2	8.256	8.343	.000*
	Within groups	1 155.794	1 168	.990		
	Total	1 172.306	1 170			
Health	Between groups	8.219	2	4.110	1.949	.143
	Within groups	2 462.387	1 168	2.108		
	Total	2 470.606	1 170			
Recreational	Between groups	32.060	2	16.030	6.259	.002*
	Within groups	2 991.172	1 168	2.561		
	Total	3 023.232	1 170			
Social	Between groups	2.764	2	1.382	1.061	.346
	Within groups	1 521.473	1 168	1.303		
	Total	1 524.237	1 170			

*Significant at $p < 0.05$ level

From Table 5.53 it is clear that there are no statistical differences between the health construct and marital status and the social construct and marital status ($p > 0.05$). As a result the null hypothesis cannot be rejected for above mentioned construct. However, the null hypothesis (H_{02}) is rejected for Dospert and marital status, ethical construct and marital status, financial construct and marital status and the recreational construct and marital status ($p < 0.05$) and the alternative hypothesis (H_{02}) concluded. The statistical differences found were further investigated with the Tukey HSD test in order to establish where the specific variances occur.

Table 5.54: Significant differences between marital status groups for Dospert

Marital status	Mean	Marital status	Mean	Comment
Never married	3.351	Married	3.136	**Never married participants are willing to take more overall risks than married and no longer married participants**
		No longer married	3.078	
Married	3.136	Never married	3.351	**Married participants are willing to take less overall risks than participants never married**
No longer married	3.078	Never married	3.351	**No longer married participants are willing to take less overall risks than never married participants**

Table 5.54 indicates that never married participants are willing to take more overall risks than married participants and no longer married participants. Spivey (2006:34) found through research that unmarried people are willing to accept more risks than married people.

Table 5.55: Significant differences between marital status groups for ethical construct

Marital status	Mean	Marital status	Mean	Comment
Never married	2.082	Married	1.843	

Marital status	Mean	Marital status	Mean	Comment
		No longer married	1.824	**Never married participants are willing to take more ethical risks than married and no longer married participants**
Married	1.843	Never married	2.082	**Married participants are less willing to take ethical risks than never married participants**
No longer married	1.824	Never married	2.082	**No longer married participants are less willing to take ethical risks than never married participants**

From Table 5.55 the never married participants are willing to take more ethical risks compared to married participants and no longer married participants. Married people are found to be more risk averse and, as a result, will have a lower ethical risk appetite than unmarried people (Van Dorresteijn, 2017:5).

Table 5.56: Significant differences between marital status groups for financial construct

Marital status	Mean	Marital status	Mean	Comment
Never married	3.007	Married	2.766	**Never married participants are willing to take more financial risks than married and no longer married participants**
		No longer married	2.664	
Married	2.766	Never married	3.007	**Married participants are less willing to take financial risks than**

Marital status	Mean	Marital status	Mean	Comment
				never married participants
No longer married	2.664	Never married	3.007	**No longer married participants are less willing to financial risks than never married participants**

Never married participants are willing to take more financial risks than married participants and no longer married participants as depicted by Table 5.56. Chattopadhyay and Dasgupta (2015:614) also highlight that unmarried individual are willing to take more risks than married individuals.

Table 5.57: Significant differences between marital status groups for recreational construct

Marital status	Mean	Marital status	Mean	Comment
Never married	3.623	Married	3.256	**Never married participants are willing to take more recreational risks than married and no longer married participants**
		No longer married	3.195	
Married	3.256	Never married	3.623	**Married participants are less willing to take recreational risks than never married participants**
No longer married	3.195	Never married	3.623	**No longer married participants are less willing to take recreational risks than never married participants**

As shown in Table 5.58, never married participants are willing to take more recreational risks compared to married participants and no longer married participants. Van Dorresteijn (2017:29) found that single individual are more willing to accept risks than married individuals.

Table 5.59 represent the results obtained for statistical differences between Dospert/ constructs and annual income.

Table 5.59: Dospert/ constructs and annual income

		Sum of squares	Df	Mean Square	F	Sig.
Dospert Total	Between groups	10.951	7	1.564	2.332	.023*
	Within groups	780.239	1 163	.671		
	Total	791.190	1 170			
Ethical	Between groups	3.422	7	.489	.624	.736
	Within groups	910.843	1 163	.793		
	Total	914.265	1 170			
Financial	Between groups	10.243	7	1.463	1.464	.176
	Within groups	1 162.063	1 163	.999		
	Total	1 172.306	1 170			
Health	Between groups	15.246	7	2.178	1.032	.407
	Within groups	2 455.359	1 163	2.111		
	Total	2 470.606	1 170			
Recreational	Between groups	24.251	7	3.464	1.344	.226
	Within groups	2 998.980	1 163	2.579		

		Sum of squares	Df	Mean Square	F	Sig.
	Total	3 023.232	1 170			
Social	Between groups	43.515	7	6.216	4.883	.000*
	Within groups	1 480.722	1 163	1.273		
	Total	1 524.237	1 170			

*Significant at $p < 0.05$ level

From Table 5.59 it is clear that there are no statistical differences between the ethical construct and annual income, financial construct and annual income, health construct and annual income and the recreational construct and annual income ($p > 0.05$). As a result, the null hypothesis (H_{02}) cannot be rejected for the abovementioned constructs. However, the null hypothesis (H_{02}) is rejected for Dospert and annual income and the social construct and annual income ($p < 0.05$) and the alternative hypothesis (H_{02}) concluded. The statistical differences found were further investigated with the Tukey HSD test in order to establish where the specific variances occur.

Table 5.60: Significant differences between annual income groups for Dospert

Annual income	Mean	Annual income	Mean	Comment
R100 000 or less	3.079	R700 001 or more	3.374	**Participants earning R100 000 or less per annum are less willing to take overall risks than participants earning R700 001 or more per annum**
R700 001 or more	3.374	R100 000 or less	3.079	**Participants earning R700 001 or more per annum are more willing to take overall risks than participants earning**

Annual income	Mean	Annual income	Mean	Comment
				R100 000 or less per annum

Table 5.60 clearly illustrates that for this sample, participants earning R700 001 or more are more willing to take overall risks compared to participants earning R100 000 or less. Roszkowski and Davey (2010:42) indicate in their research that risk assessment or risk tolerance is linked to developing a sound financial plan with a good income. Higher income earners are willing to take/ accept more overall risk (Dopsert) compared to low income earners.

Table 5.61: Significant differences between annual income groups for social construct

Annual income	Mean	Annual income	Mean	Comment
R100 000 or less	4.746	R700 001 or more	5.416	**Participants earning R100 000 per annum or less are less willing to take social risks than participants earning R700 001 or more per annum**
R100 001-R200 000	4.971	R700 001 or more	5.416	**Participants earning between R100 001-R200 000 per annum are less willing to take social risks than participants earning R700 001 or more per annum**
R200 001-R300 000	4.876	R700 001 or more	5.416	**Participants earning between R200 001-R300 000 per annum are less willing to take social risks than participants earning R700 001 or more per annum**
R700 001 or more	5.416	R100 000 or less	4.746	

Annual income	Mean	Annual income	Mean	Comment
		R100 001-R200 000	4.971	**Participants earning R700 001 or more per annum are more willing to take social risks than participants earning R100 000 or less per annum, between R100 001-R200 000 per annum and between R200 001-R300 000 per annum**
		R200 001-R300 000	4.876	

As represented by Table 5.61, it can be concluded that the more participants are earning per annum the more they are willing to take on social risk. According to Roszkowski and Davey (2010:42), the higher an individuals' income the more the individual is willing to take on risk, therefore, social risk will be higher for higher income earners.

Table 5.62 represent the results obtained for statistical differences between Dospert/ constructs and behavioural finance biases.

Table 5.62: Dospert/ constructs and behavioural finance biases

		Sum of squares	Df	Mean Square	F	Sig.
Dospert Total	Between groups	6.938	8	.867	1.282	.249
	Within groups	759.535	1 123	.676		
	Total	766.474	1 131			
	Between groups	23.249	8	2.906	3.799	.000*

		Sum of squares	Df	Mean Square	F	Sig.
Ethical	Within groups	859.062	1 123	.765		
	Total	882.311	1 131			
Financial	Between groups	24.206	8	3.026	3.026	.002*
	Within groups	1 122.900	1 123	1.000		
	Total	1 147.107	1 131			
Health	Between groups	26.637	8	3.330	1.590	.123
	Within groups	2 351.733	1 123	2.094		
	Total	2 378.370	1 131			
Recreational	Between groups	22.179	8	2.772	1.072	.380
	Within groups	2 903.422	1 123	2.585		
	Total	2 925.602	1 131			
Social	Between groups	11.471	8	1.434	1.107	.356
	Within groups	1 455.117	1 123	1.296		
	Total	1 466.588	1 131			

*Significant at $p < 0.05$ level

From Table 5.62 it is evident that there are no statistical differences between Dospert and behavioural finance biases, the health construct and behavioural finance biases, the recreational construct and behavioural finance biases and the social construct and behavioural finance biases ($p > 0.05$). As a result, the null hypothesis (H_{02}) cannot be rejected for the abovementioned. However, the null hypothesis (H_{02}) is rejected for the ethical construct and behavioural finance biases and for the financial construct and behavioural finance biases ($p <$

0.05) and the alternative hypothesis (H_{02}) concluded. The statistical differences found were further investigated with the Tukey HSD test in order to establish where the specific variances occur.

Table 5.63: Significant differences between behavioural finance biases for ethical construct

Behavioural finance biases	Mean	Behavioural finance biases	Mean	Comment
Representativeness	2.012	Self-control	1.699	**Participants subject towards representativeness bias are willing to take more ethical risks than the participants subject towards self-control bias**
Self-control	1.699	Representativeness	2.012	**Participants subject towards self-control bias are willing to take less ethical risks than the participants subject towards representativeness bias**

Table 5.63 indicates that participants subject towards the representativeness bias are likely to take more ethical risks than participants subject towards the self-control bias. This, however, has not been proved yet. Tversky and Kahneman (1972:430-454) conclude in their research that representativeness is seen as a cognitive bias and self-control an emotional bias.

Table 5.64: Significant differences between behavioural finance biases for financial construct

Behavioural finance biases	Mean	Behavioural finance biases	Mean	Comment
Availability bias	3.343	Regret aversion	2.731	**Participants subject towards availability bias are willing to take more financial risks than participants subject towards regret aversion and self-control bias**
		Self-control	2.775	
Regret aversion	2.731	Availability bias	3.343	**Participants subject towards regret aversion are less willing to take financial risks than participants subject towards availability bias**
Self-control	2.775	Availability bias	3.343	**Participants subject towards self-control bias are less willing to take financial risks than participants subject towards availability bias**

Table 5.64 clearly indicates that for this sample, participants subject towards the availability bias are willing to take on more financial risks than participants subject towards the regret aversion and self-control bias. Moreover, this statement has not yet been proven by previous

research. Pompian (2017) states that the availability bias and self-control is a cognitive bias, whereas regret aversion an emotional bias.

5.5.3 Risk tolerance and sections

The effect of demographical factors on risk tolerance is the fourth empirical objective to be achieved, which is addressed in this section to follow. As a result, the effect of demographical factors are determined also on the three subsections of risk tolerance, namely financial risk section, speculative risk section and investment risk. A null hypothesis had to be stated to determine the statistical difference between age categories, gender, ethnicity, marital status and behavioural finance for risk tolerance. Differences were determined by undertaking a one-way ANOVA set at a confidence level of 95 percent. The following hypotheses were formulated:

Null hypothesis (H_{03}): There is no significant differences for risk tolerance/ sections in terms of age categories, gender, ethnicity, marital status and behavioural finance biases.

Alternative hypothesis (H_{03}): There is a significant difference for risk tolerance/ sections in terms of age categories, gender, ethnicity, marital status and behavioural finance biases.

Table 5.65 indicates the results obtained for statistical differences between risk tolerance and age categories.

Table 5.65: Risk tolerance/sections and age categories

		Sum of squares	Df	Mean Square	F	Sig.
Risk Tolerance Total	Between groups	.054	2	.027	.407	.666
	Within groups	77.588	1 168	.066		
	Total	77.642	1 170			
Financial risk	Between groups	.428	2	.214	2.648	.071
	Within groups	94.473	1 168	.081		

		Sum of squares	Df	Mean Square	F	Sig.
	Total	94.901	1 170			
Speculative risk	Between groups	.209	2	.105	.424	.654
	Within groups	288.215	1 168	.247		
	Total	288.424	1 170			
Investment risk	Between groups	.298	2	.149	1.444	.236
	Within groups	120.534	1 168	.103		
	Total	120.832	1 170			

*Significant at $p < 0.05$ level

It is evident that there are no statistical differences between age categories and risk tolerance, age categories and financial risk section, age category and investment risk section, age category and speculative risk section ($p > 0.05$). Therefore the null hypothesis (H_{03}) cannot be rejected for the abovementioned and the alternative hypothesis (H_{03}) concluded.

No significant difference was identified between age categories for risk tolerance and sections as indicated by Table 5.65. This can be due to the context risk tolerance was measured in, as previous risk tolerance studies were not in the same context as for this study, in terms of South Africa and for South African investors.

Table 5.66: Risk tolerance/sections and gender

		Sum of squares	Df	Mean Square	F	Sig.
Risk Tolerance Total	Between groups	2.781	1	2.781	43.431	.000*
	Within groups	74.861	1 169	.064		
	Total	77.642	1 170			

		Sum of squares	Df	Mean Square	F	Sig.
Financial risk	Between groups	1.483	1	1.483	18.553	.000*
	Within groups	93.419	1 169	.080		
	Total	94.901	1 170			
Speculative risk	Between groups	5.781	1	5.781	23.910	.000*
	Within groups	282.643	1 169	.242		
	Total	288.424	1 170			
Investment risk	Between groups	2.336	1	2.336	23.048	.000*
	Within groups	118.496	1 169	.101		
	Total	120.832	1 170			

*Significant at $p < 0.05$ level

Table 5.66 indicates significant differences between gender and risk tolerance, gender and financial risk, gender and investment risk, gender and investment risk and, as a result, the null hypothesis (H_{03}) is rejected and the alternative hypothesis (H_{03}) concluded.

Table 5.67: Significant differences between genders for risk tolerance

Gender	Mean	Gender	Mean	Comment
Males	1.966	Females	1.868	**Males tolerate risk more than females**

From Table 5.67 it is evident that male participants are more risk tolerant than females. This viewpoint is confirmed by Sung and Hanna (1996a:226) who stated explicitly males are more risk tolerant than females. Other researchers (Hawley & Fuji, 1993:197-204; Sung & Hanna, 1996b:11-20; Sharma, 2006:15; Anbar & Eker, 2010:510; Faff *et al*., 2011:113; Van Schalkwyk, 2012; Cooper *et al*., 2014:275; Mazumdar, 2014:46; Rahmawati *et al*., 2015:373) confirmed similar findings, that males are more risk tolerant than females.

Table 5.68: Significant differences between genders for financial risk section

Gender	Mean	Gender	Mean	Comment
Males	1.979	Females	1.908	**Males tolerate more financial risks than females**

Table 5.68 shares the same sentiment as Table 5.68 that males are more financially risk tolerant than females. The University of Missouri-Columbia (2017) supports this viewpoint that males tend to tolerate more financial risks than females.

Table 5.69: Significant differences between genders for speculative risk section

Gender	Mean	Gender	Mean	Comment
Males	2.028	Females	1.880	**Males tolerate more speculative risks than females**

In terms of the speculative risk section of risk tolerance, Table 5.69 indicates that males are more speculative risk tolerant than females. Gustafsson and Hellström (2015:12,18) discuss that speculative risk plays a role in risk tolerance and that females are less speculative risk tolerant.

Table 5.70: Significant differences between genders for investment risk section

Gender	Mean	Gender	Mean	Comment
Males	1.903	Females	1.814	**Males tolerate more investment risks than females**

Table 5.71 represents the statistical differences between risk tolerance/ sections and ethnicity.

