



# **Modelling financial risk tolerance of female South African investors**

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“Finally.”

**J Lawrenson**

## **DECLARATION**

I declare that:

“MODELLING FINANCIAL RISK TOLERANCE OF FEMALE SOUTH AFRICAN INVESTORS”

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 thesis has not previously been submitted by me for a degree at any other university.

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J Lawrenson

November 2019

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To whom it may concern

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Doctor of Philosophy in Risk Management

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***Modelling financial risk tolerance of female South African investors***

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

Yours truly,



Linda Scott

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## ABSTRACT

**Keywords:** gender, investors, level of education, personality traits, risk tolerance, secondary data analysis, structural equation modelling

The general consensus is that investors display inconsistent financial risk-taking behaviour based on their gender. Literature suggest that female investors are less risk-tolerant than their male counterparts. The investor's ability to take on risk stems from the knowledge of their degree of financial risk tolerance. Risk tolerance refers to the degree of uncertainty an investor is willing to bear in terms of the investments they make. Risk tolerance can be influenced by both demographical factors as well as cognitive/ emotional factors. Demographical factors typically include the investor's age, race, marital status etcetera; whereas, cognitive factors typically refer to the investor's personality traits.

The primary objective of this study was to develop a model based on individual risk tolerance, for female South African investors, in order for investment firms to measure, more accurately, their investors' risk profiles. Six empirical objectives were formulated, where the first three objectives focussed on the entire sample. Thereafter, the remaining three objectives focussed only on the female portion of the sample, in order to conduct the structural equation model for female investors. A comprehensive literature review was conducted in order to support the empirical analysis of this study. The literature review covered risk and its inherent elements including risk tolerance and the factors affecting risk tolerance. A comprehensive review of personality traits and the factors influencing investors' personality traits was also conducted. The literature review was followed by a methodological chapter highlighting the methodological underpinnings of this study.

This study followed the views of the positivist research paradigm, where a Thereafter, a secondary data analysis (SDA) technique was implemented. The target population for this study was investors who held formal investments at an investment firm in South Africa. The research instrument constituted a self-administered questionnaire which was electronically distributed to 4 800 of the investment firm's clientele. The investment firm implemented a purposive sampling technique in order to ensure an

unbiased sample. The sample size constituted 1 065 investors of which 469 were male and 596 were female investors.

In terms of the investors' demographic variables, results obtained indicated that investors' demographic variables differ significantly based on their gender. With regard to investors' personality traits, investors were more inclined to be more extraverted and open to new experiences. Furthermore, investors indicated that they were less inclined to be agreeable and emotional. Additionally, investors were more concerned with being risk averse than considering the time horizons of the investments they make. Moreover, investors also displayed average levels of financial risk tolerance. Results obtained suggests that investors' gender significantly influenced their level of risk tolerance.

Results indicated that the investor's level of education also significantly influenced their level of risk tolerance. Investors with lower levels of education indicated higher levels of risk tolerance; whereas, investors with higher levels of education indicated lower levels of risk tolerance. Additionally, the results obtained were utilised to develop a model to aid in investment firms' efforts to profile their female investors more accurately. The model constituted the investor's personality traits, level of risk tolerance and level of education. By making use of this model, investment firms can suggest or even create suitable investment vehicles tailored to the needs of their female clientele.

Like most other research studies, this study was faced with limitations of its own. Future researchers should consider expanding the sampling frame and sampling size, in order to obtain a more holistic sample. Furthermore, as investors tend to display irrational investment behaviour, researchers should consider developing a model to curb such behaviour.

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## LIST OF ABBREVIATIONS

ANOVA	:	Analysis of Variance
CFA	:	Confirmatory Factor Analysis
CFI	:	Comparative Fit Index
CMIN/DF	:	Chi square value divided by degrees of freedom
GL-RTS	:	Grable and Lytton 13-item Risk Tolerance Scale
RMSEA	:	Root Mean Square Error of Approximation
SCF	:	Survey of Consumer Finances
SDA	:	Secondary Data Analysis
SEM	:	Structural Equation Modelling
SPSS	:	IBM Statistical Package for Social Sciences

## CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

### 1.1 INTRODUCTION

Understanding individual investment behaviour is a key factor in the financial market (Pereira da Silva, 2012). Financial markets encompass various risks in terms of investments as well as individual investment decisions. The most prevalent risk encountered in financial markets is financial risk (Robb & Woodyard, 2011:60). Dohmen *et al.* (2005:1) contend that risk includes a certain amount of uncertainty, as well as being the main driver in the financial decision-making process of an investor. Investors display inconsistent financial risk-taking behaviour across gender (Borden *et al.*, 2008:25). It is widely recognised that female investors are less prone to participate in risk-taking behaviours than their male counterparts are (Bajtelsmit & Bernasek, 1996:1; Gustafson, 1998:805; Jianakoplos & Bernasek, 1998:620; Booth & Nolen, 2012:57; Cárdenas *et al.*, 2012:11). A key argument in various research studies emphasises the statement that males and females perceive risk-taking different to one another (Gustafson, 1998:805; Dohmen *et al.*, 2005:1; Harris *et al.*, 2006:49; Watson & McNaughton, 2007:52).

An individual's inclination to take part in risk-related behaviour stems from his/ her ability to make financial decisions as well as his/ her understanding of financial knowledge (Hallahan *et al.*, 2003:484; Lusardi, 2008). Risk-taking behaviour is described as the action of an individual taking part in an activity where the result could be either positive or negative (Boyer, 2006:291). One of the major contributors to understanding an individual's risk-taking behaviour is his/ her level of financial risk tolerance, which is impacted by economic factors and policies (Robb & Woodyard, 2011:60). However, the individual is still in charge of making his/her financial decisions (Robb & Woodyard, 2011:60).

Risk tolerance is described as the willingness of an individual to take part in behaviours where the outcomes are uncertain, but also accompanied by the possibility of a negative result (Grable, 2000:625; Grable & Joo, 2004:142). An individual's level of risk tolerance encompasses the degree to which they are willing to accept uncertainty (Grable, 2016:19). Risk tolerance can be influenced by various demographical factors

such as gender, age, level of income, occupation and marital status (Grable, 2000:626).

Weller and Tikir (2010:118) advocate that it is important to recognise the influence personality types have on the individual's decision-making processes. Individuals frequently display unpredictable responses to risks across varied domains and situations (Schoemaker, 1990:1452; Weller & Tikir, 2010:118). Moreover, unpredictable responses are frequently displayed by individuals regarding risk-taking behaviours in different situations and personality domains (Powell & Ansic, 1997:606).

The debate of risk tolerance being part of a personality domain has undertaken a similar expansion to that of personality traits in general (Blais & Weber, 2006:33). In terms of personality traits relating to risk-taking behaviour Harris *et al.* (2006:49); Weller and Tikir (2010:118) argue that the tendency of female's risk aversion could be accredited to the propensity of making decisions based on emotion.

Furthermore, other factors could include that females are emotionally upset to a greater extent by a negative outcome (Harris *et al.*, 2006:49). Fisher and Yao (2017:92) argue that a female's financial risk tolerance should be measured more reliably and accurately, as current measures are not sufficient in determining female financial risk tolerance levels. According to Harris *et al.* (2006:49), only a few studies provide reasoning for the degree of female risk aversion and none in the South African context.

## **1.2 PROBLEM STATEMENT**

In terms of an individual's level of risk tolerance, the literature suggests that female risk takers are inclined to take fewer risks than their male counterparts are willing to take (Jianakoplos & Bernasek, 1998:620; Dwyer *et al.*, 2002:151; Vlaev *et al.*, 2010:1376; Charness & Gneezy, 2011:50; Hardies *et al.*, 2013:442). Skaperdas and Gan (1995:952) contend that an individual's risk-taking behaviour will vary in a contest setting, based on the individual's gender. Thus, it is generally known that male participants hold a higher level of risk appetite than that of their female counterparts (Skaperdas & Gan, 1995:952). It is also commonly found that male participants are inclined to take greater risks for receiving greater returns (Watson & McNaughton, 2007:52). Byrnes *et al.* (1999:367) summarise that female participants are generally

more risk-averse than their male counterparts, after analysing 150 studies from 1967 to 1997. This female risk-aversion pattern is also common in the financial markets (Schubert *et al.*, 1999:383).

In the financial markets, it is frequently found that females display risk-averse behaviour with regards to investment behaviour and/or financial decision-making processes (Schubert *et al.*, 1999:383). In the South African context, previous research indicates that South Africa conforms to the literature stereotype of female risk aversion (Lawrenson, 2017). To aid this phenomenon, Brick *et al.* (2012:133) in a study titled “Risk Aversion: Experimental Evidence From South African Fishing Communities” states that in the sample used, female participants were more risk averse than their male counterparts. In the study titled “Resolving Risk? Marriage and Creative Conjugality”, Jackson (2007:107) obtained similar results.

In general, females are perceived to be nurturers and not the traditional providers of households (McKenzie, 2011). Thus, it can be concluded that females are underrepresented and disadvantaged regarding their investment behaviour. This underrepresentation creates room for a model to be created in order to enhance female investment participation. In order for female investors to break free from the literature stereotype and to improve their participation in investment activities, they will need a better understanding of their level of risk tolerance. Furthermore, for investment firms to profile their investors accurately, they will need an accurate measurement of female risk tolerance levels along with their influential personality traits. As such, the main purpose of this study is to determine the differences in personality traits relating to female risk tolerant behaviour in a South African context. Furthermore, the purpose of the study includes the creation of a structural equation model (SEM), identifying female investment behaviour with regards to personality type, risk tolerance level and level of education.

### **1.3 OBJECTIVES OF THE STUDY**

The objectives of the study constitute primary, theoretical and empirical objectives. The objectives were formulated as follows:

### **1.3.1 Primary objective**

The primary objective of this study was to develop a model based on individual risk tolerance, for female South African investors, in order for investment firms to measure, more accurately, their investors' risk profiles.

### **1.3.2 Theoretical objectives**

In order to achieve the primary objective formulated for the study, the following theoretical objectives were formulated:

- Conduct a theoretical analysis of financial risk tolerance;
- Construct a theoretical framework for female risk tolerant behaviour;
- Construct a theoretical framework for different personality traits; and
- Contextualise a theoretical framework for female investor behaviour.

### **1.3.3 Empirical objectives**

In order to achieve the primary objective of the study, the following empirical objectives were formulated:

- Analyse demographic variables according to gender;
- Identify the various personality traits of the sample;
- Determine the risk tolerance levels for the sample;
- Identify the effect of gender on the sample in terms of the sample's risk tolerance levels;
- Determine the relationship between level of education and level of risk tolerance; and
- Develop a model to measure female investors' risk profile, considering personality traits, risk tolerance levels and level of education.

## **1.4 RESEARCH DESIGN AND METHODOLOGY**

This study constituted a literature review as well as an empirical study and will followed a quantitative research design. A research design is defined as the entire research method, including the research problem, a literature review, the research methodology as well as conclusions drawn from the results obtained (Conrad & Serlin, 2011:147).

The research study followed a positivistic paradigm as it constitutes the use of scientific approaches to measuring the phenomenon under investigation (de Vos *et al.*, 2011:6). Furthermore, the positivist paradigm allows for the generalisation of results obtained and also constitutes the true value of the phenomenon under investigation (Mack, 2010:6). Moreover, this study employed a secondary data analysis (SDA) technique on the data obtained. A SDA technique refers to the analysis of an existing data set in order to answer the research question presented (Glass, 1976:3).

#### **1.4.1 Literature review**

The literature section of this study was aimed at supporting the empirical portion of this study. The literature section focussed on female risk tolerant behaviour in the South African context, personality measures as well as the level of education influencing female risk tolerant behaviour. Relevant journal articles, textbooks, the Internet and academic sources were used to gather information for the literature portion of this study.

#### **1.4.2 Empirical study**

The empirical section of this study was supported by the literature section and constituted the following methodological subsections:

##### **1.4.2.1 Target population, sampling frame and sample size**

The identified target population for this study was investors of an investment firm in South Africa. The target population was a representative sample of the South African context, as participants reside in all nine provinces of the country. The sampling frame constituted a purposeful sample of a reputable investment firm in South Africa, constituting only female investors. A secondary data set was received from an investment firm in South Africa, which acquires funds from investors and delivers professional management services.

The choice of female South African investors to be included in the research study was based on the predetermined criteria of investors being female; however, the investors from the investment firm were selected at random, in order to obtain an unbiased

sample. The specific investment firm in South Africa was chosen because they are one of the major investment firms in the country (de Vos, 2017). For the purpose of this study, investors from the investment firm are individuals who currently possess some form of formal investment product at the specific firm.

In terms of the sample size, the secondary data set constituted 1 065 investors of which 596 were female investors. The majority of the sample indicated that they are currently married, in addition, the majority of the sample indicated they possess some form of higher education. An electronic questionnaire was distributed to 4 800 investors; the investment firm received 1 065 responses back from their clientele. The survey was conducted during the month of May 2018 and responses were returned in the same month. The secondary data set constituted several demographical characteristics of the sample. The average age of the sample was 35-50+ years for male investors and 35-49 years for female investors. In terms of ethnicity, the average investor was white and married, constituting an annual income of R100 001 – R300 000. The average level of education ranged from a diploma to an honour's degree, for the sample.

The questionnaire encompassed seven sections, namely A: Demographics, B: Financial well-being, risk tolerance and the survey of consumer finances (SCF), C: Behavioural finance, D: Subjective well-being, E: Personality measures, and F: Physical well-being. For the purpose of this study, several demographical questions were included in the questionnaire in order to avoid a biased sample, as well as to be able to generalise findings for the South African context. Furthermore, only three sections of the questionnaire will be utilised for the SDA and will be discussed in the following sections.

#### **1.4.2.2 Measuring instrument and data collection method**

The primary data for this research study were collected by means of a self-administered questionnaire. A self-administered questionnaire refers to the individual receiving the questionnaire and completing it without any support from the researcher (Cant *et al.*, 2008). All the measuring instruments used in the questionnaire have been previously validated. The questionnaire constituted the following sections:

- **Demographic information**

Demographic information refers to the characteristics of the sample population under investigation (Kolb, 2008). These characteristics typically include age, race, gender, marital status etcetera. The questionnaire used in this study included the following demographic characteristics: age, gender, race, marital status, annual income, home province and highest level of education.

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

The SCF is a periodical statistical survey constituting balance sheets, pension income and demographic characteristics of investors (Hanna *et al.*, 2008:98). For the purpose of this study, only one item from the SCF will be used. The use of the single risk tolerance measure item from the SCF has been previously validated (Grable & Lytton, 2001:43). Individuals will indicate the chosen option that suits their level of risk tolerance (Grable & Lytton, 2001:43; Gilliam *et al.*, 2010:31), thereby, measuring an individual's level of risk tolerance by means of a single question.

- **Grable and Lytton 13-item risk-tolerance scale (GL-RTS)**

The GL-RTS measures financial risk tolerance in order to manage individuals' financial decision-making processes in terms of reaching their financial goals (Gilliam *et al.*, 2010:32). The GL-RTS has been previously validated and is being used worldwide by financial advisors, educators, academics as well as researchers (Kuzniak *et al.*, 2015:178).

- **Personality measures**

The personality measure assessment used in this study is based on the big five personality domains. This scale assesses individual personality traits in five main domains, namely: (i) neuroticism, (ii) extraversion, (iii) openness to experience, (iv) agreeableness, and (v) conscientiousness (Gosling *et al.*, 2003:506; Rothmann & Coetzer, 2003:69; Mayfield *et al.*, 2008:220). The personality measures include three subscales, namely risk aversion, short-term investment decisions and long-term investment decisions.

The questionnaire was electronically distributed to an investment firm in South Africa, where the investment firm then redistributed the questionnaire onto a database used

to communicate electronically with clients. Before distribution to investors, the questionnaire was reviewed to ensure that it contained no errors.

### **1.4.2.3 Statistical analysis**

Statistical analysis will be conducted by means of a SDA technique. The statistical analysis will be conducted by North-West University's Statistical Consultation Services. The quantitative data will be re-analysed using the IBM Statistical Package for Social Sciences™ (SPSS), version 25 and IBM SPSS Amos™, version 25 (IBM SPSS, 2018). The following procedures will be included in the analysis, namely descriptive statistics as well as inferential statistics. Descriptive statistics is only applied to the participants of a sample from which data have been collected (Urdan, 2011:2). Inferential statistics refer to the use of sample data to reach a conclusion of some sort regarding the characteristics of the population (Urdan, 2011:2). Descriptive statistics will constitute percentages, means and standard deviations for the entire sample. Inferential statistics will constitute correlations and structural equation modelling (SEM) for the sample.

For the purpose of this study, a statistical comparison will be made between male investors and female investors. Thereafter, the construction of the SEM will follow. The following subsections provide a brief description of the statistical techniques to be employed in order to achieve the research objectives.

- **Descriptive statistics**

Descriptive statistics are employed to describe the features of the sample (Pallant, 2016:53). These include several statistical techniques, which are employed to organise, summarise and interpret data meaningfully (Churchill & Brown, 2004:545). Descriptive statistics mainly make use of the data set's mean and the standard deviation (Pallant, 2016:53).

- **Frequencies**

Frequency refers to the number of observations forming part of a certain category (Johnson & Bhattacharyya, 2010:24). Normally, frequencies are presented in a

frequency distribution, or by means of a histogram (Johnson & Bhattacharyya, 2010:24; Weiss, 2012:54).

- **T-test statistics**

A t-test is defined as an analysis technique employed to determine the differences between two population means with unknown variances (Hair *et al.*, 2013:288). This analysis technique incorporates a t-statistic, t-distribution as well as degrees of freedom between the two populations (Hair *et al.*, 2013:288).

- **Correlational analysis**

Correlational analysis refers to the degree to which a change in one variable is related to a change in another variable (McDaniel & Gates, 2001:254). A correlation coefficient ranges from -1 to +1 (Zikmund *et al.*, 2013:465). A value within the range of zero to one indicates a positive relationship, whereas, a value within the range of -1 and zero indicates a negative relationship (Zikmund *et al.*, 2013:465).

- **Reliability analysis**

Reliability refers to the consistency of the research results obtained over some period of time as well as the accuracy with which it signifies from the population being studied (Golafshani, 2003:598; Pietersen & Maree, 2007:215). A high level of reliability is attained when the measuring instrument shows equivalent results in the event of the research being repeated on the exact same sample (Maree & Pietersen, 2007a:147).

- **Confirmatory factor analysis (CFA)**

Factor analysis is a general term used to symbolise a group of procedures, which is primarily used for data reduction and data summarisation (Hair *et al.*, 2013). CFA is a type of SEM technique, which specifically deals with measurement models (Brown & Moore, 2012:2). CFA constitutes the relations among observed measures and inherent variables (Brown & Moore, 2012:2).

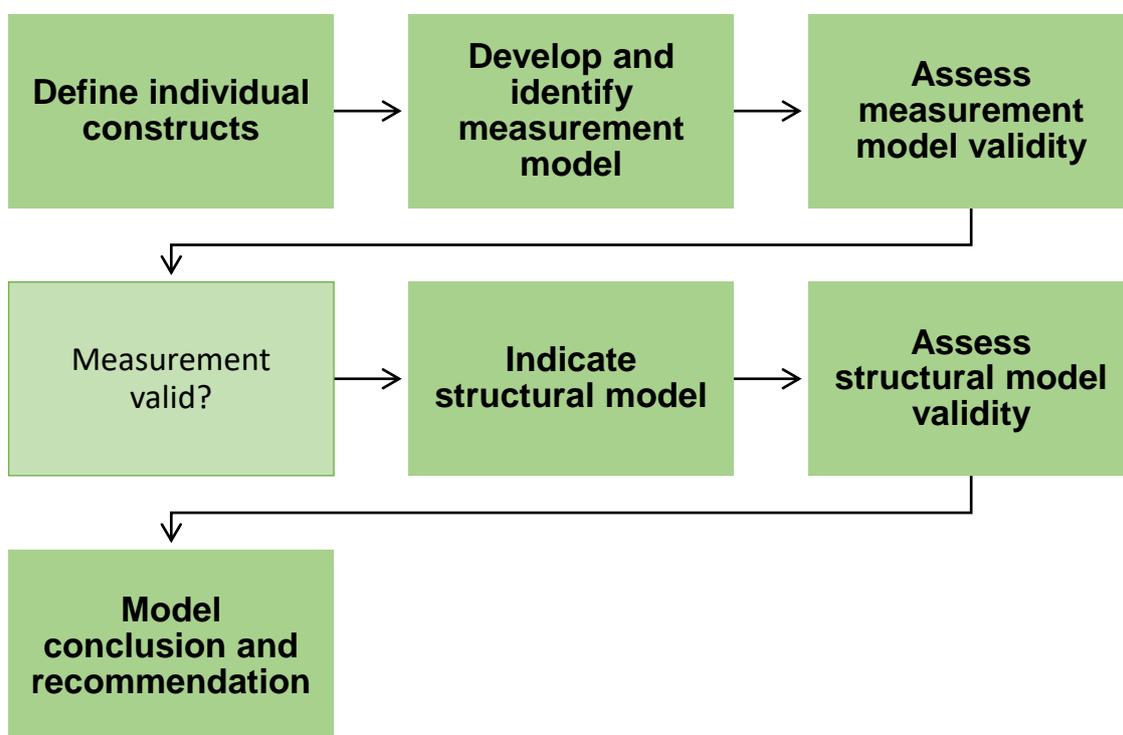
- **Analysis of variance (ANOVA)**

The ANOVA is a statistical technique used to test a hypothesis of no difference between different population means in a sample (Bradley, 2010:322). The main

objective of ANOVA is to determine whether various independent variables will have a substantial influence on a dependent variable (Parasuraman, 1991:736).

- **Structural equation model (SEM)**

SEM is a group of different statistical techniques seeking to explain relationships amongst several variables (Hair *et al.*, 2010:634). SEM holds the ability to study a series of dependent relationships at the same time, while also examining several dependent variables (Shook *et al.*, 2004:397). Figure 1 illustrates the six-stage process of SEM.



**Figure 1.1: The six-stage process of SEM**

Source: Hair *et al.* (2010:654); Malhotra (2010:729)

#### 1.4.2.3.1 Statistical techniques to be employed in order to achieve research objectives

The statistical techniques to be employed for the secondary data analysis are set out in Table 1 below. Each objective is identified along with the appropriate techniques to be employed.

**Table 1.1: Statistical techniques to be employed**

	<b>Objective</b>	<b>Statistical analysis technique</b>
<b>1</b>	Analyse demographic variables according to gender.	Descriptive statistics
<b>2</b>	Identify the various personality traits of the sample.	Descriptive statistics Reliability analysis CFA
<b>3</b>	Determine the risk tolerance levels for the sample.	Reliability analysis CFA ANOVA
<b>4</b>	Identify the effect of gender on the sample in terms of the sample's risk tolerance levels.	T-test
<b>5</b>	Determine the relationship between level of education and level of risk tolerance for the sample.	Frequency table Correlations
<b>6</b>	Develop a model to measure female investors' risk profile, considering personality traits, risk tolerance levels and level of education.	Correlation SEM

Source: Author compilation

## **1.5 ETHICAL CONSIDERATIONS**

This research study will conform to the ethical standards of academic research as prescribed by the North-West University (NWU, 2016:15). The required permission to perform the study was obtained from the relevant investment company involved. As this study will be a SDA, ethical clearance was sought from the Economic and Management Sciences Research Ethics Committee, with an ethics clearance number of NWU-0082-19A4. The researcher has no knowledge of the client database of the relevant investment firm, as the company performed the screening of the participants. Therefore, the anonymity of the participants is guaranteed.

No identifying marks were present on the documents received back from the relevant investment firm. The researcher only received raw data from the relevant investment firm. The investment firm ensured confidentiality by providing only the raw data to the researcher, thus the researcher has no knowledge of the investors forming part of the

study. The investment firm that collected the data indicated no concerns for publications from the data obtained, as long as the firm is not mentioned in any way.

## **1.6 CONTRIBUTION OF THE RESEARCH**

This research study contributes to the field of risk management in two specific areas. The first area of contribution is attributed to a contribution to the literature. The results obtained from this study contributed to the existing literature available on female risk tolerant behaviour by means of a framework. Furthermore, the research contributed to the literature focusing on female investment behaviour, also by means of a framework.

The second area of contribution is attributed to a contribution by means of a SEM development. The development of this SEM is aimed at identifying the personality traits of female investors, along with their degree of risk tolerance, as well as their level of education, in order to identify what type of investment decisions female investors will make in the long- and/or short run. Finally, the development of this risk tolerance SEM is unique in its existence, as there is currently no such model incorporating personality traits, risk tolerance levels and the investor's level of education, as well as in the South African context.

## **1.7 CHAPTER CLASSIFICATION**

This study will constitute the following six chapters:

### **Chapter 1: Introduction and background to the study**

Chapter 1 aims to introduce the research topic, along with relevant background information relative to the research topic. This chapter will comprise the problem statement as well as the objectives of the study.

### **Chapter 2: Theoretical analysis of risk tolerance**

Chapter 2 will provide a theoretical framework for risk tolerance and risk-tolerant behaviour of female investors in the South African context. Factors influencing risk-tolerant behaviour will also be discussed.

### **Chapter 3: Theoretical analysis of personality measures**

Chapter 3 serves to provide a theoretical framework of the personality measures influencing individual risk-tolerant behaviour. This chapter will also provide an overview of the various personality factors influencing female risk-tolerant behaviour.

### **Chapter 4: Research design and methodology**

Chapter 4 serves to provide an overview of the methodological process of the SDA technique. The target population, sampling frame, sample method and sample size will be described. The data collection method, as well as the data collection instrument, will be explained. Furthermore, the empirical analysis section will be explained.

### **Chapter 5: Analysis and interpretation of empirical results**

Chapter 5 serves to present the findings obtained through the relevant statistical analysis techniques employed. This chapter will also discuss and present the findings of the SEM that was conducted.

### **Chapter 6: Conclusion, recommendations and limitations of the study**

Chapter 6 serves to provide a summary of the research study along with a conclusion, which will be grounded on the results obtained from the research study. Thereafter, the contribution to the field of study will be presented and possible recommendations will be made based on the results obtained from the research study.

## CHAPTER 2: THEORETICAL ANALYSIS OF RISK TOLERANCE

### 2.1 INTRODUCTION

In an ever-changing economy, investors often need to make different investment decisions, involving some form of risk. In its most simple form, risk is described as uncertainty (Head, 1967:205). In general, risk is divided into three categories of investor risk-taking behaviour, namely (i) risk-seeking, (ii) risk neutral, and (iii) risk averse individuals. Investors displaying risk-seeking behaviour normally prefer higher risks and would also sacrifice expected returns in order to increase their returns (March & Shapira, 1987:1406). Investors who are risk neutral are indefinite in choosing investment options (Gai & Vause, 2005); whereas, investors with risk averse behaviour normally prefer a definite risk option over a riskier option with an uncertain outcome (Paulsen *et al.*, 2012:1).

Investor risk-taking behaviour is predisposed by various factors. One of the major influencers of risk-taking is an investor's level of financial risk tolerance. Financial risk tolerance refers to the degree of uncertainty an investor is willing to take on (Grable, 2016:19). In the literature, it is assumed that financial risk tolerance is a key component in determining an investor's asset allocation selections, investor goal planning approaches as well as the security choices the investor makes (Fisher & Yao, 2017:192). Financial risk tolerance grew to be an important concept for the financial market and is commonly studied by policymakers, researchers and practitioners (Fisher & Yao, 2017:192).

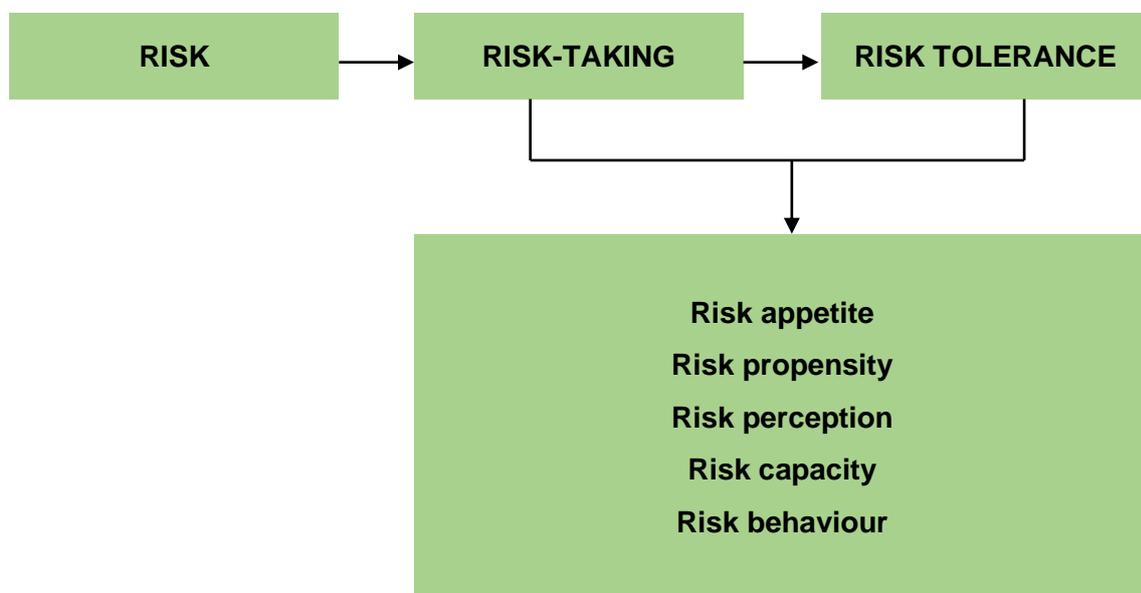
Some researchers argue that it is generally difficult to account for investor risk tolerance levels accurately (Trone *et al.*, 1996; Grable & Joo, 2004:73; Dickason & Ferreira, 2018:10853; Hemrajani & Sharma, 2018:32). It is argued that the accurate measurement of investor risk tolerance presents a challenge based on the notion that risk tolerance is subjectively present in the financial decision-making process (Dickason & Ferreira, 2018:10853). Two main methods of measuring investor risk tolerance levels exist (Yao & Hanna, 2005). The first is by means of a survey and the second by means of behavioural analysis.

The purpose of this chapter is to achieve the following theoretical objectives, namely (i) *construct a theoretical analysis of financial risk tolerance*, (ii) *construct a theoretical*

*framework for female risk-tolerant behaviour, and (iii) contextualise a theoretical framework for female investor behaviour.* As such, the first section of this chapter will focus on risk and the link with risk tolerance, along with the inherent elements thereof. Factors influencing investor risk tolerance levels will also be presented. Thereafter, an extensive literature review on different risk tolerance studies will be presented. Finally, the relationship between investor risk tolerance and investment behaviour will be discussed in detail.

## 2.2 RISK AND RISK TOLERANCE: INHERENT ELEMENTS

Research on investor risk tolerance and risk-taking behaviour has become progressively important in the financial market. Investors are constantly faced with decisions they need to make, in terms of their financial situation. These decisions encompass a certain level of risk the investor is either comfortable taking or not (Figner & Weber, 2011:211). Risk-taking behaviour is an inherent element of risk in general. It is also one of the main factors of risk with investor risk tolerance forming part of it. Thus, before one can fully understand investor risk tolerance, risk-taking and its inherent elements should be considered and explained first. These inherent elements are displayed in the following figure and will be discussed in the sections to follow.



**Figure 2.1: Risk and its inherent elements**

Source: Author compilation

### 2.2.1 Risk defined

Even though risk has been widely studied, there is no single accepted definition thereof (Aven & Renn, 2009). It is argued that the definition controversy could be attributed to the disagreement of the measurement of risk and what it entails (Blume, 1971:1). The following table provides the most commonly accepted definitions of risk. These definitions were obtained from relevant textbooks and accredited academic journals.

**Table 2.1: Definitions of risk**

<b>Publication/ Publisher</b>	<b>Year</b>	<b>Accreditation</b>	<b>Authors</b>	<b>Definition</b>
The Journal of Risk and Insurance	1967	Accredited	Head	Risk is based on an event and the outcome of the event is uncertain.
Harvard University Press	1995	Book	Graham & Wiener	Risk is defined as the likelihood of a negative outcome resulting from participating in an event.
Mathematical finance	1999	Accredited	Artzner, Delbean, Eber & Heath	Risk is defined as the variation in the value of an investment, measured between two or more different dates.
Frontiers in Psychology	2012	Accredited	Paulsen, Platt, Huettel & Brannon	Risk is the hesitant behaviour of someone to take part in an event, where the probable result is negative.

Source: Author compilation

The following table provides definitions for financial risk, distinguishing it from risk in general. These definitions were obtained from relevant accredited academic journals as well as textbooks.

**Table 2.2: Definitions of financial risk**

<b>Publication/ Publisher</b>	<b>Year</b>	<b>Accreditation</b>	<b>Authors</b>	<b>Definition</b>
Journal of Consumer Research	1994	Accredited	Grewal, Gotlieb, & Marmorstein	Financial risk is defined as the possible monetary amount affiliated with making a purchase.
Van Schaik Publishers	2013	Book	Mpofu, De Beer, Mynhardt, & Nortje	Financial risk is the amount of financial leverage a firm employ.
Van Schaik Publishers	2013	Book	Mpofu, De Beer, Mynhardt, & Nortje	Financial risk is defined as the likelihood of experiencing an event where the outcome is either positive or negative.

Source: Author compilation

### **2.2.2 Risk-taking**

Risk-taking is defined as voluntarily engaging in an event where the outcome of the event could either be positive or negative (Boyer, 2006:291). Risk-taking encompasses positive and negative results simultaneously (Reniers *et al.*, 2016:1). The literature suggests that younger investors tend to engage more in risk-taking behaviour than older investors (Coggan *et al.*, 1997:459). Galombos and Tilton-Weaver (1989:9) suggest that various factors such as age, gender and cultural differences influence an investor's decision to take part in risk-related behaviour.

### **2.2.3 Risk appetite**

The amount of risk an investor is willing to bear can be described by his/ her risk appetite. Risk appetite is defined as the level of risk an investor is willing to bear when facing an uncertain result (Gai & Vause, 2005:5). Furthermore, expanding on the basic definition of risk appetite, it can be added that the risk the investor is willing to bear is taken with the aim of receiving a return for said risk (KPMG, 2008). Researchers suggest that an investor's level of risk appetite stems from his/ her decision-making processes between risky investments/ choices and an exchange between his/ her

levels of fear and hope (Harris *et al.*, 2006:50). Risk appetite consists of three sub-categories, namely (i) risk-averse, (ii) risk-neutral, and (iii) risk-seeking.

Risk-averse behaviour is known as the probability of an investor to prefer less risk over riskier options (Paulsen *et al.*, 2012:1). Studies indicate that as investors age, their risk aversion progresses (Levin *et al.*, 2007; Weller *et al.*, 2010; Paulsen *et al.*, 2012). Risk-neutral behaviour refers to the investor who is not avoiding risks, nor seeking risks. They are indifferent to the results of the risks they take (Gai & Vause, 2005). Furthermore, risk-seeking investors are investors who are believed to prefer risks in their investment decision-making processes (Scholer *et al.*, 2010:216). Generally, an investor's hope of a possible gain increases his/ her risk-seeking behaviour (Page *et al.*, 2012:15).

An investor's level of risk appetite is influenced by various factors such as suffering a financial loss (Scholer *et al.*, 2010:216), an investor's time span (Paulsen *et al.*, 2012), and the risk-return trade-off (Concina, 2014). In terms of finances, risk appetite could refer to an investor's inclination of holding riskier assets in his/ her investment portfolio (Gai & Vause, 2005). The literature suggests that the term risk appetite, along with the terms risk capacity, risk tolerance, and risk propensity is to be used interchangeably (Gai & Vause, 2005). However, these terms slightly differ in meaning and are also not used interchangeably in this study.

#### **2.2.4 Risk propensity**

Risk propensity is defined as the inclination of investors to either participate or avoid participating in events constituting some form of risk (Kogan & Wallach, 1964; Keil *et al.*, 2000:146; Dickason, 2018:23). Research suggests that risk propensity is mainly based on three factors, namely (i) an investor's behaviour in a riskier situation, (ii) exposed risk attitudes in a riskier situation, and (iii) an investor's self-reported attitudes (Dickason, 2018:24). Furthermore, risk propensity is the level of risk the investor is prepared to take with regards to the risk of a loss (Dickason, 2018:24).

Harrison *et al.* (2005:1386) conducted a methodical review of risk propensity measurements in their study titled "Is it worth the risk? A systematic review of instruments that measure risk propensity for use in the health setting". Their results indicate that the most common measurement for risk propensity was by means of a

Likert scale. These instruments include, but are not limited to, a risk propensity questionnaire, a risk propensity scale and the sensation-seeking scale (Harrison *et al.*, 2005:1391). Furthermore, risk propensity is argued to be part of an investor's personality traits based on his/ her decision-making processes (Harrison *et al.*, 2005; Dickason, 2018).

### **2.2.5 Risk perception**

Risk perception refers to the investor's evaluation of the likelihood that an event will happen, along with concerns for consequences of the event taking place (Lawrenson, 2017:18). Furthermore, risk perception also refers to subjective decisions an investor makes concerning the factors and severity of the event taking place (Masenya, 2018:24). For the purpose of this study, risk perception is defined as the manner in which an investor observes risks concerning investment decisions.

Risk perception is directly linked to investor risk tolerance, where uncertainty is a major contributor to the investor's decision-making process. Uncertainty can influence an investor's decision-making in terms of investments and could lead to either reaching or failing to reach individual investment goals (Dickason, 2018). Furthermore, Dickason (2018:24) states that risk perception encompasses two main factors influencing the investor's risk perception. The first factor refers to *unknown risks*. This suggests that the investor is unaware of the unfamiliar risks, which might have negative consequences. The second factor refers to *dreaded risk*. This suggests that a dreaded risk, which is uncontrollable, could have disastrous results for the investor.

### **2.2.6 Risk capacity**

Goldstein and McElligott (2014:4) define risk capacity as the financial attitude of an investor to incur risks and it is dependent on the level as well as the type of risk the investor is willing to bear. Furthermore, risk capacity refers to the investor's ability to manage losses they have suffered (Dickason, 2018:29). Risk capacity also means that there is variance between the market value of the investor's investments and the value of liabilities, such as insurance.

### **2.2.7 Risk behaviour**

Risk behaviour is the voluntary participation in risk-related activities, where the outcome of the activity is either positive or negative (Reniers *et al.*, 2016:1). It is suggested in the literature that younger investors are more inclined to participate in risk behaviour (Coggan *et al.*, 1997:459). Researchers, such as Galombos and Tilton-Weaver (1989:9), argue that an investor's inclination to participate in risk behaviour is influenced by his/ her personal circumstances.

Other researchers, such as Cárdenas *et al.* (2012:22), contribute to this statement by arguing that an investor's social environment, along with his/ her culture, will also influence his/ her risk behaviour. Furthermore, the literature suggests that several other factors influence an investor's risk behaviour; these include gender (Galombos & Tilton-Weaver, 1989), personality traits (Mishra & Lalumière, 2011), risk appetite (Hillson & Murray-Webster, 2011), and loss versus gain sensitivity (Pachur & Kellen, 2012).

Along with the inherent risk elements discussed above, another element, namely risk profiling is crucial to consider as an element of risk. The importance of risk profiling stems from financial institutions' ability to profile their investors accurately in terms of their level of risk tolerance. The following section will provide an overview of risk profiling along with its importance.

### **2.2.8 Risk profiling**

Researchers such as Nobre and Grable (2015) state that a major factor in the successful implementation of investors' financial strategy is understanding the effect their level of risk tolerance has on their risk profile. Brayman *et al.* (2017:72) define risk profiling as the combination of an investor's subjective and objective characteristics, which financial advisors need to consider when aiding investors in their investment decision-making processes. Objective characteristics are characteristics that can be measured in a quantitative manner. These include time span and the investor's ability to suffer a loss (Brayman *et al.*, 2017:72). Subjective characteristics are typically factors such as risk perception and risk preference.

Furthermore, academics, researchers and practitioners tend to agree that risk profiling suitability primarily stems from the investor's characteristics instead of investment product features (Klement, 2015:2). Risk profiles are generally measured by means of a questionnaire constituting different questions based on different scenarios (Grable, 2018). This is however not a suitable manner for accurately profiling investors. An investor's level of risk tolerance is perceived to be a crucial factor in shaping their investment and financial decisions and goals (Grable, 2018:18).

Without the proper knowledge of an investor's risk profile, financial advisors cannot accurately provide financial services to their clients (Klement, 2018:1). Furthermore, if an investor is unaware of his/ her risk profile, it can lead to failures in terms of their investment goals (Klement, 2018:1). The following sections provide an overview of investor risk tolerance along with the factors affecting risk tolerance.

### **2.3 DEFINING RISK TOLERANCE**

Before defining risk tolerance, the concepts of risk-seeking and risk-averse investors need to be contextualised. Risk-seeking investors normally prefer higher risks and would also sacrifice expected returns in order to increase their returns (March & Shapira, 1987:1406). Risk-seeking investors are said to be investors who have a preference for risk (Scholer *et al.*, 2010:216). It is generally believed that investors become risk-seeking after suffering a loss (Scholer *et al.*, 2010:216). Risk averse investors tend to steer away from any form of risk-taking behaviour in general (Paulsen *et al.*, 2012:1).

For example, consider two options the investor can choose from. The first will yield a definite R100, whereas, the second option consists of a coin toss. In the event of the coin landing on heads, the investor will receive R100, whereas, if the coin lands on tails, the investor will not receive anything. Thus, risk averse individuals will prefer the first option of the definite R100, instead of the possibility of receiving a R100 by a toss of a coin (Tversky & Kahneman, 1981:455). A third category is risk neutral investors. An investor who is risk neutral will always judge an investment or financial risk by the possible return it will deliver (Larkin *et al.*, 2013:78).

Once the investors are aware of their position on the spectrum of risk aversion to risk seeking, they will be able to understand their level of risk tolerance. An extensive

literature review was undertaken in order to identify the different definitions of risk tolerance and the application thereof. Table 2.3 lists the different definitions of risk tolerance obtained from accredited academic journals.

**Table 2.3: Definitions of risk tolerance**

<b>Publisher</b>	<b>Year</b>	<b>Authors</b>	<b>Definition</b>
Journal of Business and Psychology	2000	Grable	Financial risk tolerance refers to the total amount of uncertainty an individual is inclined to bear regarding financial decision-making.
The Journal of Behavioural Finance	2004	Grable, Lytton & O’Niell	Financial risk tolerance refers to the inclination to take part in a behaviour where the outcome is uncertain.
The Journal of Financial Research	2008	Faff, Mulino & Chai	Financial risk tolerance is an individual’s attitude towards risk.
Journal of Economic Psychology	2009	Van de Venter & Michayluk	Financial risk tolerance is the degree to which an individual favours risk.
The Career Development Quarterly	2010	Roszkowski & Grable	Financial risk tolerance is the degree to which an individual is inclined to pursue an uncertain result.
Science Direct	2012	Sulaiman	Financial risk tolerance refers to the amount of risk a client trusts they are prepared to bear.
Financial Services Review	2013	Gibson, Michayluk & Van de Venter	Financial risk tolerance refers to an individual’s comfort level in bearing risks, whilst risking wealth for growth in the future.
Journal of Economic Psychology	2017	Fisher & Yao	Financial risk tolerance refers to the level of discomfort an investor is willing to bear when risking his/ her current wealth for growth in the future.
Financial Services Review	2017	Kuzniak & Grable	Financial risk tolerance refers to the inclination of an individual to take risks.