Table 5.71: Risk tolerance/sections and ethnicity

		Sum of squares	Df	Mean Square	F	Sig.
	Between groups	5.664	3	1.888	30.610	.000*

		Sum of squares	Df	Mean Square	F	Sig.
Risk Tolerance Total	Within groups	71.978	1 167	.062		
	Total	77.642	1 170			
Financial risk	Between groups	.971	3	.324	4.020	.007*
	Within groups	93.931	1 167	.080		
	Total	94.901	1 170			
Speculative risk	Between groups	24.378	3	8.126	35.915	.000*
	Within groups	264.046	1 167	.226		
	Total		1 170			
Investment risk	Between groups	3.410	3	1.137	11.298	.000*
	Within groups	117.422	1 167	.101		
	Total	120.832	1 170			

*Significant at $p < 0.05$ level

Table 5.71 indicates that the null hypothesis (H_{03}) is rejected for risk tolerance and ethnicity, financial risk section and ethnicity, speculative risk and ethnicity, investment risk section and ethnicity ($p < 0.05$), where the alternative hypothesis (H_{03}) is concluded.

Table 5.72: Significant differences between ethnicity groups for risk tolerance

Ethnicity	Mean	Ethnicity	Mean	Comment
African	2.052	White	1.879	**African participants are more risk tolerant than White, Coloured and Asian participants**
		Coloured	1.915	
		Asian	1.852	

Ethnicity	Mean	Ethnicity	Mean	Comment
White	1.879	African	2.052	**White participants are less risk tolerant than African participants**
Coloured	1.915	African	2.052	**Coloured participants are less risk tolerant than African participants**
Asian	1.852	African	2.052	**Asian participants are less risk tolerant than African participants**

From Table 5.72 it can be gathered that for this sample, African participants are more risk tolerant than White participants, Coloured participants and Asian participants. This correlates with Leigh (1986:17-31) who found in research that non-Whites took more risks than Whites did. The results from Table 5.72 correspond with another South African researcher, Van Schalkwyk (2012), who found African people to be more risk tolerant than White people.

Table 5.73: Significant differences between ethnicity groups for financial risk section

Ethnicity	Mean	Ethnicity	Mean	Comment
African	1.997	White	1.929	**African participants tolerate more financial risks than White and Asian participants**
		Asian	1.901	
White	1.929	African	1.997	**White participants tolerate less financial risks than African participants**
Asian	1.901	African	1.997	**Asian participants tolerate less**

Ethnicity	Mean	Ethnicity	Mean	Comment
				financial risks than African participants

As represented by Table 5.73, African participants also tend to tolerate more financial risks than White participants and Asian participants. Yao *et al*. (2005:51-62) state that financial risk is considered to be an important factor to achieve investment goals and non-White individuals tolerate more of this risk than White individuals.

Table 5.74: Significant differences between ethnicity groups for speculative risk

Ethnicity	Mean	Ethnicity	Mean	Comment
African	2.242	White	1.872	**African participants tolerate more speculative risks than White, Coloured and Asian participants**
		Coloured	1.949	
		Asian	1.898	
White	1.872	African	2.242	**White participants tolerate less speculative risks than African participants**
Coloured	1.949	African	2.242	**Coloured participants tolerate less speculative risk than African participants**
Asian	1.898	African	2.242	**Asian participants tolerate less speculative risks than African participants**

From Table 5.74 it can be seen than African participants take more speculative risks than White participants, Coloured participants and Asian participants. Strydom *et al*. (2009:4) viewed that African people are most risk tolerant group and tend to take speculative risks.

Table 5.75: Significant differences between ethnicity groups for investment risk

Ethnicity	Mean	Ethnicity	Mean	Comment
African	1.957	White	1.836	**African participants tolerate more investment risks than White and Asian participants**
		Asian	1.768	
White	1.836	African	1.957	**White participants tolerate less investment risks than African participants**
Asian	1.768	African	1.957	**Asian participants tolerate less investment risks than African participants**

As represented by Table 5.75 African participants tolerate more investment risks than White participants and Asian participants. It can be concluded that from Table 5.72 to Table 5.74 that non-White people, as in theory, tolerate more risks than White people.

Table 5.76 represents the significant differences between risk tolerance/ sections and marital status.

Table 5.76: Risk tolerance/sections and marital status

		Sum of squares	Df	Mean Square	F	Sig.
	Between groups	.398	2	.199	3.010	.050

		Sum of squares	Df	Mean Square	F	Sig.
Risk Tolerance Total	Within groups	77.244	1 168	.066		
	Total	77.642	1 170			
Financial risk	Between groups	.100	2	.050	.614	.542
	Within groups	94.802	1 168	.081		
	Total	94.901	1 170			
Speculative risk	Between groups	1.336	2	.668	2.718	.066
	Within groups	287.088	1 168	.246		
	Total	288.424	1 170			
Investment risk	Between groups	.480	2	.240	2.330	.098
	Within groups	120.352	1 168	.103		
	Total	120.832	170			

*Significant at $p < 0.05$ level

No significanct difference was identified between marital status and risk tolerance, marital status and financial risk section, marital status and investment risk section, marital status and speculative risk section as indicated by Table 5.76. This can be due to the context risk tolerance was measured in as previous risk tolerance studies were not in the same context as for this study, in terms of South Africa and for South African investors. Therefore, the null hypothesis (H_{03}) cannot be rejected for the abovementioned and the alternative hypothesis (H_{03}) is concluded.

Table 5.77 represents the significant differences between risk tolerance/ sections and annual income.

Table 5.77: Risk tolerance and annual income

		Sum of squares	Df	Mean Square	F	Sig.
Risk Tolerance Total	Between groups	2.370	7	.339	5.230	.000*
	Within groups	75.272	1 163	.065		
	Total	77.642	1 170			
Financial risk	Between groups	4.442	7	.635	8.158	.000*
	Within groups	90.459	1 163	.078		
	Total	94.901	1 170			
Speculative risk	Between groups	2.534	7	.362	1.473	.173
	Within groups	285.890	1 163	.246		
	Total	288.424	1 170			
Investment risk	Between groups	2.533	7	.362	3.558	.001*
	Within groups	118.299	1 163	.102		
	Total	120.832	1 170			

*Significant at $p < 0.05$ level

It is evident from Table 5.77 that there are no statistical differences between annual income and speculative risk section ($p > 0.05$). Therefore, the null hypothesis (H_{03}) cannot be rejected for the above. However, there is a statistical difference between annual income and risk tolerance, annual income and financial risk, annual income and investment risk ($p < 0.05$), where the null hypothesis (H_{03}) is rejected and the alternative hypothesis (H_{03}) concluded.

Table 5.78: Significant differences between annual income groups for risk tolerance

Annual income	Mean	Annual income	Mean	Comment
R100 000 or less	1.885	R700 001 or more	2.000	**Participants earning R100 000 or less per annum tolerate less risks than participants earning R700 001 or more per annum**
R100 001-R200 000	1.882	R700 0001 or more	2.000	**Participants earning between R100 001-R200 000 per annum tolerate less risks than participants earning R700 001 or more per annum**
R200 001-R300 000	1.891	R700 0001 or more	2.000	**Participants earning between R200 001-R300 000 per annum tolerate less risks than participants earning R700 001 or more per annum**
R300 001-R400 000	1.883	R700 0001 or more	2.000	**Participants earning between R300 001-R400 000 per annum tolerate less risks than participants earning R700 001 or more per annum**
R700 0001 or more	2.000	R100 000 or less	1.885	**Participants earning R700 001 or more per annum tolerate**
		R100 001-R200 000	1.882	
		R200 001-R300 000	1.891	

Annual income	Mean	Annual income	Mean	Comment
		R300 001-R400 000	1.883	**more risks than participants earning R100 000 or less per annum, between R100 001-R200 000 per annum, between R200 001-R300 000 per annum and between R300 001-R400 000 per annum**

From Table 5.78 it is evident that the more income participants earn per annum, the higher the risk tolerance level is. This in in conjunction with Irwin (1993) who stated high income people tend to tolerate more risks than low income people. Grable and Joo (2000:156) emphasise that high income is an important variable affecting financial risk tolerance.

Table 5.79: Significant differences between financial risk section and annual income

Annual income	Mean	Annual income	Mean	Comment
R100 000 or less	1.860	R400 001-R500 000	1.971	**Participants earning R100 000 or less per annum tolerate less financial risks than participants earning between R400 001-R500 000 per annum, between R600 001-R700 000 per annum and R700 001 or more per annum**
		R600 001-R700 000	2.059	
		R700 0001 or more	2.054	
R100 0001-R200 000	1.901	R600 001-R700 000	2.059	**Participants earning between R100 001-R200 000 per annum**
		R700 0001 or more	2.054	

Annual income	Mean	Annual income	Mean	Comment
				tolerate less financial risks than participants earning between R600 001-R700 000 per annum and R700 001 or more per annum
R200 001-R300 000	1.923	R600 001-R700 000	2.059	**Participants earning between R200 001-R300 000 per annum tolerate less financial risks than participants earning between R600 001-R700 000 per annum and R700 001 or more per annum**
		R700 0001 or more	2.054	
R300 001-R400 000	1.930	R600 001-R700 000	2.059	**Participants earning between R300 001-R400 000 per annum tolerate less financial risks than participants earning between R600 001-R700 000 per annum and R700 001 or more per annum**
		R700 0001 or more	2.054	
R400 001-R500 000	1.971	R100 000 or less	1.860	**Participants earning between R400 001-R500 000 per annum tolerate more financial risks than**

Annual income	Mean	Annual income	Mean	Comment
				participants earning R100 000 or less per annum
R600 001-R700 000	2.059	R100 000 or less	1.860	**Participants earning between R600 001-R700 000 per annum tolerate more financial risks than participants earning R100 000 or less per annum, between R100 001-R200 000 per annum, between R200 001-R300 000 per annum, between R300 001-R400 000 per annum**
		R100 001-R200 000	1.901	
		R200 001-R300 000	1.923	
		R300 001-R400 000	1.930	
R700 0001 or more	2.054	R100 000 or less	1.860	**Participants earning R700 001 or more per annum tolerate more financial risks than participants earning R100 000 or less per annum, between R100 001-R200 000 per annum, between R200 001-R300 000 per annum, between R300 001-R400 000 per annum**
		R100 001-R200 000	1.901	
		R200 001-R300 000	1.923	
		R300 001-R400 000	1.930	

Table 5.79 shows that higher annual income leads to higher financial risk tolerance levels. The people that have higher income, tend to display higher levels of risk tolerance than those earning a lower income (Kannadhasan, 2015:178).

Table 5.80: Significant differences between annual income groups for investment risk

Annual income	Mean	Annual income	Mean	Comment
R100 001-R200 000	1.829	R700 001 or more	1.962	**Participants earning between R100 001-R200 000 per annum tolerate less investment risks than participants earning R700 001 or more per annum**
R200 001-R300 000	1.891	R700 001 or more	1.962	**Participants earning between R200 001-R300 000 per annum tolerate less investment risks than participants earning R700 001 or more per annum**
R300 001-R400 000	1.883	R700 001 or more	1.962	**Participants earning between R300 001-R400 000 per annum tolerate less investment risks than participants earning R700 001 or more per annum**
R400 001-R500 000	1.912	R700 001 or more	1.962	**Participants earning between R400 001-R500 000 per annum**

Annual income	Mean	Annual income	Mean	Comment
				tolerate less investment risks than participants earning R700 001 or more per annum
R700 001 or more	1.962	R100 001-R200 000	1.829	**Participants earning R700 001 or more per annum tolerate more investment risks than participants earning between R100 001-R200 000 per annum, between R200 001-R300 000 per annum, between R300 0001-R400 000 per annum and between R400 001-R500 000 per annum**
		R200 001-R300 000	1.891	
		R300 001-R400 000	1.883	
		R400 001-R500 000	1.912	

Table 5.80 clearly shows for this sample, the more income the participants receive per annum the more investment risks they are willing to take. Table 5.78 to Table 5.80 is in line with the theory of Irwin (1993) where it is evident that the more income a participant earn per annum the higher the risks the participant is willing to tolerate.

Table 5.81 represents the significant differences between risk tolerance/ sections and behavioural finance biases.

Table 5.81: Risk tolerance and behavioural finance

		Sum of squares	Df	Mean Square	F	Sig.
Risk Tolerance Total	Between groups	.743	8	.093	1.403	.191
	Within groups	74.318	1 123	.066		
	Total	75.061	1 131			
Financial risk	Between groups	1.099	8	.137	1.728	.088
	Within groups	89.319	1 123	.080		
	Total	90.418	1 131			
Speculative risk	Between groups	1.714	8	.214	.868	.543
	Within groups	277.228	1 123	.247		
	Total	278.942	1 131			
Investment risk	Between groups	.853	8	.107	1.030	.411
	Within groups	116.300	1 123	.104		
	Total	117.153	1 131			

*Significant at $p < 0.05$ level

No significant difference was identified between behavioural finance biases for risk tolerance as indicated in Table 5.81.

No significance difference was identified between risk tolerance and behavioural finance biases, financial risk section and behavioural finance biases, investment risk section and behavioural finance biases and speculative risk section and behavioural finance biases as indicated by Table 5.81. This could be due to the context risk tolerance was measured in, as previous risk tolerance studies were not in the same context as for this study, in terms of South

Africa and for South African investors. Therefore, the null hypothesis (H_{03}) cannot be rejected for above mentioned and the alternative hypothesis (H_{03}) concluded.

5.6 CORRELATION ANALYSIS

The relationship between two variables are measured through correlation analysis, up to an extent where if one variable changes, it will influence the other variable (McDaniel & Gates, 2013:523). Pearson's correlation was used to calculate the coefficient between the constructs and sections in order to measure the relationship between risk tolerance and investor personalities. Pallant (2007:132) states that a relationships' strength is determined by calculating the Pearson's correlation. The values of this relationship can be interpreted from 0.10 to 0.29 as small strength relationship, from 0.30 to 0.49 as medium strength relationship and from 0.50 to 1.0 as strong relationship. The section to follow analyses the potential link between risk tolerance and investors personalities in order to fulfil the empirical objective requirement. Table 5.82 illustrates the correlation matrix.

As indicated in Table 5.82, the medium and strong strength relationship cells are highlighted with grey. The relationship between Dospert and risk tolerance for this study is regarded as a positive medium strength relationship. In this section to follow the hypothesis between Dospert/ constructs and risk tolerance/ sections are tested and conclusions made in terms of relationships.

Table 5.82: Relationship between investor personalities and risk tolerance - correlation analysis

		Ethical construct	Financial construct	Health construct	Recreational construct	Social construct	Dospert	Financial risk	Speculative risk	Investment risk	Risk tolerance
Ethical construct	Pearson correlation Sig (2-tailed)	1									
Financial construct	Pearson correlation Sig (2-tailed)	.336 .000*	1								
Health construct	Pearson correlation Sig (2-tailed)	.407 .000*	.294 .000*	1							
Recreational construct	Pearson correlation Sig (2-tailed)	.210 .000*	.321 .000*	.435 .000*	1						
Social construct	Pearson correlation Sig (2-tailed)	.087 .003*	.334 .000*	.332 .000*	.436 .000*	1					
Dospert	Pearson correlation Sig (2-tailed)	.535 .000*	.646 .000*	.704 .000*	.790 .000*	.671 .000*	1				
Financial risk	Pearson correlation Sig (2-tailed)	.124 .000*	.269 .000*	.140 .000*	.190 .000*	.220 .000*	.279 .000*	1			
Speculative risk	Pearson correlation Sig (2-tailed)	.060 .039*	.243 .000*	.065 .026*	.141 .000*	.124 .000*	.190 .000*	.207 .000*	1		

		Ethical construct	Financial construct	Health construct	Recreational construct	Social construct	Dospert	Financial risk	Speculative risk	Investment risk	Risk tolerance
Investment risk	Pearson correlation	.067	.259	.103	.155	.225	.241	.192	.376	1	
	Sig (2-tailed)	.021	.000*	.000*	.000*	.000*	.000*	.000*	.000*		
Risk tolerance	Pearson correlation	.112	.355	.137	.222	.255	.322	.595	.800	.728	1
	Sig (2-tailed)	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.000*	

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

The following hypotheses was stated to test the relationship with the financial construct:

Null hypothesis (H_{04}): There is no relationship between the financial construct and the ethical construct.

Alternative hypothesis (H_{04}): There is a relationship between the financial construct and the ethical construct.

A significant relationship was found between the financial construct and the ethical construct (r = 0.336, p = 0.000 < 0.05). As a result, the null hypothesis is rejected and the alternative hypothesis concluded at the 5 percent significance level. This relationship, however, is regarded as a positive medium strength relationship.

The following hypotheses were stated to test the relationship with the health construct:

Null hypothesis (H_{05}): There is no relationship between the health construct and the ethical construct.

Alternative hypothesis (H_{05}): There is a relationship between the health construct and the ethical construct.