<b>Publisher</b>	<b>Year</b>	<b>Authors</b>	<b>Definition</b>
The IUP Journal of Applied Finance	2017	Mohan & Singh	Financial risk tolerance is the amount of instability in returns, which an individual is inclined to prefer.
Gender and Behaviour	2018	Dickason & Ferreira	Financial risk tolerance is the total risk an investor is willing to take with regards to financial decision making.
The IUP Journal of Applied Finance	2018	Hemrajani & Sharma	Financial risk tolerance refers to the inclination of individuals taking part in behaviour with uncertain outcomes, along with a possible negative outcome.

Source: Author compilation

Some researchers argue that there is no single agreed-upon definition for risk tolerance (Larkin *et al.*, 2013:78). For the purpose of this study, financial risk tolerance takes on the definition of Dickason and Ferreira (2018:10853), where financial risk tolerance is the total risk an investor is willing to take with regards to financial decision-making. The following section will describe the factors influencing investor financial risk tolerance behaviour.

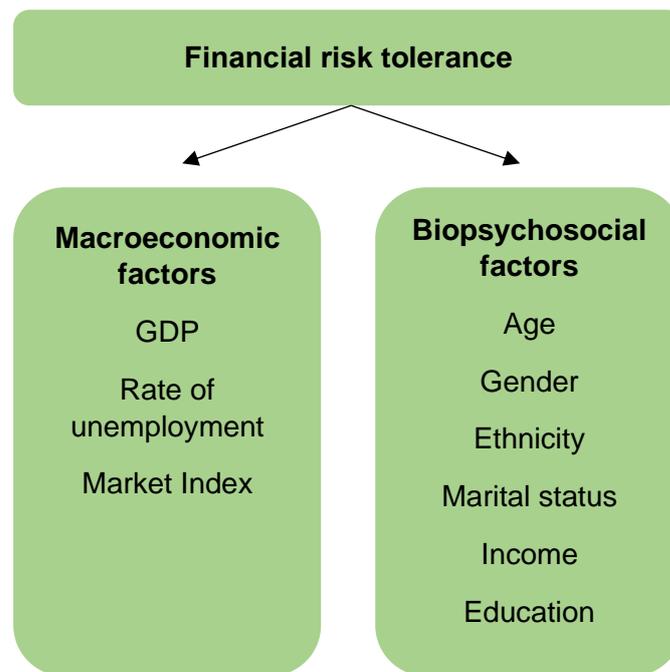
## **2.4 FACTORS INFLUENCING RISK TOLERANCE**

In the literature, it is commonly found that several factors influence investor risk-tolerant behaviour. Factors such as economical or biopsychosocial factors influence an investor's level of financial risk tolerance (Kuzniak & Grable, 2017:317). These factors can cause an increase or a decrease in investor risk tolerance levels (Dickason, 2018:17). Researchers argue that the biggest impact on investor risk tolerance levels arises from demographical characteristics (Grable & Lytton, 2001; Grable & Joo, 2004; Van de Venter & Michayluk, 2009; Gibson *et al.*, 2013; Kuzniak & Grable, 2017).

These demographical characteristics include, but are not limited to, age, gender, marital status, income and education (Grable & Joo, 2004; Grable *et al.*, 2004; Gibson *et al.*, 2013). Other factors include ethnicity, occupation, financial knowledge and number of dependants (Grable & Joo, 2004; Gibson *et al.*, 2013; Dickason, 2018). For

the purpose of this study, the focus will be on biopsychosocial factors such as age, gender, ethnicity, marital status, income and education.

These characteristics will be described in detail in the sections to follow. Figure 2.2 provides a graphical illustration between economical and biopsychosocial factors influencing an investor's financial risk tolerance.



**Figure 2.2: Graphical illustration of factors affecting financial risk tolerance**

Source: Adapted from Kuzniak and Grable (2017)

### 2.4.1 Age

Age, as an influential factor for financial risk tolerance, was first studied by Wallach and Kogan (1961) and they obtained results indicating that older individuals were more cautious in taking risks with regards to their financial decisions. Age is one of the most prevalent factors being studied, influencing an investor's financial risk tolerance (Fisher & Yao, 2017:194; Dickason, 2018:18). It is generally assumed that older investors are more risk tolerant and the reason could be attributed to their time horizon for recovering from losses suffered (Gibson *et al.*, 2013:24).

It is frequently found that younger investors are less risk tolerant and ultimately more willing to take greater risks in financial decision-making processes (Vroom & Pahl,

1971; Wang & Hanna, 1997; Chaulk *et al.*, 2003; Hallahan *et al.*, 2004; Van de Venter & Michayluk, 2009; Gibson *et al.*, 2013; Larkin *et al.*, 2013). However, some researchers report no effect of age on financial risk tolerance levels (Grable & Roszkowski, 2008; Sulaiman, 2012; Gibson *et al.*, 2013).

Some researchers argue that the opposite is also prevalent in financial risk tolerance. Meaning that older individuals are more risk tolerant than younger individuals (Larkin *et al.*, 2013:79). This phenomenon is explained by the makeup of the older investor's portfolio, including riskier assets. However, little evidence exists on this phenomenon. Dickason (2018:18) argues that although there are different opinions regarding age as an influential factor for financial risk tolerance, the impact thereof should still be studied. Masenya (2018) studied students' investment potential in the South African context. The study obtained results indicating that the students' ages did not have a statistical significance with regards to their level of financial risk tolerance.

#### **2.4.2 Gender**

Gender is treated as a demographical characteristic of an investor (Dickason & Ferreira, 2018:10853). Studies focusing on gender have been increasingly popular in financial research over the past decade. Many studies indicate a relationship between gender and financial risk tolerance of an investor. The most prevalent conclusion in these studies are that males are more risk tolerant in financial decision making (Anbar & Eker, 2008; Masenya, 2018:29).

Gender differences in financial risk tolerance have been studied widely (Bajtelsmit & Bernasek, 1996; Byrnes *et al.*, 1999; Dwyer *et al.*, 2002; Charness & Gneezy, 2011; Booth & Nolen, 2012; Cárdenas *et al.*, 2012; Fisher & Yao, 2017). However, researchers do not agree universally on the effect gender has on the investor's financial risk tolerance levels.

Gender stereotyping is common when measuring an investor's level of risk tolerance (Roszkowski & Grable, 2005:182; Yao & Hanna, 2005:67). It is generally believed that male investors are more risk tolerant than their female counterparts (Roszkowski & Grable, 2005; Yao & Hanna, 2005; Gibson *et al.*, 2013; Dickason & Ferreira, 2018). Some researchers argue that the prevalence of male risk tolerance levels may be attributed to culture and upbringing of children (Slovic, 1966:169; Larkin *et al.*,

2013:79). The occurrence of male risk tolerant behaviour has been studied across different contexts as listed in Table 2.4.

**Table 2.4: Male risk-tolerant behaviour**

<b>Researchers</b>	<b>Context</b>	<b>Results</b>
Sapienza, Zingales & Maestripieri	Medical	Males are more risk tolerant; behaviour is directly attributed to their testosterone levels.
Grable & Lytton	Financial – general	Females selected more conservative financial strategies than their male counterparts.
Barber & Odean	Financial – trading	Males are more risk tolerant in their financial trading behaviour and selected riskier trading options.
Faff, Hallahan & McKenzie	Contests	A lottery scenario was presented, and results indicated that females were more risk tolerant.

Source: Author compilation

It is commonly found and expected that male investors will be more risk tolerant than their female counterparts. This risk tolerant behaviour has also been previously found in the South African context by Jackson (2007); Brick *et al.* (2012); Lawrenson (2017).

Researchers suggest that the literature does not accurately account for female financial risk tolerance (Fisher & Yao, 2017:92). Furthermore, Fisher and Yao (2017:92) argue that females financial risk tolerance should be measured more reliably and accurately, as current measures are not sufficient in determining female financial risk tolerance levels.

### **2.4.3 Ethnicity**

In research there are only a few empirical studies that have analysed the relationship between ethnicity and financial risk tolerance. Grable (1997) argues that the first researcher to examine this relationship was Lefcourt (1965) in the study titled “Risk taking in Negro and white adults”. The results obtained in this study indicate a difference in financial risk-taking based on the investor’s ethnicity.

Weber and Hsee (1998) believe that different ethnicities influence financial risk tolerance behaviour. Gutter *et al.* (1999:150) argue that cultural differences will influence investor risk tolerance levels. Researchers agree that there exists a stereotype in the literature stating that Whites are more risk tolerant than their non-White counterparts (Grable, 1997:15; Gutter *et al.*, 1999:150; Dickason & Ferreira, 2018:10854). Leigh (1986) obtained results which indicated that non-Whites were, in fact, more risk tolerant than Whites. Furthermore, Gutter *et al.* (1999:150) indicate that variations of ethnic beliefs could lead to differences in wealth accumulation over the investor's life cycle.

The literature suggests that there are several reasons for ethnic differences in financial risk-tolerant behaviour of investors. These reasons include, but are not limited to, (i) Whites having better access to financial institutions (Grable, 1997:15; Dickason & Ferreira, 2018:10854), (ii) Whites having better investment occasions (Dickason & Ferreira, 2018:10854), (iii) non-Whites may be faced with investment opportunities, which are not traditional (Grable, 1997:15), and (iv) Whites having more confidence in their analytical abilities than non-Whites (Grable, 1997:15).

Gutter *et al.* (1999:150) argue that financial planners and financial educators need to create investment opportunities suited for different ethnic groups' requirements. Furthermore, financial advisors need to be aware of the differences in investor risk tolerance based on their ethnicity (Gutter *et al.*, 1999:150). Dickason and Ferreira (2018) studied the effect of gender and ethnicity on financial risk tolerance in South Africa. The study obtained results indicating that ethnicity influenced the investor's financial risk tolerance. African investors were more risk tolerant than other ethnic groups.

#### **2.4.4 Marital status**

It is generally assumed that an investor's marital status will influence the degree to which they are financially risk tolerant (Chaulk *et al.*, 2003:259). An investor's marital status is an adequate measurement in determining investor risk-taking behaviour (Dickason, 2018:20). Married investors' financial responsibilities are different from those who are not married (Chaulk *et al.*, 2003:260). A married investor might have

children, making his/ her financial responsibilities more intensive (Chaulk *et al.*, 2003:260).

In research, it is generally found that married investors are more risk tolerant than their unmarried counterparts (Yao *et al.*, 2004:259). In terms of the investor's investment behaviour, married investors are less likely to include risky assets in their portfolios compared to their unmarried counterparts (Grable, 2000:628; Yao & Hanna, 2005:67). The phenomenon of married investor's risk-tolerant behaviour may be attributed to the investor's family dynamics (Chaulk *et al.*, 2003:260).

Some researchers argue opposite financial risk-tolerant behaviour for married investors. The argument is based on the notion of two incomes for married investors and thus they should be able to better optimise their financial strategy and investment choices, which include more risky investments (Xiao & Anderson, 1997). Jackson (2007) obtained results in the South African context indicating that married investors were less risk tolerant than unmarried investors.

#### **2.4.5 Annual income**

Hallahan *et al.* (2003:484) state that annual income is one of the most prevalent factors impacting the financial risk tolerance of an investor. In the literature, it is commonly stated that annual income has a positive relationship with financial risk tolerance of the investor (Chaulk *et al.*, 2003; Grable *et al.*, 2004; Hallahan *et al.*, 2004; Gibson *et al.*, 2013; Fisher & Yao, 2017). Investors who are in a high income category are linked to higher levels of financial risk tolerance (Gibson *et al.*, 2013:25).

Malkiel (1996:10) states that the financial risks an investor can take depend on the investor's entire financial state. Furthermore, Schooley and Worden (1996) found that an investors' levels of financial risk tolerance changed as their levels of income changed. Anbar and Eker (2008) argue that the reason for investors with a higher annual income being more risk tolerant could be attributed to the fact that those individuals would be able to recover better from losses suffered. Furthermore, Anbar and Eker (2008) state that investors with lower annual incomes will find it more difficult to recover from losses suffered, given that it might have taken some time for them to accrue the funds for investment.

Although research suggests that investors with higher annual incomes are more risk tolerant than those with lower annual incomes, it is still of value to study the relationship between financial risk tolerance and annual income. Grable (1997:35) argues that this relationship is not definite, based on the results of some studies conducted. These studies obtained results indicating that higher annual incomes are not predictive of higher risk tolerance levels (Samuelson, 1969). Brick *et al.* (2012) obtained results in the South African context indicating that annual income directly influences financial risk tolerance levels of investors.

#### **2.4.6 Highest level of education**

With regards to financial risk tolerance of an investor, education refers to the level of formal education the investor completed (Grable, 1997:15). Larkin *et al.* (2013:80) argue that an investor's level of education plays an important role in determining the investor's level of risk tolerance. In general, researchers state that higher levels of financial risk tolerance are positively linked with higher levels of education (Sung & Hanna, 1996; Grable, 1997; Grable & Joo, 2004; Larkin *et al.*, 2013).

Hallahan *et al.* (2003:485) argue that an investor's level of education will have an influence on the investor's ability to take risk. Furthermore, Hallahan *et al.* (2003:485) state that investors who obtained higher levels of education are considered to be more risk tolerant in their financial decision-making. The positive association between financial risk tolerance and education can be attributed to the need for education to better understand inherent risks in certain investment decisions (Yao *et al.*, 2005:51).

Although the literature proposes a positive relationship between education and financial risk tolerance, some researchers have obtained results indicating the opposite (McInish, 1982). McInish (1982) obtained results in the study titled "Individual investors and risk-taking", proposing that education and financial risk tolerance are positively correlated; however, the coefficients of education were not statistically significant in any of the regressions.

Researchers agree that the demographical characteristics described above are positively correlated with the financial risk tolerance level of an investor. Table 2.5 summarises the demographical characteristics with their expected relationships to financial risk tolerance of an investor.

**Table 2.5: Expected relationship between financial risk tolerance and demographical factors**

Factor	Low risk tolerance	High risk tolerance	Sources
<b>Age</b>	Older investors	Younger investors	Wallach and Kogan (1961); Larkin <i>et al.</i> (2013); Dickason and Ferreira (2018)
<b>Gender</b>	Female investors	Male investors	Bajtelsmit and Bernasek (1996); Dwyer <i>et al.</i> (2002); Fisher and Yao (2017)
<b>Ethnicity</b>	Non-white investors	White investors	Grable (1997); Gutter <i>et al.</i> (1999); Dickason and Ferreira (2018)
<b>Marital status</b>	Married investors	Investors not married	Chaulk <i>et al.</i> (2003); Yao <i>et al.</i> (2004); Yao and Hanna (2005)
<b>Income</b>	Lower income investors	Higher income investors	Grable (1997); Hallahan <i>et al.</i> (2003); Anbar and Eker (2008)
<b>Education</b>	Lower levels of education	Higher levels of education	Hallahan <i>et al.</i> (2003); Grable and Joo (2004); Yao <i>et al.</i> (2005)

Source: Author compilation

## 2.5 PREVIOUS RESEARCH ON FINANCIAL RISK TOLERANCE

This section provides an overview of previous research studies on financial risk tolerance. The studies, along with their titles, authors, measuring instrument and results will be presented.

**Table 2.6: Previous studies on financial risk tolerance**

Authors	Title	Results
Grable (2000)	Financial risk tolerance and additional factors that affect risk taking in everyday money matters.	Risk tolerance is directly linked with being male, older, employed, married, educated, earning higher income and increased financial knowledge.
Hallahan <i>et al.</i> (2003)	An exploratory investigation of the relation between risk tolerance scores and	Financial risk tolerance shows concavity with regards to income over all age groups and regardless of gender.

<b>Authors</b>	<b>Title</b>	<b>Results</b>
	demographic characteristics.	
Grable and Joo (2004)	Environmental and biopsychosocial factors associated with financial risk tolerance.	Education, marital status, net worth, financial knowledge and income influence financial risk tolerance.
Grable <i>et al.</i> (2004)	Projection bias and financial risk tolerance.	Gender, income and stock market prices aid in explaining risk attitudes.
Roszkowski <i>et al.</i> (2004)	The comparability of husband and wives on financial risk tolerance.	Wives were more risk tolerant. On second observation, wives indicated increased levels of risk tolerance, compared to first measurement.
Jacobs-Lawson and Hershey (2005)	Influence of future time perspective, financial knowledge and financial risk tolerance on retirement saving behaviours.	Financial risk tolerance influences an investor's decision to invest in retirement saving options.
Yao and Hanna (2005)	The effect of gender and marital status on financial risk tolerance.	Financial risk tolerance was found at higher levels for unmarried men and women. Married men and women displayed lower levels of financial risk tolerance.
Corter and Chen (2006)	Do investment risk tolerance attitudes predict portfolio risk?	Financial risk tolerance is not explained by an overall cross-domain appetite for risk.
Faff <i>et al.</i> (2008)	On the linkage between financial risk tolerance and risk aversion.	Female participants were more risk tolerant in gambling situations and in situations with either a high or a low stake.
Van de Venter and Michayluk (2009)	A longitudinal study of financial risk tolerance.	Investor's risk tolerance changes somewhat over a period of time.
Gilliam <i>et al.</i> (2010)	Measuring the perception of financial risk tolerance: a tale of two measures.	The GL-RTS explains individual financial risk tolerance better than the SCF single risk tolerance question.
Roalf <i>et al.</i> (2012)	Risk, reward and economic decision making in aging.	Older adults were more risk tolerant than younger adults.
Larkin <i>et al.</i> (2013)	Risk tolerance and demographic	Education levels, gender and age directly influence individual risk tolerance levels.

Authors	Title	Results
	characteristics: preliminary Irish evidence.	
Kuzniak <i>et al.</i> (2015)	The Grable and Lytton risk-tolerance scale: a 15-year retrospective.	The risk tolerance scale's reliability and validity remained strong.
Grable (2016)	Financial risk tolerance.	Biopsychosocial and environmental factors influence individual financial risk tolerance.
Fisher and Yao (2017)	Gender differences in financial risk tolerance.	Gender differences in financial risk tolerance are explained by changes in the individual's perceived factors of financial risk tolerance.
Mohan and Singh (2017)	An empirical study on financial risk tolerance of investors in India.	Demographical characteristics directly influence an investor's financial risk tolerance level.
Brooks <i>et al.</i> (2018)	Why are older investors less willing to take financial risks?	Results indicate a modest age effect in financial risk tolerance of an individual.
Dickason and Ferreira (2018)	The effect of gender and ethnicity on financial risk tolerance in South Africa.	Results obtained indicated that male investors were more risk tolerant than their female counterparts. Ethnicity also influences investor risk tolerance.
Hemrajani and Sharma (2018)	Influence of urgency on financial risk-taking behaviour of individual investors: the role of financial risk tolerance as a mediating factor.	Urgency of financial risk-taking positively influences investors risk tolerance levels.

Source: Author compilation

Grable (2000) obtained results indicating that financial risk tolerance is directly influenced by several demographical characteristics, these include being male, being older, having higher levels of education, being married, having formal employment and possessing increased financial knowledge. Other researchers obtained similar results, linking financial risk tolerance with demographical characteristics (Hallahan *et al.*, 2003; Grable & Joo, 2004; Yao & Hanna, 2005; Roalf *et al.*, 2012; Larkin *et al.*, 2013; Mohan & Singh, 2017).

Most studies conclude that the factors they intended to measure did have an effect on an investor's level of financial risk tolerance. However, a few studies provide interesting results. Van de Venter and Michayluk (2009) obtained results indicating that an investor's level of financial risk tolerance displays only slight changes over time. The literature suggests that as investors age, thus over time, their risk tolerance level will decrease significantly. Another interesting study is that of Dickason and Ferreira (2018) whereby they obtained results indicating that male investors were more risk tolerant than their female counterparts; thus, conforming to the stereotype of female risk aversion as suggested by the literature.

## **2.6 THE INVESTOR AND RISK TOLERANCE**

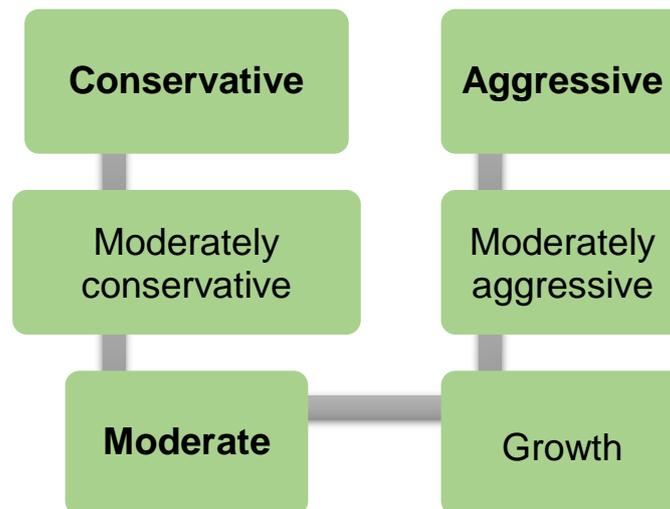
An investor's individual financial decisions are commonly influenced by a variety of factors, with the main factor being investor risk tolerance (Snelbecker *et al.*, 1990; Masenya, 2018). Thus, it is alleged that investor risk tolerance is a key factor in investment behaviour with regards to retirement planning, insurance, accumulating wealth and also asset allocation strategies (Hanna & Lindamood, 2004). Grable and Lytton (1999b:61) state that a contemporary model for investment decision making comprises four main contributions for making investment and financial plans. These four contributions are financial goals, time span, financial stability and investor risk tolerance (Anbar & Eker, 2008:504). Investor risk tolerance is commonly misinterpreted and is a multi-layered psychological notion (Anbar & Eker, 2008:504). Before one can explain investor risk tolerance, an understanding of the types of investors and investor behaviour is needed.

### **2.6.1 Investor defined**

An investor is an individual who promises money to a company or scheme, expecting to receive a return on his/ her promised money in the form of profit (Daniel *et al.*, 1998; Lin, 2015). Investors usually use their money to grow profits, or to provide themselves with an income for retirement. An investor's main goal is to receive a return on his/ her investment (Daniel *et al.*, 1998). Investors do not all make the same financial decisions, as various factors influence their decision-making processes (Daniel *et al.*, 1998). Thus, several types of investors exist, in order for investment firms to group investors with the same financial goals together.

## 2.6.2 Types of investors

There are numerous types of investors, with some researchers referring to these types of investors as investor personalities (Dickason, 2018). However, for the purpose of this study, the different types of investors will not be classified as investor personalities. Only the main investor types will be discussed; however, the following image will provide an overview of the different types of investors.



**Figure 2.3: Types of investors**

Source: Adapted from Dickason (2018)

The following sections will describe the six main types of investors in the order they appear in Figure 2.3.

### 2.6.2.1 Conservative investors

Generally, investors in this category are risk averse in nature and have a low level of financial risk tolerance. The low level of risk tolerance is an indication of a lower risk capacity as well as appetite. Conservative investors are concerned with financial security in order to preserve their wealth, rather than to risk capital to create wealth (Pompian, 2016). Furthermore, investors forming part of the conservative category are concerned about their investments' short-term performance as well as their investments in general.

These investors are more concerned with education and will thus invest therein and are also usually the carers in their households (Pompian, 2016). Furthermore, conservative investors aim to decrease investment risk as well as possible losses on their principal value. Finally, these investors typically invest in low risk investment options or they gain wealth through inheritance. One of the main characteristics of a conservative investor is his/ her cautiousness in investment decision-making (Pompian, 2016). Thus, it can be concluded that conservative investors possess lower levels of financial risk tolerance.

### **2.6.2.2 Moderately conservative investors**

Investors who are moderately conservative will accept some level of risk, they prefer more liquidity and will also rather accept lower returns with lower risk associated to it (Pompian, 2016). Furthermore, moderately conservative investors are prepared to accept small financial losses (Pompian, 2016). It can thus be concluded that moderately conservative investors have relatively lower levels of financial risk tolerance compared to other types of investors.

### **2.6.2.3 Moderate investors**

It is generally observed that investors in this category are mistaken with their level of financial risk tolerance. These investors typically aim to increase profits proportionally in order to receive better results in the long term. Furthermore, these investors tend to follow the advice of their peers, instead of seeking professional investment advice, based on a lack of financial knowledge (Dickason, 2018). Moderate investors also have a unique idea of investments in general, steering away from the norm.

Furthermore, these investors are not concerned with long term financial planning strategies. They rather are concerned with their current financial situation and how to respond to events immediately (Pompian, 2016). This behaviour gives way to popular investment opportunities, regardless of the risk involved and whether any financial goal will be achieved. Financial advisors have great difficulty working with moderate investors as they are not aware of their financial goals and severely lack any optimism for investment opportunities (Dickason, 2018:31). To conclude, moderate investors possess moderate levels of financial risk tolerance.

#### **2.6.2.4 Growth investors**

Growth investors tend to invest independently and are sometimes more determined than other types of investors (Dickason, 2018). These investors tend to rely rather on their gut feeling than seeking professional help with their investments. Furthermore, growth investors are generally comfortable in financial risk situations. Finally, growth investors generally possess medium- to high levels of financial risk tolerance (Dickason, 2018).

#### **2.6.2.5 Moderately aggressive investors**

Moderately aggressive investors prefer investments with higher long-term returns, rather than protecting their principal investments (Merrill & Lynch, 2013). Furthermore, these investors are inclined to take greater risks in order to receive greater returns and they are indifferent to liquidity (Dickason, 2018). Thus, it can be concluded that moderately aggressive investors possess higher levels of financial risk tolerance.

#### **2.6.2.6 Aggressive investors**

Normally, aggressive investors tolerate much higher levels of financial risk tolerance than other types of investors. They are usually overconfident in their competence to make investment decisions, based on their higher risk tolerance levels. This results in taking greater financial risks in order to receive higher returns on their investments (Dickason, 2018:32). Additionally, it is expected that aggressive investors' portfolio composition would change regularly, based on their desire to increase their wealth, regardless of the risks involved (Corter & Chen, 2006). In conclusion, aggressive investors possess the highest level of financial risk tolerance, compared to other types of investors.

### **2.6.3 Investor investment behaviour**

Investor investment behaviour is directly linked to behavioural finance. Behavioural finance encompasses various behavioural biases, these include cognitive and emotional biases (Baker & Ricciardi, 2014). Cognitive bias is the act of thinking and acting in certain ways. Whereas, emotional bias is the act of making decisions based

on emotion rather than facts (Baker & Ricciardi, 2014). Both these biases influence investor investment behaviour.

Investor behaviour is the act of attempting to understand the investor's decision-making processes by combining psychological and economic factors (Baker & Ricciardi, 2014). The investor's process of making decisions constitutes both subjective and objective aspects, which are based on the investment product the investor chooses to invest in (Baker & Ricciardi, 2014). Furthermore, investor behaviour also encompasses the investor's emotional problems along with their mental processing (Fehle *et al.*, 2003:5).

Generally, it is found that investors tend to base their decisions on past events, personal opinions as well as preferences (Baker & Ricciardi, 2014). Furthermore, they tend to rather save time, or take short cuts, instead of considering the long-term effects and/or rewards the investment holds (Baker & Ricciardi, 2014). Finally, when investor behaviour is understood, it can advise investors about behavioural finance biases, as well as help improve financial decision-making processes (Baker & Ricciardi, 2014).

#### **2.6.4 Investor risk tolerance**

Investor risk tolerance is defined as the investor's inclination to take part in activities where the expected outcome is not known (Irwin Jr, 1993). However, there is a likely chance of a negative outcome, when participating in said activity. Other researchers define investor risk tolerance as the maximum degree of uncertainty an investor is inclined to bear when they make financial decisions (Grable, 2000). Additionally, Grable (2000) is of the opinion that investor risk tolerance is a fundamental element within financial preparation models as well as the suitability analysis of investments.

Investor risk tolerance is a fundamental element affecting the investor's decision-making process for achieving their financial goals, in terms of both short-term and long-term goals (Grable, 2000). Furthermore, investors displaying a varying degree of risk tolerance tend to display differentiating behaviour in their investment decision-making processes. Generally, it is expected that individuals with higher levels of risk tolerance tend to take greater financial risk in order to receive a higher return. Whereas, investors with lower risk tolerance levels rather steer away from taking financial risks (Grable & Lytton, 1999b:173).

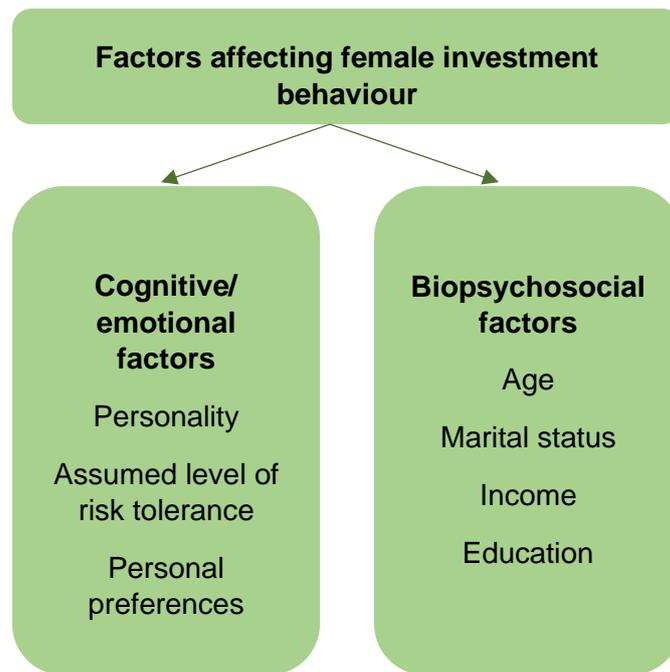
## **2.7 FEMALE INVESTOR BEHAVIOUR**

In the literature, it is generally found that female investors are more risk averse (Skaperdas & Gan, 1995; Bajtelsmit & Bernasek, 1996). Various reasons exist in an attempt to explain this notion of female risk averse behaviour. However, little evidence for these reasons exists (Harris *et al.*, 2006). In the financial market, it is found that female investors are less likely to participate in financial risk behaviours (Bajtelsmit & Bernasek, 1996:1; Gustafson, 1998:805; Jianakoplos & Bernasek, 1998:620; Booth & Nolen, 2012:57; Cárdenas *et al.*, 2012:11). One of the arguments for this phenomenon is that female investors perceive financial risks differently to their male counterparts (Gustafson, 1998:805; Dohmen *et al.*, 2005:1; Harris *et al.*, 2006:49; Watson & McNaughton, 2007:52).

Generally, it is expected of females to be the nurturers of their households instead of the traditional providers (McKenzie, 2011). It can thus be stated that female investors are underrepresented in the financial market, based on the literature stereotype. It has been found that various factors influence the female investor's inclination to participate in financial risk situations. These factors include, but are not limited to, age, marital status, income and their highest level of education. Furthermore, other factors such as personality traits and their perceived level of financial risk tolerance also influence their ability to make financially based decisions. The following section will provide an overview of the factors influencing female investment behaviour.

### **2.7.1 Factors affecting female investor behaviour**

Various factors have been found to influence female investment behaviour. These factors are directly linked to the factors discussed in Section 2.4. However, this section will only focus on the effect these factors have on female investment behaviour. Figure 2.4 provides an overview of the cognitive/ emotional factors as well as the biopsychosocial factors affecting female investment behaviour.



**Figure 2.4: Factors affecting female investment behaviour**

Source: Author compilation

### **2.7.1.1 Cognitive/ emotional factors**

Cognitive/ emotional factors comprise three main factors influencing female financial risk tolerance levels. These factors are their personality traits, their assumed level of risk tolerance and their personal preferences. The sections to follow will discuss the different factors in the order they appear in Figure 2.4.

#### **2.7.1.1.1 Personality traits**

Weller and Tikir (2010:118) are of the opinion that it is imperative to recognise the impact personality types have on the investor's financial decision-making processes. Investors often show inconsistent responses to financial risks over different domains and situations (Schoemaker, 1990:1452; Weller & Tikir, 2010:118). In terms of personality traits relating to financial risk and investment behaviour, Harris *et al.* (2006:49); Weller and Tikir (2010:118) claim that the tendency of female investor's risk aversion could be accredited to the tendency of making their decisions based on emotion. Harris *et al.* (2006:49) argue that female investors are presumed to be more emotionally upset by a negative outcome. An in-depth discussion on personality traits is presented in Chapter 3.

### **2.7.1.1.2 Assumed level of risk tolerance**

Generally, investors expect greater returns when they take on greater risks (Fisher & Yao, 2017:92). This statement leaves room for the assumption that investors are aware of their level of financial risk tolerance. However, Fisher and Yao (2017:92) suggest that the literature does not accurately account for female investors' level of financial risk tolerance. Therefore, a female investor's assumed level of financial risk tolerance will influence her investment decision-making processes and ultimately her investment behaviour.

### **2.7.1.1.3 Personal preferences**

Personal preferences refer to individual unique characteristics of what they prefer and what they dislike (Child, 1962). Furthermore, personal preferences influence individuals in their decision-making processes (Child, 1962). Thus, a female investor's desire for personal preference will influence her decision-making processes, as well as her investment behaviour.

### **2.7.1.2 Biopsychosocial factors**

Various biopsychosocial factors influence female investment behaviour as depicted in Figure 2.4 above. For a more in-depth discussion on the biopsychosocial factors, refer to Section 2.4 above. The biopsychosocial factors, along with the effect it has on female investment behaviour will be presented in Table 2.7 below.

**Table 2.7: Biopsychosocial factors influencing female investment behaviour**

<b>Factor</b>	<b>Effect</b>	<b>Sources</b>
<b>Age</b>	Younger females tend to be more risk tolerant.	Wallach and Kogan (1961); Gibson <i>et al.</i> (2013); Fisher and Yao (2017)
<b>Marital status</b>	Single females are generally more risk tolerant.	Grable (2000); Yao <i>et al.</i> (2004); Dickason (2018)
<b>Income</b>	Females earning higher annual incomes are more risk tolerant.	Chaulk <i>et al.</i> (2003); Hallahan <i>et al.</i> (2003); Gibson <i>et al.</i> (2013)
<b>Education</b>	Females possessing some form of higher education are more risk tolerant.	Sung and Hanna (1996); Grable (1997); Larkin <i>et al.</i> (2013)

Source: Author compilation

## **2.8 SYNOPSIS**

Financial risk tolerance is defined as the total amount of uncertainty an investor is inclined to bear regarding their financial decision-making processes. Financial risk tolerance is a major influencing factor on investor investment behaviour and decision-making processes in terms of their financial planning and goals. The focus of this chapter was on risk and financial risk tolerance. Various aspects of financial risk tolerance were presented, including risk taking, risk appetite, risk propensity and risk perception, as well as risk profiling.

The main elements constituting risk tolerance were discussed, as it is important to have a holistic understanding of risk tolerance. The main factors affecting investor risk tolerance were also discussed. These factors include the investor's age, gender, ethnicity, marital status, annual income and highest level of education. Furthermore, the relationship between investor risk tolerance and investment behaviour was established.

Chapter 3 focusses on the various personality types influencing investor behaviour as well as the different instruments used to measure personality traits. The various sections in Chapter 3 will cover concepts such as personality traits, life domains, measurements of personality traits as well as investor personalities.

## CHAPTER 3: THEORETICAL ANALYSIS OF PERSONALITY MEASURES

### 3.1 INTRODUCTION

The literature suggests that an individual's risk tolerance is influenced by various factors, including factors based on the individual's current situation, factors based on the individual's personality, as well as behavioural bias factors (Cooper, 2003:40; Deck *et al.*, 2008). Many researchers state that a link between an individual's level of risk tolerance and personality traits exists (Bajtelsmit & Bernasek, 1996; Jianakoplos & Bernasek, 1998; Cooper, 2003; Blais & Weber, 2006; Deck *et al.*, 2008; Weller & Tikir, 2010; Mishra & Lalumière, 2011). As such, the purpose of this chapter is to *construct a theoretical framework for different personality measures*.

An individual's personality is a set of characteristics that can be used to determine which decisions the individual will make under certain circumstances (Cooper, 2003). Furthermore, personality also refers to an individual's inclination to consistently make different decisions under contradictory circumstances (Cooper, 2003). Various factors influence and shape an individual's personality, such as parental guidance, the level of education the individual holds, as well as policy changes (Cobb-Clark & Schurer, 2012:11). Over the past decade, research on personality traits, in order to comprehend economic behaviour, has received considerable consideration (Weller & Tikir, 2010:11; Cobb-Clark & Schurer, 2012).

Gosling *et al.* (2003:504) state that should the researcher wish to know more about a personality trait of an individual, the researcher should directly enquire about said personality trait. Matthews *et al.* (2004:3) suggest that personality traits directly have an influence on the individual's level of risk tolerance. A personality trait refers to a neuropsychic construct, of which every individual's is unique (Boyle *et al.*, 2008:2). Five main domains of personality traits exist, namely: (i) neuroticism, (ii) extraversion, (iii) openness to experience, (iv) agreeableness and (v) conscientiousness (Cooper, 2003; Deck *et al.*, 2008; Vazifehdoost *et al.*, 2012). These main domains are also known as the five-factor model and will be discussed later in this chapter.

The aim of this chapter is on the investors' personality traits and the influence it has on his/ her level of financial risk tolerance. The second part of this chapter will focus on the investor's personality and gender, followed by the various classifications of

investor personalities. Thereafter, the investor's short- and long-term inclinations in terms of investment behaviour and personalities will be discussed. Finally, the measures of personality traits will be discussed, along with an extensive literature review on previous studies conducted on the effect personality has on investor risk tolerance. The chapter will then be concluded by means of a brief summary.

## **3.2 PERSONALITY**

Individuals constantly face uncertainty where they need to make decisions without sufficient information. This degree of uncertainty influences their consumption, investment choices and saving decisions (Deck *et al.*, 2008:1). Furthermore, there is also an impact on engaging in certain activities, stemming from their personality traits and their ability to make decisions. Bashir *et al.* (2013a:278) state that an individual's personality traits influence not only his/ her decision making in everyday matters, but also financial decision-making. The notion of personality traits is as old as the English language itself (Matthews *et al.*, 2004:3).

Aristotle saw behaviours such as vanity, cowardice and modesty as moral behaviour of individuals (Matthews *et al.*, 2004:3). These same behaviours are still observed in the current day and are described as personality characteristics. Two main assumptions of personality traits exist, namely (i) personality traits are constant over any given time period and (ii) personality traits directly influence an individual's behaviour (Matthews *et al.*, 2004:3). Various definitions of personality exist and are accepted in the literature.

Personality is broadly referred to as the emotional characteristics of an individual, permitting for predictions on how the individual will act and react in certain situations (Cooper, 2003). Furthermore, personality refers to the inclination of the individual to act constantly in the same manner, even in different situations. Generally, an individual's personality is influenced by three main factors, namely (i) parental roles, (ii) level of education and (iii) policy interferences (Cobb-Clark & Schurer, 2012:11). Gosling *et al.* (2003:504) suggest that if a researcher wishes to find out more about an individual's personality traits, he/ she should directly ask said individual.

Table 3.1 provides the most common definitions used in terms of investor personalities. These definitions were obtained from relevant academic journals and textbooks.

**Table 3.1: Definitions of personality**

<b>Publisher</b>	<b>Year</b>	<b>Authors</b>	<b>Definition</b>
Book published by Holt, New York	1937	Allport	An individual's personality is his/ her driving force in decision making and activities, leading the individual to behave in a certain manner. It also differs from person to person.
Journal of Personality and Social Psychology	1987	McCrae & Costa	Personality is defined as something coming from within an individual and normally remains relatively constant throughout the individual's life.
The Journal for Occupational Safety and Health	2003	Cooper	Personality is defined as the stable characteristics an individual tends to display in any given situation.
The Journal of Behavioral Finance	2008	Durand, Newby, & Sanghani	Personality is an individual's psychological composition.
Book published by Cambridge University Press	2009	Corr & Matthews	Personality is a set of behaviours, encompassing thoughts and emotional patterns, stemming from environmental and biological factors.
Economics Letters	2012	Cobb-Clark & Schurer	Personality is a talent having important impacts on the economic decisions individuals make, along with the outcomes the individuals reach.
International Journal of Management and Business	2012	Vazifehdoost, Akbari, & Charsted	Personality is the set of psychological characteristics inherent to individuals, that shape their actions in various domains of life.
Interdisciplinary Journal of Contemporary Research in Business	2012	Zaidi & Tauni	Personality is defined as a constant pattern of feelings, actions or thoughts distinguishing one individual from the next.
Book published by Lippincott	2017	Sadock, Sadock & Ruiz	Personality is an individuals' inspiration as well as their interactions with their environment,

<b>Publisher</b>	<b>Year</b>	<b>Authors</b>	<b>Definition</b>
Williams & Wilkins			shaping their decision-making processes.

Source: Author compilation

Researchers agree that an individual's personality is unique and helps him/ her shape his/ her decision-making processes (Allport, 1937; Cobb-Clark & Schurer, 2012). Furthermore, personality influences the individual's behaviour in different situations and also usually remains constant over time (Cooper, 2003). Personality is also referred to as the unique characteristics an individual possesses (Vazifehdoost *et al.*, 2012). Furthermore, the individual's personality traits influence his/ her decision-making processes and more specifically his/ her investment decisions (Tauni *et al.*, 2015).

Deck *et al.* (2008:4) argue that the differences in individual personality traits could explain the variation in performance on their decision making of activities that involve risk. Furthermore, differences in individual personality characteristics help explain differences in observed risk behaviour when eliciting techniques are used (Deck *et al.*, 2008:4). Nicholson *et al.* (2005:158) state that personality characteristics are one of the major factors influencing individual risk-tolerant behaviour.

Many researchers have studied individual personality traits in the past. Cherry (2018) argues that an individual's personality consists of four main perspectives. These perspectives are (i) the psychoanalytic perspective, (ii) the humanistic perspective, (iii) the trait perspective and (iv) the social cognitive perspective. The following table provides an overview of each of the perspectives along with the major researchers contributing to each perspective.

**Table 3.2: Personality perspectives**

<b>Personality perspective</b>	<b>Description of perspective</b>	<b>Main researchers on perspective</b>
<b>Psychoanalytic perspective</b>	The focus is on childhood experiences, as well as the individual's unconscious mind.	Freud created this perspective and was of the belief that the elements concealed in an individual's unconscious could be exposed by means of dreams, his/ her free will and also by the

<b>Personality perspective</b>	<b>Description of perspective</b>	<b>Main researchers on perspective</b>
		slip of his/ her tongue (Holt, 1989).
<b>Humanistic perspective</b>	The focus is on personal growth, personal awareness and free will for the individual. It is also focused on how individuals can have a more positive outlook on life.	Rogers believed in the free will of individuals and their personal growth (Rogers, 1959). Maslow is of the belief that individuals are driven by a hierarchy of needs (Maslow <i>et al.</i> , 1998).
<b>Trait perspective</b>	The focus is on the various elements contributing to an individual's personality.	Eysenck is of the belief that there exist three main traits for personality namely, extraversion, neuroticism and psychoticism (Eysenck, 1973). McCrae and Costa created the big five factors of personality namely, extraversion, neuroticism, agreeableness, openness to experience and conscientiousness (McCrae & Costa, 1987).
<b>Social cognitive perspective</b>	The focus is on observational education of individuals and their cognitive skills.	Bandura placed the emphasis on observational learning, along with the role the individual's beliefs play in their learning (Bandura <i>et al.</i> , 1988).

Source: Adapted from Cherry (2018)

The following section will provide a descriptive overview of behavioural finance, behavioural finance biases as well as the link between personality and behavioural finance biases.

### **3.2.1 Personality and behavioural finance**

Behavioural finance came to light when investors tended to act irrationally in their investment decision-making processes (Thaler & Johnson, 1990). Behavioural finance is defined as the process of explaining the investor's what, how and why to invest (Ricciardi & Simon, 2000:27). Furthermore, behavioural finance focuses on the reasoning of the investor and his/ her emotional process (Ricciardi & Simon, 2000:27). Behavioural finance is based on observations of individuals making decisions under

uncertainty, which are not in line with rational decisions, from which traditional finance is derived (Thaler & Johnson, 1990; Sewell, 2007; Lucarelli & Brighetti, 2011). Behavioural finance constitutes three main categories, namely (i) financial knowledge, (ii) cognitive psychology and (iii) economics (Zindel *et al.*, 2014:11). Behavioural finance encompasses several biases. The following table provides an overview of the biases, along with a description of each bias.

**Table 3.3: Behavioural finance biases**

<b>Bias</b>	<b>Description</b>
<b>Availability</b>	When investors judge an event, they think might happen they tend to look in their memory for information. This process might lead to biased information, as the investor's memories are not always available (Barberis & Thaler, 2002:15).
<b>Representativeness</b>	This bias is based on the notion that the individual's judgement is based on stereotypes. This bias gets investors to invest in options which have desirable qualities such as profit (Baker & Nofsinger, 2002:100).
<b>Framing</b>	This bias is the process of influencing an investor's perception on available information and thus influencing their perception of risk (Dickason, 2018:47).
<b>Overconfidence</b>	The tendency of individuals to overestimate their skills and predictions for success (Ricciardi & Simon, 2000:28). These investors are of the belief that their knowledge is more accurate than reality (Baker & Nofsinger, 2002:103).
<b>Anchoring</b>	Anchoring is also known as fixation (Baker & Nofsinger, 2002). Anchoring is the process of the investor to start their investments at a certain value and then adjusting said value as time lapses (Barberis & Thaler, 2002:14).
<b>Ambiguity aversion</b>	This bias refers to the investor disliking the uncertain outcome associated with events (Dickason, 2018:50). This bias also refers to the investor's competence in making investment decisions (Dickason, 2018:50).
<b>Perceived control</b>	This bias refers to the illusion of control and locus of control. Locus of control: the perceived control the investor has over their behaviour. Illusion of control: the perceived control over the outcome of an event

Bias	Description
	which is uncontrollable or random (Dickason, 2018:50).
<b>Mental accounting</b>	This bias refers to the investor's brain keeping track of their investments and their investment goals, as well as the process of achieving those goals (Baker & Nofsinger, 2002:107).

Source: Author compilation

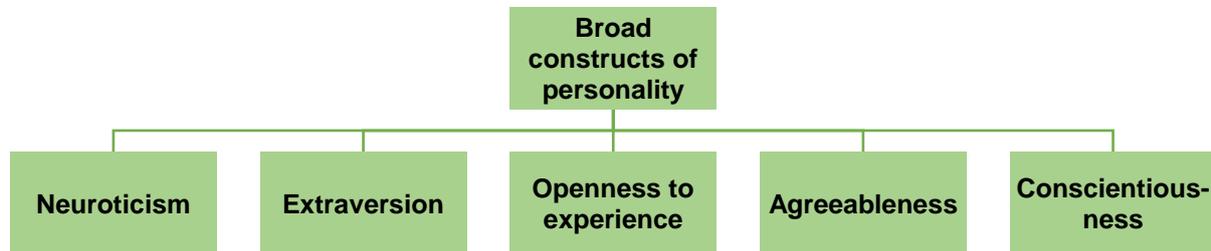
The link between personality traits and behavioural finance exists where the investor is faced with making decisions under uncertainty. The three main components of behavioural finance are (i) financial knowledge, (ii) cognitive psychology and (iii) economics (Zindel *et al.*, 2014:11). Cognitive psychology encompasses the investor's personality and his/ her personality traits. The following section will provide a descriptive overview of the five broad personality constructs of individuals.

### 3.2.2 Personality constructs

It is agreed that most personality traits can be explained by five main broad constructs of personality (Rothmann & Coetzer, 2003:68). The five broad constructs of personality are often measured with the big five model of personality discussed below. Figure 3.1 presents the five broad personality categories and each construct will be discussed in the sections to follow. Before understanding each construct on its own, the big five model should be considered.

Early versions of the big five model were created in the 1930s; however, these models were insufficient and were adapted in the 1980s (McCrae, 2011:210). Tupes and Christal (1961) were among the first to distinguish the five constructs of the big five model of personality. They classified the constructs as surgency, agreeableness, dependability, emotional stability and culture or intellect. Surgency is now referred to as extraversion, dependability is now conscientiousness, emotional stability is now neuroticism and culture or intellect is now openness to experience (Goldberg, 1992:26). Furthermore, McCrae (2011) states that almost all traits of personality form part of one of the five main constructs the big five personality measures. The big five model of personality constitutes two main components. The first component is basic tendencies and the second is characteristic adaptations (McCrae, 2011). Most of the

research conducted using the big five model of personality, focuses on the characteristic adaptations component (McCrae, 2011). The big five model of personality, as used today, was adapted by McCrae and Costa (1987).



**Figure 3.1: Broad personality constructs**

Source: Author compilation

The five constructs of personality generally measure all aspects of an individual's personality and can classify individuals according to each category, or all of the constructs as a whole (Nicholson *et al.*, 2005).

### **3.2.2.1 Neuroticism**

The neuroticism construct, also known as emotionality, refers to the inclination of individuals to feel worried, unhappy, uncomfortable and also self-doubting (Cooper, 2003:41). Myers *et al.* (2010:7) argue that the neuroticism or emotionality construct is also sometimes stated to be the anxiety factor. Furthermore, this construct encompasses individuals facing unfavourable emotions (Rothmann & Coetzer, 2003:69; Myers *et al.*, 2010:7). This construct also encompasses an individual's degree of emotional stability, as well as his/ her ability to control his/ her impulses (Vazifehdoost *et al.*, 2012:246). Finally, this construct generally leads to a career indecisiveness of individuals, because of all the emotional disparities the individual is faced with in this construct (D'souza & Saelee, 2014:86).

In the literature, it is suggested that neuroticism and the overconfidence bias have a negative relationship with one another (Zaidi & Tauni, 2012). This suggests that investors who are tense, who suffer emotionally and who are depressed are less overconfident than other investors (Zaidi & Tauni, 2012). Lin (2011) obtained results indicating that neuroticism had a positive relationship with herding and the disposition

effect. This implies that investors would make a profit when they sell their holding stocks in advance, as these investors are concerned with a loss on their investments (Lin, 2011; Jamshidinaid *et al.*, 2012).

On the other hand, Schaefer *et al.* (2004) obtained results indicating that neuroticism has no significant relationship with overconfidence. Investors who possess this personality have no intention to invest in short-term investments (Mayfield *et al.*, 2008). Nicholson *et al.* (2005) found that these investors tend to avoid the anxiety associated with a negative outcome.

### **3.2.2.2 Extraversion**

The extraverted construct refers to individuals who are ambitious and more confident, as well as individuals who are more verbose and gregarious (Cooper, 2003:41). Some researchers argue that individuals who are more extraverted prefer to be in more contact with other people (Myers *et al.*, 2010:7). Furthermore, this construct displays the individual's tendency to express his/ her personal opinions, as well as his/ her leadership skills (Myers *et al.*, 2010:7; Verduyn & Brans, 2012:665). Extraverted individuals tend to be more talkative, have more positive emotions and are also more assertive (Vazifehdoost *et al.*, 2012:246). Finally, in terms of career decision making, extraverted individuals seek job opportunities where they are in more contact with other people (D'souza & Saelee, 2014:86).

The study of Zaidi and Tauni (2012) focussed on the relationship between overconfidence, demographics and personality traits. Results indicated that a positive relationship between overconfidence and extraversion existed. The results also indicated that investors who score higher in this construct were more overconfident than others were (Lin, 2011; Zaidi & Tauni, 2012; Bashir *et al.*, 2013b). Lin (2011) found that investors with this personality would tend to follow the advice of their peers.

Mayfield *et al.* (2008) obtained results indicating that investors with this personality prefer short-term investments. Fenton-O'Creevy *et al.* (2004) found results suggesting that if an investor wants to be successful in his/ her investments, he/ she need to be introverted as well as open to new experiences. On the other hand, Lo *et al.* (2005) found results indicating that extraversion had no significant relationship with the investor's trading performance.

### 3.2.2.3 Openness to experience

The openness to experience construct relates to the ability of an individual to be inventive, sophisticated, inquisitive and to also be unique (Cooper, 2003:41; Kaufman, 2013:233). Some researchers state that the openness to experience construct also refers to an individual's ability to be open to new experiences, as well as the ability of the individual to accept change (Myers *et al.*, 2010:7). Furthermore, this construct refers to an individual's intellectual curiosity, his/ her uniqueness and also his/ her preference for diversification (Vazifehdoost *et al.*, 2012:246). Finally, in terms of career decision making, this construct refers to the ability of the individual to solve problems and also his/ her level of intelligence (D'souza & Saelee, 2014:86; McCrae & Greenburg, 2014:224).

Openness to experience yielded no significant relationship with behavioural finance biases (Zaidi & Tauni, 2012). However, Lo *et al.* (2005) found that openness to experience had a significant relationship with the overconfidence bias. This result is supported by the study of Bashir *et al.* (2013b). The study also further indicated that investors with this personality tend to seek more information on investment options and are more overconfident than others are.

On the other hand, Schaefer *et al.* (2004) suggest that investors with this personality seek information from various sources, before engaging in investment activities. It is suggested that investors with this personality tend to prefer long-term investment options (Mayfield *et al.*, 2008). Akhtar and Batool (2012) found the opposite, in other words, that investors prefer short-term investment options.

### 3.2.2.4 Agreeableness

Cooper (2003:41) argues that individuals with the agreeableness construct are inclined to be more considerate, forgiving, naïve, as well as lenient. Agreeable individuals normally display pleasant and supportive behaviour (Cooper, 2003). Researchers such as Myers *et al.* (2010:7), argue that agreeableness is the inclination of the individual to be more empathetic. Furthermore, individuals in this construct are more caring and understanding, instead of being sceptical and unfriendly towards others (Vazifehdoost *et al.*, 2012:246; Zaidi *et al.*, 2013:1346). Individuals in this

construct are inclined to seek job opportunities involving some degree of teamwork, as well as jobs regarding customer relations (D'souza & Saelee, 2014:86).

Researchers such as Zaidi and Tauni (2012) and Jamshidinaid *et al.* (2012) suggest that agreeableness is positively associated with the overconfidence bias. This suggests that investors who lack self-confidence, tend to seek advice from peers (Jamshidinaid *et al.*, 2012; Zaidi & Tauni, 2012). On the other hand, Schaefer *et al.* (2004) found that agreeableness did not in any way predict overconfidence. Investors with this personality tend to avoid the anxiety associated with a negative result (Nicholson *et al.*, 2005).

### **3.2.2.5 Conscientiousness**

Cooper (2003:41) argues that conscientiousness is the inclination of the individual to be systematic and careful, a hard worker, responsible and somebody who is organised and determined. Conscientiousness further refers to an individual being trustworthy, having self-control, as well as the individual's ability to be goal-oriented (Myers *et al.*, 2010:7; Roberts *et al.*, 2012:1). Researchers such as Jackson *et al.* (2010:503) and Vazifehdoost *et al.* (2012:246) argue that individuals in this construct are also more strategic and display more organised behaviour, rather than being impulsive. Professionally, individuals in this construct perform better in academics, based on their motivation compared to individuals of other constructs (D'souza & Saelee, 2014:86).

The overconfidence bias is directly associated with conscientiousness (Lin, 2011; Zaidi & Tauni, 2012; Bashir *et al.*, 2013b). Investors with this personality tend to sell their winning stocks in advance (Lin, 2011). On the other hand, Schaefer *et al.* (2004) found that conscientiousness had no relationship with overconfidence. One study found that investors with this personality will rather reduce their risk (Durand *et al.*, 2013). These investors also prefer short-term investment options over other options of investments (Akhtar & Batool, 2012).

The following table provides an overview of the adjectives associated with each of the personality constructs, for both high and low scorers.

**Table 3.4: Adjectives associated with each personality construct**

<b>Construct</b>	<b>Low scorer</b>	<b>High scorer</b>	<b>Sources</b>
<b>Neuroticism</b>	Emotionally stable, composed, calm	Nervous, sensitive, unstable, depressed, insecure	Roccas <i>et al.</i> (2002a:793); Cooper (2003); Pan and Statman (2013:1)
<b>Extraversion</b>	Reserved, cautious, unassuming	Excited, verbose, outgoing, talkative, sociable	Roccas <i>et al.</i> (2002a:792); Myers <i>et al.</i> (2010); Pan and Statman (2013:1)
<b>Openness to experience</b>	Insensitive, conventional, practical	Inquisitive, creative, unique, sensitive	Roccas <i>et al.</i> (2002a:792); Kaufman (2013); Pan and Statman (2013:1)
<b>Agreeableness</b>	Suspicious, irritable, stubborn, ruthless	Grateful, trusting, generous, modest, gentle, compliant	Roccas <i>et al.</i> (2002a:792); Pan and Statman (2013:1); Zaidi <i>et al.</i> (2013)
<b>Conscientiousness</b>	Careless, dishonest, disorganised	Accountable, systematic, organised, careful	Roccas <i>et al.</i> (2002a:793); Jackson <i>et al.</i> (2010); Pan and Statman (2013:1)

Source: Author compilation

Table 3.4 indicates that low scoring versus high scoring individuals differ on all of the personality constructs; generally, the lower scoring individuals display opposite behaviour and personality traits to high scoring individuals. For example, an individual scoring low on neuroticism is an indication of an emotionally stable individual; whereas, an individual scoring high on neuroticism is an indication of the individual being more emotionally unstable and depressed.

### **3.3 RISK TOLERANCE, GENDER AND PERSONALITY CONSTRUCTS**

Financial risk tolerance refers to the total amount of uncertainty an individual is inclined to bear regarding his/ her financial decision making (Grable, 2000). When considering investors risk tolerance, investors can be classified into three main categories, namely

(i) risk averse, (ii) risk neutral and (iii) risk seeking (Tversky & Kahneman, 1981; Scholer *et al.*, 2010; Larkin *et al.*, 2013). Furthermore, the investor's level of financial risk tolerance is influenced predominantly by his/ her gender. For this study, gender takes on the definition of Money (1973), who states that gender is the combination of characteristics an individual possesses, classifying them as either male or female. The second biggest factor influencing investor risk tolerance is personality traits (Weller & Tikir, 2010). Personality refers to the set of psychological characteristics inherent to the individual, which shape his/ her actions in various domains of life (Vazifehdoost *et al.*, 2012). Many studies have been conducted on the link between financial risk tolerance, gender and personality traits. The following sections will provide an overview of these topics.

### **3.3.1 Gender and personality**

Historically, gender was measured based on biological sex. Femininity and masculinity were considered to be at opposite ends of a multi-dimensional continuum (Durand *et al.*, 2008:195). In other words, an individual was either classified as feminine or masculine; thus, male or female. Gender is often one of the biggest factors influencing the individual's decision-making processes (Rizvi *et al.*, 2014:53). Traditionally, the male was perceived as the provider and the female was perceived to be the caregiver (Durand *et al.*, 2008:195). Females were perceived to be more vulnerable based on their subordinate status (Rizvi *et al.*, 2014:53).

In the late 1960s, arguments came to light suggesting that females should be equal to males in terms of professions. However, males were focused on getting the job done; whereas, females were more focused on nurturing relationships with others (Durand *et al.*, 2008:195). Bem (1974) obtained empirical results indicating that gender did not correlate with an individual's biological sex. Therefore, it can be assumed that gender will influence an individual's investment decisions.

Personality constructs differ between genders. Males and females do not report the same levels of differences in the five personality constructs. Feingold (1994) conducted a study by making use of a meta-analysis and obtained results indicating a distinct difference in personality traits based on gender. Schmitt *et al.* (2008) conducted a study across 55 nations and found results supporting the differences in

personality constructs based on gender. The following table provides an overview of the differences in personality constructs based on the individual's gender.

**Table 3.5: Personality differences based on gender**

Personality construct	Male	Female
Neuroticism	Lower levels	Higher levels
Extraversion	Lower levels	Higher levels
Openness to experience	Higher levels	Lower levels
Agreeableness	Lower levels	Higher levels
Conscientiousness	Lower levels	Higher levels

Source: Adapted from Schmitt *et al.* (2008)

Table 3.5 summarises the personality constructs based on the individual's gender. Males are more inclined to score lower levels on four of the five constructs, namely neuroticism, extraversion, agreeableness and conscientiousness. However, males generally score higher on the openness to experience construct; females display the opposite scores. They score higher on all the constructs except for the openness to experience construct.

The following table provides an overview of studies conducted on the differences between males and females in terms of their investment decision making, as well as the results of these studies.

**Table 3.6: Gender and personality studies**

Sources	Study	Results
Costa <i>et al.</i> (2000)	Gender differences in personality traits across cultures: robust and surprising findings.	Results are in line with that of other studies and are in line with gender stereotypes. Women scored higher in neuroticism, whereas men scored higher in openness to experience.
Funham <i>et al.</i> (2005)	Personality and intelligence: gender, the big five, self-estimated and psychometric intelligence.	Gender and personality traits influenced participants to report higher self-estimated intelligence scores.
Durand <i>et al.</i> (2008)	An intimate portrait of the individual investor.	Portfolio performance is statistically associated with

Sources	Study	Results
		gender and individual personality traits.
Mayfield <i>et al.</i> (2008)	Investment management and personality type.	Gender and personality influence the investor's short- and long-term investment decisions.
Mohanta and Debasish (2011)	A study on investment preferences among urban investors in Orissa.	Investment preferences is directly influenced by the type of investor (personality) and his/ her gender.
Weisberg <i>et al.</i> (2011)	Gender differences in personality across the ten aspects of the big five.	Significant gender differences are reported for every aspect of the big five.
Ady <i>et al.</i> (2013)	Psychology's factors of stock buying and selling behaviour in Indonesia Stock Exchange (Phenomenology study of investor behaviour in Surabaya).	Personality and gender factors are crucial in the investor's investment success.
Karwowski <i>et al.</i> (2013)	Big five personality traits as the predictors of creative self-efficacy and creative personal identity: does gender matter?	Openness to experience, conscientiousness and neuroticism is positively associated with creative self-efficacy for men and women. However, agreeableness was negatively and extraversion positively associated with creative self-efficacy for women.
González-Igual (2018)	Decoding behavioural finance: the practitioner's view.	Female investors are better educated, make rational decisions and are more risk averse. Gender and personality influence investment choices.

Source: Author compilation

From the Table 3.6 it is evident that both personality traits and gender influence the investor's investment decisions. It is found that male investors are more inclined to take greater risks in order to receive greater returns (Mayfield *et al.*, 2008; Mohanta & Debasish, 2011). Female investors, on the other hand, are more risk averse and steer away from taking great investment risks (González-Igual, 2018).

In terms of gender differences in personality traits, Table 3.6 provides evidence for said differences. In the study of Costa *et al.* (2000), female participants provided higher scores on the neuroticism trait. Karwowski *et al.* (2013) provided results indicating that three of the big five personality traits influenced both male and female participants in the same manner. However, female participants provided results for the other two personality traits, associating agreeableness negatively and extraversion positively with creative self-efficacy. In the study of Funham *et al.* (2005), the individual's personality traits influenced his/her decisions to report higher scores for self-estimated intelligence.

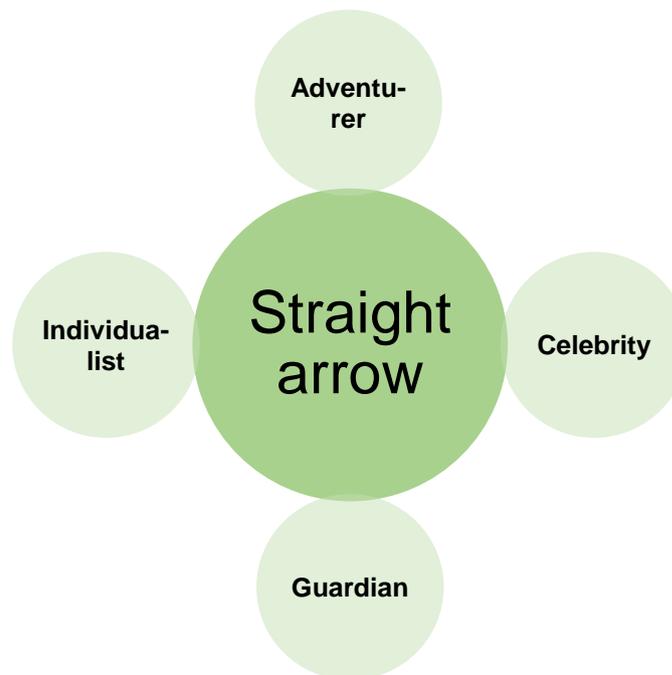
In terms of investor personalities, five main personalities exist, these are (i) the adventurer, (ii) celebrity, (iii) individualist, (iv) guardian and (v) the straight arrow and influence investor investment decisions in both the short- and long-term (Thomas & Rajendran, 2012:115). The investor personalities differ from their personality traits discussed in Section 3.2.2. These investor personalities will be discussed in the sections to follow.

### **3.4 INVESTOR PERSONALITIES**

The literature highlights the importance of classifying investors into distinct personality types (Digman, 1990; Renu & Christie, 2017). Investors are generally classified into different groups based on numerous factors combined into a single term called personalities (Dickason, 2018:30). The differences in the investor's goals, level of risk tolerance and their expected risk versus return trade-off group them into five main categories of investor personalities (Filbeck *et al.*, 2005:171; Thomas & Rajendran, 2012:117; Renu & Christie, 2017:24).

These investor personalities are the adventurer, the celebrity, the guardian, the individualist and the straight arrow. The straight arrow is known as the main investor personality, with the four other types being sub-personalities of investors (Thomas & Rajendran, 2012). These different personality types were based on two axes, namely the method of action and level of confidence (Renu & Christie, 2017:24). The method of action ranges from cautious to impulsive, whereas, the level of confidence ranges from self-assured to concerned (Renu & Christie, 2017:24). Barrick and Mount (1991)

state that the five investor personality classifications help study individual preferences and differences. Figure 3.2 depicts the different investor personalities.



**Figure 3.2: Investor personalities**

Source: Adapted from Thomas and Rajendran (2012:117)

### **3.4.1 The adventurer**

The adventurer personality is best explained by an investor who is willing to place everything they have on one bet, because they are confident (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). Furthermore, these investors follow their own idea of investing and it is thus difficult to advise them on suitable investment options (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). Finally, these investors are generally willing to take risks in their investment decisions (Parashar, 2010).

### **3.4.2 The celebrity**

The celebrity investor personality refers to investors who like to invest where there is action in the financial market (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). They generally do not possess their own ideas of investing and are also scared of feeling left out (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). As they do not have their

own ideas of investing, they tend to fall prey to brokers who only want to maximise their turnover (Parashar, 2010).

### **3.4.3 The individualist**

The individualist investor personality refers to investors who tend to go their own way on their investment decisions (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). These individuals tend to be small business owners, engineers or lawyers (Parashar, 2010). These investors pride themselves on making their own decisions, having a specific type of qualification and are also careful in their investment decisions (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). These investors tend to make investment decisions rationally.

### **3.4.4 The guardian**

This investor personality is typically associated with investors who change their investment style as they age (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). These investors tend to be careful with their investments and are also generally concerned about their money (Parashar, 2010). Furthermore, these investors are aware of their time left to earn an income and tend to preserve their investments (Thomas & Rajendran, 2012:118; Ady *et al.*, 2013). Finally, investors with this personality lack the ability to account for changes in the financial market and generally seek advice from brokers.

### **3.4.5 The straight arrow**

The straight arrow investor personality refers to investors who are well balanced and can thus not be classified as any of the aforementioned personality types (Ady *et al.*, 2013). These investors tend to be the average investors, possessing abilities from each of the other four personality types (Thomas & Rajendran, 2012:119; Ady *et al.*, 2013). These investors are only willing to bear a medium amount of risk on the investments they hold (Parashar, 2010).

The following table provides a summary of the main characteristics of each of the investor personalities discussed above.

**Table 3.7: Summary of investor personalities**

<b>Personality</b>	<b>Main characteristics</b>
<b>The adventurer</b>	Determined, volatile, entrepreneurial
<b>The celebrity</b>	Tend to follow the latest investment trends
<b>The individualist</b>	Confident, careful, encompasses the do-it-yourself technique
<b>The guardian</b>	Risk averse, wealth protector
<b>The straight arrow</b>	Equally encompasses all the characteristics from the other four personality types

Source: Adapted from Parashar (2010:36)

As indicated in Table 3.7, it is evident that every personality type is comfortable with a certain level of risk involved in his/ her financial decision making; thus, conforming to the two axes (method of action and level of confidence). The different personality types also have different financial goals. Furthermore, every personality type prefers certain investment options. The following table provides an overview of the five different investor personalities and their most likely investment options.

**Table 3.8: Investor personalities and most likely investment decisions**

<b>Personality type</b>	<b>Investment type</b>
<b>The adventurer</b>	Most investment types, including mutual funds who are equity oriented, equities, retirement annuities and hedge funds.
<b>The celebrity</b>	Different investment options including equities, direct equities and mutual funds who are debt oriented.
<b>The individualist</b>	Certain investment options only, such as equities, derivatives and real estate.
<b>The guardian</b>	Specific investments only, such as retirement annuities and fixed income securities.
<b>The straight arrow</b>	Any type of investment, including retirement annuities, equity products and fixed income securities.

Source: Adapted from Thomas and Rajendran (2012:120)

From Table 3.8, it is evident that each type of investor personality influences the investor's investment decision-making processes. There are distinct differences

between the five personality types, with the most obvious difference being between the adventurer and the straight arrow. The adventurer is an investor who is willing to invest in any type of investment, regardless of the risks involved (Thomas & Rajendran, 2012); whereas, the straight arrow is an investor who makes calculated investments, with only limited amounts of risk involved (Thomas & Rajendran, 2012). This type of investor will invest in any type of investment, if they are comfortable with the risks involved.

The celebrity and individualist tend to make investment decisions for the sake of investing, without considering all the risks involved in their investment decisions (Thomas & Rajendran, 2012). On the other hand, the guardian makes investment decisions, which are safe, with little to no risk associated with the investments (Thomas & Rajendran, 2012). Each of the investor personalities associate certain levels of risk with the investments he/ she is willing to make, thus, his/ her level of financial risk tolerance influences his/ her investment decisions.

### 3.5 PREVIOUS RESEARCH ON PERSONALITY STUDIES USING THE FIVE-FACTOR MODEL

This section provides an overview of previous research studies on personality traits, more specifically the big five personality constructs. The studies, along with their titles, authors and results will be presented.

**Table 3.9: Previous studies on the five-factor model personality traits**

Authors	Title	Results
Barrick and Mount (1991)	The big five personality dimensions and job performance: a meta-analysis.	Results indicate that conscientiousness is positively associated with all job performance criteria.
Judge <i>et al.</i> (1999)	The big five personality traits, general mental ability and career success across the life span.	Results suggest that conscientiousness is one of the biggest predictors for career success.
Soldz and Vaillant (1999)	The big five personality traits and the life course: a 45-year longitudinal study.	Results indicate that the participants' personality traits remained stable over the 45-year period.

<b>Authors</b>	<b>Title</b>	<b>Results</b>
Roccas <i>et al.</i> (2002b)	The big five personality factors and personal values.	Results indicate that the big five personality factors are positively associated with an individual's personal values.
Gosling <i>et al.</i> (2003)	A very brief measure of the big five personality domains.	The big five personality traits were adapted to 5 and 10 item inventories, which prove to be statistically significant.
Zhao and Seibert (2006)	The big five personality dimensions and entrepreneurial status: a meta-analytical review.	Results suggest that entrepreneurs scored high on openness to experience and conscientiousness and low on agreeableness and neuroticism.
O'Connor and Paunonen (2007)	Big five personality predictors of post-secondary academic performance.	Conscientiousness is the most prevalent personality trait associated with academic performance.
Rantanen <i>et al.</i> (2007)	Long-term stability in the big five personality traits in adulthood.	Personality traits changed over the individual's life span, with mean scores for agreeableness, openness to experience, conscientiousness and extraversion increasing.
Schmitt <i>et al.</i> (2007)	The geographic distribution of big five personality traits.	East Asian and south American cultures reported differentiating levels in openness to experience, compared to the other cultures.
Durand <i>et al.</i> (2008)	An intimate portrait of the individual investor.	Results suggest that portfolio performance is positively associated with the big five personality traits.
Mayfield <i>et al.</i> (2008)	Investment management and personality type.	Results suggest that individuals who are extraverted tend to invest in short-term options, whereas individuals who score high in neuroticism tend to avoid investing in the short-term.
Schmitt <i>et al.</i> (2008)	Why can't a man be more like a woman? Sex differences in big five	Results indicate that females possess higher levels of neuroticism, extraversion,

<b>Authors</b>	<b>Title</b>	<b>Results</b>
	personality traits across 55 cultures.	conscientiousness and agreeableness.
Komarraju <i>et al.</i> (2009)	Role of the big five personality traits in predicting college students' academic motivation and achievement.	Conscientiousness explains the largest amount of variance in intrinsic motivation. Followed by openness to experience.
Komarraju <i>et al.</i> (2011)	The big five personality traits, learning styles and academic achievement.	The big five personality traits positively influence academic achievement and learning styles.
Cobb-Clark and Schurer (2012)	The stability of big-five personality traits.	Results indicate that the big five personality traits are constant for adults over a four-year period.
Bashir <i>et al.</i> (2013a)	Are behavioural biases influenced by demographic characteristics & personality traits? Evidence from Pakistan.	Results show that the big five personality traits are positively associated with risk taking behaviour and the overconfidence bias.
Nga and Yien (2013)	The influence of personality trait and demographics on financial decision making among generation Y.	Results suggest that risk aversion is positively influenced by openness to experience, agreeableness and conscientiousness.
Pan and Statman (2013)	Investor personality in investor questionnaires.	Individuals with high levels of extraversion possess higher levels of financial risk tolerance; whereas, individuals with high levels of conscientiousness display low levels of financial risk tolerance.
Tauni <i>et al.</i> (2015)	The influence of investor personality traits on information acquisition and trading behaviour: evidence from Chinese futures exchange.	Results obtained indicate that extraversion and conscientiousness positively influence individual trading behaviour as well as information acquisition.
Renu and Christie (2017)	Review of the influence of investor personality (the big 5 model) on investor behavior.	Results suggest that when financial advisors are aware of their client's personality traits, they will be able to advise them more effectively.

Source: Author compilation

From Table 3.9 it is evident that the big five personality traits influence individuals in various circumstances and situations. Results from the studies above bring one factor more to light than others, conscientiousness. This could be attributed to the fact that individuals who are more conscientious are inclined to be more systematic, careful, hardworking, responsible, and also being organised and determined. Furthermore, individuals who are more conscientious tend to be more strategic and organised, rather than being impulsive.

Contradicting results were also found in terms of an individual's personality traits remaining constant over time. The study of Soldz and Vaillant (1999) suggest that the individual's personality traits will remain constant over his/ her life span. The study of Cobb-Clark and Schurer (2012) supports these findings of personality traits remaining constant over time, although their study only measured these traits over a four-year period. However, the study of Rantanen *et al.* (2007) suggests that individuals' personality traits changed as they aged. Four of the five traits changed, namely agreeableness, extraversion, conscientiousness and openness to experience.

Furthermore, the study of Schmitt *et al.* (2007) indicates that personality traits across cultures differ significantly; two cultures (South American and East Asian) report varying levels of openness to experience compared to the rest of the cultures sampled. In terms of financial decision-making behaviour and investment behaviour, two studies brought interesting results to light. The first study indicates that portfolio performance is influenced by the individual's personality traits (Durand *et al.*, 2008). The second study indicates risk aversion is positively influenced by openness to experience, agreeableness and conscientiousness (Nga & Yien, 2013). Finally, results from the studies above also indicate that personality traits influence risk taking behaviour (Bashir *et al.*, 2013a), as well as the individual's level of financial risk tolerance (Pan & Statman, 2013).

### **3.6 SYNOPSIS**

An individual's personality is his/ her driving force in decision making and activities, leading the individual to behave in a certain manner. It also differs from person to person. Personality and personality traits are key drivers in individual decision-making

processes. Personality traits also influence the investor's investment behaviour as well as the type of investments they choose to invest in.

The focus of this chapter was on individual personality and personality traits. Various aspects of personality and personality traits were presented. Behavioural finance, behavioural finance biases and the link between behavioural finance biases and personality traits were discussed. The different personality constructs were discussed, along with the different investor personalities. Furthermore, the link between financial risk tolerance, gender and personality constructs was established.

Chapter 4 focusses on the research design and methodology of the study. Research paradigms, methods and approaches will be discussed along with sampling procedures and the data collection method. The final section will present a discussion on the statistical analysis that will be followed in this study.

## CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

### 4.1 INTRODUCTION

Chapter 4 presents a discussion on the research design and methodology used in this study. In order to achieve the primary objective of the study, this chapter identifies all of the methodological underpinnings used throughout the study. The chapter is structured according to two main sections, namely Section 4.3, which explains the research design and methodology that were conducted in the primary study and Section 4.4, which explicates the secondary data analysis procedures (SDA) executed for this study. Section 4.5 gives a synopsis of the chapter. Table 4.1 provides an outline of the sections of the chapter with an overarching focus for each section and a description of the content of each section.

**Table 4.1: Chapter outline**

Section	Focus	Description
<b>Section 4.2</b>	Overview to research paradigm and design	This section provides an overview of the research paradigms and designs, as well as the applied paradigm and design of this study.
<b>Section 4.3</b>	Origin of primary data	This section provides an overview of the origin of the primary data used in this study, as well as the methods used to obtain the data.
<b>Section 4.4</b>	Secondary data analysis procedures	This section identifies all the relevant methods and procedures used in the SDA, in order to achieve the primary objective of the study.
<b>Section 4.5</b>	Synopsis	This section provides concluding remarks on the chapter, as well as an overview of the chapters to follow.

Source: Author compilation

### 4.2 OVERVIEW TO RESEARCH PARADIGMS AND RESEARCH DESIGN

This section provides an overview of the research paradigms and designs. The discussion highlights the main differences between the various paradigms as well as research designs. Furthermore, it provides insight into the paradigm and research design for this study.

### **4.2.1 Research paradigm**

A research paradigm is a worldview of how a researcher understands reality and the manner in which information is gathered about the research phenomenon (Tracy, 2013:38). Furthermore, paradigms are the method in which a worldview is seen (Guba & Lincoln, 1994:107). Paradigms are usually presented in terms of ontology (reality theory), epistemology (knowledge theory), axiology (value theory) and methodology (Margarete, 2000:247). The literature suggests that there are four main paradigms: positivism, post-positivism, constructivism and pragmatism (Feilzer, 2010; Creswell & Plano-Clark, 2011; Tracy, 2013). Table 4.2 identifies the main differences between the different paradigms.

### **4.2.2 Research design**

Research design refers to the entire research method, including the research problem, the literature review, the methodological underpinnings of the study as well as the conclusion of the study (Conrad & Serlin, 2011:147). Two basic research designs exist, namely the quantitative research design and the qualitative research design (Conrad & Serlin, 2011; Creswell & Plano-Clark, 2011). A quantitative research design makes use of large sets of data from which statistical analysis can be conducted (Golafshani, 2003; Creswell *et al.*, 2010). On the other hand, qualitative research designs do not incorporate statistical analysis techniques. The focus is placed on information such as interviews, observations, photos and relevant documents (Golafshani, 2003; Muller, 2011:27).

A third research design exists, known as the mixed methods research design. This design incorporates the elements of both quantitative and qualitative research designs (Onwuegbuzie & Leech, 2006). The mixed methods research design is typically employed when researchers deem one of the other designs as insufficient (Creswell, 2003). The following table provides an overview of the research paradigms and designs, as well as the suitability of the various research designs within the different paradigms.

**Table 4.2: Overview of research paradigms and designs**

<b>Paradigm</b>	<b>Ontology</b>	<b>Epistemology</b>	<b>Axiology</b>	<b>Research design</b>
<b>Positivism</b>	Impartial and external and independent of social factors.	Observable phenomena only provide reliable data.	Researchers are independent of data and remains objective.	Quantitative
<b>Post-positivism</b>	Impartial and independent of the researcher's thoughts.	Observable phenomena only provide reliable data.	The researcher tends to be biased by their worldview.	Quantitative or qualitative
<b>Constructivism</b>	Subjective and is constructed socially.	Focus on respondents' input and point of view.	The researcher forms part of the research phenomenon.	Qualitative
<b>Pragmatism</b>	Method chosen based on best way to achieve research question.	Observable and subjective meanings deliver suitable knowledge.	The researcher adopts objective and subjective viewpoints.	Mixed methods (quantitative and qualitative)

Source: Adapted from Le Roux (2016:56)

From Table 4.2 it is evident that this research study makes use of the positivist research paradigm. This paradigm is selected based on the notion that the researcher is independent of the data and takes an objective stance towards the research phenomenon. Furthermore, this paradigm is used since the research study makes use of a quantitative research design and the positivist paradigm is a suitable worldview for such an approach (Guba & Lincoln, 1994).

### **4.3 ORIGIN OF PRIMARY DATA**

Hox and Boeijs (2005:593) define primary data as a data set, which was collected for answering a certain research question. A reputable investment firm in South Africa collected the primary data. The firm distributed a questionnaire electronically to 4 800 investors forming part of their client base. All the investors were selected at random, in order to obtain an unbiased sample. Investors are identified as individuals who currently possess some form of formal investment portfolio at the specific South

African investment firm. The investment firm made use of a purposeful sampling method and a self-administered questionnaire. The investment firm received 1 065 completed questionnaires back from their investors. The sample size constituted 596 female investors and 469 male investors.

#### **4.3.1 SAMPLING PROCEDURE**

Sampling refers to the methods, criteria and measures employed to select a portion of the population for the research study (Lunsford & Lunsford, 1995:106; Niewenhuis, 2007:79). A sample consists of a portion of an entire population, which is under investigation for the research phenomenon (Strydom, 2011:223). The objectives and characteristics of the research study provide guidance for the researcher in determining the study's sample (Mack *et al.*, 2005:5). The sampling procedure constitutes the target population, the sampling frame, the sampling method and sample size (Marais, 2013:52). The following sections provide an overview of the sample procedures: target population, sampling frame, sampling method and sample size of the primary research.

##### **4.3.1.1 Target population**

The target population is known as the whole group of items or individuals which will be studied (Gujarati & Porter, 2010:407; Brooks, 2014:62). A population refers to a group of individuals encompassing the same characteristics (Roets, 2013:72). Thus, the target population is the entire group of individuals on which the researcher is going to focus (Marais, 2013:52). Stagnor (2015:112) states that the research study's target population should be defined accurately, as inaccurate classifications could lead to skewed or inaccurate results.

In terms of the primary data, the investors from a reputable investment firm were identified as the target population. The target population was a representative sample of the South African context, as respondents reside in all nine provinces of the country.

##### **4.3.1.2 Sampling frame**

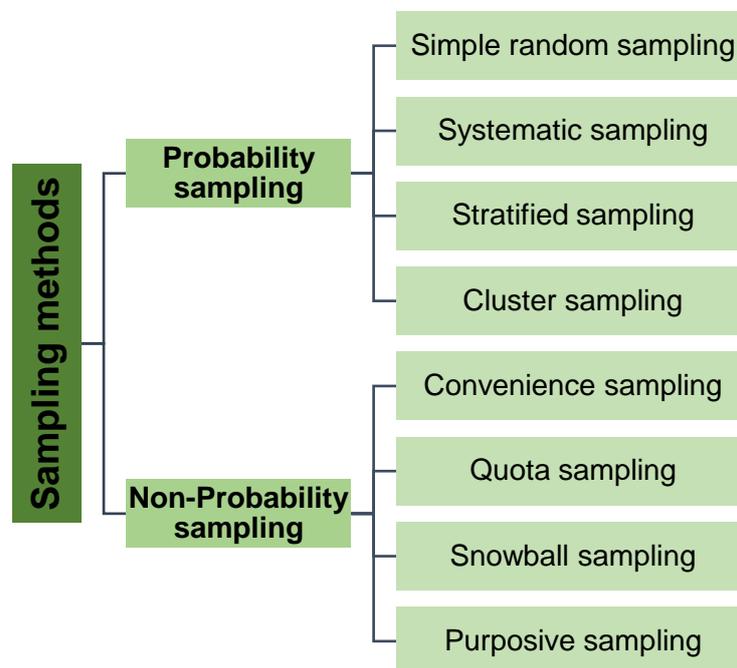
The sampling frame is a smaller section of the identified target population (Unrau *et al.*, 2007:279). Researchers generally study a sampling frame instead of a target

population as it is more efficient and practical (Marshall, 1996:522). A sample frame can either be in list form or in the form of a set of procedures (Harrison, 2006). Thus, a sampling frame makes it more feasible for researchers to conduct research studies using a small sample instead of the entire target population (Strydom, 2011:224).

The investment firm in question was responsible for selecting investors to participate in the research study for which the primary data were collected. The investment firm selected investors at random, in order to ensure an unbiased sample.

#### 4.3.1.3 Sampling method

Sampling methods refers to the method employed to identify a sample from the entire population, for the purpose of the research study (Maree & Pietersen, 2007b:172). Sampling methods are divided into two main categories, namely probability sampling and non-probability sampling (Maree & Pietersen, 2007b:172; Strydom, 2011:228). Both these categories constitute several sub-categories of sampling methods, as depicted in Figure 4.1.



**Figure 4.1: Sampling methods**

Source: Adapted from Maree and Pietersen (2007b:172); Strydom (2011:228)

The following sections will provide an overview on probability sampling and non-probability sampling methods, respectively.

#### **4.3.1.3.1 Probability sampling methods**

The probability sampling method is grounded on the concept of randomisation (Strydom, 2011:228). Every element, which forms part of the population, has a known, non-zero chance of being included in the sample for the research study (Malhotra, 2010:376). In this sampling method, human interference does not form part of the participant selection process (Maree & Pietersen, 2007b:172). Probability sampling comprises four sub-sampling strategies and will be presented in the following sections (Strydom, 2011).

- **Simple random sampling**

This technique refers to respondents having the same probability of being selected for the sample (Maree & Pietersen, 2007b:172). This technique makes use of a complete list for participant selection (Dickason, 2018:82).

- **Systematic sampling**

This technique involves the selection of the first participant at random, whereafter, the rest of the sample is selected on the  $n^{\text{th}}$  item/ order on the list (Zikmund *et al.*, 2013:396).

- **Stratified sampling**

This technique splits the sampling frame into subdivisions, also known as strata and these subdivisions are mutually exclusive (Struwig & Stead, 2001:112). Respondents forming part of the strata have the same characteristics (Onwuegbuzie & Collins, 2007:285). Respondents are also selected from each of the subdivisions (Struwig & Stead, 2001:112).

- **Cluster sampling**

This technique involves the clustering of the sampling frame (Kish, 1965:1). As soon as the clusters are formed, respondents within the clusters form part of the research study (Saifuddin, 2009).

In terms of the primary data, none of the probability sampling techniques was employed, as these techniques were not in line with answering the main research question. However, in obtaining the primary data, the investment firm employed a non-probability sampling method. These methods will be presented in the sections to follow.

#### **4.3.1.3.2 Non-probability sampling methods**

Non-probability sampling refers to the likelihood of respondents being selected for the research study being unknown (Zikmund & Babin, 2013:322). This sampling method is also employed by researchers based on its convenience, or the researcher's judgment (Zikmund *et al.*, 2013:392). In non-probability sampling, respondents do not have an equal chance of selection for inclusion in the research study (Maree & Pietersen, 2007b:176; Strydom, 2011:231). Marshall (1996:523) and Creswell and Plano-Clark (2011:174) suggest that non-probability sampling techniques can be applied to both quantitative and qualitative research studies. Furthermore, non-probability sampling comprises four sub-sampling strategies (Strydom, 2011:231), these will be identified and briefly described in the following sections.