Null hypothesis (H_{06}): There is no relationship between the health construct and the financial construct.

Alternative hypothesis (H_{06}): There is a relationship between the health construct and the financial construct.

From Table 5.81 it can be seen that a significant relationship exists between the health construct and the ethical construct (r = 0.407, p = 0.000 < 0.05). Therefore, the null hypothesis (H_{05}) is rejected and the alternative hypothesis (H_{05}) concluded at the 5 percent significance level. Moreover, this relationship is a positive medium strength relationship. A significant relationship was also found between the health construct and the financial construct (r = 0.294, p = 0.000 < 0.05) as presented by Table 5.81. As a result, the null hypothesis (H_{06}) is rejected and the alternative hypothesis (H_{06}) concluded at the 5 percent significance level. This relationship, however, is regarded as a positive small strength to medium strength relationship.

The following hypotheses were stated to test the relationship with the recreational construct:

Null hypothesis (H_{07}): There is no relationship between the recreational construct and the ethical construct.

Alternative hypothesis (H_{07}): There is a relationship between the recreational construct and the ethical construct.

Null hypothesis (H_{08}): There is no relationship between the recreational construct and the financial construct.

Alternative hypothesis (H_{08}): There is a relationship between the recreational construct and the financial construct.

Null hypothesis (H_{09}): There is no relationship between the recreational construct and the health construct.

Alternative hypothesis (H_{09}): There is a relationship between the recreational construct and the health construct.

Table 5.81 presents a significant relationship between the recreational construct and the ethical construct ($r = 0.210$, $p = 0.000 < 0.05$). Therefore, the null hypothesis (H_{07}) is rejected and the alternative hypothesis (H_{07}) can be concluded at the 5 percent significance level. However, this relationship is regarded as a positive small strength relationship. Moreover, it can be seen that a significant relationship exists between the recreational construct and the financial construct ($r = 0.321$, $p = 0.000 < 0.05$). As a result, the null hypothesis (H_{08}) is rejected and the alternative hypothesis (H_{08}) concluded at the 5 percent significance level. The relationship between the recreational construct and the financial construct is regarded as a positive medium strength relationship. A significant relationship was identified between the recreational construct and the health construct ($r = 0.435$, $p = 0.000 < 0.05$). Therefore, the null hypothesis (H_{09}) is rejected and the alternative hypothesis (H_{09}) concluded at the 5 percent significance level. This relationship is regarded as a positive medium strength relationship.

The following hypotheses were stated to test the relationship with the social construct:

Null hypothesis (H_{10}): There is no relationship between the social construct and the ethical construct.

Alternative hypothesis (H_{10}): There is a relationship between the social construct and the ethical construct.

Null hypothesis (H_{11}): There is no relationship between the social construct and the financial construct.

Alternative hypothesis (H_{11}): There is a relationship between the social construct and the financial construct.

Null hypothesis (H_{12}): There is no relationship between the social construct and the health construct.

Alternative hypothesis (H_{12}): There is a relationship between the social construct and the health construct.

Null hypothesis (H_{13}): There is no relationship between the social construct and the recreational construct.

Alternative hypothesis (H_{13}): There is a relationship between the social construct and the recreational construct.

Table 5.81 represents a significant relationship between the social construct and the ethical construct (r = 0.087, p = 0.000 < 0.05). As a result, the null hypothesis (H_{10}) is rejected and the alternative hypothesis (H_{10}) concluded at the 5 percent significance level. However, this relationship is regarded almost as no relationship to a small strength relationship. A significant relationship exists between the social construct and the financial construct (r = 0.334, p = 0.000 < 0.05) and, as a result, the null hypothesis (H_{11}) is rejected and the alternative hypothesis (H_{11}) concluded at the 5 percent significance level. The relationship strength between these constructs is positive medium strength.

Table 5.81 also shows that a significant relationship exists between the social construct and the health construct (r = 0.332, p = 0.000 < 0.05). As a result, the null hypothesis (H_{12}) is rejected and the alternative hypothesis (H_{12}) concluded at a 5 percent significance level. The strength of this relationship is regarded as a positive medium strength relationship. It is evident from Table 5.81 that a significant relationship exists between the social construct and the recreational construct (r = 0.436, p = 0.000 < 0.05). Therefore, the null hypothesis (H_{13}) is rejected and the alternative hypothesis (H_{13}) concluded at a 5 percent significance level. The relationship

strength between the social construct and the recreational construct is regarded as positive medium strength.

The following hypotheses were stated to test the relationship with Dospert:

Null hypothesis (H_{14}): There is no relationship between Dospert and the ethical construct.

Alternative hypothesis (H_{14}): There is a relationship between Dospert and the ethical construct.

Null hypothesis (H_{15}): There is no relationship between Dospert and the financial construct.

Alternative hypothesis (H_{15}): There is a relationship between Dospert and the financial construct.

Null hypothesis (H_{16}): There is no relationship between Dospert and the health construct.

Alternative hypothesis (H_{16}): There is a relationship between Dospert and the health construct.

Null hypothesis (H_{17}): There is no relationship between Dospert and the recreational construct.

Alternative hypothesis (H_{17}): There is a relationship between Dospert and the recreational construct.

Null hypothesis (H_{18}): There is no relationship between Dospert and the social construct.

Alternative hypothesis (H_{18}): There is a relationship between Dospert and the social construct.

A significant relationship exists between Dospert and the ethical construct ($r = 0.535$, $p = 0.000 < 0.05$). As a result, the null hypothesis (H_{14}) is rejected and the alternative hypothesis (H_{14}) concluded at a 5 percent significance level. This positive relationship indicates a strong strength type of relationship between Dospert and the ethical construct. From Table 5.81 it can be seen that a positive strong strength relationship exists between Dopsert and the financial construct. This relationship is statistically significant at $r = 0.646$, $p = 0.000 < 0.05$ and the null hypothesis

(H_{15}) is rejected and the alternative hypothesis (H_{15}) concluded at a 5 percent significance level.

A statistically positive, strong strength relationship exists between Dospert and the health construct (r = 0.704, p = 0.000 < 0.05). As a result, the null hypothesis (H_{16}) is rejected and the alternative hypothesis (H_{16}) concluded at a 5 percent significance level. Moreover, Dospert and the recreational construct display a statistically significant relationship (r = 0.790, p = 0.000 < 0.05) by a positive strong relationship. As a result, the null hypothesis (H_{17}) is rejected and the alternative hypothesis (H_{17}) concluded at a 5 percent significance level. Also, a significant relationship exists between Dospert and the social construct displaying a positive strong relationship (r = 0.671, p = 0.000 < 0.05). Therefore, the null hypothesis (H_{18}) is rejected and the alternative hypothesis (H_{18}) concluded at a 5 percent significance level.

The following hypotheses were stated to test the relationship with financial risk:

Null hypothesis (H_{19}): There is no relationship between financial risk and the ethical construct.

Alternative hypothesis (H_{19}): There is a relationship between financial risk and the ethical construct.

Null hypothesis (H_{20}): There is no relationship between financial risk and the financial construct.

Alternative hypothesis (H_{20}): There is a relationship between financial risk and the financial construct.

Null hypothesis (H_{21}): There is no relationship between financial risk and the health construct.

Alternative hypothesis (H_{21}): There is a relationship between financial risk and the health construct.

Null hypothesis (H_{22}): There is no relationship between financial risk and the recreational construct.

Alternative hypothesis (H_{22}): There is a relationship between financial risk and the recreational construct.

Null hypothesis (H_{23}): There is no relationship between financial risk and the social construct.

Alternative hypothesis (H_{23}): There is a relationship between financial risk and the social construct.

Null hypothesis (H_{24}): There is no relationship between financial risk and Dospert.

Alternative hypothesis (H_{24}): There is a relationship between financial risk and Dospert.

A positive small strength relationship exists between financial risk and the ethical construct (r = 0.124, p = 0.000 < 0.05). As a result, the null hypothesis (H_{19}) is rejected and the alternative hypothesis (H_{19}) concluded at a 5 percent significance level. Table 5.81 indicates that a statistically positive small strength relationship exists between financial risk and the financial risk construct (r = 0.269, p = 0.000 < 0.05). Therefore, the null hypothesis (H_{20}) is rejected and the alternative hypothesis (H_{20}) concluded at 5 percent significance level.

A significant relationship exists between financial risk and the health construct. However, this relationship is a positive small strength relationship (r = 0.140, p = 0.000 < 0.05). The null hypothesis (H_{21}) is rejected and the alternative hypothesis (H_{21}) concluded at a 5 percent significance level. Financial risk and the recreational construct display a positive small strength relationship (r = 0.190, p = 0.000 < 0.05). As a result, the null hypothesis (H_{22}) is rejected and the alternative hypothesis (H_{22}) concluded at 5 percent significance level. Moreover, a positive small strength relationship exists between financial risk and the social construct (r = 0.220, p = 0.000 < 0.05). As a result, the null hypothesis (H_{23}) is rejected and the alternative hypothesis (H_{23}) concluded at 5 percent significance level.

A statistically significant relationship also exists between financial risk and Dospert (r = 0.279, p = 0.000 < 0.05). However, this relationship is a positive small strength relationship and the null hypothesis (H_{24}) is rejected and the alternative hypothesis (H_{24}) concluded at 5 percent significance level.

The following hypotheses were stated to test the relationship with speculative risk:

Null hypothesis (H_{25}): There is no relationship between speculative risk and the ethical construct.

Alternative hypothesis (H_{25}): There is a relationship between speculative risk and the ethical construct.

Null hypothesis (H_{26}): There is no relationship between speculative risk and the financial construct.

Alternative hypothesis (H_{26}): There is a relationship between speculative risk and the financial construct.

Null hypothesis (H_{27}): There is no relationship between speculative risk and the health construct.

Alternative hypothesis (H_{27}): There is a relationship between speculative risk and the health construct.

Null hypothesis (H_{28}): There is no relationship between speculative risk and the recreational construct.

Alternative hypothesis (H_{28}): There is a relationship between speculative risk and the recreational construct.

Null hypothesis (H_{29}): There is no relationship between speculative risk and the social construct.

Alternative hypothesis (H_{29}): There is a relationship between speculative risk and the social construct.

Null hypothesis (H_{30}): There is no relationship between speculative risk and Dospert.

Alternative hypothesis (H_{30}): There is a relationship between speculative risk and Dospert.

Null hypothesis (H_{31}): There is no relationship between speculative risk and financial risk.

Alternative hypothesis (H_{31}): There is a relationship between speculative risk and financial risk.

Almost no to positive small strength relationship exists between speculative risk and the ethical construct (r = 0.060, p = 0.000 < 0.05). The null hypothesis (H_{25}) is rejected and the alternative hypothesis (H_{25}) concluded at 5 percent significance level. A positive small strength relationship exists between speculative risk and the financial risk construct (r = 0.243, p = 0.000 < 0.05). As a result, the null hypothesis (H_{26}) is rejected and the alternative hypothesis (H_{26}) concluded at 5 percent significance level.

The null hypothesis (H_{27}) is rejected and the alternative hypothesis (H_{27}) concluded at a 5 percent significance level as a significant relationship exists between speculative risk and the health construct (r = 0.065, p = 0.000 < 0.05). However, this relationship is classified as almost no relationship to small strength type relationship. A positive small strength relationship exists between speculative risk and the recreational construct (r = 0.141, p = 0.000 < 0.05). Therefore, the null hypothesis (H_{28}) is rejected and the alternative hypothesis (H_{28}) concluded at a 5 percent significance level.

From Table 5.81 it can be seen that a small strength, statistically positive relationship exists between speculative risk and the social construct (r = 0.124, p = 0.000 < 0.05). As a result, the null hypothesis (H_{29}) is rejected and the alternative hypothesis (H_{29}) concluded at a 5 percent significance level. A significant relationship exists between speculative risk and Dospert (r = 0.190, p = 0.000 < 0.05). This relationship is positive with a small strength but nonetheless the null hypothesis (H_{30}) is rejected and the alternative hypothesis (H_{30}) concluded at a 5 percent significance level. Also, a positive small relationship exists between speculative risk and financial risk (r = 0.207, p = 0.000 < 0.05) and, as a result, the null hypothesis (H_{31}) is rejected and the alternative hypothesis (H_{31}) concluded at a 5 percent significance level.

The following hypotheses were stated to test the relationship with investment risk:

Null hypothesis (H_{32}): There is no relationship between investment risk and the ethical construct.

Alternative hypothesis (H_{32}): There is a relationship between investment risk and the ethical construct.

Null hypothesis (H_{33}): There is no relationship between investment risk and the financial construct.

Alternative hypothesis (H_{33}): There is a relationship between investment risk and the financial construct.

Null hypothesis (H_{34}): There is no relationship between investment risk and the health construct.

Alternative hypothesis (H_{34}): There is a relationship between investment risk and the health construct.

Null hypothesis (H_{35}): There is no relationship between investment risk and the recreational construct.

Alternative hypothesis (H_{35}): There is a relationship between investment risk and the recreational construct.

Null hypothesis (H_{36}): There is no relationship between investment risk and the social construct.

Alternative hypothesis (H_{36}): There is a relationship between investment risk and the social construct.

Null hypothesis (H_{37}): There is no relationship between investment risk and Dospert.

Alternative hypothesis (H_{37}): There is a relationship between investment risk and Dospert.

Null hypothesis (H_{38}): There is no relationship between investment risk and financial risk.

Alternative hypothesis (H_{38}): There is a relationship between investment risk and financial risk.

Null hypothesis (H_{39}): There is no relationship between investment risk and speculative risk.

Alternative hypothesis (H_{39}): There is a relationship between investment risk and speculative risk.

A significant relationship exists between investment risk and the ethical construct (r = 0.067, p = 0.000 < 0.05). This is a no to small strength relationship, however, the null hypothesis (H_{32}) is rejected and the alternative hypothesis (H_{32}) concluded at a 5 percent significance level.

The relationship between investment risk and the financial construct can be described as a positive small strength relationship (r = 0.259, p = 0.000 < 0.05). Nonetheless, the null hypothesis (H_{33}) is rejected and the alternative hypothesis (H_{33}) concluded at a 5 percent significance level.

The relationship between investment risk and the health construct is regarded as positive and small strength where r = 0.103, p = 0.000 < 0.05. As a result, the null hypothesis (H_{34}) is rejected and the alternative hypothesis (H_{34}) concluded at a 5 percent significance level. A positive, but small strength relationship exists between investment risk and the recreational construct (r = 0.155, p = 0.000 < 0.05). Therefore, the null hypothesis (H_{35}) is rejected and the alternative hypothesis (H_{35}) concluded at a 5 percent significance level. Another positive but small strength relationship exists between investment risk and the social construct (r = 0.225, p = 0.000 < 0.05). As a result, the null hypothesis (H_{36}) is rejected and the alternative hypothesis (H_{36}) concluded at a 5 percent significance level.

The null hypothesis (H_{37}) is rejected and the alternative hypothesis (H_{37}) concluded at a 5 percent significance level as a positive small strength relationships exists between investment risk and Dospert (r = 0.241, p = 0.000 < 0.05). A positive but small strength relationship exists between investment risk and financial risk (r = 0.192, p = 0.000 < 0.05), where the null hypothesis (H_{38}) is rejected and the alternative hypothesis (H_{38}) concluded at a 5 percent significance level. The relationship that exists between investment risk and speculative risk is a positive medium strength relationship (r = 0.376, p = 0.000 < 0.05). As a result, the null hypothesis (H_{39}) is rejected and the alternative hypothesis (H_{39}) concluded at a 5 percent significance level.

The following hypotheses were stated to test the relationship with risk tolerance:

Null hypothesis (H_{40}): There is no relationship between risk tolerance and the ethical construct.

Alternative hypothesis (H_{40}): There is a relationship between risk tolerance and the ethical construct.

Null hypothesis (H_{41}): There is no relationship between risk tolerance and the financial construct.

Alternative hypothesis (H_{41}): There is a relationship between risk tolerance and the financial construct.

Null hypothesis (H_{42}): There is no relationship between risk tolerance and the health construct.

Alternative hypothesis (H_{42}): There is a relationship between risk tolerance and the health construct.

Null hypothesis (H_{43}): There is no relationship between risk tolerance and the recreational construct.

Alternative hypothesis (H_{43}): There is a relationship between risk tolerance and the recreational construct.

Null hypothesis (H_{44}): There is no relationship between risk tolerance and the social construct.

Alternative hypothesis (H_{44}): There is a relationship between risk tolerance and the social construct.

Null hypothesis (H_{45}): There is no relationship between risk tolerance and Dospert.

Alternative hypothesis (H_{45}): There is a relationship between risk tolerance and Dospert.

Null hypothesis (H_{46}): There is no relationship between risk tolerance and financial risk.

Alternative hypothesis (H_{46}): There is a relationship between risk tolerance and financial risk.

Null hypothesis (H_{47}): There is no relationship between risk tolerance and speculative risk.

Alternative hypothesis (H_{47}): There is a relationship between risk tolerance and speculative risk.

Null hypothesis (H_{48}): There is no relationship between risk tolerance and investment risk.

Alternative hypothesis (H_{48}): There is a relationship between risk tolerance and investment risk.

From Table 5.81 it can be gathered that a positive but small strength relationship exists between risk tolerance and the ethical construct (r = 0.112, p = 0.000 < 0.05). As a result, the null hypothesis (H_{40}) is rejected and the alternative hypothesis (H_{40}) concluded at a 5 percent significance level. A positive, medium strength relationship exists between risk tolerance and the financial construct (r = 0.355, p = 0.000 < 0.05), where the null hypothesis (H_{41}) is rejected and the alternative hypothesis (H_{41}) concluded at a 5 percent significance level.

A statistically positive, rather small strength relationship exists between risk tolerance and the health construct (r = 0.137, p = 0.000 < 0.05). However, the null hypothesis (H_{42}) is rejected and the alternative hypothesis (H_{42}) concluded at a 5 percent significance level. Another positive but small strength relationship was found between risk tolerance and the recreational construct (r = 0.222, p = 0.000 < 0.05), where the null hypothesis (H_{43}) is rejected and the alternative hypothesis (H_{43}) concluded at a 5 percent significance level.

The relationship between risk tolerance and the social construct is regarded as positive and small strength (r = 0.255, p = 0.000 < 0.05). The null hypothesis (H_{44}) is rejected and the alternative hypothesis (H_{44}) concluded at a 5 percent significance level. A positive, medium strength relationship was found between risk tolerance and Dospert (r = 0.322, p = 0.000 < 0.05) where the null hypothesis (H_{45}) is rejected and the alternative hypothesis (H_{45}) concluded at a 5 percent significance level. A statistically positive strong strength relationship exists between risk tolerance and financial risk (r = 0.595, p = 0.000 < 0.05). As a result, the null hypothesis (H_{46}) is rejected and the alternative hypothesis (H_{46}) concluded at a 5 percent significance level.

The strongest relationship strength exists between risk tolerance and speculative risk where r = 0.800, p = 0.000 < 0.05. As a result, the null hypothesis (H_{47}) is rejected and the alternative hypothesis (H_{47}) concluded at a 5 percent significance level. Another positive strong strength

relationship was found between risk tolerance and investment risk ($r = 0.728$, $p = 0.000 < 0.05$) and, as a result, the null hypothesis (H_{48}) is rejected and the alternative hypothesis (H_{48}) concluded at a 5 percent significance level.

From all the correlation tests done above, it can be concluded that a definite relationship exists between risk tolerance and investor personalities. This relationship between Dospert and risk tolerance can be describes as a positive medium strength relationship. All the relationships were positively correlated and indicated a significant relationship between risk tolerance/ sections and Dospert/ constructs.

5.7 RISK TOLERANCE, INVESTOR PERSONALITY AND BEHAVIOURAL FINANCE

The final two empirical objectives are to develop a link between risk tolerance, investor personality and behavioural finance and to construct a model to profile investor behaviour in terms of behavioural finance and risk tolerance. This was done by dividing behavioural financial biases into low risk, medium risk and high risk for Dospert/ construct and risk tolerance/sections.

5.7.1 Representativeness

The representativeness behavioural finance bias is known where investors make investment decisions based on own perceptions (Kannadhasan, 2009, Tekçe, 2014:6, Baker & Riccardi, 2014). Investors' subject towards this bias tend to overreact and investment decisions are based on inaccurate market participant perceptions (Singh, 2012:119). This type of investor will analyse the probability that one thing belongs to the other and vice versa. This specific type of investor firmly believes that recent trends will be repeated and that trends indicate a causal pattern (Tversky & Kahneman, 1972:430-454). Investment will only be considered in shares that offer high returns and had no poor performance historically. Representativeness relates to analysing the effects of stock market trends when investors make decisions and this representativeness is applicable to individual investors, not institutional investors (Tekçe, 2014:6-7). Pompian (2017:13) found in his research that the representative bias manifests itself in cognitive bias and stated that when a person processes new information with a flawed perceptual framework, representative bias occurs.

Regarding the ethical construct, the representativeness bias does not include any form of unethical activities. As a result, the representativeness bias is rated low risk for the ethical

construct. Investors subject towards the representativeness bias base investment decisions on inaccurate market participant perceptions (Singh, 2012:119). A form of speculation occurs and, as a result, the representativeness bias is rated as medium risk for the financial construct. In terms of the health construct, no health risks are reported under the representativeness bias and, therefore, the health construct is rated as low risk. The representativeness bias also receives a low risk for the recreational construct as no extreme activity takes place. For the social construct, investors base their investment decisions on own perceptions and a typical social risk occurs when admitting that tastes are different from those of a friend. As a result representativeness can be rated as medium risk for the social construct. From the above, it can be concluded that investors subject towards the representativeness bias have an overall medium risk level for Dospert. These investors only take reasonable level of risks by increasing their returns proportionally to be able to achieve long-term results (Bourse Securities Limited, 2016). As a result, moderate investors tend to be subject towards the representativeness bias.

For the financial risk section under risk tolerance, investors subject towards the representativeness bias attempt to avoid loss as much as possible and would, therefore, only invest in shares that offer high returns with no poor historical performance (Tversky & Kahneman, 1972:430-454). As a result, a low risk rating is given for the financial risk section. Regarding speculative risk under risk tolerance, an investor will typically invest in shares in a company close to its heart. As a result, the speculative risk section receives a medium risk rating. For the investment risk section, if investors tend to invest in high return shares it is associated with high risk. As a result, investment risk received a medium risk rating. From the discussion above, it can be concluded that investors subject towards the representativeness bias have a medium risk tolerance level.

Table 5.83: Dospert/ constructs, risk tolerance/ sections and representativeness bias

	Representativeness bias		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	2.012	.988	1.274	1.501
Financial	2.877	1.060	.561	.153
Health	2.810	1.544	.741	-.368
Recreational	3.406	1.595	.272	-.976
Social	4.980	1.242	-.779	.394
Dospert	3.246	.891	.217	-.121

	Representativeness bias		Skewness	Kurtosis
	Mean	Std Dev		
Financial risk	1.947	.281	-.036	-.263
Speculative risk	1.955	.506	.087	-.760
Investment risk	1.857	.332	.034	-.169
Risk tolerance	1.917	.265	-.083	-.502
SCF	2.77	.950	-.328	-.807

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1-1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

Table 5.83 indicates in terms of the representativeness bias, the ethical construct (μ = 2.012, Std Dev = 0.988) is grouped in the low risk category where the financial construct (μ = 2.877, Std Dev = 1.060) is grouped into the medium risk category. Moreover, the health construct (μ = 2.810, Std Dev = 1.544) is also grouped in the medium risk category. Both the recreational construct (μ = 3.406, Std Dev = 1.595) and the social construct (μ = 4.980, Std Dev = 1.242) are grouped into the medium risk category for the representativeness bias. Investors subject towards the representativeness bias have medium level risk for Dospert (μ = 3.246, Std Dev = 0.891). This corresponds with the theory of Pompian (2016:8) as moderate/ growth investors are subject towards the representativeness bias.

Investors subject towards the representatives bias have a medium level of financial risk (μ = 1.947, Std Dev = 0.281) tolerance and also medium level risk tolerance for speculative risk section (μ = 1.955, Std Dev = 0.506). As seen from Table 5.83, investment risk section (μ = 1.857, Std Dev = 0.332) also has a medium level of risk tolerance and, to conclude, investors subject towards the representativeness bias have a medium risk tolerance (μ = 1.917, Std Dev = 0.265) level. This corresponds with the medium risk tolerance level that was obtained for the SCF (μ = 2.77, Std Dev = 0.950).

5.7.2 Overconfidence

Overconfident investors tend to overestimate their investment abilities. In the literature, Bodie *et al*. (2013:267) describe how a close relationship can exists between confidence as well as

courage and found that when combining the two factors it might lead to overconfidence. Overconfidence occurs when investors tend to overestimate their investment capabilities thus leading to time the market to outperform the market (Hens & Meier, 2011:12, Singh, 2012:118).

When people believe in themselves and their own abilities with strong convictions, they are overconfident and it might be that there can be an overestimation of probabilities or a set of events (Mahajan, 1992:330, Ricciardi, 2008, Baker & Ricciardi, 2014, Massol & Molines, 2015:15). This implies that the assigned probability might be greater than the portion being correct for all assessments related to that probability (Mahajan, 1992:330). When investors select and trade stocks, they might find themselves in risky situations, their overconfidence cannot only have implications for the investor but for the market itself and such investors may trade excessively due to their different views on the market leading to success.

This accentuates that an investor must be aware of the danger as extreme amounts of trading can lead to lower net returns of investors whose portfolio turnover is high (Odean, 1998:1911,1913). One of the dangers of an overconfident investor is that he/she might apply active strategies that will lead to performing worse compared to passive investors (Andersson & Eriksson, 2013:37).

In terms of the ethical construct, the overconfidence bias does not include any form of unethical activities. Therefore, the ethical construct is rated low risk. Regarding the financial construct, the overconfidence bias is rated as low risk as this bias does not explicitly state which share or portfolio is invested in. No health risks are reported under the overconfidence bias and is in return rated as low risk. Due to overconfidence that may lead to excessive trading as investors might have different views on the market leading to success (Odean, 1998:1911,1913), the recreational construct receives a medium risk rating. Different views of investors are realised and overconfident investors might apply active strategies, which will deliver worse results than investors with another view (Andersson & Eriksson, 2013:37). As a result, the social construct is rated as medium risk. It can be concluded from the above, investors subject towards the overconfidence bias have a low risk for Dospert. Lake (2017) states that investors subject towards the overconfidence bias are usually aggressive investors, however, moderate/ growth investors can also act like an aggressive investor. As a result, the overconfidence bias can possibly occur by moderate/ growth investors.

In terms of the financial risk section under risk tolerance, investors subject towards the overconfidence bias are influenced by the profit associated with the decision made. As a result, financial risk section has a medium risk rating. Due to the overconfidence of investors, these investors would be willing to speculate with some investments and has therefore a medium risk rating for speculative risk. Investors under the overconfident bias manage investments themselves as active strategies are made use of (Andersson & Eriksson, 2013:37). As a result, investment risk has a medium risk rating. It can be concluded that investors subject towards the overconfidence bias have a medium risk tolerance level.

Table 5.84: Dospert/ constructs, risk tolerance/ sections and overconfidence

	Overconfidence		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	1.988	.926	.671	-.791
Financial	2.855	1.094	.660	.270
Health	2.875	1.682	.603	-.928
Recreational	3.994	1.802	-.332	-1.037
Social	4.983	1.215	-1.484	2.724
Dospert	3.372	.877	-.759	.393
Financial risk	1.973	.295	-.097	-1.064
Speculative risk	2.008	.543	-.110	-1.085
Investment risk	1.867	.329	-.031	-.304
Risk tolerance	1.965	.261	-.277	-.058
SCF	2.900	.759	-.335	.041

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

From Table 5.84 the ethical construct (μ = 1.988, Std Dev = 0.926) has a low risk rating in terms of the overconfidence bias. The financial construct (μ = 2.855, Std Dev = 1.094) and the health construct (μ = 2.875, Std Dev = 1.682) have medium risk level for the overconfidence bias. Moreover, the recreational construct (μ = 3.994, Std Dev = 1.802) and the social construct (μ = 4.983, Std Dev = 1.215) have medium risk level. In terms of Dospert, investors subject

towards the overconfidence bias have a medium risk level. As a result, moderate/ growth investors may be subject towards the overconfidence bias as confirmed by Lake (2017).

A medium risk level was presented by Table 5.84 for financial risk section (μ = 1.973, Std Dev = 0.295) and for speculative risk section (μ = 2.008, Std Dev = 0.543). For investment risk section (μ = 1.867, Std Dev = 0.329) a medium risk level was obtained and similarly for risk tolerance (μ = 1.945, Std Dev = 0.261). This is confirmed by the SCF (μ = 2.900, Std Dev = 0.759) as a medium risk tolerance level was obtained.

5.7.3 Anchoring

When humans excessively rely on a single piece of information when making decisions, it is called anchoring, a psychological process when making estimates and adjustment to determine a specific value ranging from the initial value up to final answers (Kahneman & Tversky, 1974:1128, Kannadhasan, 2009). Initial beliefs or a person's history plays a role in anchoring and leads to giving insufficient weight to other factors (Lucarelli & Brighetti, 2011:39).

Investment anchoring is based on features and factors on which investors base their decisions that impact their factors, figures and indicators obtained from the news, magazines and investment companies' recommendations (Andersson & Eriksson, 2013:39). A typical case of anchoring is the stock market prices and past performances (Odean, 1999:1279-1298).

Although there is innumerable available information for investors, it needs to be kept in mind that investors only rely on a single piece of information and the process of adjusting to additional information might be relatively slow (Kannadhasan, 2009).

Regarding the ethical construct, the anchoring bias does not include any form of unethical activities and as a result has a low risk rating. Anchoring involves making investment decisions based on a single piece of information (Kannadhasan, 2009) but has no impact on the financial construct, which has a low risk rating. No health risks are identified under the anchoring bias and, therefore, has a low risk rating. The tendency of investors to rely excessively on a single piece of information gives rise to a medium risk rating for the recreational construct. Investors tend to anchor too much on their initial belief or past history, giving insufficient weight to other factors (Lucarelli & Brighetti, 2011:39). As a result, different investment decisions are made compared to other market participants and the social constructs are rated medium risk. It can be concluded from the above, investors subject towards the anchoring bias have a low to

medium risk level for Dopsert. Pompian (2016:8) confirms that conservative investors are subject towards the anchoring bias.

For the financial risk section under risk tolerance, due to investors personal preference to rely on a single piece of information, this section is rated low risk. Due to the propensity of investors to rely on a single piece of, mostly historical, information the adjustment to additional information, tends to be relatively slowly. As a result, possible adjustment can potentially occur at slow rate and the speculative risk section can have a low risk rating. It can be assumed that as investors rely on a single piece of information, investors manage the investments themselves and, as a result, have a medium investment risk rating. It can be concluded that for investors subject towards the anchoring bias, the risk tolerance level is low.

Table 5.85: Dospert/ constructs, risk tolerance/ sections and anchoring bias

	Anchoring bias		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	2.000	.930	1.124	.711
Financial	2.688	.856	.247	.798
Health	2.633	1.537	1.461	2.737
Recreational	3.133	1.552	.718	-.792
Social	4.755	1.240	-.639	.560
Dospert	2.498	.795	-.336	-.158
Financial risk	2.013	.306	-.402	-.655
Speculative risk	1.733	.504	.346	-.150
Investment risk	1.933	.317	.388	.206
Risk tolerance	1.904	.282	-.568	-.375
SCF	2.730	.884	-.116	-.485

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

Table 5.85 indicates that the ethical construct ($\mu = 2.000$, Std Dev = 0.930) has a low risk level whereas the financial construct ($\mu = 2.688$, Std Dev = 0.856) and the health construct ($\mu =$

2.633, Std Dev = 1.537) have a medium risk level. Moreover, the recreational construct (μ = 3.133, Std Dev = 1.552) has a medium risk level and the social construct (μ = 4.755, Std Dev = 1.240) has a high risk level. However, Dospert (μ = 2.498, Std Dev = 0.795) indicated a medium risk rating for investors subject towards the anchoring bias. As a result, from the sample and from theory, stated by Pompian (2016:8), conservative investors tend to be more subject towards the anchoring bias.

The financial risk section (μ = 2.013, Std Dev = .306) displays a medium risk level and similarly speculative risk section (μ = 1.733, Std Dev = 0.504) and investment risk section (μ = 1.933, Std Dev = 0.317). It can be concluded from Table 5.85 that investors subject towards the anchoring bias have a medium risk tolerance level (μ = 1.904, Std Dev = 0.282). This is confirmed by the SCF (μ = 2.730, Std Dev = 0.884) that also has a medium risk tolerance level.