- **Convenience sampling**

This technique refers to the sample selection process being based on the researcher's convenience, or ease of access to respondents (Anderson, 2010:4; Petty *et al.*, 2012:380). Thus, the sample is selected by means of the most accessible group of individuals or items (Marshall, 1996:523).

- **Quota sampling**

This sampling technique refers to respondents being selected for the research study from a specific subgroup (Cant *et al.*, 2008:166). The subgroup contains a set of prerequisites that the respondents needed to adhere to (Smith, 1983:400). The prerequisites can be in any form, from the respondent's economic status to their age (Struwig & Stead, 2001:111).

- **Snowball sampling**

In this sampling technique, the researcher identifies the first participant (Goodman, 1961; Atkinson & Flint, 2001:2). After the first participant has been identified, the participant suggests other participants for inclusion in the research study (Goodman, 1961; Atkinson & Flint, 2001:2). This process is then conducted until data saturation has been achieved (Atkinson & Flint, 2001:2).

- **Purposive sampling**

This sampling technique refers to the selection of respondents based on predetermined criteria, such as identified research objectives, or shared characteristics (Mack *et al.*, 2005:5). This suggests that the respondents are selected on purpose for the research study (Ritchie *et al.*, 2013:113).

In terms of the primary data collection procedure, the investment firm made use of a purposive sampling method. This technique was employed to ensure that a non-biased sample was drawn from the investment firm's clientele.

#### **4.3.1.4 Sampling size**

Malhotra (2010:374) defines a sample size as the amount of items, which will be sampled, or the number of participants, which will be included in the research study. Struwig and Stead (2001:125) are of the opinion that a research study's sample size cannot be determined before the study is carried out and that the researcher should aim to have a similar sample size in comparison with other research studies utilising the same research instruments. This will allow for a comparative study to determine whether the researcher obtains similar results (Struwig & Stead, 2001:120).

The investment firm distributed the questionnaire to 4 800 of their investors during May 2018; 1 065 completed questionnaires were received back in the same month. Thus, the final sample size of the primary data constituted 1 065 investors.

#### **4.3.2 DATA COLLECTION METHOD**

The data collection method refers to the way data for the research study will be collected (Boyce, 2002:544). Fellegi (2003:37) defines the data collection method as

the process the researcher follows to gather all the necessary information for the research study. Furthermore, Quinlan (2011:479) states that the data collection method can be in the form of a questionnaire, interview or focus groups and the gathered information will be analysed for the research study.

Different data collection methods exist for different research designs. The quantitative research design comprises two main data collection methods, namely the survey method and the observation method (Leedy & Omrod, 2005). Whereas, the qualitative research design comprises the aforementioned methods along with two added data collection methods, namely the interview method and action research (Struwig & Stead, 2001; Ebersöhn *et al.*, 2007; Quinlan, 2011). The following sections will provide an overview of the different data collection methods.

#### 4.3.2.1 Survey method

According to Glasow (2005:1), the survey method is commonly used to investigate a certain feature of the target population. The survey or questionnaire is the instrument used to measure the features of the target population (Glasow, 2005:1). A questionnaire is defined as a list of questions along with relevant information of the research study, designed in a manner to elicit responses from respondents (Babbie, 2007). Generally, a questionnaire will contain questions and answers, which are relevant to the research study (Delpont & Roestenburg, 2011:168). Furthermore, the main purpose of a questionnaire is to gather participant's objective views on the research topic (Delpont & Roestenburg, 2011:168). Questionnaires differ between different research studies and are also not standardised (Delpont & Roestenburg, 2011:168). The different types of questionnaires are identified in Table 4.3, along with a brief description of each.

**Table 4.3: Different types of questionnaires**

Questionnaire type	Brief description
<b>Mailed questionnaire</b>	These questionnaires are also known as postal questionnaires (Quinlan, 2011:223). This questionnaire is mailed to the participant, whereafter the participant fills out the questionnaire and mails it back to the researcher (Delpont & Roestenburg, 2011:186).

Questionnaire type	Brief description
<b>Telephonic questionnaire</b>	This type of questionnaire involves the process of the interviewer contacting the interviewee telephonically (Maree & Pietersen, 2007a:157). The entire questionnaire is conducted telephonically and the interviewer normally records the interview (Maree & Pietersen, 2007a:157). This type of questionnaire is especially useful when the target sample is geographically spread widely (Mathers <i>et al.</i> , 2002).
<b>Hand delivered questionnaire</b>	This type of questionnaire is delivered to the participant by the researcher (Allred & Ross-Davis, 2010:3). Once the participant has filled out the questionnaire, at a time suitable to them, the researcher will collect the questionnaire (Delpont & Roestenburg, 2011:188).
<b>Self-administered questionnaire</b>	This questionnaire is completed by the participant, without assistance from the researcher (Cant <i>et al.</i> , 2008:100). Should a participant experience a problem with the questionnaire, the researcher is nearby to address the problem (Delpont & Roestenburg, 2011:188).
<b>Group-administered questionnaire</b>	This type of questionnaire is administered to a group of respondents simultaneously by the researcher (Quinlan, 2011:225). Each participant completes the questionnaire, thereafter a group discussion of the questionnaire commences (Delpont & Roestenburg, 2011:189).

Source: Author compilation

As seen in Table 4.3, there are five different types of questionnaires. The original questionnaire used to gather the primary data was a self-administered questionnaire. This type of questionnaire was suitable, as the questionnaire was distributed electronically to investors and the researcher did not aid in the completion of the questionnaires.

#### 4.3.2.2 Observation method

The observation method can be defined as a data collection method where the researcher observes the research phenomenon (Quinlan, 2011:221). The observations made are generally recorded in order to create data for the research study (Creswell, 2013:375). Creswell (2013:375) is of the opinion that the researcher should begin the observation procedure as openly as possible and then as the

procedure progresses, narrow it down to the research questions. The most prominent advantage of making use of the observation method, is that the researcher does not depend on the willingness of the participant to take part in the study (Struwig & Stead, 2001:96). Furthermore, the researcher does not depend on the ability of the participant to account for the accuracy of the data (Struwig & Stead, 2001:96).

#### 4.3.2.3 Interview method

The interview method is a method where the interviewer (researcher) ask questions to the interviewee (participant) to obtain data relevant to the research study (Struwig & Stead, 2001). The interview can also be described as a conversation taking place between the interviewer and the interviewee, with a fixed list of questions (Tracy, 2013:154). Gill *et al.* (2008) state that interviews are most suitable when there is little information available on the research phenomenon and the researcher requires intricate details from the respondents. The interview method is the most commonly used data collection method in qualitative studies (Greeff, 2011:342). The four different types of interviews are identified in Table 4.4, along with a brief description of each (Struwig & Stead, 2001; DiCicco & Crabtree, 2006; Gill *et al.*, 2008).

**Table 4.4: Types of interviews**

Interview type	Brief description
<b>Structured interview</b>	This type of interview constitutes a standard set of questions the researcher uses (Struwig & Stead, 2001:98). The questions used are based on the theory of the research phenomenon (Struwig & Stead, 2001:98). In this type of interview, the researcher cannot make use of follow-up questions if they wanted to (Gill <i>et al.</i> , 2008:291). These interviews tend to be fast and informal and are administered to one participant at a time (Delpont & Roestenburg, 2011:186).
<b>Semi-structured interview</b>	This interview type assists in exploring the research phenomenon (Gill <i>et al.</i> , 2008). This interview type combines the elements of a structured interview and unstructured interview (Struwig & Stead, 2001; Mathers <i>et al.</i> , 2002). DiCicco and Crabtree (2006:315) argue that this type of interview is the only suitable type of interview for qualitative research studies.
<b>Unstructured interview</b>	This interview method does not have any predetermined questions (Mathers <i>et al.</i> , 2002; Gill <i>et al.</i> , 2008). These

Interview type	Brief description
	types of interviews are of an elastic and organic style (Tracy, 2013:139). Finally, this interview method starts with a question and then the conversation follows from there on (DiCicco & Crabtree, 2006).
<b>Focus group</b>	This interview allows the interviewer (researcher) to interview multiple interviewees (participants) at the same time (Zikmund & Babin, 2013:142). The main aim of a focus group is for the researcher to gather information on the research phenomenon, by means of group interactions (Morgan, 1997:6). The ideal amount of interviewees in a focus group is between four and eight, with a maximum of 12 interviewees (Struwig & Stead, 2001; Quinlan, 2011).

Source: Author compilation

None of the above interview methods (Table 4.4) was used by the investment firm during the primary data collection process. As the research study made use of a quantitative research approach, the interview approaches were not suitable.

#### 4.3.2.4 Types of questions

Questions in a questionnaire or interview can take on one of two forms, namely open-ended and closed-ended. Open-ended questions allow the participant to answer the question in a manner they deem right, express their point of view and give their opinions regarding the research phenomenon, without the interference of the researcher (Reja *et al.*, 2003; Neuman, 2007). Whereas, closed-ended questions refer to the individual being limited to a set of predetermined responses for the questions presented to them (Reja *et al.*, 2003; Neuman, 2007). Respondents answering closed-ended questions can do so without any effort to formulate an answer (Mack *et al.*, 2005).

#### 4.3.3 QUESTIONNAIRE DESIGN

A questionnaire can be defined as an instrument, which is used to elicit responses from respondents regarding a certain research phenomenon (Stagnor, 2015:110). A questionnaire is regarded as the anchor of surveys, thus ample time and strategic thinking needs to be allocated to the design thereof (Chisnall, 1992:39; Roets, 2013:37). Therefore, the questionnaire's design is a crucial element in the research

process, in order to collect accurate and meaningful data (Malhotra *et al.*, 2012:325). Churchill and Iacobucci (2010) argue that a questionnaire's design impacts the extent to which respondents are willing to complete the questionnaire.

Should a researcher make use of a self-administered questionnaire, it is advantageous that a cover letter is included with the questionnaire (Monette *et al.*, 2013). The cover letter generally provides an overview of the research study, along with motivational reasoning for the participant to complete the questionnaire (Monette *et al.*, 2013). A respectable questionnaire design can be established by defining well written research goals specifying the information needed for the research study (Malhotra, 2010:336). The question wording should also be considered in order for respondents to understand what is being asked of them (Welman *et al.*, 2005:176). Therefore, vague wording should be avoided. The completion time of the questionnaire should not exceed 20 minutes, to ensure reliable feedback (Struwig & Stead, 2013).

The investment firm, collecting the primary data, kept the objectives for the questionnaire simple and brief. Thus, keeping the questionnaire clear, easy to follow and concise, was possible (Quinlan *et al.*, 2015:273). The language used in the questionnaire was simple and easy to understand, enabling respondents to understand clearly what was asked of them. The questionnaire was completed, on average, within 20 minutes. The questionnaire made use of structured questions only. Table 4.5 identifies the original questionnaire's design used by the investment firm.

#### **4.3.4 QUESTIONNAIRE FORMAT**

A questionnaire format is dependent on the type of questionnaire, the questionnaire's administration, as well as the individuals completing the questionnaire (Delpont & Roestenburg, 2011:193). Babbie and Rubin (2008) state that the questionnaire's format is equally as important as the questions being asked and the phrasing of the questions asked. The questions forming part of the questionnaire can either be of a structured nature, or an unstructured nature (Parasuraman, 1991:367).

Structured questions are closed questions, with pre-set responses, from which participants can choose their answer (Marais, 2013:58). It is expected from the participant completing the questionnaire to choose one of the responses, or more than one, with their chosen response being the answer, which best reflects their opinion

(McDaniel & Gates, 2010:201). In self-administered questionnaires, structured questions are the most effective. Contrarily, unstructured questions refer to questions where the participants can provide their own answers to the questions asked, instead of choosing from a list of responses (Malhotra, 2010:333).

Furthermore, questionnaires are classified as being disguised or undisguised (Marais, 2013). Disguised questionnaires refer to the research study's objectives being vague or unclear (Churchill & Iacobucci, 2010). On the other hand, undisguised questionnaires refer to a questionnaire where the research study's objectives are clear to respondents (Churchill & Iacobucci, 2010).

As this research study makes use of a SDA technique, the researcher did not develop the questionnaire used to gather the data. However, the questionnaires used to gather the data for the original research study were distributed electronically and made use of only a structured question format (Table 4.5).

#### **4.3.5 QUESTIONNAIRE LAYOUT**

McDaniel and Gates (2001) state that a questionnaire should be well organised, neatly arranged and professionally developed, in order to avoid confusion among respondents completing the questionnaire and to ensure a higher response rate. Zikmund and Babin (2013:173) state that a response rate is the number of completed questionnaires divided by the number of respondents who were selected for the research study. The order of the questions presented in the questionnaire is important. All the questions relating to a specific subject should be grouped together and asked before a new topic is introduced (Malhotra, 2010:351). Cant *et al.* (2008) are of the opinion that in order to ensure the participation of respondents, the interesting, easy to understand and easy to answer questions should be asked first.

The following table provides an overview of the different sections the questionnaire along with the subject area to measured, as well as the measurement instrument.

**Table 4.5: Questionnaire layout**

<b>Section</b>	<b>Description</b>	<b>Objective</b>	<b>Question type and measurement</b>
<b>A</b>	Demographic information	To determine the influence of demographical factors on investor behaviour.	Closed-ended questions, responses were provided for respondents to choose from.
<b>B</b>	Financial well-being	To determine financial well-being of investors.	Closed-ended questions, responses were provided for the participant to choose from.
	Risk tolerance	To determine investors' level of financial risk tolerance.	Closed-ended questions, responses were provided for the participant to choose from.
	SCF	To determine investors' level of financial risk tolerance.	Closed-ended question, responses were provided for the participant to choose from.
<b>C</b>	Behavioural finance	To determine to which biases the investor is subjective towards.	Closed-ended questions. 6-point Likert scale (1) strongly disagree – (6) strongly agree.
<b>D</b>	Subjective well-being	Determine the investor's overall subjective well-being.	Closed-ended questions. 6-point Likert scale (1) strongly disagree – (6) strongly agree.
<b>E</b>	Personality measures	To determine investors' personality traits.	Closed-ended questions. 6-point Likert scale (1) strongly disagree – (6) strongly agree.
<b>F</b>	Physical activity	To determine investors' level of physical activity.	Closed-ended questions, responses were provided for respondents to choose from. Along with open-ended questions.

Source: Author compilation

Sections A, B and E were used during the application of the SDA and are described in Section 4.4.4. The following sections provide an overview of the ethical considerations as well as the pilot testing of the questionnaire (Annexure A).

#### **4.3.6 ETHICAL CONSIDERATIONS**

This research study conforms to the ethical standards of academic research as prescribed by the North-West University. The research study obtained ethical clearance from the Economic and Management Sciences Research Ethics Committee, with an ethics clearance number of NWU-0082-19A4 (Annexure B). The required permission to perform the study was obtained from the relevant investment company involved. The researcher had no knowledge of the client database of the relevant investment firm, as the company performed the screening of the respondents. Therefore, the anonymity of the respondents was guaranteed.

No identifying marks were present on the documents received back from the relevant investment firm. The researcher only received raw data from the relevant investment firm. The investment firm ensured confidentiality by providing only the raw data to the researcher, thus the researcher has no knowledge of the investors forming part of the study. The investment firm that collected the data indicated no concerns for publications from the data obtained, as long as the firm is not mentioned in any way.

#### **4.3.7 PILOT TESTING OF QUESTIONNAIRE**

A pilot study is referred to as a smaller scaled study of the main research study (Van Teijlingen & Hundley, 2001). Thus, pilot testing refers to the pre-testing of the measuring instruments used in the research study. Delpont and Roestenburg (2011:195) suggest that the researcher should conduct a pilot study, instead of having a few people read through the research instruments to identify any mistakes. The main purpose of conducting a pilot study is to identify any errors or mistakes in the research instruments (Burgess, 2001:15).

Collins (2003:231) is of the opinion that the researcher should conduct a pilot test in order to obtain valid data, as respondents often do not understand what is expected from them. Furthermore, Bernardini *et al.* (2001:439) state that a pilot test should be conducted in order to ensure the research instrument's clarity. After all recommendations from the pilot study have been implemented, the research instrument can then be used for the main research study (Delpont & Roestenburg, 2011:195).

### **4.3.8 QUESTIONNAIRE ADMINISTRATION**

The research instrument used in this study was distributed to 4 800 of the investment firm's investors and all the questionnaires had the same questions and format. The investment firm managed to get 1 065 responses from their clientele. The survey was conducted during the month of May 2018 and responses were received back in the same month. The questionnaire's design, format and layout were presented in sections 4.3.3 – 4.3.5.

### **4.3.9 DATA PREPARATION**

After the researcher's field work is completed, the data need to be converted into a format answering the researcher's research questions (Zikmund & Babin, 2013). The raw data should be edited and coded in order for the researcher to capture the information and content thereof. Thus, the data are screened for suitability, quality and the number of questionnaires that can be used for the research study. The following sections provide a brief overview on the data preparation techniques employed in this study.

#### **4.3.9.1 Editing**

Malhotra (2010:453) states that editing is the process of analysing the questionnaire in order to increase the accuracy and the precision of the gathered data. Unanswered questions in the questionnaire are problematic. The researcher needs to look at factors such as readability of responses and unclear or varying responses from respondents (Malhotra, 2010:453). The result from the editing process is data that can be coded properly.

#### **4.3.9.2 Coding**

Once the questionnaires have been edited, the coding process can begin. Coding is the process of assigning a number or code to each response to every question of the questionnaire (Malhotra, 2010:425). Thus, the researcher can make logical sense of the captured data, which improves the analysis and interpretation of the results. As the coding and editing were conducted according to the correct standards, the data were suitable to use to conduct the SDA for this study.

The following sections of the chapter identifies the procedures followed to conduct the SDA (executed to address the empirical objectives of this study). The primary research explained in the previous sections forms the framework to: (i) explicate the relevance and value of the data that was collected in a very stringent and scientific manner and (ii) understand the background for the execution of an SDA, which was relevant to address the empirical objectives of this research. The SDA, the research method used for this study, will be discussed in the following sections.

#### **4.4 SECONDARY DATA ANALYSIS PROCEDURES**

##### **4.4.1 RESEARCH METHOD**

The research method refers to the procedures and various methods implemented to address the research questions (Strydom, 2011). The research method includes the implemented theoretical procedures, experimental studies, as well as statistical analysis (Strydom, 2011). Furthermore, the research method constitutes the manner in which the researcher collects, analyses and interprets the data (Johnston, 2014:620). The research method implemented in this study is the secondary data analysis technique and will be discussed in the sections to follow.

##### **4.4.2 SECONDARY DATA ANALYSIS**

Secondary data analysis (SDA) refers to the analysis of a pre-existing dataset, to answer new research questions, or to answer existing research questions with more sophisticated statistical analyses (Glass, 1976:3; Royse, 2004:211; Follmer Greenhoot & Dowsett, 2012:3). SDA can also be defined as the analysis and interpretation of data that were previously collected by another researcher for a different purpose (Johnston, 2014:619). Furthermore, this type of analysis also refers to the use of the original or primary dataset, without the original researchers involved in the data collection process (Follmer Greenhoot & Dowsett, 2012:3).

SDA is based on the same basic principles of primary research (Neuman, 2000:305; Johnston, 2014:619) and uses a technique of comparing between different studies, simultaneously utilising the same dataset (Ritchie & Lewis, 2003:61). Walliman (2006:53) states that the quality of the data should be thoroughly assessed to ensure

that the original dataset is trustworthy. Furthermore, SDA can be used to re-examine the initial conclusions drawn from the secondary dataset.

SDA can be applied to both quantitative and qualitative research designs (Bechhofer & Paterson, 2000:62). Content analysis is conducted on existing qualitative data, extracting the main themes from the data (Bechhofer & Paterson, 2000:62; Strydom & Delpont, 2011:384) and statistical analyses are used to correlate the items within the questionnaire to address the empirical research questions. The datasets used in both quantitative and qualitative analysis should be relatively new (Strydom & Delpont, 2011:384).

The SDA method constitutes six fundamental steps (Strydom & Delpont, 2011:384), along with advantages and disadvantages and will be discussed in the sections to follow.

#### **4.4.2.1 Steps involved in SDA**

Strydom and Delpont (2011:384) and Johnston (2014:621) state that an SDA comprises six fundamental steps: (i) problem formulation, (ii) research question formulation, (iii) pilot study, (iv) data reprocessing, (v) data analysis and (vi) report writing, which should be implemented throughout the research study. The following sections provide an overview of the steps involved in SDA.

- **Step 1: Formulating the research problem**

Formulating the research problem is the researcher's comprehensive perception of the research problem, which should be investigated. Researchers should first establish their research problem before acquainting themselves with an existing set of data. Existing data should never be used based on its convenience, existence or cost effectiveness.

- **Step 2: Formulating the research question**

The researcher's vague thoughts on the research problems must now be formulated into the research questions. All the research questions should relate to the objectives of the research study. Once the research questions have been formulated, the nature

and scope of the research study should be identified and a pilot study should be conducted.

- **Step 3: Conduct a pilot study**

Throughout the course of the pilot study, researcher needs to familiarise themselves with the theory relating to the subject of the research. All the characteristics of a pilot study should be considered when conducting the study. The researcher should engage in discussions or contact with experts in the research area, to establish value for their study. The dataset which will be used should also be examined to determine suitability for the research study.

- **Step 4: Reprocess the data**

After the first three steps of the SDA process have been completed, the researcher needs to analyse the dataset ensuring validity and suitability for their research study. The researcher also needs to ensure suitability of the dataset with the research questions and identify the appropriate variables to be used in the research study, from the dataset. Thus, the data reprocessing happens at this stage. It often occurs that the secondary study cannot make use of all the variables in the pre-existing dataset; thus, the data should be reduced where needed.

- **Step 5: Analysis and interpretation of the data**

After the data reprocessing step, the researcher needs to confirm that the dataset accurately answers the research questions established in step two. Reliability and validity of the dataset is established at this point. The data can also be compared to similar studies, or to other studies utilising the same dataset. Thus, it will enable the researcher to identify new relationships or to develop new research questions.

- **Step 6: Report writing**

The research results should be reported. Any research study is validated on its research report. Validity and verifiability can only be determined if the research study is well reported and documented.

#### 4.4.3 ADVANTAGES AND DISADVANTAGES OF SDA

SDA includes several advantages and disadvantages. The following section provides an overview of the most prominent advantages and disadvantages of SDA. Advantages of SDA can be stated as follows (Boslaugh, 2007:3; Strydom & Delport, 2011:386; Follmer Greenhoot & Dowsett, 2012:4; Johnston, 2014:624):

- The researcher avoids the data collection process; thus, the researcher does not incur any costs, as the primary researcher incurs all the costs involved in collecting the data.
- SDA is multidisciplinary; thus, the dataset can be used for multiple disciplines and different types of studies.
- Researchers are able to detect earlier developing patterns or unanticipated events.
- Datasets which were collected using complex data collection techniques, result in representative samples and allow for broader generalisations of findings.
- Making use of existing datasets allows for a faster research process as the time-consuming element of data collection is eliminated.

Disadvantages of SDA can be stated as follows (Herron, 1989:68; Boslaugh, 2007:4; Strydom & Delport, 2011:388):

- The researcher making use of the secondary analysis technique relies on the validity and reliability as determined by the primary researcher of the dataset.
- The researcher needs to understand thoroughly the variables and definitions thereof, that were intended to be measured by the primary study.
- The dataset may not be completely suitable for the SDA study. The collected data may not include certain aspects of the representative sample, which the researcher wanted to use in the secondary study.
- Respondents' confidentiality and anonymity could be affected as other researchers are also making use of the initial study's dataset.
- Copyright issues may come to light, as the SDA researcher is not the owner of the dataset to be used in their research study.

#### 4.4.4 APPLYING THE SECONDARY DATA ANALYSIS PROCEDURES

Table 4.6 provides information on the steps involved in an SDA and how those steps were applied in this research study.

**Table 4.6: Applying SDA procedures**

<b>Primary objective</b>	
<i>Develop a model based on individual risk tolerance, for female South African investors, in order for investment firms to measure, more accurately, their investors' risk profiles</i>	
<b>SDA Procedure</b>	<b>Applying procedure</b>
<b>Step 1</b> Formulate the problem	The researcher identified a shortcoming in the investment sector's risk profiling of their investors. This led the researcher to formulate the research problem of this study: <ul style="list-style-type: none"> <li>• Investment firms fail to measure investor profiles accurately based on the investor's risk tolerance levels, their personality traits and their level of education.</li> </ul>
<b>Step 2</b> Formulate the research questions	<b>Primary objective</b> Develop a model based on individual risk tolerance, for female South African investors, in order for investment firms to measure, more accurately, their investors' risk profiles.
	<b>Theoretical objectives</b> <ul style="list-style-type: none"> <li>• Conduct a theoretical analysis of financial risk tolerance;</li> <li>• Construct a theoretical framework for female risk tolerant behaviour;</li> <li>• Construct a theoretical framework for different personality measures; and</li> <li>• Contextualise a theoretical framework for female investor behaviour.</li> </ul>
	<b>Empirical objectives</b> <ul style="list-style-type: none"> <li>• Analyse demographic variables in terms of males and females;</li> <li>• Report on the various personality traits of the sample;</li> <li>• Determine the risk tolerance levels for the sample;</li> <li>• Report the effect of gender on the sample in terms of the sample's risk tolerance levels;</li> <li>• Determine the relationship between level of education and level of risk tolerance for the sample; and</li> <li>• Develop a model to measure female investors' risk profile accurately, considering their personality traits, risk tolerance levels and level of education.</li> </ul>
<b>Step 3</b>	The researcher did not conduct a pilot study on the research instrument. The investment firm collecting the primary data did

<b>Primary objective</b>	
<i>Develop a model based on individual risk tolerance, for female South African investors, in order for investment firms to measure, more accurately, their investors' risk profiles</i>	
<b>SDA Procedure</b>	<b>Applying procedure</b>
Conduct pilot study	not grant the researcher access to their database, therefore, the researcher could not conduct a pilot study. However, the research study was approved, without performing a pilot study on the research instrument.
<b>Step 4</b> Reprocess the data	The researcher received the primary data collected by the investment firm electronically. Thereafter, the researcher identified suitable data for the research study. Once the suitable data were identified, the researcher only extracted the necessary data from the primary dataset.
<b>Step 5</b> Analyse and interpret data	The analysis and interpretation of the data will only be presented in Chapter 5.
<b>Step 6</b> Report writing	The final step of the SDA procedure will only be presented in Chapter 5.

Source: Author compilation

Section 4.3.5 (Table 4.5) identified the layout of the questionnaire used to gather the primary data. However, this research study only made use of certain elements from the questionnaire. The sections to follow will provide an overview of the elements used from the primary dataset and what these elements intend to measure.

#### **4.4.4.1 Data used from the questionnaire**

##### **Section A – Demographic information**

Demographic information refers to the characteristics of the sample population (Kolb, 2008). These characteristics typically include age, race, gender, and marital status etcetera. The questionnaire used in this study included the following demographic characteristics: age, gender, race, marital status, annual income and highest level of education.

## Section B – Risk tolerance and SCF

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

The SCF is a periodical statistical survey constituting balance sheets, pension income and demographic characteristics of investors (Hanna *et al.*, 2008:98). For the purpose of this study, only one item from the SCF will be used. The use of the single risk tolerance measure item from the SCF has been previously validated (Grable & Lytton, 2001:43). Individuals will indicate the chosen option that suits their level of risk tolerance (Grable & Lytton, 2001:43; Gilliam *et al.*, 2010:31), thereby, measuring an individual's level of risk tolerance by means of a single question. Table 4.7 identifies the risk tolerance measurement question, along with the possible responses investors could choose.

**Table 4.7: SCF single risk tolerance question**

Question	Responses
Which of the following statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?	<ol style="list-style-type: none"><li>1. Take substantial financial risk expecting to earn substantial returns.</li><li>2. Take above average financial risk expecting to earn above average returns.</li><li>3. Take average financial risk expecting to earn average returns.</li><li>4. Not willing to take any financial risk.</li></ol>

Source: Gilliam *et al.* (2010)

- **Grable and Lytton 13-item risk-tolerance scale (GL-RTS)**

The GL-RTS measures financial risk tolerance in order to manage an individual's financial decision making processes in terms of reaching their financial goals (Gilliam *et al.*, 2010:32). The GL-RTS has been previously validated and is being used worldwide by financial advisors, educators, academics as well as researchers (Kuzniak *et al.*, 2015:178). Grable and Lytton (1999b) suggest that an instrument measuring financial risk tolerance should include the following five elements:

- A central risk concept;
- Allowing for a source of a risk measure;

- Significance to respondents;
- Easy administration, and
- Acceptable reliability and validity.

Furthermore, MacCrimmon and Wehrung (1986) suggest that a valid risk tolerance measuring instrument should adhere to the following guidelines:

- Include various risky financial situations;
- Be constant and non-redundant;
- Be interesting in order to complete it, and
- Take a limited amount of time to complete.

Kuzniak *et al.* (2015) conducted a study where they examined the validity and reliability of the GL-RTS as well as the SCF single risk tolerance question. They examined the validity and reliability over a 15-year period and obtained results indicating that both these statistical measures remained robust over the indicated period. Thus, it is a sufficient instrument to measure investor risk tolerance.

## **Section E – Personality measures**

The personality measure assessment used in this study is based on the big five personality domains. This scale assesses individual personality traits in five main domains, namely (i) neuroticism, (ii) extraversion, (iii) openness to experience, (iv) agreeableness, and (v) conscientiousness (Gosling *et al.*, 2003:506; Rothmann & Coetzer, 2003:69; Mayfield *et al.*, 2008:220). The personality measures include three subscales, namely short-term investment decisions, long-term investment decisions and risk aversion.

The big five model of personality constitutes two main components. The first component is basic tendencies and the second is characteristic adaptations (McCrae, 2011). Most research conducted, making use of the big five model of personality, focusses on the characteristic adaptations component (McCrae, 2011). The big five model of personality as used today was adapted by McCrae and Costa (1987). The five domains of personality generally measure all aspects of an individual's personality and can classify individuals according to each domain, or all of the domains as a whole (Nicholson *et al.*, 2005).

#### **4.4.5 STATISTICAL ANALYSIS OF SDA**

After the collection and preparation of the dataset, statistical analysis can be conducted. Statistical analysis refers to applying various analysis techniques to understand the data that were gathered and to obtain information from the gathered data (Swanepoel *et al.*, 2006:3; Zikmund *et al.*, 2013:68). Statistical analysis also refers to reporting on the tendencies of the dataset being analysed (Shazia, 2014:141).

The secondary dataset was analysed using the IBM Statistical Package for Social Sciences™ (SPSS), version 25 (IBM SPSS, 2018) and AMOS™, version 25 (IBM SPSS Amos, 2018). These two programmes are computer software programmes, which are used to analyse statistics from gathered datasets. The following sections provide an overview on the statistical techniques used to analyse the secondary dataset.

##### **4.4.5.1 Reliability**

Reliability refers to the consistency of the results gathered from the dataset being analysed, over a certain period of time (Golafshani, 2003:598; Pietersen & Maree, 2007:215). For the research instrument to be reliable, other researchers making use of similar research methodologies, should obtain similar results (Malhotra & Birks, 1999:140; Golafshani, 2003:598). High reliability is achieved when the research instrument provides similar results, in the event of the research study being repeated on the same sample (Maree & Pietersen, 2007a:147). The reliability analysis of a scale also accounts for the degree to which a scale is free from random errors (McDaniel & Gates, 2001).

Three main approaches to reliability analysis exist, namely: (i) test-retest reliability, (ii) alternative-forms reliability, and (iii) internal consistency reliability (McDaniel & Gates, 2001; Malhotra, 2010). These methods are described in the sections to follow.

- **Test-retest reliability**

This approach involves administering the same set of scale items at two different points in time, under conditions being as equal as possible, in order to test the scale's stability (McDaniel & Gates, 2001:254; Pietersen & Maree, 2007:215; Malhotra, 2010).

- **Alternative-forms reliability**

This approach constitutes measuring the reliability of the scale. It requires that two separate evaluations of the scale need to be created and that the same respondents should be measured at two different time points (McDaniel & Gates, 2001:254; Malhotra, 2010:319).

- **Internal consistency reliability**

This approach measures the scale items' internal consistency, where some of the items are summed in order to form a total scale score (McDaniel & Gates, 2001:254; Pietersen & Maree, 2007:216; Malhotra, 2010:319). This method constitutes the split-half method, which is regarded as the simplest measure of internal consistency reliability (Iacobucci & Churchill, 2010:259).

#### 4.4.5.2 Validity

Iacobucci and Churchill (2010:259) are of the opinion that in order for a scale to be valid, it needs to be reliable first, thus if the scale is not reliable, it is not valid. Validity refers to the extent to which the research instrument measures the phenomenon it intended to measure, even when administered under different circumstances (Struwig & Stead, 2001:136; Hair *et al.*, 2013:166; Zikmund & Babin, 2013:258). Therefore, a measuring instrument is deemed valid when the intended phenomenon is measured as predicted by the researcher (Welman *et al.*, 2005:142).

Three main approaches to validity analysis exist, namely (i) content validity, (ii) criterion validity, and (iii) construct validity (Iacobucci & Churchill, 2010; Malhotra, 2010). The following table provides a brief description on the three most prominent reliability analysis approaches.

**Table 4.8: Validity analysis approaches**

Validity approach	Brief description
<b>Content validity</b>	This validity approach is also known as face validity (Parasuraman, 1991:442). This approach refers to a systematic analysis of the representability of the scale's content relative to the intended phenomenon (Iacobucci & Churchill, 2010:256; Malhotra, 2010:320).

Validity approach	Brief description
<b>Criterion validity</b>	This approach measures whether the research instrument performs as expected (Pietersen & Maree, 2007:217; Malhotra, 2010:320). This approach also compares scores of the research instrument to known external criteria measuring the phenomenon (Delpont & Roestenburg, 2011:174).
<b>Construct validity</b>	This approach is considered as the link between theory and the scale/ research instrument (Masenya, 2018:77). This approach involves the extent to which the measuring instrument measures a theoretical concept/ construct (Delpont & Roestenburg, 2011:174; Dickason, 2018:101).

Source: Author compilation

#### 4.4.5.3 Descriptive statistics

Descriptive statistics is the basic transformation of raw data into a summarised manner, in order to describe fundamental characteristics of the dataset (Quinlan *et al.*, 2015:359). Zikmund and Babin (2013:411) state that the most common way to summarise data is to construct a frequency distribution. A frequency distribution and descriptive statistics are interlinked and used to summarise the data (Synodinos, 2013:46). The most widely used descriptive statistics techniques are: (i) measures of location, (ii) measures of variability, and (iii) measures of shape (Malhotra, 2010:484). Table 4.9 provides an overview and brief description of the various descriptive statistics techniques.

**Table 4.9: Different descriptive statistics techniques**

Descriptive statistics		
<b>Measures of location</b>	<b>Mean</b>	Value representing the average score, which is obtained by adding all scores and dividing by the sample size (Welman <i>et al.</i> , 2005:233).
	<b>Median</b>	Data are organised from the highest score to the lowest score. The median value is the score in the middle of the highest and lowest scores (McDaniel & Gates, 2010:410).
	<b>Mode</b>	This value takes on the score in the dataset that occurs the most (Zikmund & Babin, 2013).

Descriptive statistics		
Measures of variability	Range	The value that is obtained from deducting the lowest score from the highest score in the dataset (Marais, 2013:73).
	Variance	This value cannot ever be negative (Malhotra, 2010:488). The degree to which scores differ from the mean score (Malhotra, 2010).
	Standard deviation	This score measures the manner in which the data are spread around the mean score (Masenya, 2018:78).
Measures of shape	Skewness	The degree to which data deviated from the mean score in a certain direction (Masenya, 2018:78).
	Kurtosis	This score measure the peakedness or flatness of the dataset's curve (Pallant, 2016).

Source: Author compilation

Descriptive statistics were used in this study to describe the sample's characteristics in terms of gender, highest level of education and race. These statistics were presented in different ways, including ratios, standard deviations, ranges and averages (Quinlan *et al.*, 2015:359).

#### 4.4.5.4 Significance tests

Malhotra (2010:581) states that significance tests involve testing the significance levels of the complete regression equation, in addition to the regression coefficients. Boyce (2002) is of the opinion that the researcher needs to report on the significance levels of the results obtained from the statistical analysis. Three main significance tests exist, namely (i) T-tests, (ii) Cohen's D-Statistic, and (iii) Correlation analysis. These tests are described in Table 4.10.

**Table 4.10: Types of significance tests**

Type of test	Brief description
T-tests	The t-test is calculated to compare an observed mean value of the sample to an expected value, or to compare mean values between two observations (Malhotra, 2010:503).

Type of test	Brief description
<b>Cohen's D-Statistic</b>	This test determines an effect size statistic and is used to compare different groups to one another (Pallant, 2016).
<b>Correlation analysis</b>	This technique is used to determine the strength and direction of a relationship between two or more variables (Pallant, 2016).

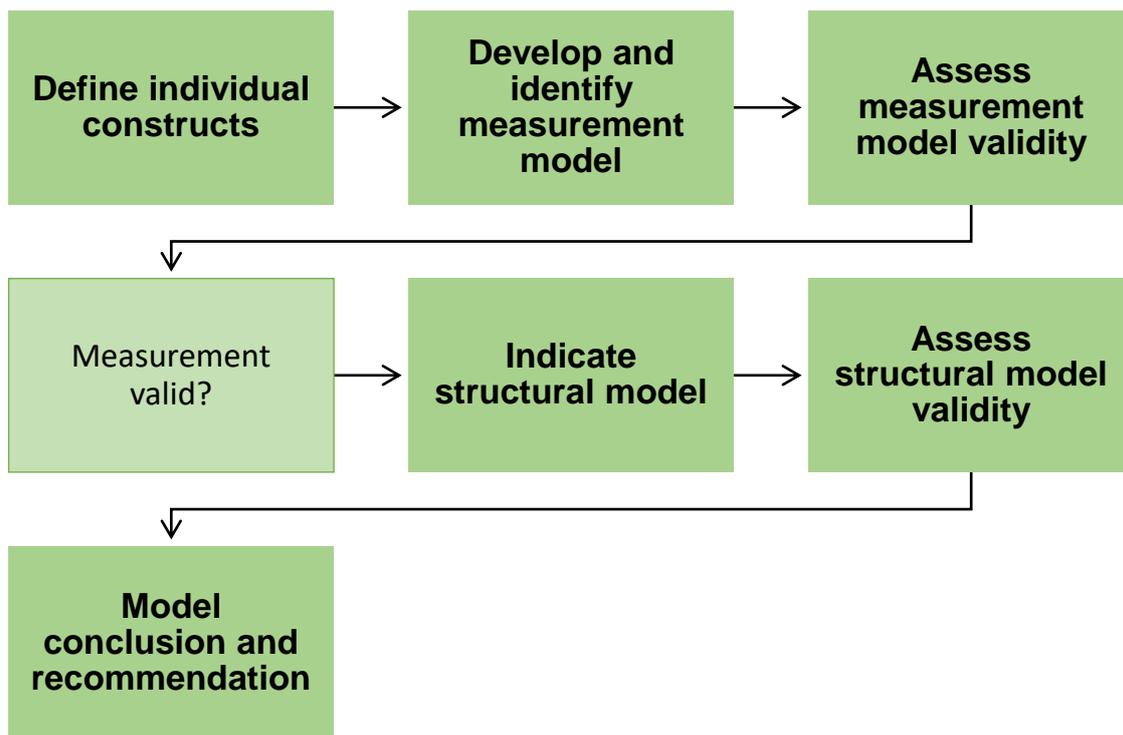
Source: Author compilation

#### 4.4.5.5 Confirmatory factor analysis

Factor analysis is a general term used to symbolise a group of procedures primarily used for data reduction and data summarisation (Hair *et al.*, 2013). CFA is a type of SEM technique, which specifically deals with measurement models (Brown & Moore, 2012:2). CFA constitutes the relations among observed measures and inherent variables (Brown & Moore, 2012:2).

#### 4.4.5.6 Structural equation modelling

SEM is a group of different statistical techniques, seeking to explain relationships amongst several variables (Hair *et al.*, 2010:634). SEM holds the ability to study a series of dependent relationships at the same time, while also analysing several dependent variables (Shook *et al.*, 2004:397). This technique is used on large scale samples of 200 or more respondents (Barrett, 2007:820; Kline, 2011:12). The biggest advantage of making use of a SEM technique is its ability to test all relationships between variables simultaneously, whether the relationships are direct or indirect (Iacobucci & Churchill, 2010:538). The decision to make use of this multivariate technique stems from its academically appealing basis to test an existing theory of a phenomenon (Malhotra & Birks, 1999:150). When conducting a SEM technique, six steps should be followed. Figure 4.2 illustrates the six-stage process of SEM. Thereafter, a discussion on the six stages will follow.



**Figure 4.2: The six-stage process of SEM**

Source: Author compilation

- **Step 1: Define individual constructs**

A SEM technique is grounded on a theoretical relationship between two or more variables (Hardy & Bryman, 2004:436). The first stage in a SEM technique is to define these constructs, which are based on theory and to state how they will be measured, as well as to elaborate on the interrelationships amongst the identified variables (Bowen & Guo, 2012:7). Furthermore, a SEM is used to test the measurement theory and the structural theory (Malhotra, 2010:729). Measurement theory refers to the theory on how the constructs are represented, whereas structural theory refers to how the different constructs are related (Malhotra, 2010:729). Furthermore, this stage involves converting the structural relationships into hypotheses to be tested by the model (Malhotra *et al.*, 2012:871). In this research study, a relationship between the investor's demographical characteristics, their level of financial risk tolerance and their personality characteristics exist. Figure 4.3 identifies the theoretical relationships between these variables.



**Figure 4.3: Theoretical relationship amongst variables**

Source: Author compilation

- **Step 2: Develop and identify measurement tool**

The second stage in conducting a SEM is to identify and develop the measuring instrument (Kaplan, 2009:9). In this stage, all the underlying variables are identified and then assigned to indicator variables. Variables can take on the form of observed variables or latent variables. Latent variables refer to those variables, which cannot be measured or observed directly (Byrne, 2013). However, these variables are directly associated with measurable variables, thus making the measurement of latent variables possible, by measuring them indirectly (Byrne, 2013). The researcher should keep in mind that the latent variables do not always fully explain the indicator variables (Malhotra *et al.*, 2012). When the complexity of a SEM is considered, the sample size should be given special consideration (Hardy & Bryman, 2004:253). The sample size to construct a SEM depends on (i) the complexity of the model, (ii) the number of variables and (iii) the communality (Malhotra *et al.*, 2012:873).

- **Step 3: Assess measurement model validity**

Kaplan (2009:9) states that this stage is the most important in the entire SEM process. This stage answers the question: Is the measurement model fit? Thus, the measurement model depends on numerous goodness of fit indices as well as

validating the model's validity (Hardy & Bryman, 2004:445). The goodness of fit test is used to determine how well the data fit the hypothesised model. Three types of indices exist to determine this fit and are described in the Table 4.1.

**Table 4.11: Goodness of fit indices**

Goodness of fit indices	Brief description
<b>Absolute</b>	This method stipulates the extent to which the empirical data fit the hypothesised measurement model (Malhotra <i>et al.</i> , 2012:874). Furthermore, this model draws a distinction between the goodness of fit indices as well as the badness of fit indices (Malhotra <i>et al.</i> , 2012:874). The goodness of fit indices needs a value greater than 0.9 in order to be acceptable.
<b>Incremental</b>	This method includes incremental indices where the indices assess the extent to which the measurement model is supported by the empirical data (Malhotra <i>et al.</i> , 2012:875). It is then compared to a benchmark model which assumes that all the variables are uncorrelated (Malhotra <i>et al.</i> , 2012:875).
<b>Parsimony</b>	This method is used to compare multifaceted models rather than single facet models (Hardy & Bryman, 2004:445). This method requires higher levels of goodness of fit (Hardy & Bryman, 2004:445).