5.7.4 Gambler's fallacy

When gamblers believe and are confident they can outperform a market or system, it is called gambler's fallacy. Especially when gamblers predict trend movements and/or reversal incorrectly – they believe that one occurrence of an outcome, might repeat itself, thereby betting on the future trend of the market (Barberis & Thaler, 2003:1054, Singh, 2012:118).

In terms of the ethical construct, the gambler's fallacy bias has no unethical activities and has a low risk rating for this construct. Gambler investors are confident in their abilities to outperform the market and bet on the future trend of the market (Singh, 2012:118). As a result the financial construct has a medium risk rating. No health risks are incorporated in the gambler's fallacy bias and the health construct has a low risk rating. Medium risk is identified for the recreational construct as the gambler's effect originated from the notion that gamblers, in general, believe and are confident that they can outperform a market or system. For the social construct, as investors believe they can outperform the market, has different views from other market participants and, therefore, has a medium risk level. It can be concluded that investors subject towards the gambler's fallacy have a medium risk level for the Dospert scale. From research that was done, the gambler's fallacy is a biased effect from representativeness and availability heuristics (Lucarelli & Brighetti, 2011:36). Pompian (2016:8) states that moderate/ growth investors are subject towards these biases/ theories, which make moderate/ growth investors subject towards the gambler's fallacy bias.

The financial risk section has a medium risk rating as investors are willing to take calculated risks. Gambler investors are confident in their abilities to outperform the market and bet on future trends of the market. Moreover, speculative risk is rated as a high risk as investors are taking risks by betting on market trends. Investment risk is also rated as medium risk as investors subject to the gambler's fallacy manage their own investments in order to outperform the market. It can be concluded that investors subject towards the gambler's fallacy have a medium risk tolerance level.

Table 5.86: Dospert/ constructs, risk tolerance/ sections and gambler's fallacy

	Gambler's fallacy		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	1.759	.565	.369	.725
Financial	3.277	1.099	-.317	1.545
Health	2.861	1.425	.201	-.811
Recreational	3.555	1.285	-.157	-1.182
Social	5.629	1.132	-1.684	2.118
Dospert	3.456	.656	.109	-1.101
Financial risk	2.089	.362	.765	.673
Speculative risk	2.055	.410	-.671	.594
Investment risk	2.022	.272	.128	-.782
Risk tolerance	2.055	.249	.012	-.465
SCF	2.670	1.000	-.107	-.643

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

Table 5.86 indicates that the ethical construct ($\mu = 1.759$, Std Dev = 0.565) has low risk whereas the financial construct ($\mu = 3.277$, Std Dev = 1.099) has a medium risk level. The health construct ($\mu = 2.861$, Std Dev = 1.425) also has a medium risk level similar to the recreational construct ($\mu = 3.555$, Std Dev = 1.285). The social construct ($\mu = 5.629$, Std Dev = 1.132) has a high risk level and it can be concluded from Table 5.86 that investors subject towards the

gambler's fallacy have a medium risk for Dospert (μ = 3.456, Std Dev = 0.656). This in line with the theory provided by Lucarelli and Brighetti (2011:36) and Pompian (2016:8).

In terms of risk tolerance (μ = 2.055, Std Dev = 0.249), financial risk section (μ = 2.089, Std Dev = 0.362), speculative risk section (μ = 2.055, Std Dev = 0.410) and investment risk section (μ = 2.022, Std Dev = 0.272) investors have a medium risk level. The SCF (μ = 2.670, Std Dev = 1.000) measurement of risk tolerance confirms medium risk tolerance level for the gambler's fallacy bias.

5.7.5 Availability bias

When decisions are based on only the most recent available information, it is called availability bias (Kannadhasan, 2009; Abreu, 2014:7). This occurs where there is no background information pr if current information is incorrectly interpreted. This may result in a decrease in investment or its returns. If people are able to recall the frequency of a class, or a probability of an event, these instances or occurrences come to mind. Lucarelli and Brighetti (2011:27) found in their research that availability produces biased estimates of events. This accentuates the need for investment decisions to be only based on the most recent available information that is classified in the availability bias category (Kannadhasan, 2009). When making incorrect decisions, lacking background information, could impede positive investment returns that would result in poor portfolio returns.

Investors subject towards the availability bias report no unethical activities and, as a result, have a low risk level for the ethical construct. Investment decisions based on only the most recent available information are classified in the availability bias category (Kannadhasan, 2009). As a result some investments are made and risks incurred, which result in a medium risk for the financial construct. No health risks are encountered and, as a result, a low risk rate is given towards the health construct. Since investments are based on only recent information, a medium risk level occurs for the recreational construct. Investors subject towards the availability bias report a medium risk level for the social construct as these investors base investment decisions only on recent available information. It can be concluded that for the Dospert scale, investors' subject towards the availability bias, has a medium risk level. It is confirmed by Kannadhasan (2009) and Abreu (2014:7) that moderate/ growth investors can possibly be subject towards the availability bias.

These types of investors are willing to take some form of financial risk as investment decisions are based only on recent available information, thus medium financial risk level. Medium risk level is also applicable for the speculative risk section as investors speculate where to invest based on recent available information. Investments are managed by the investors as decisions are based only on recent information and are thus a low risk level. It can be concluded that the risk tolerance level for investors' subject towards the availability bias has a medium risk tolerance level.

Table 5.87: Dospert/ constructs, risk tolerance/ sections and availability bias

	Availability bias		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	1.921	.779	.861	.092
Financial	3.101	1.029	.171	-.365
Health	2.621	1.322	.833	.102
Recreational	3.180	1.538	.366	-.718
Social	5.027	1.000	-.348	-.636
Dospert	3.209	.752	.018	-.958
Financial risk	2.022	.315	.231	-.341
Speculative risk	2.013	.523	.000	-.999
Investment risk	1.889	.316	-.224	-.013
Risk tolerance	1.972	.274	-.010	-.660
SCF	2.630	.879	-.202	-.589

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

It can be seen from Table 5.87 that the ethical construct ($\mu = 1.921$, Std Dev = 0.779) has a low risk level and the financial construct ($\mu = 3.101$, Std Dev = 1.029) a medium risk level. Medium risk level is presented by Table 5.87 for the health construct ($\mu = 2.621$, Std Dev = 1.322) and also a medium risk level is reported for the recreational construct ($\mu = 3.180$, Std Dev = 1.538). However, the social construct ($\mu = 5.027$, Std Dev = 1.000) has a high risk level. The Dospert scale ($\mu = 3.209$, Std Dev = 0.752) reported a medium risk level for investors subject towards

the availability bias. Kannadhasan (2009) and Abreu (2014:7) confirm through research done that moderate/ growth investors are subject towards the availability bias.

Risk tolerance (μ = 1.972, Std Dev = 0.274) for investors subject towards the availability bias as well as the financial risk section (μ = 2.022, Std Dev = 0.315), speculative risk section (μ = 2.013, Std Dev = 0.523) and investment risk (μ = 1.889, Std Dev = 0.316) section all have medium risk levels. According to the SCF (μ = 2.630, Std Dev = 0.879), investors subject towards the availability bias have a medium risk tolerance level.

5.7.6 Loss aversion

When investors view losses more than gains it is called loss aversion and is a situation where investors tend to give something up, rather than acquiring it and thereby assigning more value/ significance to avoiding loss rather than achieving gain (Kahneman *et al*., 1991:194, Lo & Repin, 2002:232-339, Lucarelli & Brighetti, 2011:43). This also involves the situation where investors express different emotions towards gains and losses, thereby being more sensitive towards their losses and inability to turn losses into gains. This presents a financial risk and needs to be addressed (Singh, 2012:120; Chaudhary, 2013:1).

When losses are experienced more drastically rather than in the case of a gain of the same size, different emotions can be experiences (e.g. joy, anxiety, and excitement). When this happens, investors tend to hold onto investments that deliver negative returns and they might also take higher or more risks, hoping that positive returns might be delivered (Singh, 2012:120).

In terms of the ethical construct, no unethical activities are reported under the ethical construct, which is rated a low risk. Medium risk level in terms of the financial construct is confirmed by Singh (2012:120) and Chaudhary (2013:1). No health risks are recorded for loss aversion, which are rated low risk. The recreational construct has medium risk rating as investors hold on to nonperforming investments with the hope that these investments will deliver positive returns in the future (Singh, 2012:120). Also, a medium risk is reported for the social construct as investment views differ from investor to investor, especially as investors subject towards the loss aversion bias hold onto nonperforming investments with the hope of a positive outcome. It can be concluded that for the Dospert scale, a low risk to medium risk level is gathered for investors subject towards loss aversion. Pompian (2016:8) states that conservative investors are subject towards the loss aversion bias.

Investors subject towards loss aversion are willing to take some form of financial risk as investment decisions are made when people assign more value/ significance to avoiding loss rather than achieving gain, thus medium financial risk tolerance level are given. Low risk level is applicable for the speculative risk section as investors avoid loss rather than achieving gain. Investments are managed by the investors as decisions are based to avoid loss instead of increasing gain and a medium risk level for the investment risk section is given. It can be concluded that the risk tolerance level for investors' subject towards loss aversion has medium risk tolerance level.

Table 5.88: Dospert/ constructs, risk tolerance/ sections and loss aversion

	Loss aversion		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	1.700	.813	2.455	7.483
Financial	2.799	1.165	.623	-.281
Health	2.358	1.245	.759	-.579
Recreational	3.529	1.855	.342	-1.019
Social	4.863	1.202	-1.154	2.243
Dospert	1.989	.912	-.167	-.571
Financial risk	1.954	.277	-2.51	.911
Speculative risk	1.987	.469	-.098	-.643
Investment risk	1.831	.326	.161	-1.004
Risk tolerance	1.919	.242	.155	-.383
SCF	2.920	.739	-.699	.991

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

Table 5.88 clearly indicates that a low risk level was obtained for the ethical construct (μ = 1.700, Std Dev = 0.813) and a medium risk level for the financial construct (μ = 2.799, Std Dev = 1.165) and the health construct (μ = 2.358, Std Dev = 1.245). Moreover, a medium risk level was obtained for the recreational construct (μ = 3.529, Std Dev = 1.855) and a high risk level for the social construct (μ = 4.863, Std Dev = 1.202). In terms of the entire Dospert scale (μ =

1.989, Std Dev = 0.912) a low risk level was obtained, which corresponds with theory of Pompian (2016:8).

A medium risk level was obtained for risk tolerance (μ = 1.919, Std Dev = 0.242) and for the financial risk (μ = 1.954, Std Dev = 0.277) section. Moreover, speculative risk section (μ = 1.987, Std Dev = 0.469) has a medium risk level similar to the investment risk section (μ = 1.831, Std Dev = 0.326) a low risk level. A medium risk tolerance level is also obtained for the SCF (μ = 2.920, Std Dev = 0.739) measurement.

5.7.7 Regret aversion

When investors make an error in judgement it is called regret aversion and these investors do not want to experience emotions or negative feelings that are caused by a loss or nonperforming investment (Quiggin, 1994:153-16, Zeelenberg & Pieters, 2006:3-18, (Zeelenberg & Pieters, 2007:3-18). When investors postpone the sale of losing investments, they tend to believe that this is a good way to postpone the sense of regret. By failing to deliver expected returns these investors experience feelings of grief and guilt when they realise investments underperformed and they made incorrect decisions. These investors will try to manage situations better to avoid feelings of regret thereby being more regret averse (Zeelenberg & Pieters, 2007:3-18).

No unethical activities were recorded under the ethical construct for investors subject towards regret aversion and as a result has low risk level. As incorrect decisions were made in the past some financial risk occurred in those investment decisions are for the financial construct a medium risk level is given. No health risks are incorporated for investors subject towards regret aversion and as a result the health construct are rated low risk. As investors postpone the sale of a losing investment believing it is a way to postpone the sense of regret a medium risk level for the recreational construct is given. Investors will attempt to manage situations to avoid regret and be regret averse (Zeelenberg & Pieters, 2007:3-18), which can be a possible opposing view from other investors, which forms a medium risk level for the social construct. It can be concluded that investors subject towards regret aversion have a medium risk tolerance level. Pompian (2016:8) confirms through his research that moderate investors are usually subject towards regret aversion.

Investors subject towards regret aversion are willing to take some form of financial risk as investment decisions are made when investors realise errors were made in the judgement process of investments (Quiggin, 1994), thus medium financial risk level are given. Medium

risk level is applicable for the speculative risk section as investors made investment decisions based on own perception. Investors will attempt to manage situations to avoid regret and be regret averse, which makes investment risk section medium risk. It can be concluded that the risk tolerance level for investors' subject towards regret aversion are medium risk level.

Table 5.89: Dospert/ constructs, risk tolerance/ sections and regret aversion

	Regret aversion		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	2.035	.948	.761	-.034
Financial	2.511	.921	1.211	3.465
Health	2.800	1.453	.527	-.434
Recreational	3.383	1.702	.102	-1.174
Social	4.930	1.019	-.157	-.504
Dospert	3.156	.841	-.093	-.748
Financial risk	1.880	.287	.011	-.567
Speculative risk	1.942	.496	.224	-.482
Investment risk	1.800	.276	.135	-.284
Risk tolerance	1.997	.228	.082	-.458
SCF	3.130	.883	-.777	-.120

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

Table 5.88 indicates that for the ethical construct (μ = 2.035, Std Dev = 0.948) a low risk level was obtained, whereas the financial construct (μ = 2.511, Std Dev = 0.921) and the health construct (μ = 2.800, Std Dev = 1.453) a medium risk level. The recreational construct (μ = 3.383, Std Dev = 1.702) has a medium risk level, whereas the social construct (μ = 4.930, Std Dev = 1.019) has a high risk level. The Dospert scale (μ = 3.156, Std Dev = 0.841) has a medium risk level. This is confirmed by Pompian (2016:8) that moderate investors tend to be subject towards regret aversion.

A medium risk level was obtained for, investors subject towards regret aversion, risk tolerance (μ = 1.997, Std Dev = 0.228). Moreover, for the financial risk section (μ = 1.880, Std Dev = 0.287), speculative risk section (μ = 1.942, Std Dev = 0.496) and for the investment risk section (μ = 1.800, Std Dev = 0.276) a medium risk tolerance level was also obtained as seen in Table 5.89. However, the SCF (μ = 3.130, Std Dev = 0.883) obtained a high risk tolerance level for investors subject towards regret aversion.

5.7.8 Mental accounting

Mental accounting relates to life experiences that occur in mental compartments and can influence investment behaviour more that life itself and relates to investing funds, receiving excessive returns on the investment and only receiving normal returns later. Investors tend to hesitate to sell during the process of receiving normal returns (Jagongo & Mutswenje, 2014:92-102). Mental accounting is thereby the process of keeping track of their gains and losses when they make financial decisions and re-examining it only intermittently when it becomes relevant (Thaler, 1985:199-214).

Mental accounting can be divided into three groups, namely consumption account (general expenses), income account (revenues) and wealth income (different sources of wealth). When an investor groups' information related to specific events, it reflects the mental accounting bias and affecting behaviour more than the specific event (Jagongo & Mutswenje, 2014:92-102).

There are two scenarios in mental accounting, namely when an investor invests money and receiving excessive return and the second situation is when normal returns are being received. The investor will then be able to compare the two scenarios but may feel hesitant to dispose of his investments with normal returns and tend to wait until his investments yield higher returns.

No unethical activities were recorded under the ethical construct for investors' subject towards mental accounting and, as a result, has low risk level. Low levels of financial risk are reported as no betting occurs. No health risks are identified under the health construct and, therefore, has low risk level. The investor then typically compares the two scenarios and the reaction, and will be hesitant to dispose investments with normal returns. As a result, the excessive returns will motivate investors, due to the comparison between compartment information, to wait until higher returns are achieved. As a result, medium risk level is identified for the recreational construct. Investors have different views regarding investments and a medium risk level is identified for the social construct. It can be concluded that investors subject towards mental

accounting have a low risk to medium risk level for Dospert. In the view of Jagongo and Mutswenje (2014:92-102) conservative investors are more subject towards the mental accounting bias.

Investors subject towards mental accounting keep track of gains and losses regarding financial decisions in separate mental accounts while re-examining it only intermittently when it becomes relevant (Thaler, 1985:199-214); thus, medium financial risk levels are given. Medium risk level is applicable for the speculative risk section as investors only re-exam financial decisions as relevant. Investors will attempt to manage situations where two scenarios occur and, therefore, the investment risk section is medium risk. It can be concluded that the risk tolerance level for investors' subject towards mental accounting are a medium risk level.

Table 5.90: Dospert/ constructs, risk tolerance/ sections and mental accounting

	Mental accounting		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	1.861	.833	1.221	.919
Financial	2.990	.985	.612	-.099
Health	2.405	1.343	.915	-.439
Recreational	3.336	1.597	.431	-.843
Social	4.918	.934	-.137	-.219
Dospert	2.474	.745	.391	-.725
Financial risk	1.921	.281	-.847	.176
Speculative risk	2.004	.466	-.287	-.880
Investment risk	1.898	.324	-.094	-.280
Risk tolerance	1.966	.264	-.404	.218
SCF	2.700	.927	-.261	-.860

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

Table 5.90 indicates that for the ethical construct ($\mu = 1.861$, Std Dev = 0.833) a low risk level, the financial construct ($\mu = 2.990$, Std Dev = 0.985) a medium risk level and the health construct

(μ = 2.405, Std Dev = 1.343) a low risk level is recorded. For the recreational construct (μ = 3.336, Std Dev = 1597) a medium risk level was obtained whereas the social construct (μ = 4.918, Std Dev = .934) has a high risk level. However, Dospert (μ = 2.474, Std Dev = 0.745) has a low risk level. This corresponds with the theory of Jagongo and Mutswenje (2014:92-102).

A medium risk level was obtained for, investors subject towards mental accounting, risk tolerance (μ = 1.966, Std Dev = 0.264) similar to financial risk section (μ = 1.921, Std Dev = 0.281). Speculative risk section (μ = 2.004, Std Dev = 0.466) indicates a medium risk level and for the investment risk section (μ = 1.898, Std Dev = 0.324) a medium risk level. This is in correspondence with the SCF scale (μ = 2.700, Std Dev = 0.972).

5.7.9 Self-control

Self-control occurs when investors are tempted and aiming to exercise self-control to reduce temptations so that there are no losses and to protect their investments (Kannadhasan, 2009). When investors experience self-control bias, it means they tend to save today rather than consuming for the next day.

In terms of the ethical construct, no unethical activities were found under the self-control bias and, as a result, delivers a low risk level. Low levels of risk are reported for the financial construct as no betting occurs and investments are made under self-control characteristics. No health risks are associated with the self-control bias and as a result a low risk level is reported. Self-control bias only attempts to control temptations, which give rise to a medium risk level for the recreational construct. The crux of self-control is to avoid losses and protect investments (Kannadhasan, 2009), which might be in opposing view of other participants and this delivers a high risk level. It can be concluded that for Dospert, the risk level is medium to high for investors subject towards the self-control bias. Typical aggressive investors are subject towards the self-control bias (Pompian, 2016:8).

Investors subject towards self-control bias are willing to take calculated risks, thus medium financial risk level is given. Low risk level is applicable for the speculative risk section as investors exercise self-control. The crux of self-control is to avoid losses and protect investments (Kannadhasan, 2009) and, therefore, the investment risk section is medium risk. It can be concluded that the risk tolerance level for investors subject towards the self-control bias are a medium risk level.

Table 5.91: Dospert/ constructs, risk tolerance/ sections and self-control bias

	Self-control bias		Skewness	Kurtosis
	Mean	Std Dev		
Ethical	1.699	.681	1.092	.815
Financial	2.680	.881	.805	1.604
Health	2.532	1.321	.860	-.018
Recreational	3.245	1.584	.461	-.883
Social	5.132	1.026	-.647	.480
Dospert	5.095	1.713	.204	-.485
Financial risk	1.932	.269	.116	-.230
Speculative risk	1.920	.480	.179	-.420
Investment risk	1.839	.315	.192	-.265
Risk tolerance	1.995	.244	-.001	-.465
SCF	2.810	.791	-.357	-.197

For the Dospert scale and constructs, 1 - 2.5 is regarded as low risk, >2.5 - <4.5 is regarded as medium risk and ≥4.5 - 7 is high risk. Similarly, the middle point of the risk tolerance was used to create three categories, 1 - 1.5 low risk, >1.5 - <2.5 medium risk and ≥2.5 - 3 high risk. Regarding the SCF, 1 - 2 is regarded as low risk, >2 - <3 as medium risk and ≥3 - 4 as high risk.

Table 5.91 indicates that for the ethical construct ($\mu = 1.699$, Std Dev = 0.681) a low risk level, the financial construct ($\mu = 2.680$, Std Dev = 0.881) and the health construct ($\mu = 2.532$, Std Dev = 1.321) a medium risk level is recorded. The recreational construct ($\mu = 3.245$, Std Dev = 1.584) has a medium risk level and the social construct ($\mu = 5.132$, Std Dev = 1.026) a high risk level. The Dospert scale ($\mu = 5.095$, Std Dev = 1.713) has a high risk level. The theory of Pompian (2016:8) holds that aggressive investors are subject towards the self-control bias.

A medium risk level was obtained for, investors subject towards the self-control bias, risk tolerance ($\mu = 1.995$, Std Dev = 0.244), the financial risk ($\mu = 1.932$, Std Dev = 0.269) section, speculative risk ($\mu = 1.920$, Std Dev = 0.480) section and the investment risk ($\mu = 1.839$, Std Dev = 0.315) section. The SCF ($\mu = 2.810$, Std Dev = 0.791) risk tolerance scale also obtained a medium risk tolerance level.

To conclude, for the empirical objective to develop a link between risk tolerance, risk personalities and behavioural finance, the following links were developed:

- Representativeness bias, moderate to growth investor, medium risk tolerance. Pompian (2016:8) stated that moderate/ growth investors are subject towards the representativeness bias;
- Overconfidence bias, moderate to growth investor, medium risk tolerance. Lake (2017) confirms that the overconfidence bias mostly occurs at aggressive investors, however, as soon as investors act like aggressive investors this bias may occur;
- Anchoring bias, conservative investor, medium risk tolerance. Pompian (2016:8) confirms that conservative investors are subject towards the anchoring bias;
- Gambler's fallacy, moderate to growth investor, medium risk tolerance. Lucarelli and Brighetti (2011:36) stated that moderate to growth investors are subject towards the gambler's fallacy;
- Availability bias, moderate to growth investor, medium risk tolerance. Kannadhasan (2009) and Abreu (2014:7) confirmed that moderate to growth investors can be subject towards the availability bias;
- Loss aversion, conservative investor, medium risk tolerance. The loss aversion bias is mostly experienced by conservative investors (Pompian, 2016:8);
- Regret aversion, moderate investor, medium risk tolerance. Moderate investors subject towards regret aversion experience a medium risk tolerance level (Bourse Securities Limited, 2016);
- Mental accounting, conservative investor, medium risk tolerance. Jagongo and Mutswenje (2014:95-102) confirmed that conservative investors can possibly be subject towards the mental accounting bias; and
- Self-control bias, aggressive investor, medium risk tolerance. Pompian (2016:8) states that aggressive investors can experience the self-control bias.

It was confirmed in Section 5.4 that the overall sample's risk tolerance level is between low and medium risk. The SCF scale indicated 66.0 percent for low to medium risk tolerance. This is the reason that the risk tolerance level for the sample is confirmed as low to medium. Table 5.92 indicates the final empirical objective by profiling investor behaviour considering risk tolerance and behavioural finance based on the findings from Section 5.7.

Table 5.92: Behavioural finance biases and risk tolerance

Behavioural finance bias	Percentage (%) of sample	Risk tolerance level of the overall sample	Risk tolerance level of behavioural finance biases
Representativeness	45.3	Low to medium	Medium
Overconfidence	2.7	Low to medium	Medium
Anchoring	1.3	Low to medium	Low
Gambler's fallacy	0.8	Low to medium	Medium
Availability bias	6.4	Low to medium	Medium
Loss aversion	3.4	Low to medium	Medium
Regret aversion	6.2	Low to medium	Medium
Mental accounting	4.7	Low to medium	Medium
Self-control	29.2	Low to medium	Medium

The majority of the sample (45.3%) selected the representativeness bias as the most relevant bias indicated by Table 5.92. For the self-control bias, 29.2 percent of the sample ranked this bias as most relevant whereas 6.4 percent of the sample ranked the availability bias as most relevant. The risk tolerance level of the sample is low to medium as analysed in Section 5.4. In Section 5.7 the behavioural finance biases were analysed in terms of risk tolerance levels. A risk tolerance level was concluded for every behavioural finance bias as indicated by Table 5.92.

The representativeness bias has a medium risk tolerance level according to analysis and the overall risk tolerance level for the sample is between low and medium. As a result, a potential link exists between the represenativeness bias and the sample's risk tolerance level. If a potential investor has a low to medium risk tolerance level according to risk profiles, the representativeness bias can influence the investment choice of an investor as this bias has a medium risk tolerance level based on analysis in Section 5.7. Which ultimately can influence the risk tolerance level of an investor. The investor can make investment decisions based on own perception, as per Lucarelli and Brighetti's (2011:36) definition.

From the sample, 29.2 percent ranked self-control as the most relevant behavioural finance bias. A medium risk tolerance level was found for this behavioural finance bias, which is in correspondence with the sample's overall low to medium risk tolerance level. The crux of self-control is to avoid losses and protect investments (Kannadhasan, 2009). Therefore, medium

risk tolerance investors can potentially be influenced by the self-control bias in their investment choices that can ultimately influence their risk tolerance level.

Table 5.92 indicates that the availability bias was ranked by 6.4 percent of the respondents as the most relevant bias. From the analysis in Section 5.7, a medium risk tolerance level was found for this bias, which is corresponding to the low to medium risk tolerance level of the sample. An availability bias occurs when investors make investment decisions based on only the most recent available information (Kannadhasan, 2009). As a result, if an investor has a low to medium risk tolerance level as per risk profile, the availability bias can potentially influence the investors' investment choice that can have an impact on the risk tolerance level.

If an investor has negative feelings regarding final decisions and when an error was made in judgement it is referred to regret aversion (Quiggin, 1994:153-165). According to analysis in Section 5.7 regret aversion has a medium risk tolerance level which is corresponding with the risk tolerance level of the overall sample. Moreover, if an investor has a low to medium risk tolerance level the investment choices of an investor can possibly be influenced by the regret aversion bias which can have an impact on the risk tolerance level.

The mental accounting bias was ranked by 4.7 percent of the respondents as the most relevant bias. Table 5.92 indicates that from analysis the mental accounting bias has a medium risk tolerance level, which is corresponding to the overall low to medium risk tolerance level of the sample. When an investor groups' information related to specific events, it reflects the mental accounting bias and affecting behaviour more than the specific event (Jagongo & Mutswenje, 2014:92-102). Therefore, if an investor has a low to medium risk tolerance level the mental accounting bias can potentially influence investors' investment choices that can impact the risk tolerance level.

From the sample, 3.4 percent of the sample ranked loss aversion as most relevant. If an investor view losses more than gains, the investor is subject towards loss aversion (Sewell, 2007:2). According to analysis the risk tolerance level for loss aversion is medium which is in line with the sample's overall risk tolerance level. As a result, an investor with a low to medium risk tolerance level can potentially be influenced by the loss aversion bias in their investment choices. This can ultimately influence the risk tolerance level of an investor.

The overconfidence bias is ranked by 2.7 percent of the respondents as most relevant. The risk tolerance level analysed for this bias in Section 5.7 is medium which is corresponding with the

sample's overall low to medium risk tolerance level. Overconfidence is when people believe in themselves and their own abilities with strong conviction (Ricciardi, 2008). As a result, investors with a low to medium risk tolerance level can be influenced by the overconfidence bias in their investment choices, which can have an impact on the investors'risk tolerance level.

Kannadhasan (2009) referred to anchoring as a tendency in which humans excessively rely on a single piece of information when making decisions. From the sample, 1.3 percent respondents ranked anchoring as the most relevant behavioural finance bias. The risk tolerance level analysed for this bias is low risk, which is corresponding to the overall risk tolerance level of the sample. Therefore, if an investor has low to medium risk tolerance levels, the investment choices of an investor can potentially be influenced by the anchoring bias, which will impact the risk tolerance level of the investor.

A small number of the sample, 0.8 percent of the respondents, ranked gambler's fallacy as most relevant. Gambler's fallacy is evident when gambler investors incorrectly predict trend movements and/ or reversals. These types of investors believe that one occurrence of one outcome might repeat itself (Barberis & Thaler, 2003:1054). Low to medium risk tolerance level investors can typically be subject towards the gambler's fallacy in their investment choices that can potentially impact the risk tolerance levels.

To conclude, if an investor has a low to medium risk tolerance level this investor might be subject towards the representativeness bias, anchoring bias, loss aversion, overconfidence bias, availability bias, regret aversion, anchoring bias, mental accounting, gambler's fallacy or self-control bias. As a result, these biases can potentially influence an investor's investment choices and ultimately the risk tolerance level of investors. Behavioural finance biases can influence the investment decisions of investors by causing investors to act irrational. These biases should be included in risk profiles of investors in order to profile investors more accurately.

5.8 SYNOPSIS

Chapter 5 presented the results and findings obtained from the empirical portion of this study. This chapter is comprised of eight sections of which Section 5.2 entails the coding of the questionnaire. Section 5.3 analysed the demographic portion of this study, which was followed by Section 5.4 that presented the descriptive statistics for SWL, Dospert/ constructs, risk tolerance/ sections. From this section it can be concluded that the sample is conservative and has a low risk tolerance. This was followed by the hypothesis testing section, Section 5.5, which

included ANOVA testing. Section 5.6 tested for the relationship between Dospert/ construct and risk tolerance/ sections. From this section it was concluded that a positive medium strength relationship exists between risk personalities (Dospert) and risk tolerance. From Section 5.7 behavioural finance biases were grouped into risk tolerance levels.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

"The four most dangerous words in investing: 'this time it's different'."

- Sir John Templeton

6.1 SUMMARY

Based on the study, it became apparent that research in the field of investor behaviour within a South African context is imperative. Hence, this study was concerned with the task faced by investment companies to profile their clients based on their financial decisions and level of risk these investors are willing to tolerate. Investment companies in South Africa assume investors are rational due to their measurement that mainly incorporates risk tolerance and risk personalities within an individual risk profile. Therefore, according to existing risk profiles, investors will only make investment decisions based on rationality and no measurement of irrational behaviour is included in these risk profiles. The measurements used by South African investment companies are compiled based on institutional intellect, which only makes provision for the rational investor behaviour. Consequently, investment companies make no provision for the inclusion of irrational investor behaviour in South Africa. Although classical theory suggests rationality, investors and markets do not always operate in a rational manner. Investors generally aim towards maximising return during acts of both rational and irrational behaviour. This behaviour may affect the financial wellbeing of individual investors. Moreover, investors are irrational as per behavioural finance evidence; hence, this component, along with risk personalities and risk tolerance, were included to get an accurate risk profile for the potential investor.

Therefore, this study focused on modelling investor behaviour by adding behavioural finance elements to existing measures of risk tolerance. Theoretical objectives provided insight into the general behaviour of investors. Chapter 2 focused on the analysis of risk tolerance and what previous researchers found in their studies regarding risk tolerance. Also, different investor personalities and the amount of risk tolerance these personalities are willing to take on were theoretically analysed. Chapter 3 focused on the origin of behavioural finance as this phenomenon highlights the importance of psychological and sociological effects on investment behaviour. As a result, investors tend to make emotional rather than rational investment decisions. These emotions can potentially influence the behaviour of an investor. If an investor is cheerful and content, this investor might look differently at the amount of risk he/she is

willing to take on. Chapter 3 further contextualised a theoretical framework, which consisted of risk tolerance levels, investor personality types and behavioural finance biases. Chapter 4 viewed the methodological approach to be followed for this study. The researcher applied a quantitative research design and, therefore, the positivist paradigm was followed. The empirical objectives (Chapter 5) shed light on the actual financial decision-making personalities and behaviour of South African investors. Section 6.2 elaborates more on the satisfaction of the empirical objectives.

This chapter provides an overview of the study, followed by the leading findings. Several recommendations were provided for further research based on the important outcomes found (Chapter 5). This chapter will further emphasise the contributions made to the field of study but also highlight some of the limitations encountered.

6.2 FINDINGS

The primary objective for this study was to develop a model against which investment companies could profile their clients more accurately by adding behavioural finance elements to existing measures of risk tolerance. The achievement of the following empirical objectives contributed to the successful findings of this study.