Source: Author compilation

- **Step 4: Indicate structural model**

Once model validity is satisfactory, the measurement model can be indicated and laid out for model specification (Hardy & Bryman, 2004:452). The structural model indicates how the latent variables are related to one another (Byrne, 2013). In this stage, the identified model from stage one is altered by focussing on the extent of the relationships amongst the latent variables and ultimately creating dependence relationships. A dependence relationship is a relationship that suggests that one independent variable is dependent on other independent variables (Malhotra *et al.*, 2012:878).

- **Step 5: Assess structural model validity**

This is the second last stage in developing a SEM and includes assessing the validity of the model. The purpose of this stage in the SEM process is to determine the model's validity and to concur the theoretical relationships between the variables identified (Kaplan, 2009:9). In assessing the model's validity, there are three stages to be completed. First, structural model fitness should be established. Secondly, a comparison of the structured model with competing models should be conducted. Thirdly, confirmation of the hypothesised theoretical relationships should be achieved (Kaplan, 2009). Finally, after the model's validity have been verified, model conclusions and recommendations can be made (Malhotra *et al.*, 2012:880).

- **Step 6: Model conclusion and recommendation**

The model conclusion and recommendation is the final stage in the SEM process, providing insight for future research. This study's SEM provided a major contribution to the field of risk management, as no other researcher has conducted a SEM on investor's risk tolerance, their personality traits and demographical characteristics. The SEM aids in accurately profiling investors' investment decisions based on their level of financial risk tolerance, personality traits, gender and their level of education.

The following section provides an overview of the statistical analysis techniques to be employed throughout the SDA. Table 4.12 provides an overview of the statistical analysis techniques to be employed in order to achieve the empirical objectives as set out in Chapter 1 (Section 1.3).

**Table 4.12: Statistical analysis techniques to be employed**

<b>Empirical objective</b>	<b>Questionnaire sections</b>	<b>Statistical technique</b>
Analyse demographic variables based on gender	Section A	Descriptive statistics
Report on the various personality traits of the sample	Section E	Descriptive statistics, reliability analysis and CFA
Determine the risk tolerance levels for the sample	Section B	Reliability analysis and CFA

<b>Empirical objective</b>	<b>Questionnaire sections</b>	<b>Statistical technique</b>
Report the effect of gender on the sample in terms of the sample's risk tolerance levels	Sections A and B	T-tests
Determine the relationship between level of education and level of risk tolerance for the sample	Sections A and B	Descriptive statistics and correlation analysis
Develop a model to measure female investors' risk profile accurately, considering their personality traits, risk tolerance levels and level of education	Sections A, B and E	Correlation analysis and SEM

Source: Author compilation

#### **4.5 SYNOPSIS**

The main aim of this chapter was to identify and describe the research methodology used in the empirical analysis of the study. Thus, the chapter provided an outline of the research paradigm, where the study implemented the positivist view, aiding in shaping the research question. The research design and method, as well as the sampling procedure and data collection method were presented.

The study made use of an SDA technique, which aided in the elimination of time constraints and was more cost effective. Furthermore, the chapter also provided an overview of the pilot testing of the questionnaire, the administration of the questionnaire, as well as the statistical analysis techniques implemented in the study. The statistical analysis portion presented in the chapter formed a substantial part of the study's research methodology.

Finally, Chapter 4 provided the theoretical foundation for Chapter 5. Chapter 5 presents the data analysis and interpretation of the research findings; thereafter, a conclusion on the study will be made in Chapter 6.

## **CHAPTER 5: ANALYSIS AND INTERPRETATION OF EMPIRICAL RESULTS**

### **5.1 INTRODUCTION**

The focus of this chapter is to present the analysis and empirical results of the study. The primary objective of this study was to develop a structural model based on investor risk tolerance for female South African investors. This chapter presents the results, according to the empirical objectives as presented in Chapter 1 (Section 1.3.3):

- Analyse demographic variables in terms of males and females;
- Report on the various personality traits of the sample;
- Determine the risk tolerance levels for the sample;
- Report the effect of gender on the sample in terms of the sample's risk tolerance levels;
- Determine the relationship between the level of education and level of risk tolerance for the sample; and
- Develop a model to measure female investors' risk profile accurately, considering their personality traits, risk tolerance levels and level of education.

The following sections present the results of the objectives outlined above. Additionally, the chapter also include descriptive analysis of the demographical data, as well as the preliminary data analysis conducted to address the empirical objectives of the study. Section 5.2 presents a discussion regarding the coding, tabulation and the preparation of the data for the secondary data analysis (SDA) process. Section 5.3 presents an overview of the demographic information of the sample used in this study. Section 5.4 focuses on the descriptive analysis for the sample, along with relevant discussions. Furthermore, Section 5.6 to Section 5.11 presents the results of each empirical objective as outlined above. Finally, Section 5.12 provides a short summary of the empirical results presented in this chapter.

### **5.2 EDITING AND CODING OF PRIMARY DATA FOR SECONDARY DATA ANALYSIS**

Before a data set was analysed, it was suggested that some preliminary analysis should be conducted. This preliminary data analysis included coding and tabulation of the primary data (Malhotra, 2010). The following sections provide an overview of the

data gathering process (Section 4.3.2), the coding and tabulation analysis information, which were done before the secondary data analysis.

### 5.2.1 Data gathering process

As this study follows a SDA technique, the researcher did not gather the data. However, the investment firm in question was in charge of gathering the data used in this study. An electronic questionnaire was distributed to 4 800 investors, where the investment firm managed to obtain 1 065 responses from their clientele. The survey was conducted during the month of May 2018 and responses were received back in the same month. The data were collected by means of a self-administered questionnaire. The investment firm that collected the data indicated no concerns for publications from the data obtained, as long as the firm is not mentioned in any way.

### 5.2.2 Coding

Coding refers to the process of assigning codes, in a numerical form, to the responses of each question forming part of the questionnaire (Creswell, 2008:247; Malhotra *et al.*, 2012). Furthermore, coding constitutes the process of identifying various themes from the identified data codes (Struwig & Stead, 2001:169). The questionnaire used to obtain the data for this study constituted three sections of importance. Section A relates to the demographic information of the investors and constituted six questions. Section B constituted 14 questions relating to the risk tolerance levels of the investors. Finally, Section C constituted 37 questions and elicited responses in terms of the investor's personality traits. Table 5.1 presents the coding information for each question's responses, used in the questionnaire.

**Table 5.1: Coding information**

Section			
Question	Code	Variable measured	Value
Question 1	A1	Age	16-24 (1), 25-35 (2), 35-49 (3), 50+ (4)
Question 2	A2	Gender	Male (1), Female (2)
Question 3	A3	Race	African (1), White (2), Coloured (3),

<b>Section</b>			
<b>Question</b>	<b>Code</b>	<b>Variable measured</b>	<b>Value</b>
			Indian/Asian (4)
Question 4	A4	Marital status	Single – staying on my own (1), Single – staying with parents (2), Not married – staying together (3), Married (4), No longer married (5)
Question 5	A5	Annual income	R100 000 or less (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 6	A7	Home province	Gauteng (1), KwaZulu-Natal (2), Western Cape (3), Northern Cape (4), Eastern Cape (5), Free State (6), Mpumalanga (7), Limpopo (8), North West (9), Outside RSA (10)
Question 7	A6	Highest level of education	Some primary school (1), Some high school (2), Matric (3), Diploma (4), Undergraduate degree (5), Honours degree (6), Master's degree (7), Doctoral degree (8)
<b>Section</b>			
<b>Item</b>	<b>Code</b>	<b>Variable measured</b>	<b>Value</b>
Item 1	B1	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)
Item 2	B2	Risk tolerance	A real gambler (1), Willing to take risks after completing adequate research (2), Cautious (3), A real risk avoider (4)
Item 3	B3		A cash prize of a R1000 (1),

Section			
Question	Code	Variable measured	Value
			A 50% chance at winning R5000 (2), A 25% chance at winning R10 000 (3), A 5% chance at winning R100 000 (4)
Item 4	B4		Cancel the vacation (1), Take a much more modest vacation (2), Go as scheduled, reasoning that you need the time to prepare for a job search (3), Extend your vacation, because this might be your last chance to go first class (4)
Item 5	B5		Not at all comfortable (1), Somewhat comfortable (2), Very comfortable (3)
Item 6	B6		Deposit it in a bank account, money market account or an insured Certificate of Deposit (1), Invest it in safe, high-quality bonds or bond mutual funds (2), Invest it in shares (3)
Item 7	B7		Loss (1), Uncertainty (2), Opportunity (3), Thrill (4)
Item 8	B8		Hold the bonds (1), Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets (2), Sell the bonds and put the total proceeds into hard assets (3), Sell the bonds, put all the money into hard assets, and borrow additional money to buy more (4)
Item 9	B9		A R200 gain best case; R0 gain/loss worst case (1), A R800 gain best case; R200 loss worst case (2), A R2,600 gain best case; R800 loss worst case (3), A R4,800 gain best case; R2,400 loss worst case (4)
Item 10	B10		A sure gain of R500 (1), A 50% chance to gain R1,000 and a 50% chance to gain nothing (2)
Item 11	B11		A sure loss of R500 (1), A 50% chance to lose a R1,000 and a 50% chance to lose nothing (2)
Item 12	B12		A savings account or money market mutual fund (1), A mutual fund that owns shares and bonds (2), A portfolio of 15 common shares (3), Commodities like gold, silver and oil (4)

<b>Section</b>			
<b>Question</b>	<b>Code</b>	<b>Variable measured</b>	<b>Value</b>
Item 13	B13		Invest 60% in low-risk investments, 30% in medium-risk investments and 10% in high-risk investments (1), Invest 30% in low-risk investments, 40% in medium-risk investments and 30% in high-risk investments (2), Invest 10% in low-risk investments, 40% in medium-risk investments and 50% in high-risk investments (3)
Item 14	B14		Nothing (1), One month's salary (2), Three month's salary (3), Six month's salary (4)
<b>Section</b>			
<b>Item</b>	<b>Code</b>	<b>Variable measured</b>	<b>Value</b>
Item 1 Item 2 Item 3 Item 4 Item 5	C1 C2 C3 C4 C5	Personality – Neuroticism	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5), Strongly agree (6)
Item 6 Item 7 Item 8 Item 9	C6 C7 C8 C9	Personality – Extraversion	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5), Strongly agree (6)
Item 10 Item 11 Item 12 Item 13 Item 14	C10 C11 C12 C13 C14	Personality – Openness to experience	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5), Strongly agree (6)
Item 15 Item 16 Item 17 Item 18	C15 C16 C17 C18	Personality – Agreeableness	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5), Strongly agree (6)
Item 19 Item 20 Item 21 Item 22 Item 23	C19 C20 C21 C22 C23	Personality - Conscientiousness	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5), Strongly agree (6)
Item 24 Item 25 Item 26 Item 27	C24 C25 C26 C27	Risk aversion	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5),

Section			
Question	Code	Variable measured	Value
			Strongly agree (6)
Item 28 Item 29 Item 30 Item 31 Item 32	C28 C29 C30 C31 C32	Short-term investment intentions	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5), Strongly agree (6)
Item 33 Item 34 Item 35 Item 36 Item 37	C33 C34 C35 C36 C37	Long-term investment intentions	Strongly disagree (1), Disagree (2), Slightly disagree (3), Slightly agree (4), Agree (5), Strongly agree (6)

Source: Author compilation

### 5.2.3 Tabulation

After the completion of the coding, tabulation of the variables should follow. Tabulation refers to the process of organising the data into categories, then summarising the results in order to answer the research question of the study (Struwig & Stead, 2001:151). Table 5.2 presents the frequencies for Section C of the questionnaire. A total of 37 questions were captured on a six-point Likert scale, along with the descriptive statistics including the mean and standard deviation.

**Table 5.2: Tabulating Likert scale items**

Scale Item	N	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Mean	Standard Deviation
C1	1065	199	317	197	230	94	28	2.80	1.346
C2	1065	107	290	203	279	123	63	3.20	1.376
C3	1065	126	307	225	250	117	40	3.04	1.332
C4	1065	255	311	158	200	99	42	2.72	1.445
C5	1065	126	320	218	237	119	45	3.04	1.351
C6	1065	19	64	107	280	400	195	4.47	1.180
C7	1065	41	149	264	365	195	51	3.63	1.182
C8	1065	10	43	132	370	382	128	4.37	1.037
C9	1065	40	115	169	336	282	123	4.01	1.287
C10	1065	26	88	87	330	350	184	4.35	1.236
C11	1065	49	134	141	318	286	137	4.00	1.354
C12	1065	106	206	255	195	213	90	3.44	1.463
C13	1065	4	23	71	303	423	241	4.73	0.979
C14	1065	29	117	198	339	268	114	3.98	1.245

Scale Item	N	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Mean	Standard Deviation
C15	1065	83	209	213	250	225	85	3.54	1.418
C16	1065	93	219	188	168	269	128	3.64	1.547
C17	1065	102	227	167	166	253	150	3.65	1.597
C18	1065	3	4	17	167	556	318	5.09	0.769
C19	1065	9	34	73	240	447	262	4.75	1.053
C20	1065	8	38	85	263	456	215	4.66	1.046
C21	1065	78	214	250	221	217	85	3.51	1.407
C22	1065	112	222	174	186	238	133	3.58	1.578
C23	1065	110	203	160	183	268	141	3.68	1.588
C24	1065	46	215	259	268	197	80	3.56	1.316
C25	1065	11	68	132	328	416	110	4.31	1.085
C26	1065	15	132	246	354	263	55	3.83	1.131
C27	1065	71	219	292	287	146	50	3.35	1.263
C28	1065	91	243	120	205	303	103	3.65	1.532
C29	1065	137	331	240	219	110	28	2.92	1.295
C30	1065	191	415	203	161	71	24	2.60	1.254
C31	1065	145	310	208	220	139	43	3.03	1.389
C32	1065	113	289	178	248	196	41	3.23	1.340
C33	1065	44	89	76	278	373	205	4.37	1.327
C34	1065	40	106	100	316	363	140	4.20	1.288
C35	1065	149	332	173	219	134	58	3.03	1.439
C36	1065	65	209	272	288	184	47	3.43	1.271
C37	1065	84	179	182	299	239	82	3.63	1.398

Source: Author compilation

The following section provides an overview of the demographic information of the sample used in the SDA.

### 5.3 DEMOGRAPHIC INFORMATION

Demographic information refers to the sample population's characteristics (Kolb, 2008). Typically, these characteristics include, but are not limited to, the individual's age, race, gender, marital status and annual income. The sections to follow will provide discussions on the demographic characteristics of the sample. The discussion will focus on the following characteristics: age, gender, ethnicity, marital status, home province, annual income and the highest level of education.

The relevant tables and figures in the following sections present the demographical characteristics used in this study, along with its descriptive information of the sample used. The descriptive information includes the relevant categories, frequencies and

percentages. The sections to follow will elaborate on the characteristics used in this study. Table 5.3 summarises the frequencies and percentages of the demographic characteristics for the entire sample.

**Table 5.3: Demographic information**

Demographic Characteristic			Frequencies	Percentages
A1	Age	16-24	23	2.20
		25-34	176	16.50
		35-49	387	36.30
		50+	479	45.00
A2	Gender	Male	469	44.00
		Female	596	56.00
A3	Race	African	169	15.90
		White	715	67.10
		Coloured	88	8.30
		Indian/Asian	93	8.70
A4	Marital status	Single – staying alone	198	18.60
		Single – staying at parents	56	5.30
		Staying together	110	10.30
		Married	577	54.20
		No longer married	124	11.60
A5	Annual income	R100 000 or less	264	24.80
		R100 001 – R200 000	285	26.80
		R200 001 – R300 000	182	17.10
		R300 001 – R400 000	128	12.00
		R400 001 – R500 000	94	8.80
		R500 001 – R600 000	29	2.70
		R600 001 – R700 000	12	1.10
		R700 001 – R800 000	21	2.00
		R800 001 – R900 000	9	0.80
		R900 001 – R1 Million	17	1.60
		More than R1 Million	24	2.30
A6	Home province	Gauteng	439	41.20
		KwaZulu-Natal	164	15.40
		Western Cape	280	26.30
		Northern Cape	10	0.90
		Eastern Cape	54	5.10
		Free State	26	2.40
		Mpumalanga	28	2.60
		Limpopo	18	1.70
		North West	31	2.90
		Outside RSA	15	1.40
A7	Highest level of education	Some Primary School	21	2.00
		Some High School	18	1.70
		Matric	231	21.70
		Diploma	373	35.00
		Undergraduate Degree	168	15.80
		Honours Degree	206	19.30
		Master's Degree	42	3.90
		Doctoral Degree	6	0.60

Source: Author compilation

The sections below identify the demographic characteristics included in the research study. Each characteristic is presented with a summary providing the most prominent information of each. All the information provided below is derived from Table 5.3.

### **5.3.1 Age spreading**

Investors were asked to indicate their age and could choose from four categories, namely: (i) 16-24 years, (ii) 25-34 years, (iii) 35-49 years, and (iv) 50 years or older. The age spreading represents the ages of all investors who took part in the study. Table 5.3 indicates that the smallest portion of the sample were between the ages of 16 and 24 (2.20%), followed by ages between 25 and 34 (16.50%) and the 35 to 49 age categories (36.30%). The biggest portion of the sample is represented by the 50 years and older category (45.00%).

### **5.3.2 Gender composition**

Table 5.3 indicates the gender composition for the sample. Investors could identify themselves as either male or female; no other options were presented. The gender composition encompasses the gender of all the investors who participated in the study. The female investors represent the largest portion of the sample with 56.00 percent of all the investors. The male investors represent the remaining 44.00 percent of the total sample population.

### **5.3.3 Ethnicity**

Investors were asked to indicate their ethnicity and could select one of four options. The options were (i) African, (ii) White, (iii) Coloured and (iv) Indian/Asian. The majority of the sample is classified as White (67.10%), followed by African (15.90%). The Indian/Asian race only accounts for 8.70 percent of the sample population. Finally, the remaining portion of the sample is classified as the Coloured race, accounting for 8.30 percent of the total sample.

### **5.3.4 Marital status**

Investors could select one of five options with regards to their marital status. These options were (i) single – staying on my own, (ii) single – staying with parents, (iii) staying together, (iv) married and (v) no longer married. The majority of the sample is

classified as married, representing 54.20 percent for the total population. The married investors are followed by single investors who live on their own (18.60%). Investors who are no longer married represents 11.60 percent of the sample, along with investors who are not married but staying together, representing 10.30 percent. Finally, the remainder of the sample is represented by investors who are single and still living with their parents (5.30%).

### **5.3.5 Annual income**

Investors were asked to indicate their annual income by means of categorisation, therefore, not explicitly stating what they earn. The categories were segmented in the values of R100 000. Investors could indicate a value falling below R100 000 up to values over R1 million. The majority of the sample (80.00%) earns between R100 000 and R400 000 annually. The remainder of the population earns between R400 001 and more than R1 million rand annually. Income earners between R400 001 and R500 000 represent 8.80 percent of the sample, followed by income earners in the bracket of R500 001 to R600 000 representing only 2.70 percent of the sample. The remainder of the sample is represented by income earners in the R600 001 – R700 000 (1.10%), R700 001 – R800 000 (2.00%), R800 001 – R900 000 (0.80%), R900 001 – R1 million (1.60%) and investors earning more than R1 million annually (2.30%).

### **5.3.6 Home province**

Investors were asked to indicate their home province and could indicate any of the nine provinces of South Africa, as well as a tenth option of residing outside of South Africa. The majority of the sample resides in Gauteng with 41.20 percent, followed by the Western Cape with 26.30 percent and then KwaZulu-Natal with 15.40 percent. The remaining investors reside in the Eastern Cape (5.10%), North West (2.90%), Mpumalanga (2.60%), Free State (2.40%), Limpopo (1.70%) and the Northern Cape (0.90%). Finally, only 1.40 percent of the sample resides outside of South Africa.

### **5.3.7 Highest level of education**

Investors were tasked with indicating their highest level of education and could select between eight options. These were (i) Some Primary School, (ii) Some High School,

(iii) Matric, (iv) Diploma, (v) Undergraduate Degree, (vi) Honours Degree, (vii) Master’s Degree and (viii) Doctoral Degree. The majority of the sample (35.00%) obtained a diploma as their highest level of education, followed by matric, representing 21.70 percent of the sample. Undergraduate degrees and honours degrees account for 15.80 percent and 19.30 percent of the sample, respectively. Some primary school and some high school only account for 3.70 percent of the sample. Finally, the remaining 4.50 percent of the sample is represented by investors who obtained master’s degrees and doctoral degrees as their highest level of education.

## 5.4 DESCRIPTIVE ANALYSIS FOR SAMPLE

This section identifies the descriptive statistics for all the items forming part of the questionnaire. The main purpose of descriptive statistics is to identify relevant information that was collected from the sample, grounded on the questionnaire used (Creswell & Plano-Clark, 2011:30). According to Pallant (2016:53), descriptive statistics include the dataset’s mean and standard deviation values. Descriptive statistics are employed to describe the characteristics of the sample under investigation (Pallant, 2016:53).

### 5.4.1 Survey of Consumer Finances

This section highlights the frequency distribution for the Survey of Consumer Finances (SCF) question, as well as the descriptive statistics for the question. This question forms part of Section B of the questionnaire used. Table 5.4 indicates the frequencies obtained for the SCF question. Table 5.4 is followed by Table 5.5, which indicates the descriptive statistics for the SCF question.

**Table 5.4: Frequencies for SCF**

Item	Frequency	Percentage
<b>Not willing to take any financial risk</b>	166	18.40
<b>Take average risk – average return</b>	344	32.30
<b>Take above average risk – above average return</b>	312	29.30
<b>Substantial risk and return</b>	172	16.20
<b>Not indicated</b>	41	3.80

Source: Author compilation

Table 5.4 indicates the frequencies and valid percentages for each risk-tolerant statement forming part of the SCF question. From Table 5.4 it is evident that 41 investors (3.80%) were not willing to take financial risks. However, the remaining investors indicated their willingness to take financial risks. The majority of the sample (32.30%) indicated that they are willing to take average financial risk in order to receive average returns. This view is followed by 29.30 percent of the sample who indicated that they are willing to take above average financial risk, expecting to earn above average returns. From the remaining portion of the sample, some indicated that they are not willing to take any financial risks (18.40%) and the rest are willing to take substantial financial risk, expecting to earn substantial returns (16.20%).

**Table 5.5: Descriptive statistics for SCF**

Item	Valid (n)	Mean	Standard deviation	Skewness	Kurtosis
B1	1065	2.55	1.08	0.28	-0.65

Source: Author compilation

The valid value (n = 1 065) indicates the number of investors who completed the questionnaire successfully. From Table 5.5 it is evident that the data are normally distributed as indicated by the 0.28 skewness value, which falls within the -2 or +2 range (Norman & Streiner, 2007:26). The value also indicates that the data are skewed to the right. The kurtosis value presented in Table 5.5 indicates that the data are relatively flat with regards to its peakedness (Malhotra, 2010:489), as the value falls below zero. The standard deviation value indicates the dispersion from the mean value. A lower standard deviation value is an indication of lesser dispersion from the mean value. Thus, indicating that investors display lesser dispersion from participating in financial risk behaviour.

Gilliam *et al.* (2010:39) conducted a study on the reliability and validity of both the SCF single risk tolerance question and the Grable and Lytton 13-item risk tolerance scale (GL-RTS). Results suggest that both measures are valid and reliable in determining investors' level of risk tolerance. Results also indicate that the SCF single risk tolerance question provides a reasonably accurate indication of investors' risk tolerance levels (Gilliam *et al.*, 2010:39). Sung and Hanna (1996:13) obtained similar results, indicating that the SCF single risk tolerance question efficiently measures risk tolerance levels.

#### 5.4.2 Grable and Lytton 13-item risk tolerance scale

This section identifies the descriptive statistics for the Grable and Lytton 13-item risk tolerance scale. This scale forms part of Section B of the questionnaire used.

**Table 5.6: Descriptive statistics for GL-RTS**

Item	Valid (n)	Mean	Standard deviation	Skewness	Kurtosis
<b>B2</b>	1065	2.48	0.71	-0.03	-0.25
<b>B3</b>	1065	2.46	1.02	0.20	-1.10
<b>B4</b>	1065	1.92	0.88	0.31	-1.27
<b>B5</b>	1065	1.73	0.67	0.38	-0.79
<b>B6</b>	1065	2.03	0.93	0.44	-0.80
<b>B7</b>	1065	2.18	0.63	0.16	0.08
<b>B8</b>	1065	1.77	0.72	0.62	0.01
<b>B9</b>	1065	2.60	0.86	-0.27	-0.56
<b>B10</b>	1065	1.75	0.97	0.52	-1.73
<b>B11</b>	1065	2.44	0.90	-0.98	-1.04
<b>B12</b>	1065	2.20	1.00	0.33	-0.97
<b>B13</b>	1065	1.68	0.66	0.46	-0.74
<b>B14</b>	1065	1.74	0.84	1.15	1.30

Source: Author compilation

The valid n value (1 065) indicates that all investors forming part of the study successfully completed this section of the questionnaire. Table 5.6 provides an overview of the skewness and kurtosis values obtained in the statistical analysis for the GL-RTS. The skewness values fall within the accepted range of -2 to +2, which is indicative of a relatively normal distribution (Norman & Streiner, 2007:26). However, items B2, B9 and B11 display negative skewness values, indicating that these items are skewed to the left. The remaining items are all skewed to the right. Furthermore, the kurtosis value refers to the peakedness of the data. If the value falls below zero, it indicates a relatively flat distribution (Dickason, 2018:118). The kurtosis values presented in Table 5.6 indicate a relatively peaked distribution. The standard deviation value indicates the dispersion from the mean value. A lower standard deviation value is an indication of lesser dispersion from the mean value. Thus, indicating that investors display lesser dispersion from participating in financial risk behaviour based on their level of risk tolerance.

To interpret the standard deviation and mean scores of the GL-RTS, attention should be given to the three facets of the GL-RTS measures. The first facet is investment risk

(Item 4, 5, 8, 11 and 12), then financial risk (Item 1, 3, 6, 7 and 13) and speculative risk (Item 2, 9 and 10). Table 5.7 provides an overview of the standard deviation and mean scores for the GL-RTS according to the three main facets.

**Table 5.7: GL-RTS standard deviation and mean scores according to facets**

Facet		Average standard deviation	Standard deviation	Average mean	Mean
Investment risk	B5	0.82	0.67	2.05	1.73
	B6		0.93		2.03
	B9		0.86		2.60
	B12		1.00		2.20
	B13		0.66		1.68
Financial risk	B2	0.76	0.71	2.13	2.48
	B4		0.88		2.46
	B7		0.63		2.18
	B8		0.72		1.77
	B14		0.84		1.74
Speculative risk	B3	0.96	1.02	2.22	2.46
	B10		0.97		1.75
	B11		0.90		2.44

Source: Author compilation

In terms of standard deviation, the financial risk facet holds the lowest value (Std dev = 0.76). This indicates that investors are displaying lesser dispersion from participating in financial risk-tolerant behaviour. This facet is followed by the investment risk facet (Std dev = 0.82), indicating that investors are more inclined to participate in riskier investment behaviour. The speculative risk facet encompasses the highest standard deviation value (Std dev = 0.96), indicating that investors are more prone to engage in speculative risk-tolerant behaviour.

In terms of mean scores, the speculative risk facet holds the highest value (mean = 2.22), this indicates that investors are more prone to participate in speculative risk tolerance behaviour. Furthermore, the financial risk facet holds the second highest mean score (mean = 2.13), indicating that investors are likely to engage in financial risk tolerance behaviour. Finally, the investment risk facet holds the lowest mean score (mean = 2.05), indicating that investors would rather steer away from participating in riskier investment behaviour. The standard deviation scores obtained for this facet confirm the investor's risk tolerance behaviour.

Gilliam *et al.* (2010:39) conducted a study on the reliability and validity of both the SCF single risk tolerance question and GL-RTS. Results suggest that both measures are valid and reliable in determining investors' level of risk tolerance. Furthermore, results suggest that the GL-RTS is a good indication of the investor's overall financial risk tolerance (Gilliam *et al.*, 2010:39). Grable and Lytton (1999b:178) state that the GL-RTS measures the investor's risk tolerance on three facets. The results obtained indicated that the scale is an efficient tool for measuring investor risk tolerance levels (Grable & Lytton, 1999b:179).

### 5.4.3 Personality measures

This section highlights the descriptive statistics distribution for the personality measures used in the questionnaire. This section forms part of Section E of the questionnaire used in the study. Table 5.8 indicates the descriptive statistics obtained for the personality measures section.

**Table 5.8: Descriptive statistics for personality measures**

Item	Valid (n)	Mean	Standard deviation	Skewness	Kurtosis
Neuroticism	1065	2.96	1.12	0.34	-0.53
Extraversion	1065	4.12	0.90	-0.39	0.11
Openness to experience	1065	4.10	0.76	-0.16	0.39
Agreeableness	1065	3.98	1.01	0.08	-0.97
Conscientiousness	1065	4.03	0.88	0.30	-0.50
Risk aversion	1065	3.76	0.92	-0.04	-0.13
Short-term intentions	1065	3.09	0.93	0.18	0.06
Long-term intentions	1065	3.73	0.98	-0.41	0.23

Source: Author compilation

The valid n value in Table 5.8 indicates the number of investors who successfully completed the questionnaire. Thus, all investors forming part of the study successfully completed the questionnaire as represented by n = 1 065. Table 5.8 provides an overview of the skewness and kurtosis values for all of the personality domains. All the domains fall within the accepted range of +2 to -2 in terms of skewness, indicating that the data are normally distributed (Norman & Streiner, 2007:26). However, extraversion, openness to experience, risk aversion and long-term intentions all display a negative skewness value, which indicates that for these constructs, the data

are skewed to the left. For neuroticism, agreeableness, conscientiousness and short-term intentions, positive skewness values indicate that the data are skewed to the right.

In terms of the kurtosis values (peakedness of the data), if the value is below zero, it is an indication of a flatter distribution of the data (Dickason, 2018:118). Thus, the data presented in Table 5.8 are considered to be relatively flat (Malhotra, 2010:489). The standard deviation value indicates the dispersion from the mean value. A lower standard deviation value is an indication of lesser dispersion from the mean value. Thus, indicating that investors display lesser dispersion from participating in financial risk behaviour based on their personality traits.

From Table 5.8, it is evident that extraversion had the highest mean score (mean = 4.12) from all of the personality domains tested. This indicates that investors place a lot of emphasis on being ambitious and confident in their decisions. The following highest mean value is that of openness to experience (mean = 4.10), indicating that investors place more emphasis on being unique, inventive and sophisticated. Conscientiousness had the third-highest mean value (mean = 4.03), which is an indication of investors tending to be more systematic and careful and they are inclined to be hard workers. Furthermore, agreeableness (mean = 3.98) and neuroticism (mean = 2.96) hold the two lowest mean values from all of the personality domains.

The lower agreeableness mean value is attributed to investors being more considerate and forgiving, whereas, the lower mean value of neuroticism can be attributed to investors being more uncomfortable and self-doubting in their decisions. Finally, the higher mean score values of extraversion, openness to experience and conscientiousness is an indication that investors value assertiveness, uniqueness and trustworthiness more than being considerate and self-doubting. In terms of risk aversion and short- and long-term intentions, investors are more concerned with being risk averse (mean = 3.76) than being concerned with their investments' time horizon. Furthermore, investors are more likely to invest in longer-term investments (mean = 3.73) than in short-term investments (mean = 3.09).

Mayfield *et al.* (2008:230) obtained results indicating that the adjusted personality measure is suitable for determining investors' personality traits. Results also indicated

that male investors are more inclined to participate in short- and long-term investment behaviour than their female counterparts are. Bajtelsmit and Bernasek (1996) and Jianakoplos and Bernasek (1998) support these findings. Cobb-Clark and Schurer (2012:12) obtained results, which indicated that the participants in their study presented higher levels of agreeableness, neuroticism and conscientiousness. However, lower levels of extraversion and openness to experience were obtained (Cobb-Clark & Schurer, 2012:12). Similarly, Karwowski *et al.* (2013:224) obtained results indicating that their sample displayed higher mean scores for openness to experience, extraversion and conscientiousness. Furthermore, their sample indicated lower mean scores for neuroticism and agreeableness (Karwowski *et al.*, 2013:224). As such, results obtained in this study are in line with studies utilising the same research instrument.

## 5.5 HYPOTHESIS TESTING

A hypothesis refers to a statement about a certain population, tested by means of empirical analysis, which is then either rejected or accepted (Boyce, 2002:455). The following hypotheses were formulated in order to address the empirical objectives of the study:

Null hypothesis ( $H_{01}$ ): There is no difference between demographic variables for the investors based on gender.

Alternative hypothesis ( $H_{a1}$ ): There is a difference between demographic variables for the investors based on gender.

Null hypothesis ( $H_{02}$ ): There is no difference in personality traits of the investors.

Alternative hypothesis ( $H_{a2}$ ): There is a difference in personality traits for the investors.

Null hypothesis ( $H_{03}$ ): There is no difference in risk tolerance levels for investors.

Alternative hypothesis ( $H_{a3}$ ): There is a difference in risk tolerance levels for investors.

Null hypothesis ( $H_{04}$ ): Gender has no effect on the investor's risk tolerance levels.

Alternative hypothesis ( $H_{a4}$ ): Gender has an effect on the investor's risk tolerance levels.

Null hypothesis ( $H_{05}$ ): There is no relationship between the investor's level of risk tolerance and level of education.

Alternative hypothesis ( $H_{a5}$ ): There is a relationship between the investor's level of risk tolerance and level of education.

Each of the formulated hypotheses will be concluded in the relevant sections to follow. The following sections describe the empirical objectives of the study, along with the statistical analysis techniques used to achieve the objectives.

## **5.6 OBJECTIVE 1: ANALYSE DEMOGRAPHIC VARIABLES ACCORDING TO GENDER**

The first empirical objective of the research study is to *analyse the demographic characteristics of the sample according to their gender*. In order to achieve this objective, the following demographic variables were identified, namely age, ethnicity, marital status, annual income, home province and the highest level of education. Table 5.9 presents these demographic characteristics for both the male and female portions of the sample.

**Table 5.9: Demographic characteristics based on gender**

Demographic Characteristic	Cramer's V	P - value	Sub-categories	Males		Females	
				F	P	F	P
<b>Age</b>	0.21	0.000	16-24	2	0.40	21	3.50
			25-34	57	12.20	119	20.00
			35-49	150	32.00	237	39.80
			50+	260	55.40	219	36.70
<b>Ethnicity</b>	0.06	0.342	African	79	16.80	90	15.10
			White	313	66.70	402	67.40
			Coloured	32	6.80	56	9.40
			Indian/Asian	45	9.60	48	8.10
<b>Marital Status</b>	0.25	0.000	Single – staying in my own	61	13.00	137	23.00
			Single – staying with parents	13	2.80	43	7.20
			Not married – staying together	45	9.60	65	10.90
			Married	316	67.40	261	43.80
			No longer married	34	7.20	90	15.10
<b>Annual Income</b>	0.23	0.000	R100 000 or less	85	18.10	179	30.00
			R100 001 – R200 000	106	22.60	179	30.00
			R200 001 – R300 000	83	17.70	99	16.60
			R300 001 – R400 000	75	16.00	53	8.90
			R400 001 – R500 000	56	11.90	38	6.40
			R500 001 – R600 000	15	3.20	14	2.30
			R600 001 – R700 000	8	1.70	4	0.70
			R700 001 – R800 000	11	2.30	10	1.70
			R800 001 – R900 000	3	0.60	6	1.00
			R900 001 – R1 Million	9	1.90	8	1.30
			More than R1 Million	18	3.80	6	1.00
<b>Home Province</b>	0.13	0.035	Gauteng	181	38.60	258	43.30
			Kwazulu-Natal	76	16.20	88	14.80
			Western Cape	125	26.70	155	26.00
			Northern Cape	5	1.10	5	0.80
			Eastern Cape	18	3.80	36	6.00
			Free State	11	2.30	15	2.50

Demographic Characteristic	Cramer's V	P - value	Sub-categories	Males		Females	
				F	P	F	P
			Mpumalanga	15	3.20	13	2.20
			Limpopo	8	1.70	10	1.70
			North West	17	3.60	14	2.30
			Live outside RSA	13	2.80	2	0.30
Highest level of education	0.10	0.148	Some Primary School	6	1.30	15	2.50
			Some High School	6	1.30	12	2.00
			Matric	94	20.00	137	23.00
			Diploma	170	36.20	203	34.10
			Undergraduate degree	65	13.90	103	17.30
			Honours degree	102	21.70	104	17.40
			Master's degree	23	4.90	19	3.20
			Doctoral degree	3	0.60	3	0.50

Source: Author compilation

Table 5.9 indicates the Cramer's V and significance values of each of the demographic variables (P – value). Age, marital status and annual income all have significant p – values ( $p = 0.000$ ). Thus, age ( $V = 0.21$ ) marital status ( $V = 0.25$ ) and annual income ( $V = 0.23$ ) all have medium effect sizes. Whereas, ethnicity, home province and level of education do not have significant p – values or effect sizes.

In Table 5.9, F is indicative of the frequency values and P is indicative of the percentage values. The total sample constituted 1 065 investors, of which 469 (44.03%) were male investors and 596 (55.96%) female investors. Table 5.9 indicates all the possible selections the investors could choose from when indicating their demographic information. The following sections will provide a detailed analysis of the demographic characteristics between the male and female investors.

### **5.6.1 Age**

For the male portion of the sample, the majority of the investors indicated that they are in the age range of 50+ (55.40%), followed by the age category of 35-49 (32.00%). Male investors between the ages of 25-34 accounted for 12.20 percent of the sample and the remaining portion of the sample is accounted to investors who were between the ages of 16 and 24 (0.40%).

For the female portion of the sample, the majority of the investors were in the age range of 35-49 (39.80%), followed by the age range of 50+ (36.70%), 20 percent between the ages of 25-34 and the remaining portion of the female sample is attributed to investors who were between the ages of 16 and 24 (3.50%). Thus, the main difference was between the age category where majority of the investors are.

### **5.6.2 Ethnicity**

In terms of ethnicity, the majority (66.70%) of the males were White, followed by the African ethnic group (16.80%) and then the Indian/Asian ethnic group (9.60%). Less than 10 percent (6.80%) of the investors were Coloured. For the female portion of the sample, the majority of the investors indicated that they were in the White ethnic group (67.40%); followed by the African ethnic group (15.10%) and then the Coloured ethnic group (9.40%). The remainder of the investors were in the Indian/Asian ethnic group

and account for 8.10 percent of the female sample. For both the male and female investors, the majority form part of the White and African ethnic groups.

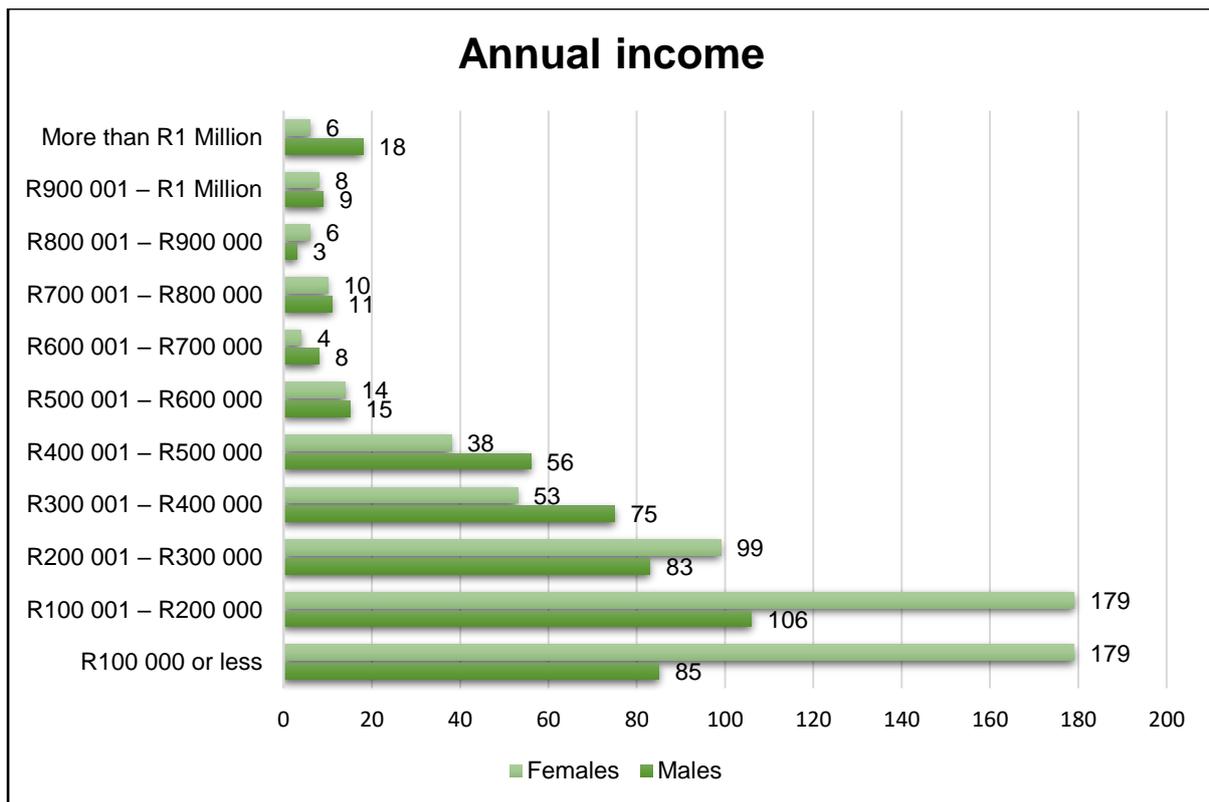
### **5.6.3 Marital status**

For the male portion of the sample, the majority indicated that they were currently married and account for 67.40 percent, followed by investors who were currently single and staying on their own (13.00%) and then individuals who were in a relationship and staying together (9.60%). The remainder of the portion is accounted for by male investors who were no longer married (7.20%) and who were single and still staying with their parents (2.80%).

For the female portion of the sample, the majority of the investors indicated that they were currently married and account for 43.80 percent, followed by single investors staying on their own (23.00%) and then investors who were no longer married (15.10%). The remainder of the sample is accounted for by investors who were not married but staying together (10.90%) and who were single and still staying with their parents (7.20%). For both the male and female portions of the entire sample, the majority are currently married, followed by investors who are currently single and staying on their own.

### **5.6.4 Annual income**

Figure 5.1 indicates the annual income distribution based on the investor's gender. Table 5.9 indicates the number of investors per income category.