6.2.1 Empirical objective 1: Risk personalities

The first empirical objective focused on determining the risk personality of the sample. Dospert and constructs were divided between high and low risk, where a high willingness to take on risk refers to a more aggressive investor and low risk indicated low willingness to take on risk. The low willingness to take on risk refers to a more conservative investor. From Chapter 5 it can be concluded that the majority of the sample consisted of conservative investor personalities. In other words, these investors all have a low willingness to consume risk.

6.2.2 Empirical objective 2: Risk tolerance

The second empirical objective was to determine the level of risk tolerance for the sample of South African investors. The single measure for risk tolerance (SCF) was divided into two categories, namely low risk tolerance and high risk tolerance. Following the single measure of risk tolerance, more than half of the sample had a low level of risk tolerance. Risk tolerance was further divided into three sections, namely financial risk section, speculative risk section and investment risk section. These sections were divided into low, medium and high risk

tolerant categories. The sample of respondents were found to be between low risk tolerant and medium risk tolerant for financial risk section, investment risk section and speculative risk section. The overall level of risk tolerance for this sample was therefore between low risk tolerance and medium risk tolerance.

6.2.3 Empirical objective 3: Demographics and satisfaction with life

The third objective was to determine the effect of demographical factors (age, gender, ethnicity and marital status) on the SWL of the sample. It is recommended that the SWL scale is added towards the risk profile of investment companies since there is a link between satisfaction of life and risk tolerance, which will ultimately influence the overall risk profile of an investor. A definite relationship exists between risk tolerance and satisfaction with life, where people who are unsatisfied with their lives tend to tolerate more risk. Hence, making it possible for financial investment companies to more accurately analyse investor profiles. Concerning the first demographical factor of age, there was a statistical difference between SWL and the three age categories. Respondents 50 years of age and older tend to be more satisfied with their lives than respondents in age category 16-34 and respondents in age category 35-49. This concurs with theory where these investors tend to be in retirement and all their debt is already paid off. Concerning gender, the study concluded that males are more satisfied with life than females within the sample. The majority of White respondents were also found to be more satisfied with their lives than non-White respondents. Married respondents were also more satisfied with their lives, than the respondents who stated that they have never been married or the respondents who were no longer married. The effect of income and SWL was also put to the test. The more income per annum the respondents received the more these respondents were satisfied with their lives. The lower the annual income of respondents, the lower was the level of overall life satisfaction. Significant difference exists between behavioural finance biases and SWL. The respondents who were subjected towards the regret aversion bias were less satisfied with their lives than respondents subject towards the representativeness bias, gambler's fallacy, loss aversion and self-control bias.

6.2.4 Empirical objective 4: Demographics and risk tolerance

The effect of demographic factors on risk tolerance was the fourth empirical objective to be achieved. A null hypothesis was stated in order to determine the statistical difference between age categories, gender, ethnicity, marital status and behavioural finance for risk tolerance. It

was evident that there were no statistical differences between age category and risk tolerance, age category and financial risk section, age category and investment risk section, age category and speculative risk section. No significant difference was identified between marital status and risk tolerance, marital status and financial risk section, marital status and investment risk section, marital status and speculative risk. Furthermore, no significant difference was identified between risk tolerance and financial risk section, investment risk section, speculative risk section and behavioural finance biases. The lack in statistical difference could be due to the context in which risk tolerance was measured in, since previous risk tolerance studies were not in the same context. This study measured risk tolerance in South Africa in terms of South African investors.

On the other hand, significant differences were found between gender and risk tolerance in terms of gender and financial risk section, gender and investment risk section and gender and speculative risk section. The findings found males to be more risk tolerant than females, which is in correspondence with theory and previous studies. In terms of ethnicity and risk tolerance, African respondents were found to be more risk tolerant than White respondents, Coloured respondents and Asian respondents. This is in parallel to previous studies, which found that non-White respondents took more risks than White respondents did. Looking at income level, no statistical difference was found between annual income and speculative risk. However, a statistical difference was found between annual income and risk tolerance, annual income and financial risk, annual income and investment risk. Hence, it is clear that the more annual income respondents earn, the higher are the risk tolerance level. This is in conjunction with previous studies that found high income earners to be more risk tolerant than low income earners.

6.2.5 Empirical objective 5: Risk tolerance and investor personalities

The fifth empirical objective was to analyse and establish a link between risk tolerance and investor personalities using Dospert within the sample. A potential link between risk tolerance and investor personalities was drawn using a correlation analysis in order to fulfil the empirical requirement. Values ranging from 0.10 to 0.29 represented a small strength relationship, from 0.30 to 0.49 a medium strength relationship and from 0.50 to 1.0 a strong relationship between risk tolerance and investor personalities. Concerning financial risk (first section of risk tolerance) a positive small strength relationship exists between financial risk section and the ethical construct, financial construct, health construct, recreational construct, social construct and Dospert. In terms of speculative risk section, a positive small strength relationship was also

found to exist between speculative risk section and the ethical construct, financial construct, health construct, recreational construct, social construct and Dospert. A small but positive strength relationship was again illustrated between investment risk section and Dospert and all four of its constructs. On the other hand, a positive medium strength relationship was found between Dospert and risk tolerance. Risk tolerance was highly correlated with all of its sections and also indicated a positive relationship.

6.2.6 Empirical objective 6: Risk tolerance, risk personalities and behavioural finance

The main aim of this objective was to develop a link between risk tolerance, investor personality and behavioural finance biases. This was done by dividing behavioural financial biases into low risk, medium risk and high risk for Dospert/ constructs and risk tolerance/ sections. The following list contains the behavioural finance biases, each with their corresponding level of risk tolerance and risk personality.

- Representativeness bias, moderate to growth investor, medium risk tolerance;
- Overconfidence bias, moderate to growth investor, medium risk tolerance;
- Anchoring bias, conservative investor, medium risk tolerance;
- Gambler's fallacy, moderate to growth investor, medium risk tolerance;
- Availability bias, moderate to growth investor, medium risk tolerance;
- Loss aversion, conservative investor, medium risk tolerance;
- Regret aversion, moderate investor, medium risk tolerance;
- Mental accounting, conservative investor, medium risk tolerance; and
- Self-control bias, aggressive investor, medium risk tolerance.

All risk tolerance levels are found to be medium risk due to the sample's overall low to medium risk tolerance level. This confirmed a definite link between behavioural finance biases, investor personality and risk tolerance levels. Moderate to growth investors can possibly be subject towards the representativeness bias, overconfidence bias, gambler's fallacy and availability bias with a medium risk tolerance level as per sample. On the other hand, conservative investors can be subject towards the anchoring bias, loss aversion and mental accounting with a medium risk tolerance level. Moderate investors can be subject towards regret aversion, while aggressive investors can be subject towards self-control bias with medium risk tolerance levels.

These results were in agreement with previous studies and these results will contribute towards the investor profiling of South African investors in terms of their, behavioural traits, willingness to take on risk and their investor type personality.

6.2.7 Empirical objective 7: Investor profile model

The final and most significant objective of this study was to construct an investor behaviour profiling model by linking each behavioural finance bias to a specific level of risk tolerance. The aim was to determine if risk tolerance levels can be influenced by behavioural finance biases, as this will contribute towards risk profiles of investors.

The majority of the sample (45.3%) selected the representativeness bias as the most relevant bias. Due to the sample being low risk tolerance to medium risk tolerance, the majority of the behavioural finance biases are grouped medium risk tolerance as per Section 5.7. As a result, it can be concluded that behavioural finance biases can possibly influence the investment choices of investors and ultimately the risk tolerance levels.

If an investor has a low to medium risk tolerance level this investor might be subject towards the representativeness bias, anchoring bias, loss aversion, overconfidence bias, availability bias, regret aversion, anchoring bias, mental accounting, gambler's fallacy or self-control bias. As a result, these biases can potentially influence an investor's investment choices and ultimately the risk tolerance level of investors. Behavioural finance biases can influence the investment decisions of investors by causing investors to act irrational. These biases should be included in risk profiles of investors in order to profile investors more accurately.

This allowed for investor behaviour to be framed according to the way in which investors make their decisions and the level of risk they are willing to tolerate. This objective will make a significant contribution towards the manner in which financial investment companies profile their clients. By implementing this investor profile model, investment companies are given the opportunity to more accurately profile their clients according to the type of bias they are influenced by and the level of risk this type of investor will be willing to tolerate. A more accurate investor profile will lead to the achievement of the investor's desired financial position.

6.3 GENERAL CONCLUSION

With previous research on investor behaviour, this study contributed to the body of knowledge in terms of providing a framework to model investor behaviour in the South African context. The model made provision for analysing potential irrational investor behaviours that can be associated with the level of risk tolerance in South Africa. The theoretical objectives provided an in-depth analysis of risk tolerance and how risk tolerance is measured. Investor personalities were differentiated upon to illuminate the various classifications of investors. The origin of behavioural finance had to be established in order to explain its importance in this study, whereby a contextual framework was created.

The seven empirical objectives contributed towards the achievement of the primary objective. Thus, it can be concluded that South African investors are not completely rational as per theory and are influenced by behavioural finance biases. The model constructed for the seventh empirical objective concluded that a certain level of risk tolerance can be associated with certain behavioural biases. This will allow investment companies in South Africa to be aware of behavioural finance biases that can potentially influence their client's investment decisions.

This study will contribute significantly towards forthcoming frameworks utilised by investment companies and will reshape the manner in which investor behaviour and their risk profiles are created. The research conducted ended with the most critical objective to model investors' behaviour in terms of the behavioural biases they are subjected to and their specific level of risk tolerance.

6.4 RECOMMENDATIONS AND LIMITATIONS

This section provides appropriate recommendations based on the insights gained from both the literature and empirical results in the previous chapters regarding the modelling of investor behaviour in the South African context. This study acknowledges a number of limitations within the research, which may offer several opportunities for future researchers. The researcher utilised a quantitative research approach to model investor behaviour. However, it can be recommended that, a mixed method whereby qualitative interviews were conducted, could have been employed to further investigate the reasons behind the irrational behaviour of South African investors. Investor personalities were evaluated based on Dospert; whereas, Hexaco (a six-dimension personality measure) could also have been implemented along with

Dospert. A further recommendation for future researchers would be to see whether irrational investor behaviour and decisions are influenced by the type of assets in which investors invest.

Since this study included all investors representing all age categories, races, income groups, marital status and province, no recommendations can be made regarding the sample. However, it can be recommended that this study be implemented by other investment companies in South Africa, or the study can become province specific. The study can also be implemented by investment firms in other areas of the world such as the United States and United Kingdom to contribute towards more accurate investor profiles.

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ANNEXURE A: INFORMED CONSENT

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

PO Box 1174, Vanderbijlpark
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Tel: 016 910-3111
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Risk Management Department
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Participant information leaflet and consent form

Title of the research project: Modelling investor behaviour in the South African context.

Principal investigator: Zandri Dickason (071 484 0396)

Promoter(s): Dr D Viljoen

Reference numbers: ECONIT-2017-012

You are being invited to take part in a research project that forms part of a PhD study. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research is about and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say decline, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Social and Technological Sciences Research Ethics Committee of the Faculty of Economic Sciences & IT of the North-West University** (ECONIT-2017-012) and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records to make sure that we (the researchers) are conducting research in an ethical manner.

What is this research study about?

Investment companies in South Africa treat investors as rational due to their measurement instrument that mainly incorporates risk tolerance and risk personalities. The measurement use by South African investment companies are compiled based on institutional intellect in terms of rational investor behaviour. As a result, no provision is made for testing irrational behaviour in South Africa by investment companies. Moreover, investors are irrational as per behavioural finance evidence and this component should be included in the measurement to get an accurate profile for the potential investor. This study aims to model investor behaviour based on academic intellect to measure risk tolerance, risk personalities and behavioural finance. You have been invited to participate in this study.

Why have you been invited to participate?

You have been invited to participate because your company represents the sample population under study.

What will your responsibilities be?

The questionnaire should take approximately 15-20 minutes to complete.

Who will have access to the data?

Anonymity (that is, in no way will the results be linked to the company) will be ensured as the researchers do not have direct access to the company's client database. Confidentiality (that is, we assure you that we will protect the information we have about the company) will be ensured by the way the data will be captured, and no mention of the company will be included in the study or any research reports related to the study. Only the researchers will have access to the data. Data will be stored for 5 years before being confidentially destroyed.

What will happen to the data?

The data from this study will be reported on in the following ways: in an academic study and research articles. In all of this reporting, you will not be personally identified. This means that the reporting will not include the company name or details that will help others identify that the company participated (e.g., the company's name or physical description). Only researchers affiliated with the NWU will have access to the data.

Will you be paid/compensated to take part in this study and are there any costs involved?

No, you will not be paid/compensated to take part in the study.

How will you know about the findings?

The general findings of the research will be shared with you electronically in article form, after completion of the study.

Is there anything else that you should know or do?

Should you have any queries please contact Zandri Dickason at 071 484 0396 or 20800274@nwu.ac.za. Alternatively, you can contact Dr Diana Viljoen at (016) 910-3403, Diana.Viljoen@nwu.ac.za.

If you have any concerns or complaints that have not been adequately addressed by the researcher you can contact the chair of the Social and Technological Sciences Research Ethics Committee (Prof Dawid Jordaan) at (016) 910-3260 or Dawid.Jordaan@nwu.ac.za.

You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I Jean Dommisse agree to take part in the research study.

I declare that:

- I have read and understood this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions to both the person obtaining consent, as well as the researcher (if this is a different person), and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I understand that what I contribute (what I report/say/write/draw/produce visually) could be reproduced publically and/or quoted, but without reference to my personal identity.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) Belville on (*date*) 04 August 20.17

....

Signature of participant **Signature of witness**

Declaration by researcher

I Zoxi Dickson declare that:

- I explained the information in this document to Jean Dommisse
- I encouraged her to ask questions and took adequate time to answer them.
- I am satisfied that she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter.

Signed at (*place*) Vanderbijlpark on (*date*) 04 August 20.17

....

Signature of participant **Signature of witness**

ANNEXURE B: ETHICAL CLEARANCE

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
VAAL TRIANGLE CAMPUS

FACULTY OF ECONOMIC SCIENCES AND INFORMATION TECHNOLOGY

ETHICS CLEARANCE DOCUMENT

Dissertation (M)	
Thesis (PhD)	X
Article	
Hons	

SUPERVISOR							
Study Leader / Promoter / Author(s)	Dr D Viljoen						
STUDENT / AUTHOR							
Name	Z Dickason						
Student / Staff Number	20800274						
Registered Title of Dissertation or Thesis or Project Title of Article	Modelling investor behaviour in the South African context						
School	Accounting		Economics	X	Information Technology		
ETHICAL CLEARANCE							
Ethics clearance number	ECONIT-2017-012						
Date (of Ethics Sub Committee Meeting)	5 May 2017						

.....
CHAIRPERSON: ETHICS COMMITTEE

10 May 2017 .....
DATE

.....
RESEARCH DIRECTOR

10 May 2017 .....
DATE

ANNEXURE C: QUESTIONNAIRE

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
VAAL TRIANGLE CAMPUS

Modelling investor behaviour in the South African context

Please do not put your name, surname, or any identifying marks on your questionnaire.

You are being invited to take part in a research project that forms part of a PhD study. The purpose of the study is to model investor behaviour in the South African context. Most investment firms do not take potential investor behaviour into account when analysing a client. This study will determine if the addition of behavioural finance frameworks to traditional investor profiling techniques will provide investment firms with a more accurate model for investor profiling.

Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research is about and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you did agree to take part. You are kindly requested not to withdraw without careful consideration, since it may have a detrimental effect on, inter alia, the statistical reliability of the project.

By agreeing to take part in the project, you are also giving consent for the data that will be generated to be used by the researchers for scientific purposes as they see fit. The data will be **confidential** and your results will be reported in aggregate (as part of the whole sample) and not individually. The questionnaire should take, on average, 15 minutes to complete.

This study has received ethical clearance from the Social and Technological Sciences Research Ethics Committee of the Faculty of Economic Sciences & IT of the North-West University and received the following ethical clearance number: (ETHICS CLEARANCE NUMBER). The study will be conducted according to the ethical guidelines and principles as prescribed to by the North-West University (www.nwu.ac.za). It might be necessary for the research ethics committee members or relevant authorities to inspect the research records to make sure that we (the researchers) are conducting research in an ethical manner.

Should you have any queries please contact Zandri Dickason at 072 414 4461 or 20800274@nwu.ac.za. Alternatively, you can contact Dr Diana Viljoen at (016) 910-3403, Diana.Viljoen@nwu.ac.za. If you have any concerns or complaints that have not been adequately addressed by the researcher you can contact the chair of the Social and Technological Sciences Research Ethics Committee (Prof Dawid Jordaan) at (016) 910-3260 or Dawid.Jordaan@nwu.ac.za.

SECTION A

Age	16 - 24	1
	25 -34	2
	35 - 49	3
	50+	4

Gender	Male	1
	Female	2

Race	African	1
	White	2
	Coloured	3
	Asian	4
	Other	5

Other:_____

Marital status	Never married	1
	Married	2
	Divorced	3
	Other	4

Other:_____

Nationality	South African	1
	Other	2

Other:_____

What is your home province (if you live in South Africa?)	Gauteng	1
	Kwazulu-Natal	2
	Western Cape	3
	Northern Cape	4
	Eastern Cape	5
	Free State	6
	Mpumalanga	7
	Limpopo	8
	North West	9
	I live outside South Africa	10

What language do you mostly speak at home?	English	1	isiZulu	4	Sepedi	7
	Afrikaans	2	Xitsonga	5	Sesotho	8
	IsiXhosa	3	SiSwati	6	IsiNdebele	9
	Setswana	10	Tshivenda	11	Other	12

What is your annual income?	R100 000 or less	1	R 600 001-700 000	7
	R 100 001-200 000	2	R 700 001-800 000	8
	R 200 001-300 000	3	R 800 001-900 000	9

	R 300 001-400 000	4	R 900 001-R 1 million	10
	R 400 001-500 000	5	R 600 001-700 000	11
	R500 001-600 000	6		

Which of the following statements comes closest to the amount of financial risk that you and your spouse/partner are willing to take when making an investment?	1	Take substantial financial risks expecting to earn substantial returns
	2	Take above average financial risks expecting to earn above average returns
	3	Take average financial risks expecting to earn average returns
	4	Not willing to take any financial risks

Rank the following statements according to their relevance	A	I often make decisions based on my perception/opinion
	B	I often overestimate my investment abilities
	C	I tend to rely on a single piece of information to make investment decisions
	D	I predict market movements accurately
	E	My investment decisions are based only on the most recent information
	F	I would rather hold onto investments with negative returns instead of selling and taking the loss
	G	I regret some of the investment decisions I have taken in the past
	H	When I receive high profit margins, I tend to hold onto investments to receive even higher profit margins
	I	I exercise self-control when making investment decisions

SECTION B

***Indicate the degree to which you* agree or disagree with this statement**

		Strongly disagree	**Disagree**	**Slightly disagree**	**Neither agree nor disagree**	**Slightly agree**	**Agree**	**Strongly agree**
1	In most ways, my life is close to ideal	1	2	3	4	5	6	7
2	The conditions of my life are excellent	1	2	3	4	5	6	7
3	I am satisfied with my life	1	2	3	4	5	6	7
4	So far I have gotten the important things I want in my life	1	2	3	4	5	6	7
5	If I could live my life over I would change almost nothing	1	2	3	4	5	6	7

SECTION C

For each of the following statements, please indicate the likelihood that you would engage in the described activity or behaviour if you were to find yourself in that situation.

		Extremely unlikely	**Moderately Likely**	**Somewhat likely**	**Not sure**	**Somewhat Likely**	**Moderately Likely**	**Extremely Likely**
1	Admitting that your tastes are different from those of a friend	1	2	3	4	5	6	7
2	Going camping in the wilderness	1	2	3	4	5	6	7
3	Betting a day's income at the horse races	1	2	3	4	5	6	7
4	Investing 10% of your annual income in a moderate growth diversified fund	1	2	3	4	5	6	7
5	Taking some questionable deductions on your income tax return	1	2	3	4	5	6	7
6	Disagreeing with an authority figure on a major issue	1	2	3	4	5	6	7
7	Betting a day's income at a high-stake poker game	1	2	3	4	5	6	7
8	Having an affair with a married man/woman	1	2	3	4	5	6	7
9	Passing off somebody else's work as your own	1	2	3	4	5	6	7
10	Going down a ski run that is beyond your ability	1	2	3	4	5	6	7
11	Investing 5% of your annual income in a very speculative stock	1	2	3	4	5	6	7
12	Going whitewater rafting at high water in the spring	1	2	3	4	5	6	7
13	Betting a day's income on the	1	2	3	4	5	6	7

	outcome of a sporting event							
14	Revealing a friend's secret to someone else	1	2	3	4	5	6	7
15	Driving a car without wearing a seat belt	1	2	3	4	5	6	7
16	Investing 10% of your annual income in a new business venture	1	2	3	4	5	6	7
17	Taking a skydiving class	1	2	3	4	5	6	7
18	Riding a motorcycle without a helmet	1	2	3	4	5	6	7
19	Choosing a career that you truly enjoy over a more secure one	1	2	3	4	5	6	7
20	Speaking your mind about an unpopular issue in a meeting at work	1	2	3	4	5	6	7
21	Sunbathing without sunscreen	1	2	3	4	5	6	7
22	Bungee jumping off a tall bridge	1	2	3	4	5	6	7
23	Piloting a small plane	1	2	3	4	5	6	7
24	Walking home alone at night in an unsafe area of town	1	2	3	4	5	6	7
25	Moving to a city far away from your extended family	1	2	3	4	5	6	7
26	Starting a new career in your mid-thirties	1	2	3	4	5	6	7
27	Leaving your young children alone at home while running an errand	1	2	3	4	5	6	7
28	Not returning a wallet you found that contains R200	1	2	3	4	5	6	7

SECTION D

	Indicate the degree to which you agree or disagree with this statement					
		Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
1	It's hard for me to win a bargain/argument	1	2	3	4	5
2	When travelling, I like to take new routes	1	2	3	4	5
3	I like to try new foods, new places and totally new experiences.	1	2	3	4	5
4	When driving a car, I would always obey the traffic rules and avoid dangerous situation	1	2	3	4	5

SECTION E: FINANCIAL RISK

1	When you hear "financial risk", what do you think of?	**Loss** 1	**Uncertainty** 2	**Opportunity** 3	**Adventure** 4

2. How would you describe yourself as a financial risk taker? (E.g. Gambling, investing, saving etc.) (Choose 1 option only)		
1	Willing to take as much risk as possible to get desired profit	
2	Willing to take calculated risks	
3	Cautious	
4	Avoid loss as much as possible	
3. What influences your financial decisions such as saving, spending, investing or loaning money to a friend? (Choose 1 option only)		
1	Personal preferences/comfort/pleasure	
2	Financial return/profit associated with the decision	
3	Financial risk (loss) associated with the decision	
4	Both risk and return	
4. Which situation would make you the happiest?		**(Choose 1 option only)**
1	You win R 5 000 in a competition	
2	You inherit R 5 000 from a rich relative	
3	You earn R 5 000 by risking R 1 000 in an investment	
5. Assume you are to buy a car in the near future, which of the following financing options would you choose? (Choose 1 option only)		
1	Save money and buy an affordable pre-owned car for cash (second hand car)	
2	Borrow money from a friend or relative to buy a good new affordable car **(Note: you can negotiate repayment terms)**	
3	Ask for a loan from a bank or financial institution and pay monthly installments as long as you buy the car of your dreams **(Note: Repayment terms set by bank)**	

SECTION F. SPECULATIVE RISK		
1. Suppose a relative left you an inheritance to the value of R 300 000, however you are required to choose a way in which this inheritance is to be presented to you. Given the following options, which would you choose? (Choose 1 option only)		
1	R300 000 cash	
2	A house worth R300 000	
3	Shares to the value of R 300 000 at a company which is very close to your heart	
2. You have just taken a job at a small fast growing company. After your first year you are offered the following options, which one would you choose? (Choose 1 option only)		
1	A once off bonus of R 300 000	
2	A 3 year employment contract earning R10 000 a month (i.e. It will be R360 000 in 3 years)	
3	Shares in the company to the value of R300 000 with the hope of selling them later at a larger profit	
3. Assume you are in a TV game show or any other game show offering different options, which of the following options would you choose? (Choose 1 option only)		
1	R1 000 in cash	
2	A 50% chance to win R5 000	
3	A 25% chance to win R10 000	
4	A 5% chance to win R100 000	
4. Suppose a company you invested R 3 000 in is about to close down. They offer you the following options (each with 2 possible outcomes) and you can only choose one option, which would you choose? (Choose 1 option only)		
1	Take your R3 000 and loose R0	
2	Possibility of gaining R5 000 or losing your R1 000	
3	Possibility of gaining R8 000 or losing R2 000	
4	Possibility of gaining R12 000 or losing all your R3 000	
SECTION G. INVESTMENT RISK		
1. Should you decide to invest, which of the following options regarding the management of investments would you choose? (Choose 1 option only)		
1	Manage them yourself	
2	Hire a manager	
3	Ask a friend	
2. Should you get employed today on a permanent basis with a Table salary, how much % of your monthly income (after paying for all expenses) would you be interested to invest/save? (Choose 1 option only)		
1	Nothing (0%)	
2	Less than 10%	
3	10%-20%	
4	25%-35%	

5	More than 40%
3. Which of the following investment opportunities do you find appealing? (Choose 1 option only)	
1	60% in low risk with low return, 30% in medium risk with medium return, 10% in high risk with high return
2	30% in low risk with low return, 40% in medium risk with medium return, 30% in high risk with high return
3	10% in low risk with low return, 40% in medium risk with medium return, 50% in high risk with high return
4. If you unexpectedly received R20 000 to INVEST, what would you do? (Choose 1 option only)	
1	Deposit it into a bank account
2	Invest in fixed income investments where you will get low constant returns with minimal risk of loss
3	Invest in shares where it will be exposed to high risk of loss but with high return possibilities
5. As you probably know that investing comes with risks of losing your money. Suppose that you have R 50 000 invested, what % of loss in your investment would make you feel uncomfortable to an extent that you end up withdrawing your money? (Choose 1 option only)	
1	Nothing (0%)
2	Less than 5%
3	5%-15%
4	15%-25%
5	25%-40%
6	More than 40%

THANK YOU

ANNEXURE D: CODING OF THE SCALES

Coding of the scales

Section A			
Question	**Code**	**Construct measured**	**Value**
Question 1	A1	Age	16-24 (1), 25-34 (2), 35-49 (3), 50+ (4)
Question 2	A2	Gender	Male (1), Female (2)
Question 3	A3	Race	African (1), White (2), Coloured (3), Asian (4), Other (5)
Question 4	A4	Marital status	Never married (1), Married (2), Divorced (3), Other (4)
Question 5	A5	Nationality	South African (1), Other (2)
Question 6	A6	Home province	Gauteng (1), Kwazulu-Natal (2), Western Cape (3), Northern Cape (4), Eastern Cape (5), Fee State (6), Mpumalanga (7), Limpopo (8), North West (9), Outside South Africa (10)
Question 7	A7	Home language	English (1), Afrikaans (2), isiXhosa (3), isiZulu (4), Xitsonga (5), siSwati (6), Sepedi (7), Sesotho (8), isiNdebele (9), Setswana (10), Tshivenda (11), Other (12)
Question 8	A8	Annual income	Below R100 000 (1), R100 001 – R200 000 (2), R200 001 – R300 000 (3), R300 001 – R400 000 (4), R400 001 – R500 000 (5), R500 001 – R600 000 (6), R600 001 – R700 000 (7), R700 001 – R800 000 (8), R800 001 – R900 000 (9), R900 001 – R1 million (10), More than R1 million (11)

Question 9	A9	Survey of consumer finances	Take substantial financial risks expecting to earn substantial returns (1), Take above average financial risks expecting to earn above average returns (2), Take average financial risks expecting to earn average returns (3), Not willing to take any financial risks (4)
Question 10	A10	Behavioural finance	Ranking question: • I often make decisions based on my perception/opinion (a) • I often overestimate my investment abilities (b) • I tend to rely on a single piece of information to make investment decisions (c) • I predict market movements accurately (d) • My investment decisions are based only on the most recent information (e) • I would rather hold onto investments with negative returns instead of selling and taking the loss (f) • I regret some of the investment decisions I have taken in the past (g) • When I receive high profit margins, I tend to hold onto investments to receive even higher profit margins (h) • I exercise self-control when making investment decisions (i)
Section B			
Item	**Code**	**Construct measured**	**Value**

Item 1	B1	Satisfaction with life	Strongly disagree (1), Disagree (2), Slightly disagree (3), Neither agree nor disagree (4), Slightly agree (5), Agree (6), Strongly agree (7)
Item 2	B2		
Item 3	B3		
Item 4	B4		
Item 5	B5		
Section C			
Item	**Code**	**Construct measured**	**Value**
Item 1	C1	Dospert	Extremely unlikely (1), Moderately unlikely (2), Somewhat unlikely (3), Not sure (4), Somewhat likely (5), Moderately likely (6), Extremely likely (7)
Item 2	C2		
Item 3	C3		
Item 4	C4		
Item 5	C5		
Item 6	C6		
Item 7	C7		
Item 8	C8		
Item 9	C9		
Item 10	C10		

Item 11	C11
Item 12	C12
Item 13	C13
Item 14	C14
Item 15	C15
Item 16	C16
Item 17	C17
Item 18	C18
Item 19	C19
Item 20	C20
Item 21	C21
Item 22	C22
Item 23	C23
Item 24	C24
Item 25	C25
Item 26	C26
Item 27	C27
Item 28	C28

Section D			
Item	**Code**	**Construct measured**	**Value**

Item 1	D1	Risk tolerance test	Strongly disagree (1), Disagree (2), Neither agree nor disagree (3) Agree (4), Strongly agree (5)
Item 2	D2		
Item 3	D3		
Item 4	D4		
Item 5	D5		
Section E			
Question	**Code**	**Construct measured**	**Value**
Question 1	E1	Financial risk	Loss (1), Uncertainty (2), Opportunity (3), Adventure (4)
Question 2	E2		Willing to take as much risk as possible (1), Willing to take calculated risks (2), Cautious (3), Avoid loss as much as possible (4)
Question 3	E3		Personal preferences/comfort/pleasure (1), Financial return/profit associated with the decision (2), Financial risk (loss) associated with the decision (3), Both risk and return (4)
Question 4	E4		You win R5 000 in a competition (1), You inherit R5 000 from a rich relative (2), You earn R5 000 by risking R1 000 in an investment (3)
Question 5	E5		Save money and buy an affordable pre-owned car for cash – second hand car (1), Borrow money from a friend or relative to buy a good new affordable car – negotiable repayment terms (2), Ask for a loan from a bank or financial institution and pay monthly instalments as

			long as you buy the car of your dreams – repayment terms set by bank (3)
Section F			
Question	**Code**	**Construct measured**	**Value**
Question 1	F1	Speculative risk	R300 000 cash (1), A house worth R300 000 (2), Shares to the value of R300 000 at a company which is very close to your heart (3)
Question 2	F2		A once off bonus of R300 000 (1), A 3 year employment contract earning R10 000 a month – i.e. it will be R360 000 in 3 years (2), Shares in the company to the value of R300 000 with the hope of selling them later at a larger profit (3)
Question 3	F3		R1 000 in cash (1), A 50% chance to win R5 000 (2), A 25% chance to win R10 000 (3), A 5% chance to win R100 000 (4)
Question 4	F4		Take your R3 000 and loose R0 (1), Possibility of gaining R5 000 or losing R1 000 (2), Possibility of gaining R8 000 or losing R2 000 (3), Possibility of gaining R12 000 or losing all your R3 000 (4)
Section G			
Question	**Code**	**Construct measured**	**Value**
Question 1	G1	Investment risk	Manage them yourself (1), Hire a manager (2), Ask a friend (3)
Question 2	G2		Nothing – 0% (1), Less than 10% (2), 10%-20% (3), 25%-35% (4), More than 40% (5)

Question 3	G3		60% in low risk with low return, 30% in medium risk with medium return, 10% in high risk with high return (1), 30% in low risk with low return, 40% in medium risk with medium return, 30% in high risk with high return (2), 10% in low risk with low return, 40% in medium risk with medium return, 50% in high risk with high return (3)
Question 4	G4		Deposit it into a bank account (1), Invest in fixed income investments where you will get low constant returns with minimal risk of loss (2), Invest in shares where it will be exposed to high risk of loss but with high return possibilities (3)
Question 5	G5		Nothing - 0% (1), Less than 5% (2), 5%-15% (3), 15%-25% (4), 25%-40% (5), More than 40% (6)