**Figure 5.1: Annual income distribution based on gender**

Source: Author compilation

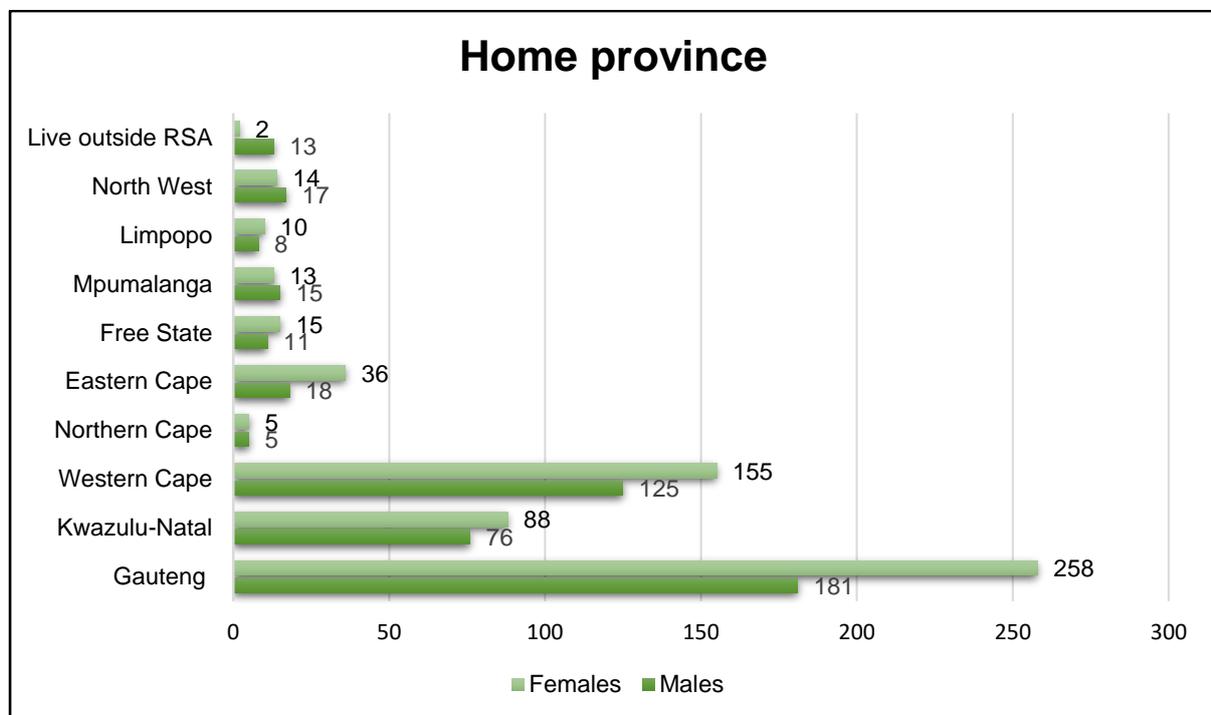
From Figure 5.1, it is evident that the majority of the male investors earn between R100 001 and R200 000 (22.60%). Thereafter, male investors earn between R100 000 or less (18.10%), R200 001 – R300 000 (17.70%), R300 001 – R400 000 (16.00%) and R400 001 – R500 000 (11.90%). The remainder of the male sample earns from R500 001 – more than R1 million (13.50%). More specifically, 3.80 percent earn more than R1 million, 3.20 percent earn between R500 001 – R600 000, 2.30 percent earn between R700 001 – R800 000 and 1.90 percent earn between R900 001 – R1 million. The remainder of the male sample earn between R600 001 – R700 000 (1.70%) and R800 001 – R900 000 (0.60%).

Figure 5.1 indicates that the majority of the female sample earn less than R100 000 (30.00%) and between R100 001 – R200 000 (30.00%). These investors are followed by investors who earn between R200 001 – R300 000 (16.60%), R300 001 – R400 000 (8.90%), R400 001 – R500 000 (6.40%) and R500 001 – R600 000 (2.30%). Thereafter, only 5.70 percent of female investors earn between R600 001 to

More than R1 million. More specifically, 1.70 percent earn between R700 001 – R800 000, 1.30 percent earn between R900 001 – R1 million, 1 percent earn between R800 001 – R900 000 and More than R1 Million respectively. The remainder of the sample earns between R600 001 – R700 000, accounting for only 0.70 percent of the female sample. The only category where female investors out-earn their male counterparts is in the range of R800 001 – R900 000.

### 5.6.5 Home province

Figure 5.2 indicates the home province distribution based on the investor’s gender. Table 5.9 indicates the number of investors per province.



**Figure 5.2: Home province distribution based on gender**

Source: Author compilation

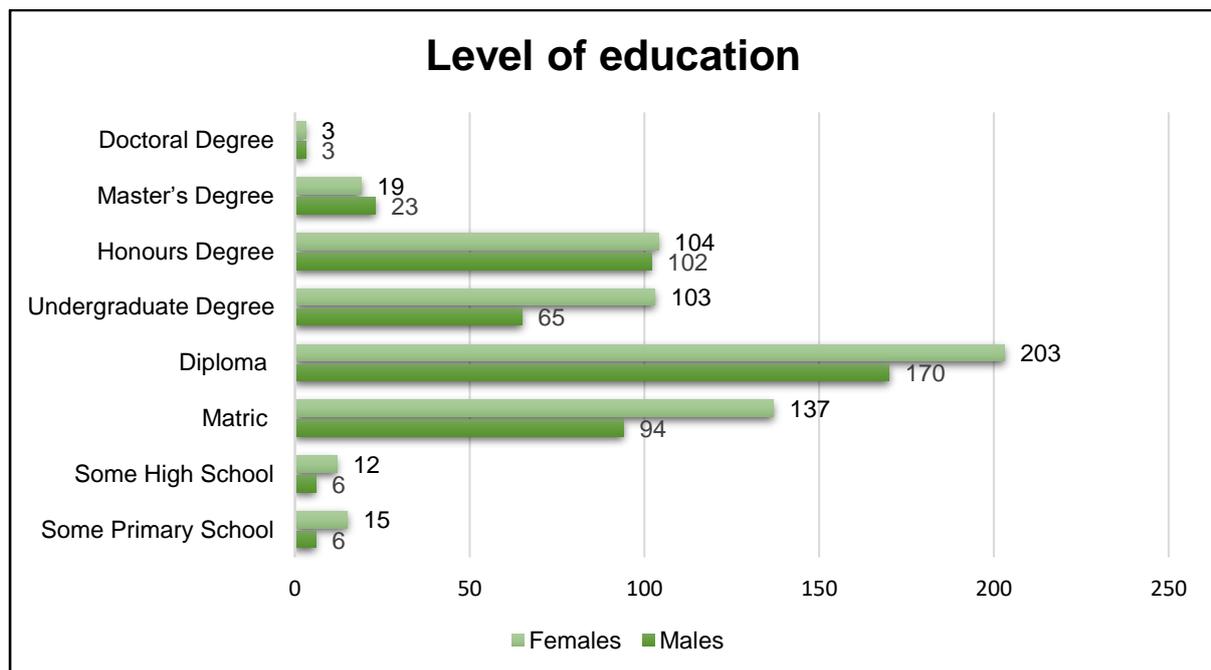
Figure 5.2 indicates that the majority of the male sample resides in Gauteng (38.60%), followed by the Western Cape (26.70%), Kwazulu-Natal (16.20%) and the Eastern Cape (3.80%). Thereafter, the male investors reside in North West (3.60%), Mpumalanga (3.20%), the Free State (2.30%), Limpopo (1.70%) and the Northern Cape (1.10%). The remainder of the sample do not currently reside in South Africa and account for 2.80 percent of the male sample.

For the female portion of the sample (Figure 5.2), the majority of the sample resides in Gauteng (43.30%), followed by the Western Cape (26.00%), Kwazulu-Natal (14.80 %) and the Eastern Cape (6.00%). Thereafter, the female investors reside in the Free State (2.50%), North West (2.30%), Mpumalanga (2.20%), Limpopo (1.70%) and the Northern Cape (0.80%). Only 0.30 percent of the female sample do not currently stay in South Africa.

The majority of the sample, for both the male and female investors, reside in Gauteng, the Western Cape, Kwazulu-Natal and the Eastern Cape. The least amount of investors reside in Limpopo and the Northern Cape, for both the male and female portions of the sample.

### 5.6.6 Highest level of education

Figure 5.3 indicates the highest level of education distribution based on the investor's gender. Table 5.9 indicates the number of investors per level of education.



**Figure 5.3: Highest level of education based on gender**

Source: Author compilation

Figure 5.3 indicates that the highest level of education for the majority of the male sample is the diploma level (36.20%), followed by honours degree (21.70%), matric

(20.00%) and undergraduate degree (13.90%). Thereafter, a master's degree (4.90%), some primary school (1.30%) and some high school (1.30%) and doctoral degree (0.60%) account for the remainder of the male sample.

For the female portion of the sample, the majority of the investors indicated that their highest level of education is a diploma (34.10%), followed by matric (23.00%), an honours degree (17.40%) and undergraduate degree (17.30%). Thereafter, the remainder of the female sample's highest level of education distribution is as follows: master's degree (3.20%), some primary school (2.50%), some high school (2.00%) and doctoral degree (0.50%).

The highest level of education for both the male and female investors is a diploma. The second-highest level of education for male investors is an honours degree and for female investors matric. The third-highest level of education for the male investors is matric and for female investors is an honours degree. Thereafter, both the male and female investors' highest level of education is in line with one another.

### **5.6.7 Summary on demographic variables based on gender**

In order to conclude the first empirical objective of the difference between demographical variables according to gender, the following hypotheses were formulated (Section 5.5):

Null hypothesis ( $H_{01}$ ): There is no difference between demographic variables for the investors based on gender.

Alternative hypothesis ( $H_{a1}$ ): There is a difference between demographic variables for the investors based on gender.

The objective aimed to identify the differences in investors' demographical variables according to their gender. Age, ethnicity, marital status, annual income, home province and the highest level of education were identified as demographical variables for this study. The sample differed in all six variables based on their gender. From the discussions presented above (Section 5.6.1 – Section 5.6.6) it is evident that there is a significant difference in all the demographical variables examined, based on the investor's gender. Thus, the  $H_{01}$  stating that there is no difference is rejected and the

$H_{a1}$  of the difference based on gender is accepted. Therefore, based on the results, it is confirmed that there is a significant difference in demographic variables based on the investor's gender. The following section will discuss the statistical methods and results for the second empirical objective of the research study.

## **5.7 OBJECTIVE 2: IDENTIFY THE VARIOUS PERSONALITY TRAITS OF THE SAMPLE**

The second empirical objective of this study is *to identify the various personality traits of the sample*. In order to answer the second empirical objective of the study, a measurement scale was implemented. This study made use of a measurement model based on the five-factor model of personality. This scale assesses the investor's personality constructs in five main domains and three sub-domains. The five main domains are (i) neuroticism, (ii) extraversion, (iii) openness to experience, (iv) agreeableness and (v) conscientiousness (Gosling *et al.*, 2003:506). The three sub-categories are (i) short-term intentions, (ii) long-term intentions and (iii) risk aversion (Mayfield *et al.*, 2008:233).

In order to analyse the scale's results, the following measures were calculated: (i) descriptive statistics, (ii) the scale's reliability and (iii) confirmatory factor analysis. The measures calculated are in line with measures used in similar studies and will be presented in the following sub-sections.

### **5.7.1 Descriptive statistics for personality measures**

Table 5.10 indicates the descriptive statistics for the personality measures used in this study. The following section will provide an overview of the sample's personality traits.

**Table 5.10: Descriptive statistics for personality measures**

<b>Item</b>	<b>Valid (n)</b>	<b>Inter-item corr.</b>	<b>Cronbach's alpha</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Skewness</b>	<b>Kurtosis</b>
<b>Neuroticism</b>	1065	0.57	0.87	2.96	1.11	0.34	-0.53
<b>Extraversion</b>	1065	0.45	0.77	4.12	0.90	-0.39	0.11
<b>Openness to experience</b>	1065	0.40	0.56	4.10	0.76	-0.16	0.39
<b>Agreeableness</b>	1065	0.32	0.72	3.98	1.01	0.08	-0.97
<b>Conscientiousness</b>	1065	0.25	0.65	4.03	0.88	0.30	-0.50
<b>Risk aversion</b>	1065	0.45	0.77	3.76	0.92	-0.04	-0.13
<b>Short-term intentions</b>	1065	0.33	0.70	3.09	0.93	0.18	0.06
<b>Long-term intentions</b>	1065	0.41	0.77	3.73	0.98	-0.41	0.23

Source: Author compilation

From Table 5.10, the n value indicates the number of investors who successfully completed the questionnaire. Thus, it is evident that all investors forming part of the study successfully completed the personality measures section of the questionnaire (n = 1 065). The average inter-item correlation for the personality measures is 0.40, which falls in the accepted range of 0.15 and 0.50 (Clark & Watson, 1995:316). Each individual construct also holds an accepted inter-item correlation value. Furthermore, the skewness values presented (Table 5.10) is indicative that the data are normally distributed, as the values lie within the accepted range of -2 to +2 (Norman & Streiner, 2007:26). In terms of the kurtosis values, the data are indicative of a flatter distribution, as all values are below zero (Dickason, 2018:118).

In terms of the investors' personality traits, extraversion holds the highest mean value (mean = 4.12), indicating that investors place great emphasis on being ambitious and confident in their decision-making. Openness to experience holds the second highest mean value (mean = 4.10), indicating that investors also place great emphasis on being unique, inventive and sophisticated. Furthermore, conscientiousness holds the third-highest mean value (mean = 4.03), indicating that investors are more systematic and careful and are inclined to be hard workers. Agreeableness (mean = 3.98) and neuroticism (mean = 2.96) hold the two lowest mean values, meaning that investors tend to be more extraverted, open to experience and conscientious, than being agreeable or emotional. Mayfield *et al.* (2008:225) obtained results where participants indicated equal levels for conscientiousness, extraversion and agreeableness. Furthermore, participants displayed lower levels of openness to experience and neuroticism (Mayfield *et al.*, 2008:225). Results from this study are similar to that of the study of Mayfield *et al.* (2008).

In terms of risk aversion and the investment time horizon, investors are more concerned with being risk averse (mean = 3.76), than being concerned with their investment's time horizon. Furthermore, investors are more likely to invest in longer-term investments (mean = 3.73), than short-term investments (mean = 3.09). Mayfield *et al.* (2008:225) obtained similar results indicating that participants are more willing to invest in long-term investments followed by short-term investments. Furthermore, participants indicated a smaller concern to their degree of risk aversion (Mayfield *et al.*, 2008:225). Komarraju *et al.* (2009:50) obtained results indicating their sample are

more concerned with their level of conscientiousness, openness to experience and extraversion. Furthermore, their sample indicated less concern about their levels of neuroticism and agreeableness (Komarraju *et al.*, 2009:50).

Effect sizes were computed to determine whether personality traits had a significant impact on the investor’s risk tolerance. Cohen (1988:284) provides guidelines on calculating and interpreting effect sizes:

- 0.20 = small effect;
- 0.50 = medium effect; and
- 0.80 = large effect.

The following table provides an overview of the effect sizes obtained for the personality measures. Thereafter, the effect sizes will be interpreted.

**Table 5.11: Effect sizes of personality measures**

Personality construct	Gender	Mean	Standard deviation	P-value	Effect size
Neuroticism	Male	2.76	1.04	0.003	0.31
	Female	3.11	1.14		
Extraversion	Male	4.26	0.85	0.033	0.28
	Female	4.01	0.92		
Openness to experience	Male	4.32	0.87	0.663	0.11
	Female	4.22	0.91		
Agreeableness	Male	3.94	0.96	0.030	0.08
	Female	4.02	1.05		
Conscientiousness	Male	4.00	0.85	0.148	0.06
	Female	4.06	0.90		
Risk aversion	Male	3.59	0.91	0.872	0.33
	Female	3.90	0.91		
Short-term intentions	Male	3.28	0.93	0.233	0.37
	Female	2.94	0.89		
Long-term intentions	Male	3.87	0.93	0.047	0.24
	Female	3.63	0.99		

Source: Author compilation

The effect sizes presented in Table 5.11, range from small effects to medium effects. The most notable effect size is that of the investor’s short-term intentions ( $r = 0.37$ ), which classifies as a medium effect. This indicates that investors are more prone to short-term investment intentions than to their personality traits. Furthermore, the investor’s risk aversion holds the second-highest effect size ( $r = 0.33$ ), which classifies as a small to medium effect size. Thus, investors’ short-term time horizon and risk

aversion are their greatest influencers on their investment decisions. The remainder of the effect sizes range from small (conscientiousness  $r = 0.06$ , agreeableness  $r = 0.08$ , openness to experience  $r = 0.11$ ) to relatively medium (long-term intentions  $r = 0.24$ , extraversion  $r = 0.28$ , neuroticism  $r = 0.31$ ). Thus, investors are more prone to disregard their personality traits when making their investment decisions. The effect sizes obtained in this study are in line with those obtained by Rammstedt and John (2007:203).

### 5.7.2 Reliability of the personality measures

The reliability of a scale usually refers to the scale's consistency (Marais, 2013:69). The most frequently used statistic to compute the reliability of a scale is Cronbach's alpha (McDaniel & Gates, 2001:256). Malhotra (2010:319) states that for a scale to have an accepted Cronbach's alpha value, the value should exceed 0.6. The Cronbach's alpha values obtained for the personality measures are presented in Table 5.12 and will be discussed thereafter.

**Table 5.12: Reliability of personality measures**

Personality construct	Cronbach's alpha
Neuroticism	0.87
Extraversion	0.77
Openness to experience	0.56
Openness to experience - adjusted	0.72
Agreeableness	0.72
Conscientiousness	0.65
Risk aversion	0.77
Short term intentions	0.70
Long term intentions	0.77

Source: Author compilation

From Table 5.12, it is evident that all the personality constructs hold acceptable Cronbach's alpha values (Values  $>0.60$ ), except for openness to experience. The openness to experience construct was adjusted to obtain the Cronbach alpha value of 0.72. This value was obtained by removing the third variable from the openness to experience construct. Thus, it can be concluded that the scale used to determine the investors' personality traits is reliable (Malhotra, 2010:319). Results obtained in this study are in line with that of Gosling *et al.* (2003), who also found the personality measures scale to be reliable. Furthermore, results of this study are very similar to those obtained by Judge *et al.* (1999:635) who found the personality constructs'

reliability to fall within 0.72 and 0.93. The following section will provide an overview of the process followed to conduct confirmatory factor analysis.

### 5.7.3 Confirmatory factor analysis of the personality measures

After the descriptive analysis and reliability analysis of the personality measures were deemed suitable, a confirmatory factor analysis (CFA) was conducted to determine that the specified model is a good fit for the data (Ferreira, 2018:152). Another reason for conducting CFA is to obtain factor loadings or estimates, covariance, correlation and residual errors of parameters in the specified model (Hox & Becher, 1998:356). Table 5.13 indicates the factor loadings and significance for each construct forming part of the main personality measures, as well as the sub-constructs constituting the investor's risk aversion and short- and long-term intentions.

It is evident that all factors forming part of the personality measures are significant ( $p < 0.01$ ) and the factors indicated suitable loadings. Agreeableness's fourth sub-construct indicated a very small significance, along with conscientiousness's first and second sub-constructs, also indicating a very small significance.

**Table 5.13: Personality measures estimates and p-values**

Personality construct/ Item code	Estimate	P-value
Neuroticism – C1	0.71	***
Neuroticism – C2	0.76	***
Neuroticism – C3	0.73	***
Neuroticism – C4	0.78	***
Neuroticism – C5	0.79	***
Extraversion – C6	0.58	***
Extraversion – C7	0.72	***
Extraversion – C8	0.71	***
Extraversion – C9	0.69	***
Openness to experience – C10	0.57	***
Openness to experience – C11	0.47	***
Openness to experience – C13	0.74	***
Openness to experience – C14	0.76	***
Agreeableness – C15	0.63	***
Agreeableness – C16	0.93	***
Agreeableness – C17	0.84	***
Agreeableness – C18	0.04	***
Conscientiousness – C19	0.03	***
Conscientiousness – C20	-0.00	***
Conscientiousness – C21	0.67	***
Conscientiousness – C22	0.85	***
Conscientiousness – C23	0.83	***
Risk aversion – C24	0.75	***

Personality construct/ Item code	Estimate	P-value
Risk aversion – C25	0.61	***
Risk aversion – C26	0.59	***
Risk aversion – C27	0.73	***
Short-term intentions – C28	0.39	***
Short-term intentions – C29	0.66	***
Short-term intentions – C30	0.73	***
Short-term intentions – C31	0.50	***
Short-term intentions – C32	0.65	***
Long-term intentions – C33	0.59	***
Long-term intentions – C34	0.68	***
Long-term intentions – C35	0.66	***
Long-term intentions – C36	0.66	***
Long-term intentions – C37	0.60	***
***P-value is significant at the .000 level		

Source: Author compilation

As the chi-square test is seen as an excessively strict indicator of model fit, Hancock and Mueller (2010) proposed small deviations from the model. Mueller (1996) is of the opinion that the chi-square statistic should be divided by the degrees of freedom (CMIN/DF). The CMIN/DF value obtained for this analysis is 4.64, which represents a good model fit (Mueller, 1996). A respectable overall comparative fit index (CFI) value is indicated as a value above 0.90 (Hancock & Mueller, 2010). A moderately adequate CFI value of 0.848 was obtained, while a root mean square error of approximation (RMSEA) value of 0.058, with a 90.00 percent confidence interval of [0.056; 0.061]. A model with an RMSEA value of 0.10 and larger should not be accepted (Blunch, 2008).

Figure 5.4 indicates the factors for all the constructs that form part of the personality measures, the risk aversion, as well as the short- and long-term intentions. Moreover, Figure 5.4 also indicates the entire CFA and all factors were found to be significant. In their study, Barrick and Mount (1991:12) obtained similar results indicating that all the factors of the personality measures are significant. These findings are also supported by Mayfield *et al.* (2008).

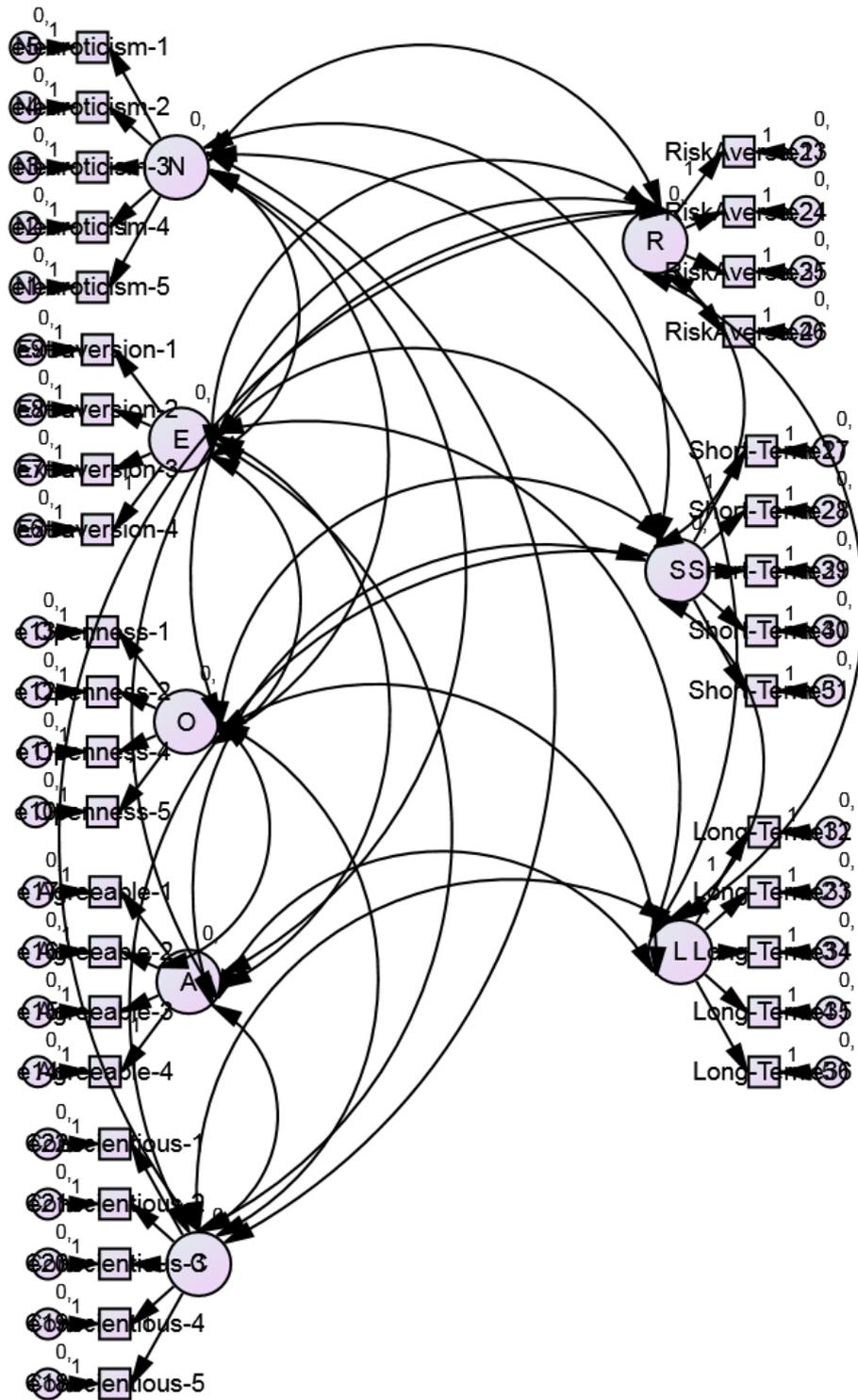


Figure 5.4: CFA for personality measures

Source: Author compilation

#### **5.7.4 Summary on the personality traits of investors**

In order to conclude the second empirical objective of the personality traits of investors, the following hypotheses were formulated (Section 5.5):

Null hypothesis ( $H_{02}$ ): There is no difference in personality traits of the investors.

Alternative hypothesis ( $H_{a2}$ ): There is a difference in personality traits of the investors.

From the discussions presented above (Section 5.7.1 - 5.7.3) it is evident that the investor's personality traits could be determined by making use of the adjusted five-factor model (neuroticism, extraversion, openness to experience, agreeableness and conscientiousness). The scale was determined to be reliable (Section 5.7.2) and all the factors the scale intended to measure, were achieved (Section 5.7.3). Overall, investors tended to be more extraverted and open to experience. Investors are less inclined to be agreeable and emotional. They are also more concerned with their degree of risk aversion than the time horizons of the investments they make. As such, the null hypothesis ( $H_{02}$ ), stating that there is no difference in personality traits of the investors, is rejected. The alternative hypothesis ( $H_{a2}$ ), stating that there is a difference in personality traits for the investors, is accepted.

#### **5.8 OBJECTIVE 3: DETERMINE THE RISK TOLERANCE LEVELS FOR THE SAMPLE**

The third empirical objective of this study is to report on *the risk tolerance levels for the sample*. In order to answer the third empirical objective of the study, a risk tolerance measurement scale was implemented. This study made use of the single SCF risk tolerance question, as well as the GL-RTS. These measurements both determine the investor's level of financial risk tolerance. This study made use of the single SCF risk tolerance question; however, the entire 13-item GL-RTS was used.

In order to analyse the risk tolerance scales' results, the following measures were calculated: (i) descriptive statistics, (ii) the scale's reliability and (iii) a confirmatory factor analysis. The measures calculated are in line with measures used in similar studies and will be presented in the following sub-sections.

### 5.8.1 Descriptive statistics

This section provides an overview of the descriptive statistics for both the SCF single risk tolerance question, as well as the GL-RTS.

**Table 5.14: Descriptive statistics for SCF risk tolerance question**

Item	Valid (n)	Mean	Standard deviation	Skewness	Kurtosis
B1	1065	2.55	1.08	0.28	-0.65

Source: Author compilation

The valid value (n = 1065) indicates the number of investors who completed the questionnaire successfully. From Table 5.14, it is evident that the data are normally distributed as indicated by the 0.28 skewness value, which falls within the -2 to +2 range (Norman & Streiner, 2007:26). The value also indicates that the data are skewed to the right. The kurtosis value presented in the table above indicates that the data are relatively flat with regards to its peakedness (Malhotra, 2010:489), as the value falls below zero. The standard deviation value indicates the dispersion from the mean value. A lower standard deviation value is an indication of lesser dispersion from the mean value. Thus, indicating that investors display lesser dispersion from participating in financial risk behaviour. Table 5.15 provides an overview of the descriptive statistics for the SCF question's sub-categories.

**Table 5.15: Descriptive statistics for SCF sub-categories**

Sub-category	Frequency	Percentages (%)
Take substantial financial risk, expecting to earn substantial returns	172	16.20
Take above average financial risk, expecting to earn above average returns	312	29.30
Take average financial risk, expecting to earn average returns	344	32.30
Not willing to take any financial risk	196	18.40
Not indicated	41	3.80

Source: Author compilation

Table 5.15 presents the frequencies and percentages for the SCF sub-categories. The majority (32.30%) of the investors indicated that they are willing to take average

financial risks, expecting average financial returns. Investors who are willing to take substantial financial risk in return for substantial financial rewards account for 16.20 percent of the sample. On the other hand, investors who are willing to take above average financial risks for above average financial returns, account for 29.30 percent of the sample. Investors who are not willing to take any financial risk account for 18.40 percent of the sample. The remainder of the sample (3.80%) did not indicate if they are willing to take financial risks.

Gilliam *et al.* (2010:39) conducted a study on the reliability and validity of both the SCF single risk tolerance question and the GL-RTS. Results suggest that both measures are valid and reliable in determining investors' level of risk tolerance. Results also indicate that the SCF single risk tolerance question provides a reasonably accurate indication of investors' risk tolerance levels (Gilliam *et al.*, 2010:39). Sung and Hanna (1996:13) obtained similar results, indicating that the SCF single risk tolerance question efficiently measures investors' risk tolerance levels.

The following section provides a discussion on the GL-RTS implemented in the study. Descriptive statistics for the scale as a whole and the separate facets will be presented and discussed. Table 5.16 indicates the descriptive statistics for the GL-RTS as a whole.

**Table 5.16: Descriptive statistics for GL-RTS**

Item	Valid (n)	Mean	Standard deviation
GL-RTS	1065	2.03	0.44

Source: Author compilation

From Table 5.16, it is evident that all the investors forming part of the study successfully completed the section of the questionnaire relating to the GL-RTS (n = 1 065). The standard deviation value (Std dev = 0.44) indicates the dispersion from the mean value. A lower standard deviation value is an indication of lesser dispersion from the mean value. Thus, indicating that investors display lesser dispersion from participating in financial risk-tolerant behaviour. The following table provides an overview of the sub-components of the GL-RTS.

**Table 5.17: Descriptive statistics for the GL-RTS facets**

<b>GL-RTS facet</b>	<b>Valid (n)</b>	<b>Facet standard deviation</b>	<b>Facet mean</b>
<b>Investment risk</b>	1 065	0.82	2.05
<b>Financial risk</b>	1 065	0.76	2.13
<b>Speculative risk</b>	1 065	0.96	2.22

Source: Author compilation

Section 5.4.2 identified the three facets of the GL-RTS. Table 5.17 gives an indication of the number of investors who completed the questionnaire, the GL-RTS facets' standard deviation and mean scores. The n value indicates the number of investors who successfully completed the questionnaire (n = 1065). The standard deviation value indicates the dispersion from the mean value. A lower standard deviation value is an indication of lesser dispersion from the mean value. This indicates that investors tend to be more risk-tolerant in their financial behaviour.

To be more specific, the speculative risk facet holds the highest standard deviation (Std dev = 0.96). As a result, the standard deviation indicates that investors are more prone to participate in risk-tolerant behaviour in the speculative risk facet. Furthermore, investment risk holds the second-highest standard deviation (Std dev = 0.82). As such, the standard deviation value indicates that investors engage in investment risk behaviour but to a lesser extent. The final facet, financial risk, holds the lowest standard deviation (Std dev = 0.76), which indicates that investors still engage in financial risk tolerance behaviour, however, to an even lesser extent than the first two facets.

In terms of the mean scores, the speculative risk facet also holds the highest value (mean = 2.22), this confirms that investors are more willing to engage in risk-tolerant behaviour in this facet. Furthermore, the financial risk facet holds the second highest mean score (mean = 2.13), which is indicative of financial risk-tolerant behaviour, however, to a lesser extent. Furthermore, the investment risk facet holds the lowest mean value (mean = 2.05), which indicates that investors do engage in investment risk behaviour, however, they are less likely to engage in investment risk than the other two facets.

Gilliam *et al.* (2010:39) conducted a study on the reliability and validity of both the SCF single risk tolerance question and GL-RTS. Results suggest that both measures are valid and reliable in determining investors' level of risk tolerance. Furthermore, results suggest that the GL-RTS is a good indication of the investor's overall financial risk tolerance (Gilliam *et al.*, 2010:39). Grable and Lytton (1999b:178) state that the GL-RTS measures the investor's risk tolerance on three facets. The results obtained indicated that the scale is an efficient tool for measuring investor risk tolerance levels (Grable & Lytton, 1999b:179). Furthermore, Grable and Lytton (1999b:176) obtained results indicating that their 13-item scale displayed moderate reliability scores.

To conclude the objective of determining investors' level of risk tolerance, it is evident that the sample displayed average risk tolerance levels. However, investors are inclined to participate in financial risk-tolerant behaviour. They are more inclined to participate in speculative risk, followed by financial risk and then investment risk. Thus, although the investors are aware of their level of risk tolerance, they still engage in risk-tolerant behaviour. As the SCF single risk tolerance question is not a scale, reliability and CFA cannot be conducted. The following sections will focus on the GL-RTS reliability and CFA.

### 5.8.2 Reliability of GL-RTS

The reliability of a scale usually refers to the scale's consistency (Marais, 2013:69). The most frequently used statistic to compute the reliability of a scale is Cronbach's alpha (McDaniel & Gates, 2001:256). Malhotra (2010:319) states that for a scale to have an accepted Cronbach alpha value, the value should exceed 0.60. The GL-RTS was adapted and three of the constructs were removed as these constructs presented low correlation. Constructs 1, 7 and 10 were removed. Before the adapted scale, a Cronbach alpha value of 0.67 was obtained. Table 5.18 indicates the Cronbach's alpha values as well as the item correlation values for the constructs, which were removed from the GL-RTS.

**Table 5.18: Cronbach's alpha values for removed constructs**

GL-RTS construct	Item correlation	Cronbach's alpha if item deleted
GL-RTS – 1	0.06	0.68

GL-RTS construct	Item correlation	Cronbach's alpha if item deleted
GL-RTS – 7	0.14	0.68
GL-RTS – 10	0.19	0.68

Source: Author compilation

The initial Cronbach alpha value of 0.67 is deemed suitable according to Malhotra (2010:319), as the value is >0.60. However, based on the low correlations of the three removed constructs, the adapted scale's Cronbach alpha value will be used to determine whether the scale is reliable. The Cronbach alpha value of 0.68 is >0.60 and thus the scale measuring investor's risk tolerance is deemed reliable. Grable and Lytton (1999b) conducted a study on their 13-item scale where they revisited the development process of the scale. Results obtained indicated moderate levels of reliability (Grable & Lytton, 1999b). As such, the results obtained in this study are in line with those obtained by Grable and Lytton (1999b).

### 5.8.3 CFA of GL-RTS

After the reliability analysis of the GL-RTS was deemed suitable, a CFA was conducted to determine that the specified model is a good fit for the data (Ferreira, 2018:152). Another reason for conducting CFA is to obtain factor loadings or estimates, covariance, correlation and residual errors of parameters in the specified model (Hox & Becher, 1998:356). Table 5.19 indicates the factor loadings and significance for each construct forming part of the risk tolerance scale.

It is evident that all factors forming part of the GL-RTS are significant ( $p < 0.01$ ) and all of the factors indicated suitable loadings. All factors indicated loadings >0.04, except for GL-RTS – 3 (0.26) and GL-RTS – 9 (0.27). These factors are still valid; however, they contribute less to the investor's risk tolerance level.

**Table 5.19: GL-RTS estimates and p-values**

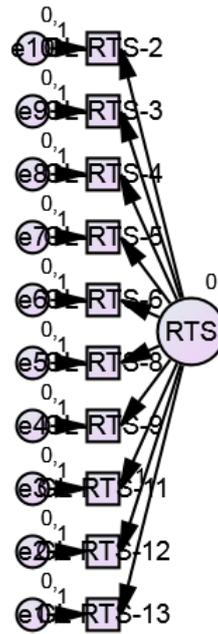
GL-RTS Construct	Estimate	P-value
GL-RTS – 2	0.42	***
GL-RTS – 3	0.26	***
GL-RTS – 4	0.49	***
GL-RTS – 5	0.44	***
GL-RTS – 6	0.54	***
GL-RTS – 8	0.46	***
GL-RTS – 9	0.27	***

<b>GL-RTS Construct</b>	<b>Estimate</b>	<b>P-value</b>
GL-RTS – 11	0.50	***
GL-RTS – 12	0.57	***
GL-RTS – 13	0.44	***
***P-value is significant at the .000 level		

Source: Author compilation

As the chi-square test is seen as an excessively strict indicator of model fit, Hancock and Mueller (2010) proposed small deviations from the model. Mueller (1996) is of the opinion that the chi-square statistic should be divided by the degrees of freedom. The CMIN/DF value obtained in this study is 3.17, which represents a good model fit (Mueller, 1996). A respectable overall CFI value is indicated as a value above 0.9 (Hancock & Mueller, 2010). An adequate CFI value of 0.933 was obtained, while a RMSEA value of 0.045 with a 90% confidence interval of [0.036; 0.055] was obtained. A model with an RMSEA value of 0.10 and larger should not be accepted (Blunch, 2008).

Grable and Lytton (1999b) revisited the development of the GL-RTS and obtained results indicating that all factors forming part of their scale were deemed suitable. As such, results obtained in this study are similar to those obtained by Grable and Lytton (1999b). Figure 5.5 indicates the factors for all of the constructs forming part of the adapted GL-RTS scale. Furthermore, all factors forming part of the CFA were found to be significant.



**Figure 5.5: CFA for GL-RTS**

Source: Author compilation

#### 5.8.4 Summary of the risk tolerance levels for investors

In order to conclude the second empirical objective of determining the risk tolerance levels of the investors, the following hypotheses were formulated (Section 5.5):

Null hypothesis ( $H_{03}$ ): There is no difference in risk tolerance levels for investors.

Alternative hypothesis ( $H_{a3}$ ): There is a difference in risk tolerance levels for investors.

From the discussions presented above (Section 5.8.1 – 5.8.3), it is evident that both the SCF single risk tolerance question and the GL-RTS indicated the extent to which investors are risk-tolerant. Although the GL-RTS was adjusted, the scale still proved to be reliable (Cronbach alpha = 0.68). Furthermore, from the CFA, it can be concluded that all the factors forming part of the adjusted GL-RTS had sufficient factor loadings, thus all factors were confirmed. From the SCF single risk tolerance question, investors are considered to be of average risk tolerance. The same results were obtained when making use of the GL-RTS. Thus, the null hypothesis ( $H_{03}$ ), stating that there is no

difference in risk tolerance levels for the investors, is rejected. The alternative hypothesis ( $H_{a3}$ ), stating that there is a difference in risk tolerance levels for the investors, is accepted.

## **5.9 OBJECTIVE 4: IDENTIFY THE EFFECT OF GENDER ON THE SAMPLE IN TERMS OF THE SAMPLE'S RISK TOLERANCE LEVELS**

The fourth empirical objective of the study relates to *the effect of gender on the sample's level of risk tolerance*. The study implemented two measures to obtain the sample's level of risk tolerance, namely (i) the SCF single risk tolerance question and (ii) the GL-RTS. These two measures reported that investors tend to display average risk-tolerant behaviour (Section 5.8.1).

Several t-tests were conducted to determine the effect of gender on the sample's level of risk tolerance. The measures calculated are in line with measures used in similar studies and will be presented in the following sub-sections.

### **5.9.1 The effect of gender on the SCF**

This section serves to identify the effect gender has on the investor's risk tolerance, by making use of the SCF single risk tolerance question. Table 5.20 identifies the different responses investors provided on the SCF single risk tolerance question, based on their gender. The table also indicates the number of investors who preferred not to answer the SCF single risk tolerance question. The F refers to the frequencies and the P refers to the valid percentage within the sample.

**Table 5.20: SCF single risk tolerance question, based on gender**

Sub-category	Males		Females	
	F	P	F	P
Take substantial financial risk, expecting to earn substantial returns	62	13.20	110	18.50
Take above average financial risk, expecting to earn above average returns	161	34.30	151	25.30
Take average financial risk, expecting to earn average returns	174	37.10	170	28.50
Not willing to take any financial risk	60	12.80	136	22.80
Not indicated	12	2.60	29	4.90

Source: Author compilation

From Table 5.20, it is evident that the investor's gender has an effect on his/ her risk tolerance. For the male portion of the sample, the majority (37.10%) of the investors indicated that they are willing to take average financial risks. The majority (28.50%) of the female sample also indicated that they are willing to take average financial risks.

The second highest (34.30%) group of risk-takers for the male portion of the sample indicated that they are willing to take above average financial risks. The second highest (25.30%) contributing group to the female portion of the sample indicated that they are also willing to take above average financial risks. Thereafter, the sample's risk tolerance differs significantly based on their gender (Anbar & Eker, 2008).

The third group of male investors indicated that they are willing to take substantial financial risks (13.20%), whereas, for the female portion of the sample, investors indicated that they are not willing to take any financial risks (22.80%). The least number of female investors indicated that they are willing to take substantial financial risks (18.50%); whereas, the least number of male investors indicated that they are not willing to take any financial risks (12.80%). These results are in line with the literature, which argues that female investors are less risk-tolerant than their male counterparts are (Bajtelsmit & Bernasek, 1996; Jianakoplos & Bernasek, 1998; Cárdenas *et al.*, 2012).

From the discussion presented above, the SCF single risk tolerance question highlights the differences in investor risk tolerance based on their gender. However, the differences between the risk tolerance levels for the male and female portions of

the sample are at opposite ends of the risk tolerance continuum. Whilst the majority of the sample indicated that they are of average financial risk tolerance, the remainder of the female sample indicated that they are not willing to take any financial risks. However, the remainder of the male sample indicated that they are willing to take substantial financial risks.

Table 5.21 indicates the differences in risk tolerance of investors, based on their gender. As discussed above, it is evident that the SCF single risk tolerance question yields a small difference in investor risk-tolerant behaviour based on their gender ( $M_{\text{Male}} = 2.56$ ,  $M_{\text{Female}} = 2.54$ ). The effect size calculated for the SCF single risk tolerance question is  $r = 0.01$ , which is indicative of a very small effect (Cohen, 1988:284). The following section provides an overview of the gendered differences in investor risk tolerance, as suggested by the GL-RTS.

### **5.9.2 The effect of gender on the GL-RTS**

To determine the effect of gender on the investor's risk tolerance, an independent samples t-test was calculated for the GL-RTS. Table 5.21 presents the independent samples t-test statistics for this risk tolerance measurement. The Levene's test assumes that there is homogeneity of variance (variances are equal) (Levene, 1960:292; Ferreira, 2018:182). Thus, the independent samples t-test is based on the assumption that the mean values for the two groups (males and females) are the same. A higher mean value indicates that investors are more likely to participate in risk-tolerant behaviour. Effect sizes were computed to determine whether gender had a significant impact on the investor's risk tolerance. Cohen (1988:284) provides guidelines on calculating and interpreting effect sizes:

- 0.20 = small effect;
- 0.50 = medium effect; and
- 0.80 = large effect.

The GL-RTS provided an effect size of  $r = 0.48$ , which is indicative of a medium-sized effect. Thus, gender does have a medium impact on the investor's risk tolerance. Levene's test indicated a significance value of  $p = 0.473$ , which is greater than 0.05, suggesting that the variability of the scores are comparatively the same (Levene, 1960:292). The independent t-test displays a significance of  $p = 0.000$  at the 5.00

percent confidence interval. Thus, this significance value indicates that gender does have a significant impact on the investor's risk tolerance.

The mean scores obtained for the male and female portion of the sample, confirm the difference in risk tolerance based on gender ( $M_{\text{Male}} = 2.14$ ,  $M_{\text{Female}} = 1.94$ ). The higher mean score for the male portion of the sample indicates that the male investors are more likely to participate in financial risk-tolerant behaviour than their female counterparts. Table 5.21 indicates the Levene's test results as well as the independent t-test results for both the SCF single risk tolerance question and the GL-RTS.

Grable (2000:628) conducted a study on the factors influencing investor risk-tolerant behaviour. Results indicated that male investors were more risk-tolerant than their female counterparts are (Grable, 2000:628). Furthermore, Jianakoplos and Bernasek (1998:627) obtained similar results of male investors' inclination to be more risk-tolerant than their female counterparts. As such, results obtained in this study are in line with those obtained by Jianakoplos and Bernasek (1998:627) and Grable (2000:628).

**Table 5.21: Independent samples t-test for risk tolerance**

Risk tolerance measurement		Levene's test for equality of variances		T-test for equality of means					
		F	Sig	t	df	Sig (2-tailed)	Mean Difference	Mean	Std error difference
<b>SCF</b>	Equal variances assumed	34.03	0.000	0.24	1063	0.808	0.02	2.56	0.07
	Equal variances not assumed			0.25	1061.06	0.804	0.02	2.54	0.07
<b>GL-RTS</b>	Equal variances assumed	0.52	0.473	7.97	1063	0.000	0.21	2.14	0.03
	Equal variances not assumed			7.94	986.56	0.000	0.21	1.94	0.03

Source: Author compilation

### **5.9.3 Summary on the effect of gender on investor risk tolerance**

The fourth empirical objective of the study aimed to identify the effect gender has on the investor's risk tolerance. As such, the following hypotheses were formulated:

Null hypothesis ( $H_{04}$ ): Gender has no effect on the investor's risk tolerance levels.

Alternative hypothesis ( $H_{a4}$ ): Gender has an effect on the investor's risk tolerance levels.

To conclude the fourth empirical objective of the study, identifying the effect of gender on investor risk tolerance, the discussions above presented the necessary evidence. The SCF single risk tolerance question presented a small difference in investor risk-tolerant behaviour, whereas, the GL-RTS presented a medium-sized effect. Both measurements indicated that the investor's level of financial risk tolerance is influenced by their gender. Thus, the null hypothesis ( $H_{04}$ ), stating that gender has no effect on the investor's risk tolerance levels, is rejected. The alternative hypothesis ( $H_{a4}$ ), stating that gender has an effect on the investor's risk tolerance levels, is thus accepted.

### **5.10 OBJECTIVE 5: DETERMINE THE RELATIONSHIP BETWEEN LEVEL OF EDUCATION AND LEVEL OF RISK TOLERANCE FOR THE SAMPLE**

The fifth empirical objective of the study aims to *identify the relationship between the investor's level of risk tolerance and their level of education*. The focus of the fifth empirical objective is on female investors only, as the objective sets out the foundation for the sixth empirical objective. In order to achieve the objective, the Spearman correlation was computed for the investor's level of risk tolerance and their level of education. Furthermore, crosstabulation was also computed in order to identify an exact relationship between the investor's level of risk tolerance and education.

#### **5.10.1 Descriptive statistics for the relationship between the level of education and risk tolerance**

Both risk tolerance measures are presented in Table 5.22 below (SCF and GL-RTS), along with the Spearman correlation for the investor's level of education. Significance

was computed at the 0.01 level (99.00 percent confidence). The n value indicates that all the female investors (n = 596) completed this section of the questionnaire successfully. The SCF single risk tolerance question did not present a significant relationship with the investor's level of education. However, the GL-RTS presented a 0.000 significance value, which indicates that the investor's level of risk tolerance and level of education holds a significant relationship.

**Table 5.22: The relationship between risk tolerance and level of education**

Risk tolerance measure	Spearman correlation	Level of education
<b>SCF</b>	Correlation coefficient	0.06
	Sig (2-tailed)	0.129
	n	596
<b>GL-RTS</b>	Correlation coefficient	0.17**
	Sig (2-tailed)	0.000
	n	596
**Correlation is significant at the 0.01 level		

Source: Author compilation

Before analysing the relationship between the investor's level of education and their level of risk tolerance, the education categories as presented in Section 5.3 (Section 5.3.7), were adjusted to four new categories. As the education category's data distribution was not evenly distributed, the categories were adjusted to ensure for a more evenly distributed sample. Thus, the categories were adjusted to provide a better understanding of the exact relationship between the investor's level of risk tolerance and their level of education. Table 5.23 provides an overview of the newly formulated education categories.

**Table 5.23: Education categories**

New category	Education levels
Matric	Some primary school, some high school, matric
Diploma	Diploma
Undergraduate degree	Undergraduate degree
Postgraduate degree	Honour's degree, master's degree, doctoral degree

Source: Author compilation

Table 5.24 provides an overview of the cross tabulation between the investor's level of education and their level of risk tolerance. The count rows provide the number of investors who indicated their preferred level of risk tolerance. The % within education provides the sample size for the specific risk tolerance level the investor indicated within the education sample. The % within SCF provides the sample size of the investors who participate in risk-tolerant behaviour within the SCF single risk tolerance question. The SCF single risk tolerance question categories are as follows:

- 1 – Substantial risk;
- 2 – Above average risk;
- 3 – Average risk; and
- 4 – No risk.

**Table 5.24: Cross-tabulation between risk tolerance and level of education**

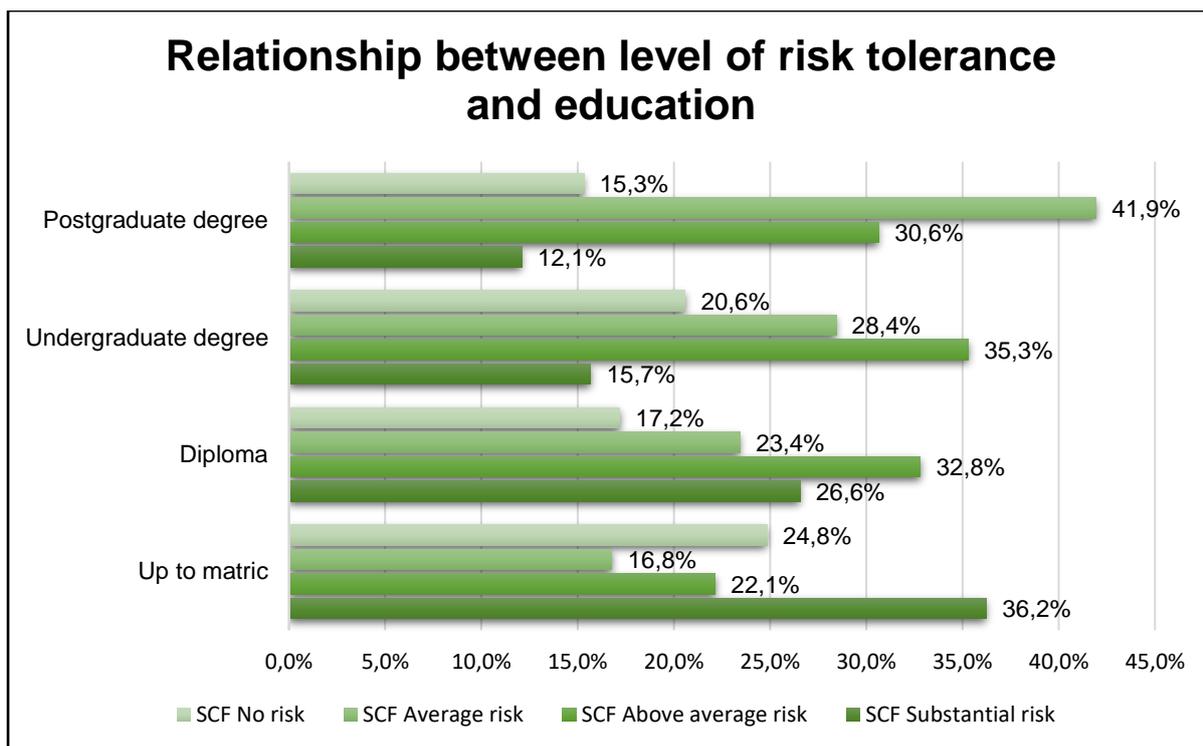
			SCF				Total
			1	2	3	4	
<b>Level of education</b>	<b>Matric</b>	Count	54	33	25	37	149
		% within education	36.20	22.10	16.80	24.80	100%
		% within SCF	39.70	19.40	16.60	33.60	26.30%
		% of Total	9.50	5.80	4.40	6.50	26.30%
	<b>Diploma</b>	Count	51	63	45	33	192
		% within education	26.60	32.80	23.40	17.20	100%
		% within SCF	37.50	37.10	29.80	30.00	33.90%
		% of Total	9.00	11.10	7.90	5.80	33.90%
	<b>Undergraduate degree</b>	Count	16	36	29	21	102
		% within education	15.70	35.30	28.40	20.60	100%
		% within SCF	11.80	21.20	19.20	19.10	18.00%
		% of Total	2.80	6.30	5.10	3.70	18.00%
	<b>Postgraduate degree</b>	Count	15	38	52	19	124
		% within education	12.10	30.60	41.90	15.30	100%
		% within SCF	11.00	22.40	34.40	17.30	21.90%
		% of Total	2.60	6.70	9.20	3.40	21.90%
<b>Total</b>	Count	136	170	151	110	567	
	% within education	24.00	30.00	26.60	19.40	100%	
	% within SCF	100	100	100	100	100%	

			SCF				Total
			1	2	3	4	
		% of Total	24.00	30.00	26.60	19.40	100%

Source: Author compilation

In terms of effect size, the Cramer's V ( $V = 0.13$ ) indicates that the relationship between level of risk tolerance and level of education holds a small effect, at a 0.01 confidence interval ( $P = 0.000$ ). From Table 5.24, it is evident that the female investors' level of risk tolerance and level of education have a relationship. 26.30 percent of the female investors indicated an education level of up to Matric, from which 75.10 percent participate in risk-tolerant behaviour. The remaining 24.90 percent indicated that they do not take any financial risk. In terms of diploma, 33.90 percent of the investors indicated their level of risk-tolerant behaviour. Only 17.20 percent of these investors prefer not to take any financial risk. Furthermore, the undergraduate degree accounts for 18.00 percent of the female investors, with only 20.60 percent of investors indicating that they do not take any financial risks. Finally, the postgraduate degree accounts for the remainder of the sample (21.90%), with only 15.30 percent of investors indicating that they are not willing to take any financial risks.

Figure 5.6 provides a detailed chart for the relationship between the investor's level of risk tolerance and level of education.



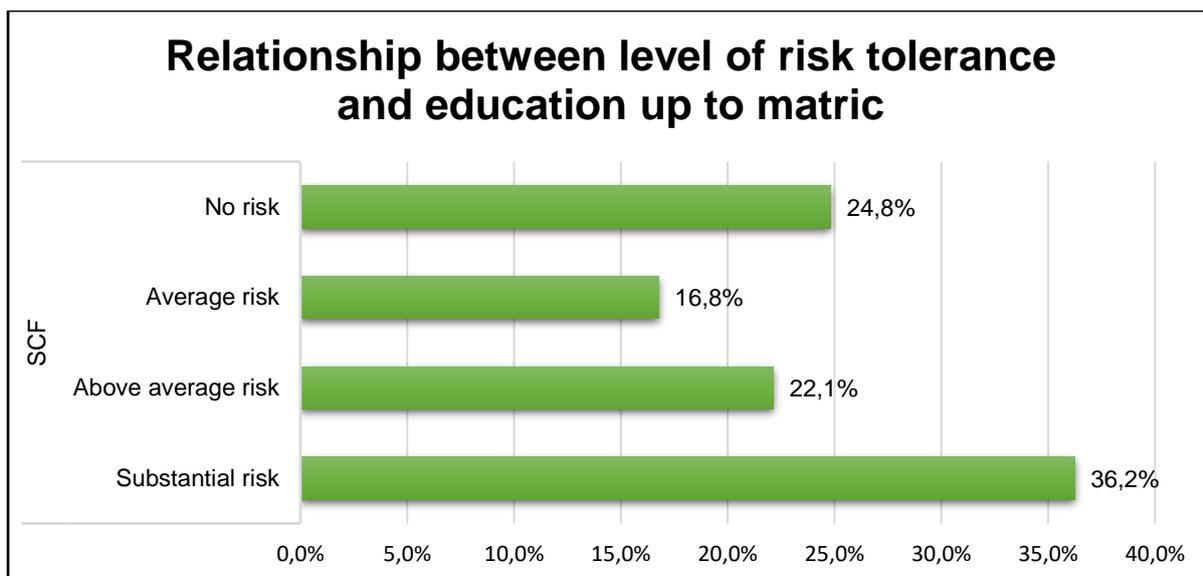
**Figure 5.6: Relationship between the level of education and risk tolerance**

Source: Author compilation

From Figure 5.6, it is evident that lower educated investors account for the majority of the sample, typically those investors with an education level of matric and diploma (60.14%). Investors who are higher educated account for the remainder of the sample (undergraduate degree and postgraduate degree – 39.86%). Furthermore, it is evident that investors who are less educated prefer to take more financial risks and investors who are more educated, prefer to take fewer financial risks. The following sections provide a detailed overview of each of the investors' level of education and the relationship it has with their level of risk tolerance.

### 5.10.2 Relationship between level of risk tolerance and education up to matric

This section provides an exact overview of the relationship between the investor's level of risk tolerance and their education level up to matric. This education category includes investors with some primary school, some high school and matric as their highest level of education.



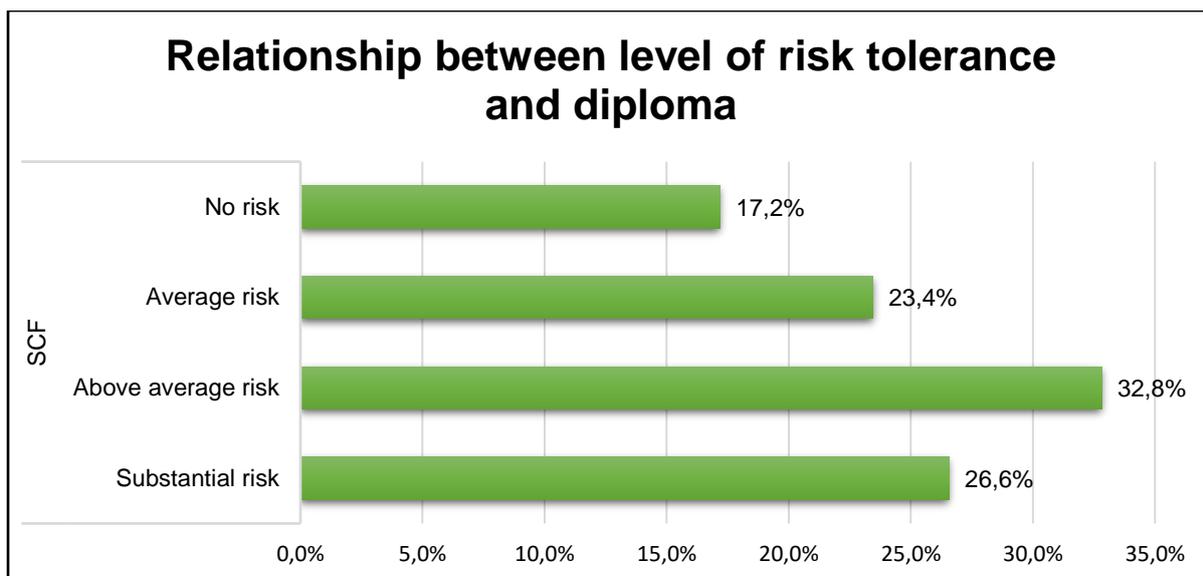
**Figure 5.7: Relationship between the level of risk tolerance and education up to matric**

Source: Author compilation

From Figure 5.7 above, it is evident that investors who have an education level of up to matric participate in risk-tolerant behaviour. From the overall sample size, this education category only accounts for 26.30 percent of the entire sample. Within this education category, only 24.80 percent do not take any financial risks. The majority of the investors indicated that they take substantial financial risk (36.20%), followed by investors who take above average financial risk (22.10%) and investors who take average financial risks (16.80%). Thus, for this level of education, it is evident that investors who possess a lower level of education are more inclined to participate in risk-tolerant behaviour.

### **5.10.3 Relationship between level of risk tolerance and diploma**

This section provides an exact overview of the relationship between the investor's level of risk tolerance and investors possessing a diploma as their highest level of education.



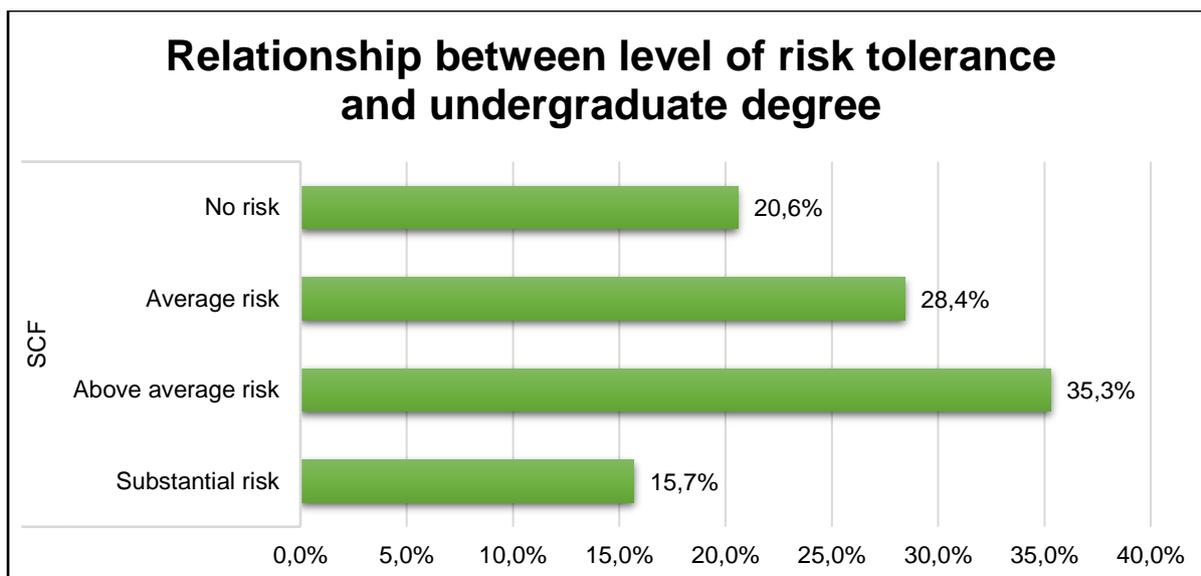
**Figure 5.8: Relationship between the level of risk tolerance and diploma**

Source: Author compilation

From the overall sample size, this education category accounts for 33.90 percent of the sample size. From Figure 5.8, only 17.20 percent of the investors indicated that they do not take any financial risks. The majority of the sample indicated that they take above average financial risks (32.80%), followed by investors who take substantial financial risks (26.60%) and investors who only take average financial risks (23.40%). Thus, investors who possess a diploma as their highest level of education are more inclined to participate in risk-tolerant behaviour. This behaviour is in line with investors who possess an education level of up to Matric. Thus, it can be stated that investors who possess a lower level of education, are more inclined to participate in risk-tolerant behaviour. Irwin Jr (1993) argued that higher educated investors' risk tolerance levels are undoubtedly influenced by their level of education. As such, this study obtained results indicating opposite risk-tolerant behaviour of investors.

#### **5.10.4 Relationship between level of risk tolerance and undergraduate degree**

This section provides an exact overview of the relationship between the investor's level of risk tolerance and investors possessing an undergraduate degree as their highest level of education.



**Figure 5.9: Relationship between the level of risk tolerance and undergraduate degree**

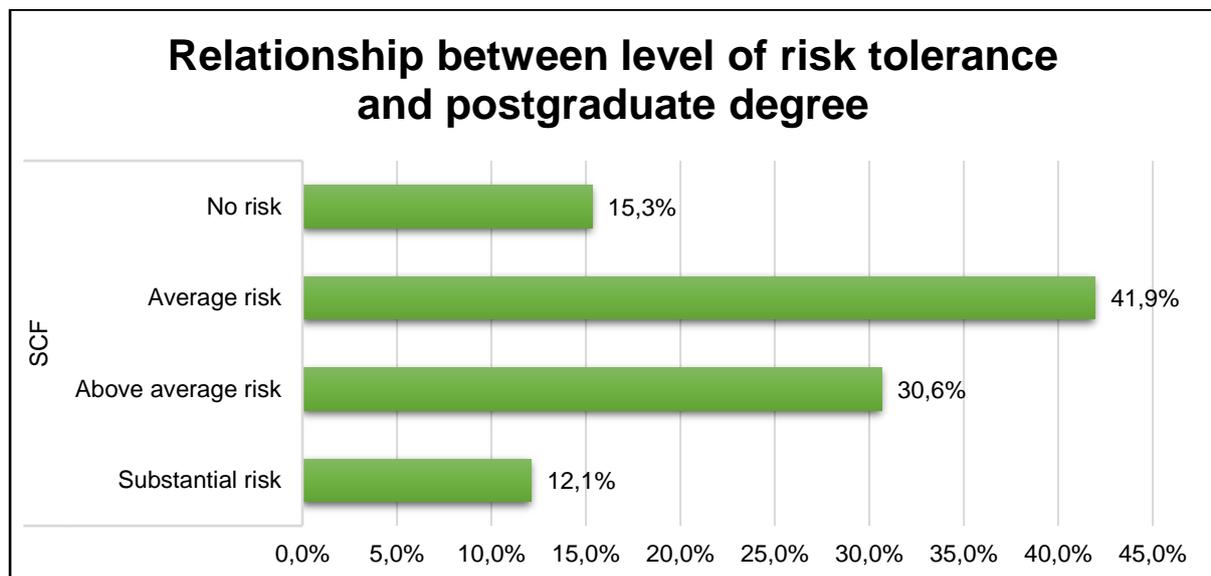
Source: Author compilation

From the overall sample size, this education category only accounts for 18.00 percent of the sample size. From Figure 5.9, 20.60 percent of the investors indicated that they do not take any financial risk. The majority of the investors indicated that they take above average financial risks (35.30%), followed by investors who take average financial risk (28.40%) and investors who take substantial financial risk (15.70%). Thus, from the sample size, it can be concluded that investors who possess a higher level of education are less inclined to participate in risk-tolerant behaviour. Furthermore, the investors who choose to participate in financial risk behaviour participate in financial behaviour, which carries fewer risks. Irwin Jr (1993) argued that higher educated investors' risk tolerance levels are undoubtedly influenced by their level of education. To be more specific, Hallahan *et al.* (2003:56) concluded that investors with a bachelor's degree are more risk-tolerant. As such, results obtained in this study are similar to those obtained by Hallahan *et al.* (2003:56).

#### **5.10.5 Relationship between level of risk tolerance and postgraduate degree**

This section provides an exact overview of the relationship between the investor's level of risk tolerance and investors possessing a postgraduate degree as their highest level

of education. This education category includes investors who obtained an honour's degree, a master's degree and a doctoral degree.



**Figure 5.10: Relationship between the level of risk tolerance and postgraduate degree**

Source: Author compilation

From the overall sample size, this education category only accounts for 21.90 percent of the sample size. From Figure 5.10, 15.30 percent of the investors in this education category prefer not to take any financial risks. The majority of the investors take average financial risk (41.90%), followed by investors who take above average financial risks (30.60%) and investors who take substantial financial risks (12.10%). Thus, investors who possess a higher level of education are less inclined to participate in risk-tolerant behaviour. Furthermore, this education level constitutes 21.90 percent of investors compared to 26.30 percent of investors with an education level of up to matric and 33.90 percent of investors with a diploma as their highest level of education. Thus, based on the sample size, the same conclusion can be drawn that investors who possess higher levels of education are less inclined to participate in risk-tolerant behaviour.

The results obtained in this study contradict results obtained by Irwin Jr (1993). Irwin Jr (1993) argued that higher educated investors' risk tolerance levels are undoubtedly influenced by their level of education. To be more specific, Hallahan *et al.* (2003:56)

concluded that investors with a bachelor's degree are more risk-tolerant. As such, the results obtained in this study are in line with those of Hallahan *et al.* (2003:56) and Sung and Hanna (1996) who also obtained similar results. However, the results are only in line with the aforementioned studies for the education category of undergraduate degree. The remainder of the education categories obtained contradicting results to that of the aforementioned studies.

#### **5.10.6 Summary on the relationship between the level of education and risk tolerance**

The fifth empirical objective of this study aimed to identify a relationship between the investor's level of education and their level of risk tolerance. As such, in order to answer the objective, the following hypotheses were formulated (Section 5.5):

Null hypothesis ( $H_{05}$ ): There is no relationship between the investor's level of risk tolerance and level of education.

Alternative hypothesis ( $H_{a5}$ ): There is a relationship between the investor's level of risk tolerance and level of education.

To conclude the fifth empirical objective of the study, determining the relationship between the investor's level of education and level of risk tolerance, Sections 5.10.1 – 5.10.5 provide sufficient evidence. From the sections presented above, it is evident that there is a relationship between the investor's level of education and level of risk tolerance. Investors who possess a lower level of education such as education level up to matric and a diploma are more inclined to participate in risk-tolerant behaviour.

Furthermore, investors who possess higher levels of education such as an undergraduate and postgraduate degree are less inclined to participate in risk-tolerant behaviour. It is also evident that more investors possess lower levels of education than a higher level of education. Thus, the lower educated investors' lack of education might aid in the explanation of their inclination to participate in risk-tolerant behaviour. As such, the null hypothesis ( $H_{05}$ ) of no relationship between the investor's level of risk tolerance and the level of education is rejected. The alternative hypothesis ( $H_{a5}$ ), stating that there is a relationship between the investors level of risk tolerance and level of education is accepted.

## **5.11 OBJECTIVE 6: DEVELOP A MODEL TO MEASURE FEMALE INVESTORS' RISK PROFILE, CONSIDERING PERSONALITY TRAITS, RISK TOLERANCE LEVELS AND LEVEL OF EDUCATION**

The sixth empirical objective of the study aims *to develop a model to measure female investors' risk profile*. This objective includes making use of the investors' personality traits, their level of risk tolerance and their level of education. As such, a structural equation model (SEM) was computed in order to achieve this objective. In order to make use of a SEM, a study's sample size should be greater than 200 for multivariate normal data and 400 for non-normal data sets (Hox & Becher, 1998:357). As such, this study's female portion of the data set constituted 596 investors, which is an adequate sample size for conducting SEM (Hox & Becher, 1998:357). The SEM was conducted by making use of IBM SPSS Amos™, version 25 (IBM SPSS, 2018). The following sections provide an overview of the conducted six-stage process of SEM. Steps one to three of the SEM were presented in Chapter 4 (Section 4.4.5.6), as such, steps four to six will be presented in the sections to follow. Before steps four to six are presented, a correlation analysis between all the variables need to be identified. Table 5.25 identifies the correlations between all the variables forming part of the SEM.

In the table below, Edu refers to level of education, N refers to neuroticism, E refers to extraversion, O refers to openness to experience, A refers to agreeableness, C refers to conscientiousness, RA refers to risk aversion, ST refers to short term intentions, and LT refers to long term intentions. A – sign in front of the values indicate a negative correlation, and if there is no sign in front of the values, it is indicative of a positive correlation. A single \* indicates a significance level of 0.05, whereas, two \*\* indicates a significance level of 0.01.

**Table 5.25: Correlations between SEM variables**

<b>Construct</b>	<b>Values</b>	<b>Edu</b>	<b>SCF</b>	<b>N</b>	<b>E</b>	<b>O</b>	<b>A</b>	<b>C</b>	<b>RA</b>	<b>ST</b>	<b>LT</b>	<b>GL-RTS</b>
<b>SCF</b>	Corr.	0.06	1.00	-0.04	-0.06	0.04	-0.43**	-0.37**	-0.09*	0.03	-0.01	0.07
	Sig.	0.129		.390	.144	.390	.000	.000	.024	.464	.729	.089
<b>N</b>	Corr.	-0.21**	-0.04	1.00	-0.38**	-0.19**	-0.04	-0.04	0.16**	-0.04	-0.12**	-0.18**
	Sig.	0.000	.390		.000	.000	.331	.279	.000	.283	.003	.000
<b>E</b>	Corr.	0.05	-0.06	-0.38**	1.00	0.30**	0.17**	0.13**	-0.09*	0.21**	0.26**	0.17**
	Sig.	0.260	.144	.000		.000	.000	.001	.023	.000	.000	.000
<b>O</b>	Corr.	0.25**	0.04	-0.19**	0.30**	1.00	0.03	-0.05	-0.21**	0.22**	0.25**	0.25**
	Sig.	0.000	.390	.000	.000		.534	.249	.000	.000	.000	.000
<b>A</b>	Corr.	-0.09*	-0.43**	-0.04	0.17**	0.03	1.00	0.60**	0.02	0.10*	0.10*	0.02
	Sig.	0.030	.000	.331	.000	.534		.000	.656	.020	.019	.595
<b>C</b>	Corr.	-0.08*	-0.37**	-0.04	0.13**	-0.05	0.60**	1.00	0.02	0.07	0.11**	-0.00
	Sig.	0.047	.000	.279	.001	.249	.000		.695	.077	.007	.977
<b>RA</b>	Corr.	-0.21**	-0.09*	0.16**	-0.09*	-0.21**	0.02	0.02	1.00	-0.21**	-0.21**	-0.49**
	Sig.	0.000	.024	.000	.023	.000	.656	.695		.000	.000	.000
<b>ST</b>	Corr.	0.07	0.03	-0.04	0.21**	0.22**	0.10*	0.07	-0.21**	1.00	0.60**	0.28**
	Sig.	0.094	.464	.283	.000	.000	.020	.077	.000		.000	.000
<b>LT</b>	Corr.	0.16**	-0.01	-0.12**	0.25**	0.25**	0.10*	0.11**	-0.21**	0.60**	1.00	0.34**
	Sig.	0.000	.729	.003	.000	.000	.019	.007	.000	.000		.000
<b>GL-RTS</b>	Corr.	0.17**	0.07	-0.18**	0.17**	0.25**	0.02	-0.00	-0.49**	0.28**	0.34**	1.00
	Sig.	0.000	.089	.000	.000	.000	.595	.977	.000	.000	.000	

\* Significant at 0.05 level  
\*\* Significant at 0.01 level

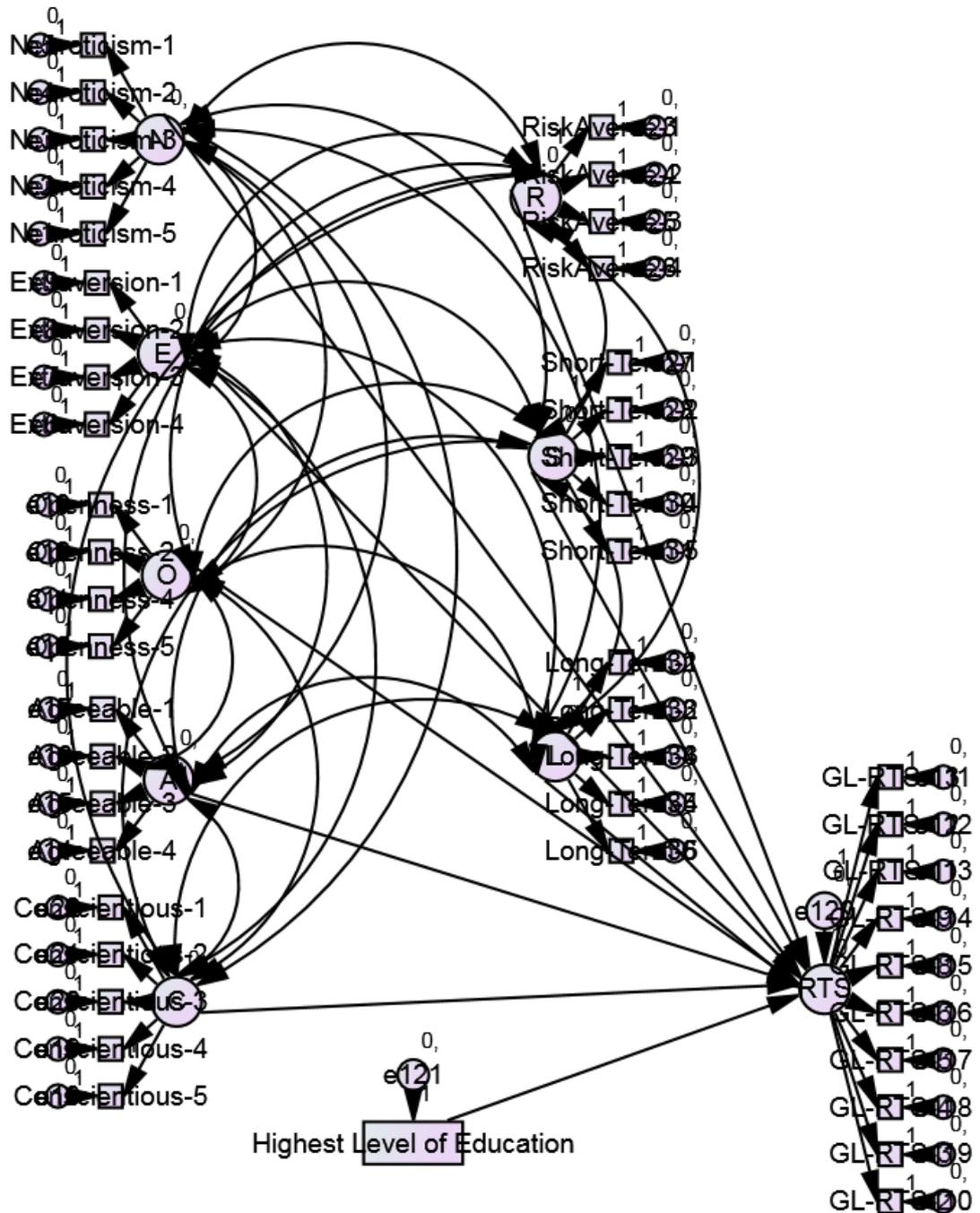
Source: Author compilation

From the table above, it is evident that all variables forming part of the SEM have correlations with one another. Neuroticism provides an interesting result in term of the correlations it holds with the other variables. All the correlations are negative, except for the correlation with risk aversion. This indicates that all the relationships are negative with neuroticism. Another interesting result is that of the correlations between long term intentions and all other variables. All the correlations are significant at the 0.01 level, except for the correlation with SCF. In terms of short-term intentions, all the correlations with the other variables are positive, except for neuroticism and risk aversion. This indicates that the relationships are positive in nature.

The following sections provide an overview of the conducted six-stage process of SEM. Steps one to three of the SEM were presented in Chapter 4 (Section 4.4.5.6), as such, steps four to six will be presented in the sections to follow.

#### **5.11.1 Indicate structural model**

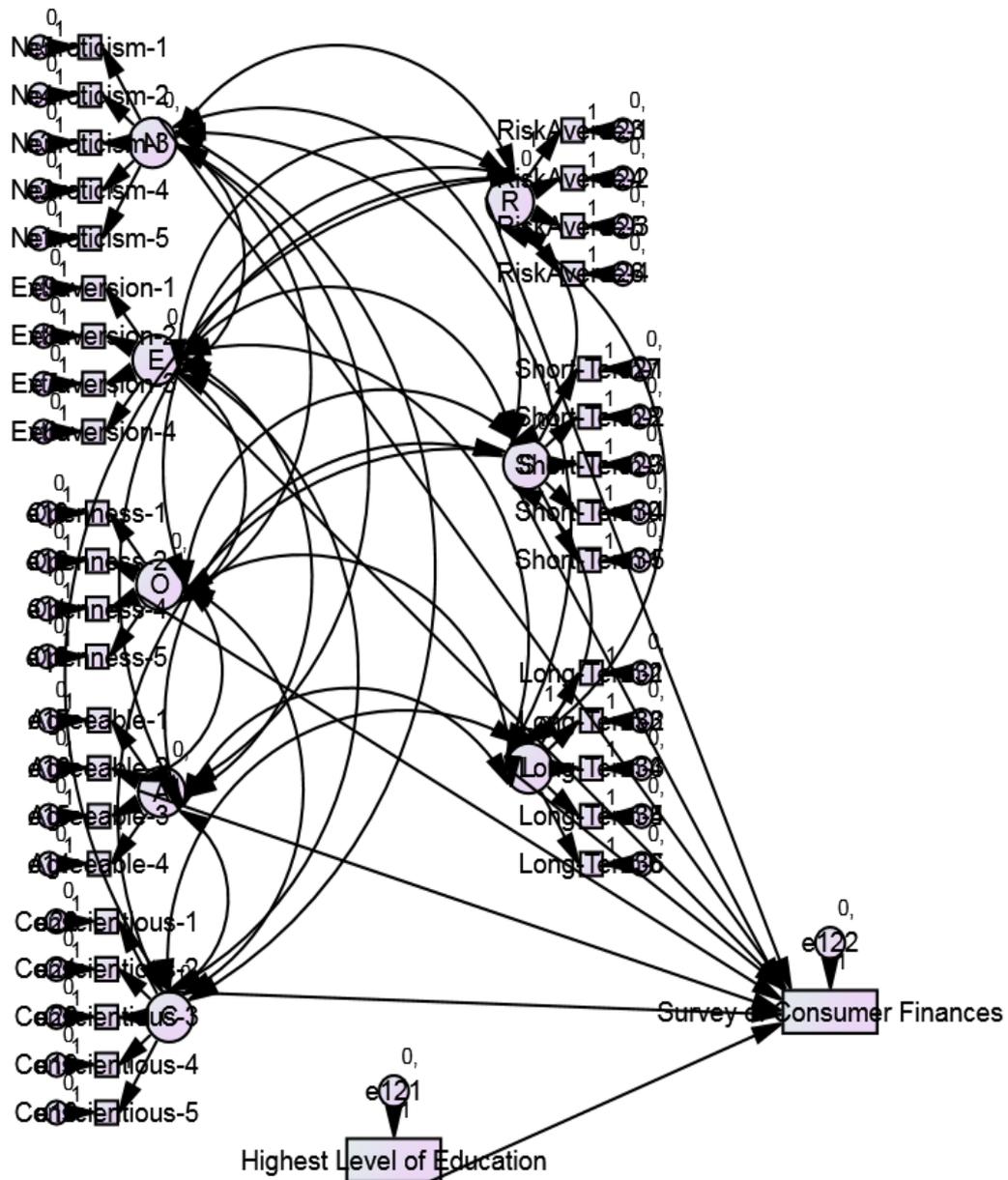
Once the validity of the measurement scale has been determined and found suitable, the structural model can be shown and laid out for description (Hardy & Bryman, 2004:452). The structural model was conducted by making use of first, the GL-RTS and secondly, the SCF single risk tolerance question. The SEM was conducted twice in order to determine whether both risk tolerance measures provided a unified result. Figures 5.11 and 5.12 provide graphical illustrations of the SEM with the GL-RTS and SCF single risk tolerance question, respectively. Both models obtained the same results, although each model made use of a different risk tolerance measurement tool.



**Figure 5.11: Structural model with GL-RTS**

Source: Author compilation

In terms of the structural model with the GL-RTS, a moderately adequate CFI value of 0.818 was obtained. An RMSEA value of 0.053 with a 90.00% confidence interval of [0.050; 0.055] was obtained. The CMIN/DF value obtained in this study is 2.66, which represents a good model fit (Mueller, 1996).



**Figure 5.12: Structural model with SCF**

Source: Author compilation

In terms of the structural model with the SCF single risk tolerance question, the CMIN/DF value obtained in this study is 3.37, which represents a good model fit (Mueller, 1996). A moderately adequate CFI value of 0.820 was obtained. An RMSEA value of 0.063 with a 90.00% confidence interval of [0.060; 0.066] was obtained.

### 5.11.2 Assess structural model validity

Assessing the structural model validity is the second-last step in conducting a SEM. This step aims to confirm the validity of the structural model, as well as the concurring theoretical relationships amongst the identified variables (Kaplan, 2009:9). Sections 5.7 and 5.8 provide sufficient evidence of the measuring scales' validity. The scales' reliability was also presented and is accepted as reliable. Table 5.25 provides an overview of the risk tolerance scales' standardised weights.

**Table 5.26: Standardised regression weights for risk tolerance scales, personality traits and level of education**

	Personality traits	Estimate	P-value
<b>GL-RTS</b>	<--- Neuroticism	-0.03	0.592
	<--- Extraversion	0.08	0.171
	<--- Openness to experience	0.07	0.184
	<--- Agreeableness	0.09	0.452
	<--- Conscientiousness	-0.10	0.169
	<--- Risk aversion	-0.62	***
	<--- Short-term intentions	0.09	0.424
	<--- Long-term intentions	0.16	0.142
	<--- Level of education	0.05	0.215
<b>SCF</b>	<--- Neuroticism	-0.06	0.249
	<--- Extraversion	-0.07	0.246
	<--- Openness to experience	-0.01	0.854
	<--- Agreeableness	-0.24	0.378
	<--- Conscientiousness	-0.25	***
	<--- Risk aversion	-0.06	0.210
	<--- Short-term intentions	0.18	0.097
	<--- Long-term intentions	-0.15	0.151
<--- Level of education	-0.00	0.910	
*** Significant at 0.01 level			

Source: Author compilation

In terms of the GL-RTS in Table 5.25, risk aversion has a unique statistically significant contribution ( $p < 0.01$ ) to the investor's risk tolerance with a negative extent (standardised regression coefficient = -0.62). The remainder of the personality variables and level of education did not have a unique contribution to the GL-RTS. However, all the variables aid in the explanation of the structural model. As the chi-square test is seen as an excessively strict indicator of model fit, Hancock and Mueller (2010) proposed small deviations from the model. Mueller (1996) is of the opinion that the chi-square statistic should be divided by the degrees of freedom. The CMIN/DF value obtained in this study is 2.66, which represents a good model fit (Mueller, 1996).

A respectable overall CFI value is indicated as a value above 0.9 (Hancock & Mueller, 2010). A moderately adequate CFI value of 0.818 was obtained; a value closer to one indicates a better fit; whereas, a value closer to zero indicates that the data do not fit the model (Mueller, 1996:204). An RMSEA value of 0.053 with a 90.00% confidence interval of [0.050; 0.055] was obtained. A model with an RMSEA value of 0.10 and larger should not be accepted (Blunch, 2008).

In terms of the SCF single risk tolerance question, conscientiousness has a unique statistically significant contribution ( $p < 0.01$ ) to the investor's risk tolerance with a negative extent (standardised regression coefficient = -0.25). The remainder of the personality variables and level of education did not have a unique contribution to the SCF. However, all the variables aid in the explanation of the structural model. The CMIN/DF value obtained in this study is 3.37, which represents a good model fit (Mueller, 1996). A moderately adequate CFI value of 0.820 was obtained; thereafter, the IFI and TLI were also conducted, obtaining 0.821 and 0.799 values respectively. An RMSEA value of 0.063 with a 90.00% confidence interval of [0.060; 0.066] was obtained. A model with an RMSEA value of 0.10 and larger should not be accepted (Blunch, 2008).

### 5.11.3 Model conclusion and recommendation

The final step in conducting a SEM constitutes valuable conclusions and recommendations on the structural model, for future research (Malhotra *et al.*, 2012:880). Table 5.26 provides an overview of all the variables that may have influenced the investor's risk-tolerant behaviour in terms of their personality traits and level of education.

**Table 5.27: Model summary**

Item	Construct	Summary
Personality	Neuroticism	Does not have a unique contribution to model
	Extraversion	Does not have a unique contribution to model
	Openness to experience	Does not have a unique contribution to model
	Agreeableness	Does not have a unique contribution to model
	Conscientiousness	Does not have a unique contribution to model

Item	Construct	Summary
	Risk aversion	Significant contribution to model
	Short-term intentions	Does not have a unique contribution to model
	Long-term intentions	Does not have a unique contribution to model
<b>Risk tolerance</b>	GL-RTS	Model statistically significant
	SCF	Model statistically significant
<b>Demographic variables</b>	Level of education	Does not have a unique contribution to model

Source: Author compilation

From Table 5.26, it is concluded that all the personality constructs, level of risk tolerance and level of education contributed to the development of the SEM. Risk aversion contributed significantly to the development of the model. The investors' risk profile is thus significantly influenced by their personality traits, level of risk tolerance and level of education. The SEM provided a significant contribution to the field of study, as no researcher to date has developed a model incorporating the investor's personality traits, level of risk tolerance and level of education, to measure the investor's risk profile accurately.

## 5.12 SYNOPSIS

The purpose of this chapter was to report on the empirical findings of the study. The empirical analysis and explanations were presented in a structured manner to answer the six empirical objectives of the study. The chapter presented the descriptive statistics, as well as the demographical information of the sample. Thereafter, an overview of the formulated hypotheses was presented. The following table provides an overview of the six empirical objectives, the method of achievement and a conclusion on the formulated hypotheses as set out in Section 5.5. Thereafter, an overview of the main findings will be presented per empirical objective.

**Table 5.28: Summary of empirical objectives**

Objective	Statistical techniques employed	Accept/ reject hypothesis
Analyse demographic variables according to gender	Descriptive statistics	H <sub>01</sub> – rejected H <sub>a1</sub> – accepted
Identify the various personality traits of the sample	Descriptive statistics Reliability analysis CFA	H <sub>02</sub> – rejected H <sub>a2</sub> – accepted

Objective	Statistical techniques employed	Accept/ reject hypothesis
Determine the risk tolerance levels for the sample	Descriptive statistics Reliability analysis CFA	H <sub>03</sub> – rejected H <sub>a3</sub> – accepted
Identify the effect of gender on the sample in terms of the sample's risk tolerance levels	Frequency distribution T-tests	H <sub>04</sub> – rejected H <sub>a4</sub> – accepted
Determine the relationship between level of education and level of risk tolerance for the sample	Spearman correlation Crosstabulation	H <sub>05</sub> – rejected H <sub>a5</sub> – accepted
Develop a model to measure female investors' risk profile, considering personality traits, risk tolerance levels and level of education	SEM Validity analysis	N/ A

Source: Author compilation

The first empirical objective provided the differences in the sample's demographic information based on the investor's gender. Age, ethnicity, marital status, annual income, home province and the highest level of education were identified as demographical variables for this study. The sample differed in all six variables based on their gender. Thus, the H<sub>01</sub> stating that there is no difference is rejected and the H<sub>a1</sub> of the difference based on gender is accepted.

The second empirical objective identified the investors' personality traits. The investor's personality traits could be determined by making use of the adjusted five-factor model. The scale was determined to be reliable and all the factors the scale intended to measure were achieved. Overall, investors tended to be more extraverted and open to experience. Investors are less inclined to be agreeable and emotional. They are also more concerned with their degree of risk aversion than the time horizons of the investments they make.

Thereafter, the third empirical objective identified the investors' level of risk tolerance. It is evident that both the SCF single risk tolerance question and the GL-RTS indicated the extent to which investors are risk-tolerant. Although the GL-RTS was adjusted, the scale still proved to be reliable (Cronbach alpha = 0.68). From the SCF single risk tolerance question, investors are considered to be of average risk-tolerant behaviour. The same results were obtained when making use of the GL-RTS.

This was followed by the fourth empirical objective, which identified the effect of the investor's gender on their level of risk tolerance. The SCF single risk tolerance question presented a small difference in investor risk-tolerant behaviour, whereas, the GL-RTS presented a medium-sized effect. Both measurements indicated that the investor's level of financial risk tolerance is influenced by their gender.

The fifth empirical objective provided the relationship between female investors' level of education and level of risk tolerance. It is evident that there is a relationship between the investor's level of education and level of risk tolerance. Investors who possess a lower level of education, such as education level up to matric and a diploma are more inclined to participate in risk-tolerant behaviour. Furthermore, investors who possess higher levels of education such as an undergraduate and postgraduate degree are less inclined to participate in risk-tolerant behaviour.

The final empirical objective was achieved by means of conducting a SEM. The validity and reliability of the SEM were conducted and were found to be moderate to highly reliable. The investors' risk aversion provided a unique contribution to the structural model. The results obtained from the SEM were in line with the hypothesised research model. All the personality constructs, level of risk tolerance and level of education contributed to the development of the SEM. The investor's risk profile, thus, is significantly influenced by their personality traits, level of risk tolerance and level of education.

Chapter 6 offers a synthesis on the empirical results presented in Chapter 5. A breakdown of the theoretical and empirical objectives' method of achievement will be presented. Chapter 6 provides a detailed overview of the contribution to the field of study. As such, limitations, recommendations and avenues for further research will also be presented.

## **CHAPTER 6: CONCLUSION, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY**

### **6.1 INTRODUCTION**

Gender is often a major contributor towards the difference in investors' investment behaviour. In the literature, it is commonly found that female investors are less inclined to participate in risk-tolerant behaviour than their male counterparts. The literature on female risk-tolerant behaviour provides sufficient evidence of female investors' inclination to be less risk-tolerant than their male counterparts. However, the literature presents little to no solutions regarding female investors' inclination to be less risk-tolerant. As such, the dearth in the literature created a basis for this research study. The main purpose of this study was to develop a structural equation model (SEM) which incorporated the three main components of understanding female investors' investment behaviour. The main components were the investors' personality traits, their level of risk tolerance and their level of education. The empirical results obtained from the secondary data analysis (SDA) were presented in Sections 5.6 – 5.11.

Chapter 6 is aimed at providing a comprehensive overview of the research study (chapters 1 – 5). The chapter will comprise of a discussion on the summary of the research study (Section 6.2), the main results obtained in the empirical analysis of the study (Section 6.3), as well as a section that focuses on the conclusion of the study (Section 6.6). Furthermore, the contribution of the study (Section 6.4), recommendations of the study (Section 6.5.1) and limitations of the study will be presented (Section 6.5.2). Thereafter, a brief discussion on avenues for future research will be presented (Section 6.5.3).

### **6.2 SUMMARY OF THE STUDY**

This section provides an overview of the preceding chapters. Chapter 1 presented the primary objective (Section 1.3.1), theoretical objectives (Section 1.3.2) and empirical objectives (Section 1.3.3) of the study.

The main aim of Chapter 1 was to provide an introduction and problem statement to the research study. Chapter 1 also provided an overview of the formulated primary,

theoretical and empirical objectives of the study. Furthermore, an outline of the research design implemented in the study was presented.

The primary, theoretical and empirical objectives of the study were formulated as follows (Section 1.3):

### **6.2.1 Primary objective**

The primary objective of this study was to develop a model based on individual risk tolerance, for female South African investors, in order for investment firms to measure, more accurately, their investors' risk profiles.

### **6.2.2 Theoretical objectives**

In order to achieve the primary objective formulated for the study, the following theoretical objectives were formulated:

- Conduct a theoretical analysis of financial risk tolerance;
- Construct a theoretical framework for female risk-tolerant behaviour;
- Construct a theoretical framework for different personality traits; and
- Contextualise a theoretical framework for female investor behaviour.

### **6.2.3 Empirical objectives**

In order to achieve the primary objective of the study, the following empirical objectives were formulated:

- Analyse demographic variables according to gender;
- Identify the various personality traits of the sample;
- Determine the risk tolerance levels for the sample;
- Identify the effect of gender on the sample in terms of the sample's risk tolerance levels;
- Determine the relationship between the level of education and level of risk tolerance for the sample; and
- Develop a model to measure female investors' risk profile, considering personality traits, risk tolerance levels and level of education.

Chapter 2 aimed at achieving three of the four theoretical objectives as formulated in Chapter 1. Chapter 2 started off with contextualising risk tolerance and its inherent elements. Thereafter, formal definitions of risk tolerance were presented, along with the definition of risk tolerance used in this study. The factors influencing investor risk-tolerant behaviour were also contextualised. The chapter also provided evidence of previous research studies on risk-tolerant behaviour, along with a brief discussion of these studies' results. Thereafter, the investor was formally contextualised, followed by investor risk-tolerant behaviour. The final section of Chapter 2 identified female investor behaviour along with the factors influencing female investment behaviour.

Chapter 3 was aimed at achieving the fourth theoretical objective as formulated in Chapter 1. Chapter 3 commenced with an investigation of the investor's personality traits. This included a detailed section of the link between the investor's personality and the behavioural finance biases, as well as a detailed explanation of the various personality constructs. Thereafter, a theoretical link between the investor's risk tolerance, gender and personality traits were established. Furthermore, Chapter 3 identified the various investor personalities along with the type of investments the personalities are most likely to make. Chapter 3 concluded with a section on previous research studies making use of the five-factor model of personality.

Chapter 4 was focused on providing a guideline on the methodological underpinnings used in the empirical portion of this study. Furthermore, Chapter 4 provided arguments in support of the research approach, design, instrument and sample size. As this study followed a SDA technique, Chapter 4 provided guidelines on the origin of the primary data (Section 4.3) and the SDA procedures (Section 4.4). To summarise, the sample size constituted 1 065 investors, of which 596 were female and 469 were male. The sample size was determined to be adequate for conducting a SEM. Furthermore, Chapter 4 provided a short summary of the statistical techniques to be employed, in order to achieve the empirical objectives as set out in Chapter 1.

Chapter 5 provided a detailed analysis of the achievement of the empirical objectives of this study. Chapter 5 commenced with a section on the preliminary data analysis (Section 5.2), demographic information of the sample (Section 5.3), a descriptive analysis of the sample (Section 5.4) as well as a section highlighting the formulated hypotheses for the study (Section 5.5). Thereafter, each empirical objective and its

method of achievement was presented. Chapter 5 concluded with a summary on all of the empirical findings presented. The following section provides an overview of the main findings for each of the empirical objectives.

### 6.3 SUMMARY OF FINDINGS

The primary objective of this study was to develop a model based on individual risk tolerance, for female South African investors, in order for investment firms to measure, more accurately, their investors' risk profiles. To achieve the primary objective formulated for this study, the following empirical objectives were formulated and achieved. The following table provides an overview of the empirical objectives, along with the main results obtained for each. Thereafter, the sections to follow elaborates on the findings obtained for each empirical objective.

**Table 6.1: Summary of empirical objectives**

Objective	Results	Section
Analyse demographic variables according to gender	Investors demographic characteristics differed significantly across all six identified demographic variables.	Section 5.6
Identify the various personality traits of the sample	Investors are more concerned about their risk aversion than their personality traits and their investments time horizons.	Section 5.7
Determine the risk tolerance levels for the sample	Investors displayed average risk tolerance levels.	Section 5.8
Identify the effect of gender on the sample in terms of the sample's risk tolerance levels	Gender had a significant impact on the investor's level of risk tolerance.	Section 5.9
Determine the relationship between level of education and level of risk tolerance for the sample	Lower educated investors are more risk-tolerant and higher educated investors are less risk-tolerant.	Section 5.10
Develop a model to measure female investors' risk profile, considering personality traits, risk tolerance levels and level of education	SEM was successfully conducted. Investors' risk profiles are significantly influenced by their personality traits, level of risk tolerance and level of education.	Section 5.11

Source: Author compilation

### **6.3.1 Empirical objective 1: Analyse demographic variables according to gender**

The first empirical objective was achieved in Section 5.6. This objective was achieved by means of dividing the sample's demographic information by gender. Age, ethnicity, marital status, annual income, home province and the highest level of education were identified as demographic factors for this study. For all the identified demographic factors, the sample differed based on the investor's gender.

In terms of the investor's age, the key difference between the male and female investors are the age category wherein majority of the investors fall. The main similarity is that the least number of investors are between the ages of 16 and 24. In terms of the investor's ethnicity, for both the males and females, the majority form part of the white and African ethnic groups. In terms of the investor's marital status, for both the male and female portions of the sample, the majority are currently married, followed by investors who are currently single and staying on their own.

With regards to annual income, it was found that male investors earn more than their female counterparts do for all the income brackets identified, apart from one income bracket. Female investors earn more than their male counterparts do for the income bracket of R800 001 – R900 000. In terms of the investor's home province, the majority of the sample, for both the male and female investors, resides in Gauteng, the Western Cape, Kwazulu-Natal and the Eastern Cape. The least number of investors reside in Limpopo and the Northern Cape, for both the male and female portions of the sample.

Regarding the investors' level of education, the highest level of education for both the male and female segments of the sample is a diploma. The second-highest level of education for male investors is an honours degree and for female investors matric. The third-highest level of education for male investors is matric and for female investors is an honours degree. Thereafter, both the male and female investors' highest level of education is in line with one another.

As such, the investors differed across all six identified demographic variables based on their gender. Thus, the objective of analysing the investor's demographic variables based on gender was achieved.

### **6.3.2 Empirical objective 2: Identify the various personality traits of the sample**

The second empirical objective of determining the investors' personality traits was achieved in Section 5.7. A Cronbach's alpha value was calculated to determine the reliability of the adjusted personality measures scale and all the constructs were deemed reliable. Thereafter, a confirmatory factor analysis (CFA) was conducted, where all the personality constructs indicated significant factor loadings.

Effect sizes were also computed, with the most notable effect size of short-term investment intentions. This indicates that investors are more prone to short-term investment intentions than to their personality traits. Furthermore, investors tended to be more extraverted and open to experience. Investors are less inclined to be agreeable and emotional. They are also more concerned with their degree of risk aversion than the time horizons of the investments the investors make.

### **6.3.3 Empirical objective 3: Determine the risk tolerance levels for the sample**

The third empirical objective of determining the risk tolerance levels of investors was achieved in Section 5.8. Two measurement instruments were identified for measuring the investors' risk tolerance, namely the Survey of Consumer Finances (SCF) single risk tolerance question and the Grable and Lytton 13-item Risk Tolerance Scale (GL-RTS). The SCF single risk tolerance question obtained results indicating that investors display average risk tolerance levels.

In terms of the GL-RTS, the scale was adjusted with items GL-RTS – 1, GL-RTS – 7 and GL-RTS – 10 being removed. Although the GL-RTS was adjusted, the scale still proved to be reliable. Furthermore, from the CFA, it can be concluded that all the factors forming part of the adjusted GL-RTS had sufficient factor loadings, thus all factors were confirmed. From the SCF single risk tolerance question, investors are considered to have average risk tolerance. The same results were obtained when making use of the GL-RTS.

#### **6.3.4 Empirical objective 4: Identify the effect of gender on the sample in terms of the sample's risk tolerance levels**

The fourth empirical objective of identifying on the effect of gender on the investors' risk tolerance was achieved in Section 5.9. The effect of gender was computed on both the SCF and GL-RTS. Results obtained indicated that the investors' gender does influence their level of risk tolerance. In terms of the SCF single risk tolerance question, majority of the male and female portions of the sample indicated that they are willing to take average financial risks followed by investors being willing to take above-average financial risks. Thereafter, the sample differed significantly in their risk tolerance levels, based on their gender.

The remaining portion of the female sample indicated no inclination to participate in financial risk tolerance events, whereas the remainder of the male portion indicated an inclination to participate in substantial financial risks. In terms of the GL-RTS, effect sizes were calculated and found to be medium-sized. This indicates that gender significantly impacts investors' level of risk tolerance. Furthermore, t-tests were computed to determine the effect of gender on the investors' level of risk tolerance, results indicated a significant effect.

#### **6.3.5 Empirical objective 5: Determine the relationship between the level of education and level of risk tolerance for the sample**

The fifth empirical objective of determining the relationship between the investors' level of education and level of risk tolerance was achieved in Section 5.10. The focus of the fifth empirical objective is on female investors only, as the objective sets out the foundation for the sixth empirical objective. The Spearman correlation was calculated for both the SCF and GL-RTS to determine whether there is a relationship between the investors' level of education and their level of risk tolerance. The SCF single risk tolerance question did not yield significant results; however, the GL-RTS yielded a significant relationship with the investors' level of education.

Results obtained indicated that investors who possess a lower level of education such as education level up to matric and a diploma, are more inclined to participate in risk-tolerant behaviour. Furthermore, investors who possess higher levels of education, such as an undergraduate and postgraduate degree are less inclined to participate in

risk-tolerant behaviour. It is also evident that more investors possess lower levels of education than higher educated investors.

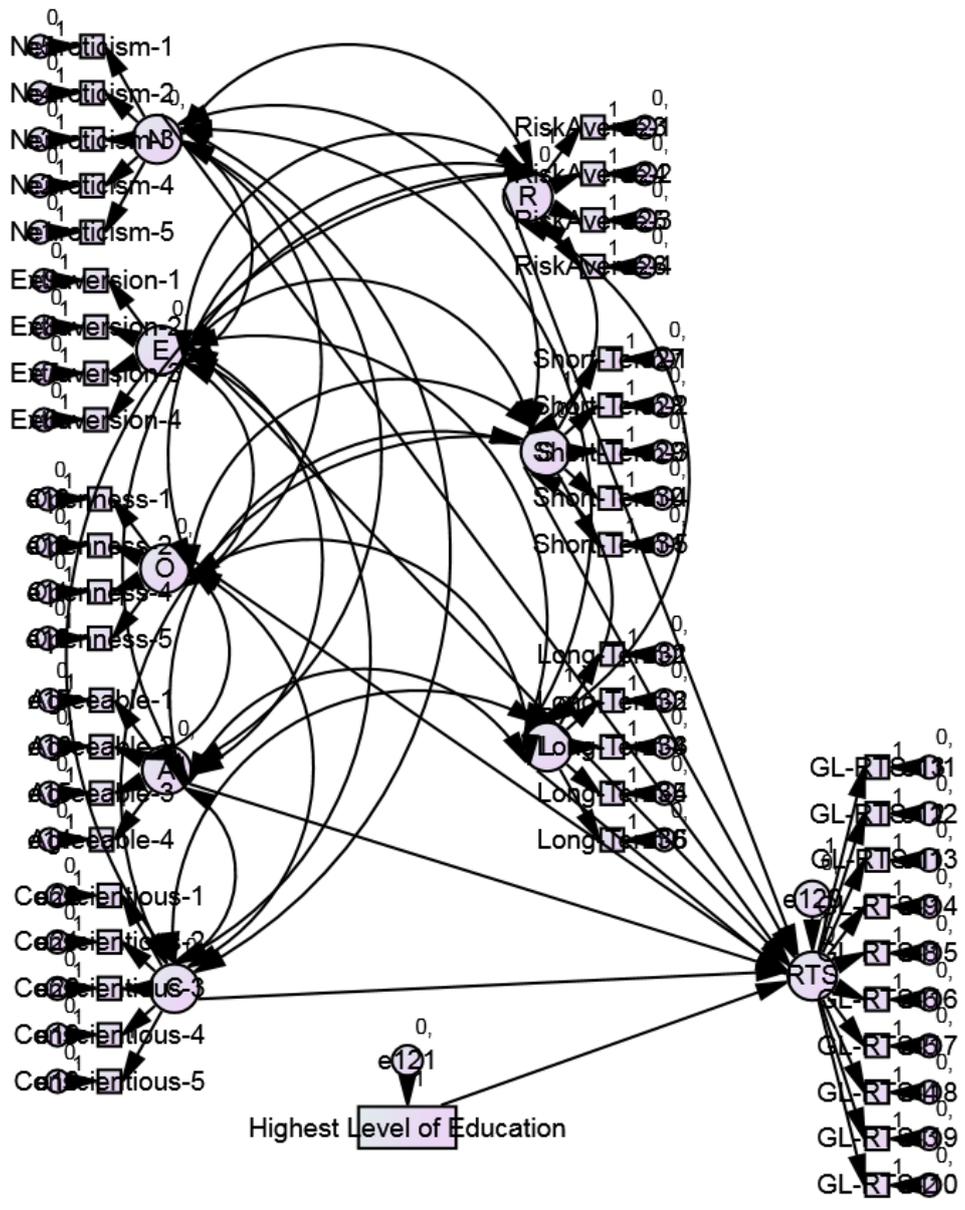
### **6.3.6 Empirical objective 6: Develop a model to measure female investors' risk profile, considering personality traits, risk tolerance levels and level of education**

The sixth empirical objective of the study aimed to develop a model to measure female investors' risk profile accurately. This objective included making use of the investors' personality traits, their level of risk tolerance and their level of education. The objective was achieved by conducting a SEM (Section 5.11). Two SEMs were conducted for the final empirical objective of the study. The first SEM was conducted by making use of the SCF single risk tolerance question as the investor's risk tolerance component. The second SEM made use of the GL-RTS as the investor's risk tolerance component.

The models' structural validity were conducted. In terms of the GL-RTS, the investors' risk aversion significantly influenced their risk tolerance levels. Furthermore, all the remaining variables aided in the explanation of the structural model. In terms of the SCF single risk tolerance question, all the variables aided in the explanation of the structural model. The investors' risk profiles are thus significantly influenced by their personality traits, level of risk tolerance and level of education.

## **6.4 CONTRIBUTION OF THE STUDY**

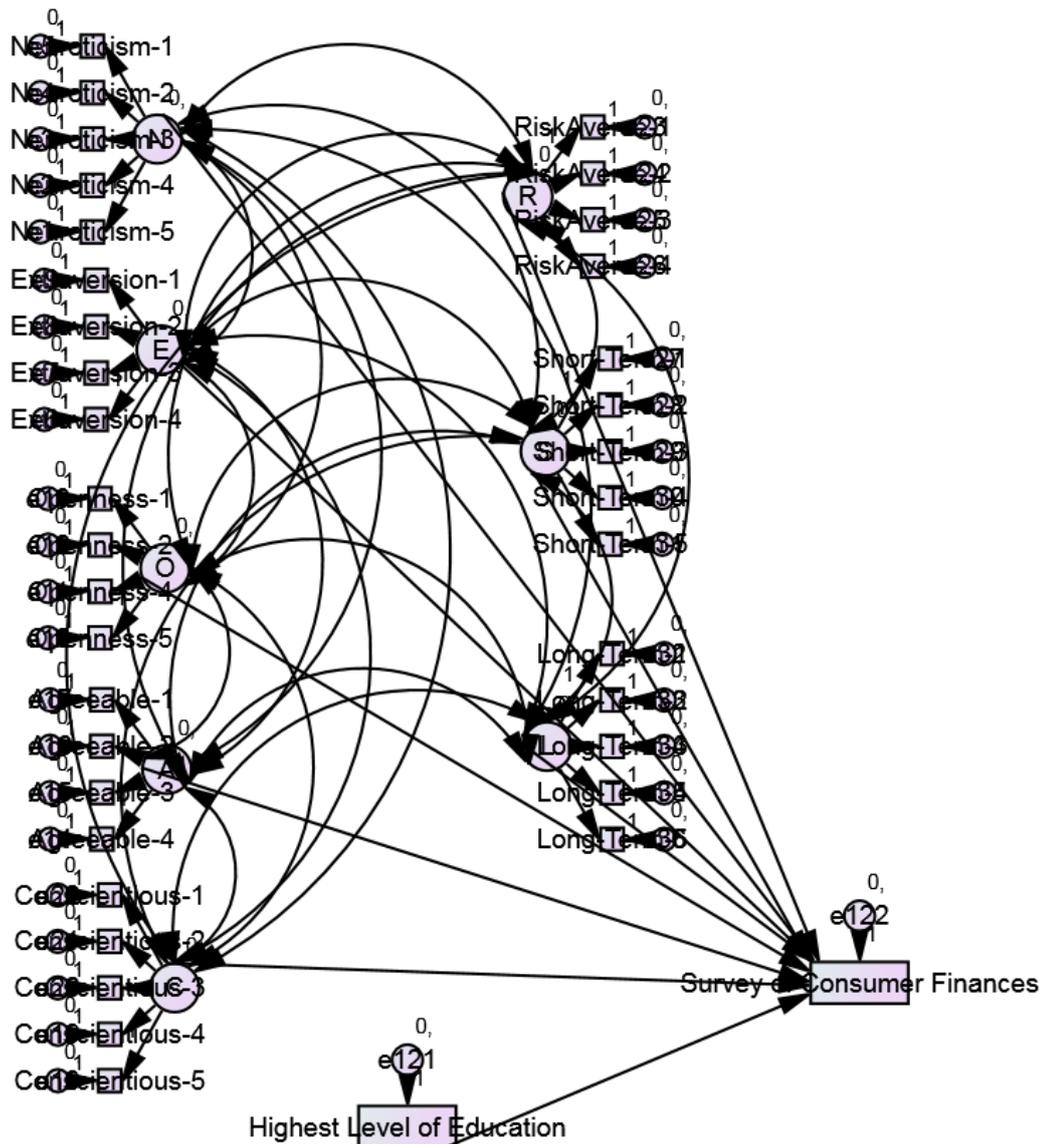
The results obtained in this study contribute significantly to the field of study. First, a contribution is made to the limited literature regarding female investors' investment behaviour in the South African context. Furthermore, the creation of the SEM incorporating female investors' personality traits, level of risk tolerance and level of education provided a unique contribution to the field of study. No researcher to date has developed a model incorporating the above-mentioned variables to measure the investor's risk profile accurately. Figure 6.1 provides a graphical illustration of the SEM incorporating the GL-RTS as the investor's risk tolerance component.



**Figure 6.1: Structural model with GL-RTs**

Source: Author compilation

Figure 6.2 provides a graphical illustration of the SEM incorporating the SCF single risk tolerance question as the investor's risk tolerance component.



**Figure 6.2: Structural model with SCF**

Source: Author compilation

Two SEMs were conducted in order to determine whether the different risk tolerance measuring tools (SCF and GL-RTS) obtained the same results. As such, the figures presented above (Figure 6.1 and Figure 6.2) indicate that both risk tolerance measuring tools yielded a significant influence within the SEMs conducted. The following sections will provide recommendations, limitations of the study and avenues for further research.

## **6.5 RECOMMENDATIONS, LIMITATIONS AND AVENUES FOR FUTURE RESEARCH**

In the financial markets, investors' level of financial risk tolerance significantly influences their spending and investment behaviour. Therefore, it is essential for investment firms to be able to accurately risk profile their prospective and current investors. In accordance with the results obtained in this study, the following sections outline recommendations, limitations to the study and avenues for future research.

### **6.5.1 Recommendations**

Academic authors, investment vehicle creators and authors in the literature should consider the following recommendations:

- **Curbing irrational investor behaviour**

Results obtained by this study indicated that investors tend to participate in highly speculative investment behaviour. As such, it can be stated that investors do not think rationally about the investments they make. Therefore, room exists to create a method to curb irrational investor behaviour in order to ensure that investors make sound investment decisions.

- **Enhanced financial risk tolerance knowledge**

The results obtained in this study indicated that investors possess some form of knowledge regarding their level of financial risk tolerance. Investors forming part of this research study indicated a willingness to participate in financial risk-tolerant behaviour. However, investors were not confident in the type of risks they face when participating in financial risk-tolerant behaviour. As such, there is an opportunity for an intervention to be created, to educate investors on their level of financial risk tolerance, in order to enhance future investment behaviour.

- **Educational vehicle for enhanced financial knowledge**

From the above-mentioned recommendation, the literature provides an opportunity for an educational vehicle to enhance investors' financial risk tolerance knowledge. Special attention should be given to what exactly financial risk tolerance entails, the

factors associated with financial risk tolerance as well as methods or instruments to determine individual investor risk tolerance levels. Once investors are better educated in terms of their financial risk tolerance levels, an influx in the financial market by means of investments can be expected.

### **6.5.2 Limitations of the study**

This study was conducted by means of a SDA. The results obtained in this study are representative of female investors' willingness to participate in financial risk-tolerant behaviour, incorporating their degree of risk tolerance and personality traits. However, this study was limited to making use of two measuring instruments to determine investors' degree of financial risk tolerance and only one measure to determine investors' personality traits. Thus, the opportunity to use other measuring instruments to determine investors' level of financial risk tolerance and personality traits exists.

This study was also limited to making use of one investment firm in South Africa. The opportunity to make use of several investment firms in South Africa thus exists. In the event of making use of multiple investment firms in South Africa, a more comprehensive sample of the South African investment market could be accounted for. Results obtained from studies making use of more than one investment firm can then be compared to similar studies to determine whether results obtained are an accurate representation of the South African investment market.

Another limitation presented with this research study was the use of the adapted personality measures scale which is based on the original five-factor model. Although results obtained in this study are in line with those obtained by similar studies, room exists to make use of different measurement tools to determine investors' personality traits. Measuring instruments such as the Domain Specific Risk-Taking Scale and the HEXACO Personality Inventory – Revised could also be used to determine investors' personality traits in the various domains of life. Furthermore, future research can focus on implementing more than one measuring instrument to determine investors' level of risk tolerance and personality traits.

### **6.5.3 Avenues for future research**

Several avenues for future research have been identified, based on the limitations presented to this study:

- The results obtained in this study identified that female investors' lack of education might contribute to their irrational investment behaviour. As such, future research should focus on the relationship between female investors' level of education and other differentiating factors influencing their risk-tolerant behaviour.
- A mixed-methods study should be conducted to determine the exact causes of female investors' inclination to be less risk-tolerant than their male counterparts. The researcher should make use of qualitative interviews to determine the definite factors influencing female investors' risk-tolerant behaviour alongside their degree of risk aversion.
- Also, a comprehensive study should be conducted on the investor's financial knowledge pertaining to his/ her degree of risk tolerance. Such a study can identify a suitable course of action for investors to follow in their investment decision-making processes. The said research study should be conducted in the South African context as the limitations presented to this study fall within the same region.
- Finally, a study conducting an in-depth investigation into investor personality traits should also be considered. The study should make use of various measuring instruments to provide a comprehensive framework for investor personality traits. The said study should be conducted in the South African context, as the limitations presented to this study fall within the same region.

### **6.6 CONCLUDING REMARKS**

Although investor risk-tolerant behaviour has been studied widely, very few studies provide an exact cause for female investors' inclination to be risk-tolerant. During this research study, several statistical techniques were employed to determine whether investor risk tolerance, education levels and personality traits of female investors provide a significant answer to female investor risk-tolerant behaviour. A SEM was

conducted with the aforementioned variables, where the model was found to be valid and reliable. The SEM confirmed the relationship between female investors' levels of education, their level of risk tolerance and their personality traits. The model incorporated the investors' risk aversion as well as their inclination to participate in short- and long-term investments. As such, investment firms can employ the model in order to measure their female investors' risk profile more accurately. By being able to profile their investors accurately, investment firms can suggest or even create suitable investment vehicles tailored for the needs of their female clientele.

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## ANNEXURE A: QUESTIONNAIRE

### SECTION A (Demographics)

<b>Age</b>	16 – 34	1
	35 – 49	2
	50+	3

<b>Gender</b>	Male	1
	Female	2

<b>Race</b>	African	1
	White	2
	Coloured	3
	Asian	4
	Other	5

Other: \_\_\_\_\_

<b>Marital status</b>	Single – staying on my own	1
	Single – staying with my parents	2
	Not married but staying together	3
	Married	4
	No longer married	5

<b>What is your annual income?</b>	R100 000 or less	1	R 600 001-700 000	7
	R 100 001-200 000	2	R700 001 or more	8
	R 200 001-300 000	3		
	R 300 001-400 000	4		
	R 400 001-500 000	5		
	R 500 001-600 000	6		

<b>Which religion do you associate yourself with?</b>	Christian	1	Non-religious	7
	Muslim	2	Other	8
	Catholic	3		
	Buddhist	4		
	Atheist	5	Other: _____	
	Agnostic	6		

<b>Highest level of education</b>	Secondary school education	1
	High school education	2
	Diploma	3
	Undergraduate degree	4
	Honours degree	5
	Master's degree	6
	Doctoral degree	7

Other: \_\_\_\_\_

**SECTION B (Financial well-being, Risk Tolerance & SCF)**

Circle or check the responses that are most appropriate for your situation.

<b>Who is responsible for making financial decisions?</b>	1	You on your own
	2	You with your partner
	3	Your partner
	4	Somebody else

<b>1. What do you feel is the level of your financial stress today?</b>	1	Overwhelming stress
	2	
	3	
	4	
	5	High stress
	6	
	7	Low stress
	8	
	9	
	10	No stress at all
<b>2. How satisfied you are with your present financial situation? The "1" represents complete dissatisfaction. The "10" represents complete satisfaction. The more dissatisfied you are, the lower the number you should circle. The more satisfied you are, the higher the number you should circle.</b>	1	Dissatisfied
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	Satisfied
<b>3. How do you feel about your current financial situation?</b>	1	Feel overwhelmed
	2	
	3	
	4	Sometimes feel worried
	5	
	6	
	7	Not worried
	8	
	9	
	10	Feel comfortable
<b>4. How often do you worry about being able to meet normal monthly living expenses?</b>	1	Worry all the time
	2	
	3	
	4	Sometimes worry

	5	
	6	
	7	Rarely worry
	8	
	9	
	10	Never worry
<b>5. How confident are you that you could find the money to pay for a financial emergency that costs about R10 000?</b>	1	No confidence
	2	
	3	
	4	Little confidence
	5	
	6	
	7	Some confidence
	8	
	9	
	10	High confidence
<b>6. How often does this happen to you? You want to go out to eat, go to a movie or do something else and don't go because you can't afford to?</b>	1	All the time
	2	
	3	
	4	Sometimes
	5	
	6	
	7	Rarely
	8	
	9	
	10	Never
<b>7. How frequently do you find yourself just getting by financially and living paycheck to paycheck?</b>	1	All the time
	2	
	3	
	4	Sometimes
	5	
	6	
	7	Rarely
	8	
	9	
	10	Never
<b>8. How stressed do you feel about your personal finances in general?</b>	1	Overwhelming stress
	2	
	3	
	4	High stress
	5	
	6	
	7	Low stress
	8	
	9	
	10	No stress at all

<b>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?</b>	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

<b>1. In general, how would your best friend describe you as a risk taker</b>	1	A real gambler
	2	Willing to take risks after completing adequate research
	3	Cautious
	4	A real risk avoider
<b>2. You are on a TV game show and can choose one of the following. Which would you take?</b>	1	A cash prize of R1,000
	2	A 50% chance at winning R5,000
	3	A 25% chance at winning R10,000
	4	A 5% chance at winning R100,000
<b>3. You have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would:</b>	1	Cancel the vacation
	2	Take a much more modest vacation
	3	Go as scheduled, reasoning that you need the time to prepare for a job search
	4	Extend your vacation, because this might be your last chance to go first class
<b>4. In terms of experience, how comfortable are you investing in shares?</b>	1	Not at all comfortable
	2	Somewhat comfortable
	3	Very comfortable
<b>5. If you unexpectedly received R20,000 to invest, what would you do?</b>	1	Deposit it in a bank account, money market account or an insured Certificate of Deposit
	2	Invest it in safe, high-quality bonds or bond mutual funds
	3	Invest it in shares
<b>6. When you think of the word "risk," which of the following words comes to mind first?</b>	1	Loss
	2	Uncertainty
	3	Opportunity
	4	Thrill
<b>7. Some experts are predicting the value of assets such as gold, jewels, collectibles and real estate (hard assets) will rise, while bond prices may fall. However, experts tend to agree that government</b>	1	Hold the bonds
	2	Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets
	3	Sell the bonds and put the total proceeds into hard assets
	4	Sell the bonds, put all the money into hard assets, and borrow additional money to buy more

<b>bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?</b>		
<b>8. Given the best and worst case returns of the four investment choices below, which would you prefer?</b>	1	A R200 gain best case; R0 gain/loss worst case.
	2	A R800 gain best case; R200 loss worst case
	3	A R2,600 gain best case; R800 loss worst case
	4	A R4,800 gain best case; R2,400 loss worst case
<b>9. In addition to whatever you own, you have been given R1,000. You are now asked to choose between:</b>	1	A sure gain of R500
	2	A 50% chance to gain R1,000 and a 50% chance to gain nothing
<b>10. In addition to whatever you own, you have been given R2,000. You are now asked to choose between:</b>	1	A sure loss of R500
	2	A 50% chance to lose R1,000 and a 50% chance to lose nothing
<b>11. A relative left you an inheritance of R100,000, stipulating in the will that you invest all the money in one of the following choices. Which one would you select?</b>	1	A savings account or money market mutual fund
	2	A mutual fund that owns shares and bonds
	3	A portfolio of 15 common shares
	4	Commodities like gold, silver and oil
<b>12. If you had to invest R20,000, which of the following investment choices would you find most appealing?</b>	1	Invest 60% in low-risk investments, 30% in medium-risk investments and 10% in high-risk investments
	2	Invest 30% in low-risk investments, 40% in medium-risk investments and 30% in high-risk investments
	3	Invest 10% in low-risk investments, 40% in medium-risk investments and 50% in high-risk investments
<b>13. Your trusted friend and neighbour, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest?</b>	1	Nothing
	2	One month's salary
	3	Three months' salary
	4	Six months' salary

**SECTION C (Behavioural finance)**

**Indicate to what extent the following statements drive your financial decisions:**

<b>Behavioural finance biases</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Somewhat disagree</b>	<b>Somewhat agree</b>	<b>Agree</b>	<b>Strongly agree</b>
I base my investment decision on the past performance of investments	1	2	3	4	5	6
My superior investment knowledge drives my decisions	1	2	3	4	5	6
I rely only on a single piece of information (past or current information) to make investment decisions	1	2	3	4	5	6
My investment decisions are based on future market predictions	1	2	3	4	5	6
My investment decisions are based on the most recent information	1	2	3	4	5	6
I would rather take the risk to keep my money in current investments (with negative returns) to avoid taking the loss	1	2	3	4	5	6
My previously incorrect investment decisions which led to a financial loss drives my investment decisions	1	2	3	4	5	6
I receive a good return on my investment and will rather keep money in my current investment as to earn higher future returns elsewhere	1	2	3	4	5	6
I exercise self-control when making investment decisions	1	2	3	4	5	6

**SECTION D (Subjective well-being)**

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Slightly disagree</b>	<b>Slightly agree</b>	<b>Agree</b>	<b>Strongly agree</b>
1	In most ways, my life is close to ideal	1	2	3	4	5	6
2	The conditions of my life are excellent	1	2	3	4	5	6
3	I am satisfied with my life	1	2	3	4	5	6

4	So far I have gotten the important things I want in my life	1	2	3	4	5	6
5	If I could live my life over I would change almost nothing	1	2	3	4	5	6

**SECTION E (Personality measures)**

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Slightly disagree</b>	<b>Slightly agree</b>	<b>Agree</b>	<b>Strongly agree</b>
1	I often feel inferior to others	1	2	3	4	5	6
2	When I'm under a great deal of stress, sometimes I feel like I'm going to pieces	1	2	3	4	5	6
3	I often feel tense and jittery	1	2	3	4	5	6
4	Sometimes I feel completely worthless	1	2	3	4	5	6
5	Too often, when things go wrong, I get discouraged and feel like giving up	1	2	3	4	5	6
6	I really enjoy talking to people	1	2	3	4	5	6
7	I often feel as if I'm bursting with energy	1	2	3	4	5	6
8	I am a cheerful, high-spirited person	1	2	3	4	5	6
9	I am a very active person	1	2	3	4	5	6
10	I am intrigued by the patterns I find in art and nature	1	2	3	4	5	6
11	I often try new and foreign foods	1	2	3	4	5	6
12	I have little interest in speculating on the nature of the universe or the human condition	1	2	3	4	5	6
13	I have a lot of intellectual curiosity	1	2	3	4	5	6
14	I often enjoy playing with theories or abstract ideas	1	2	3	4	5	6

15	I often get into arguments with my family and co-workers	1	2	3	4	5	6
16	Some people think I'm selfish and egotistical	1	2	3	4	5	6
17	Some people think of me as cold and calculating	1	2	3	4	5	6
18	I generally try to be thoughtful and considerate	1	2	3	4	5	6
19	I keep my belongings neat and clean	1	2	3	4	5	6
20	I'm pretty good about pacing myself so as to get things done on time	1	2	3	4	5	6
21	I waste a lot of time before settling down to work	1	2	3	4	5	6
22	Sometimes I'm not as dependable or reliable as I should be	1	2	3	4	5	6
23	I never seem to be able to get organized	1	2	3	4	5	6
24	I am not willing to take risk when choosing a stock or investment	1	2	3	4	5	6
25	I prefer a low risk/high return investment with a steady performance over an investment that offers higher risk/higher return	1	2	3	4	5	6
26	I prefer to remain with an investment strategy that has known problems rather than take the risk trying a new investment strategy that has unknown problems, even if the new investment strategy has great returns	1	2	3	4	5	6
27	I view risk in investment as a situation to be avoided at all cost	1	2	3	4	5	6
<i>Short term investment intentions</i>							
1	I intend to invest in an Individual Retirement Account every year	1	2	3	4	5	6
2	I intend to put at least half of my investment money into the stock market	1	2	3	4	5	6

3	I intend to engage in portfolio management activities at least twice per week	1	2	3	4	5	6
4	I intend to perform my own investment research instead of using outside advice	1	2	3	4	5	6
5	I intend to compare my portfolio performance to that of professional managers	1	2	3	4	5	6
<i>Long term investment decisions</i>							
1	I intend to save at least 10% of my gross earnings for investing/saving/retirement purposes	1	2	3	4	5	6
2	I intend to have a portfolio that focuses on multiple asset classes (i.e., shares, bonds, cash, real estate, etc.)	1	2	3	4	5	6
3	I intend to take an investments course	1	2	3	4	5	6
4	I intend to manage my portfolio for maximum gross return rather than tax and cost efficiency	1	2	3	4	5	6
5	I intend to invest some money in long-term assets where my money will be tied up and inaccessible for years	1	2	3	4	5	6

## SECTION F (Physical activities)

The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

### PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

Yes

No →

***Skip to PART 2: TRANSPORTATION***

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

\_\_\_\_\_ **days per week**

No vigorous job-related physical activity



***Skip to question 4***

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

\_\_\_\_\_ **days per week**

No moderate job-related physical activity



***Skip to question 6***

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.

\_\_\_\_\_ **days per week**

No job-related walking



***Skip to PART 2: TRANSPORTATION***

7. How much time did you usually spend on one of those days **walking** as part of your work?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

## PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

\_\_\_\_\_ **days per week**

No traveling in a motor vehicle



***Skip to question 10***

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

\_\_\_\_\_ **days per week**

No bicycling from place to place



***Skip to question 12***

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

\_\_\_\_\_ **days per week**

No walking from place to place



***Skip to PART 3: HOUSEWORK,  
HOUSE MAINTENANCE, AND  
CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

***PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY***

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

\_\_\_\_\_ **days per week**

No vigorous activity in garden or yard



***Skip to question 16***

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

\_\_\_\_\_ **days per week**

No moderate activity in garden or yard



***Skip to question 18***

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

\_\_\_\_\_ **days per week**

No moderate activity inside home



***Skip to PART 4: RECREATION,  
SPORT AND LEISURE-TIME  
PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

#### ***PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY***

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

\_\_\_\_\_ **days per week**

No walking in leisure time



***Skip to question 22***

21. How much time did you usually spend on one of those days **walking** in your leisure time?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

\_\_\_\_\_ **days per week**

No vigorous activity in leisure time



***Skip to question 24***

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

\_\_\_\_\_ **days per week**

No moderate activity in leisure time

➔ **Skip to PART 5: TIME SPENT SITTING**

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

### **PART 5: TIME SPENT SITTING**

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

**THANK YOU!**

## ANNEXURE B: ETHICAL CLEARANCE LETTER



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22 February 2019

Dr Dickason and Dr V Leenderts  
*Per e-mail*

Dear Dr Dickason and Dr V Leenderts,

### **FEEDBACK – ETHICS APPLICATION 22022019 – J LAWRENSON (23667907) PhD Management**

Your ethics application on *Modelling financial risk tolerance of female South African investors*, that served on the EMS-REC meeting of 22 February 2019 refers.

#### **Outcome:**

Approved as a minimal risk study – NWU-0082-19A4 – for three years of ethical clearance.

Kind regards,

A handwritten signature in black ink, appearing to read 'B Linde'.

Prof B Linde  
Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC)